POLICY ROUNDTABLES

Pro-active Policies for Green Growth and the Market Economy

2010

Introduction

The OECD Competition Committee discussed pro-active policies for green growth and the market economy in October 2010. This document includes an executive summary of that discussion and the documents from the meeting: an analytical note by Resources for the Future (USA), written submissions from Australia, Bulgaria, Chile, the Czech Republic, the European Union, Korea, Spain, Switzerland, Chinese Taipei, the United Kingdom, the United States, BIAC as well as a joint contribution by Denmark, Finland, Iceland, Norway and Sweden. An aide-memoire of the discussion is also included.

Overview

The question of what types of policies nations should use to address the threat of global climate change has become pressing. The OECD Competition Committee contributed to the debate by discussing the implications of different market-based policy alternatives, including taxation, subsidies, and tradable performance standards. The discussion showed not only that effective competition enforcement and advocacy can make such policies more effective, but that the policies themselves also have effects on competition. Consequently, there was broad agreement that competition authorities have an important part to play in the design and implementation of market-based environmental policies.

Related Topics

Electricity: Renewables and Smart Grids (2010)
Horizontal Agreements in the Environmental Context (2010)
Emissions Trading (2010)
Environmental Regulation and Competition (2006)
Competition Policy and Environment (1995)

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PRO-ACTIVE POLICIES FOR GREEN GROWTH AND THE MARKET ECONOMY

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FOREWORD

This document comprises proceedings in the original languages of a Roundtable on Pro-Active Policies for Green Growth and the Market Economy held by the Competition Committee in October 2010.

It is published under the responsibility of the Secretary General of the OECD to bring information on this topic to the attention of a wider audience.

This compilation is one of a series of publications entitled "Competition Policy Roundtables".

PRÉFACE

Ce document rassemble la documentation dans la langue d'origine dans laquelle elle a été soumise, relative à une table ronde sur les Politiques proactives en faveur de la croissance verte et l'économie de marché qui s'est tenue en octobre 2010 dans le cadre du Comité de la concurrence.

Il est publié sous la responsabilité du Secrétaire général de l'OCDE, afin de porter à la connaissance d'un large public les éléments d'information qui ont été réunis à cette occasion.

Cette compilation fait partie de la série intitulée "Les tables rondes sur la politique de la concurrence".

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EXECUTIVE SUMMARY

By the Secretariat

Considering the discussion at the roundtable, the delegates' written submissions and the Secretariat's background paper, several key points emerge:

(1) Various forms of market-based environmental policies, including taxes and fees, subsidies, and emissions trading, have been implemented across OECD countries.

Examples of market-based environmental policy instruments that have been or are currently in use in OECD countries include taxes and charges (such as automobile tax differentiation, taxes on CO_2 and other emissions, fuel taxes, as well as targeted stationary and mobile source fees), emissions trading programs (such as the European Union's Emission Trading Program (EU ETS) and the United States' Acid Rain Program), subsidies (such as those for vehicle upgrades and renewable energy production), performance standards, as well as a range of other policies (e.g. public programs to increase the market share of electric vehicles).

(2) There are a number of ways to define green growth, as well as a broad range of tools that can be used to promote it.

Green growth is generally defined as economic growth under environmental constraints, similar to what is commonly referred to as sustainable growth. The range of motivations underlying green growth includes environmental conservation, energy security, innovation, green jobs, promotion of infant industrials and industrial policy, among others. Naturally, such a diversity of motivations gives rise to different priorities, as well as the desire for a range of policy mechanisms. During the roundtable, the speakers and delegates highlighted various policies that can be used to promote green growth, including emissions taxes, fees, subsidies, and tradable performance standards. The delegates offered real-world examples of these policy instruments as well as less well known programs such as bi-lateral debt-for-environment swap agreements. An important lesson was that policy choices will (and should) reflect both the particular circumstances facing a country and its specific goals underlying the promotion of green growth.

(3) A preference for market-based environmental policy instruments was evident. A number of arguments, discussed in the Background Note and underscored by comments from the delegates, support using market-based approaches over command-and-control ones whenever possible.

Many of the written submissions and delegate interventions expressed a preference for achieving environmental goals with market-based policies. At the same time, a few delegations indicated ongoing support for non-market-based environmental policies in certain circumstances. Nonetheless, the general preference was for market-based approaches relative to many command-and-control alternatives. The principal considerations in favor of market-based environmental policy include enhanced compliance flexibility, cost-effectiveness, and incentives for technological innovation.

(4) Clear rationales should be given in cases where multiple policy instruments are used to address a single environmental problem.

The roundtable included a discussion of the rationale for continued subsidisation of renewables when a negative externality is already internalised, i.e. the marginal damages from CO_2 emissions are correctly priced. In particular, it was noted that if a binding cap-and-trade policy is in place, emission reductions cannot be the rationale for additional environmental policy measures. However, there can be *other* rationales that make additional policies attractive. In the context of subsidies for renewable energy, examples of alternative justifications include the fact that inventions and innovations are public goods (i.e. investment in renewable energy will be less than socially optimal), learning-by-doing has spillover effects, and that energy security is a public good.

The important distinction between fixed-price policies, such as an emissions tax, and endogenous-price policies, such as a cap and trade system, was noted. The contribution of additional measures can be seen in light of this distinction. For example, implementing additional policy measures to reduce emissions will have no effect on emissions under a fixed-price (endogenous-price) policy regime since the allowance price will adjust to reflect (and ultimately offset) the reductions that the additional policy was implemented to achieve.

(5) Policymakers must understand the implications of multiple, overlapping policies.

Part of the roundtable focused on the implications of multiple, overlapping environmental policy instruments. Examples include emissions taxes, generation tax exemptions for renewable energy, emissions performance standards, tradable green tariffs, feed-in-tariffs, production subsidies, investment subsidies, and R&D subsidies. The distinction between environmental policy instruments that allow for price impacts when overlapping policies are implemented and those that do not is important. Under a cap-and-trade system, overlapping policies to further reduce emissions will be ineffective, as they serve only to lower the emissions price, ultimately raising emissions elsewhere in the economy. Such cases raise concerns about the cost-effectiveness of the overall policy, as it becomes more costly to achieve a given emission reduction goal. As a result, promoting green growth requires a delicate balance of the alternative policy tools and a clear understanding of the problem being addressed in order to avoid redundancy and efficiency losses.

(6) Policymakers must evaluate a number of important considerations when designing market-based environmental policies.

The Background Note and guest experts mentioned a range of considerations for designing policies on emission taxes, fees, and charges. These included defining the basis of the tax, determining the tax/fee rate, entities responsible to pay, use of government revenues, and the effect of market structure on outcomes. In the case of subsidies, policymakers must evaluate which entities (as well as activities) receive subsidies, the level and form of the subsidies, the source of revenues used to pay for them, as well as whether market structure affects the effectiveness or justification for the subsidies themselves.

(7) *Market-based environmental policy considerations often have competitive implications and vice versa. Given this reality, several delegates proposed that competition authorities should have an expanded role in the development of market-based environmental policies.*

An important theme of the roundtable was the interconnection of environmental and competition policies, including the competitive effects of product standards and the role of market structure in determining environmental policy outcomes. Because environmental policy has the ability to affect competitive outcomes, competition authorities have an opportunity to ensure it does so in a constructive way. Some delegates highlighted the role that competition agencies could play in the development of market-based environmental policies, including further *ex ante* assessments of the competitive effects of a proposed change in policy. While these assessments may be conducted by the agency sponsoring the policy change, competition authorities can provide specific guidance on the competition issues. In countries where such an assessment process is not in operation, an *ad hoc* process could be adopted. Overall, it is anticipated that new opportunities will emerge for competition authorities to participate as new policies are implemented to foster green growth. In particular, competition authorities can help to ensure that future market-based environmental policies are based on sturdy competitive foundations. There are a number of ways competition authorities can pursue the goal, including both advocacy and enforcement.

SYNTHÈSE

Par le Secrétariat

Plusieurs points essentiels ressortent de l'examen des échanges de vues qui se sont déroulés lors de la table ronde, des communications écrites soumises par les délégués et de la note de référence établie par le Secrétariat :

(1) *Diverses mesures de protection de l'environnement fondées sur le jeu du marché, notamment les taxes et redevances, les subventions, et les échanges de permis d'émission, sont mises en œuvre dans tous les pays de l'OCDE.*

Parmi les exemples d'instruments économiques au service de la politique d'environnement qui ont été mis en œuvre ou sont actuellement en vigueur dans les pays de l'OCDE figurent les taxes et les redevances (notamment la différentiation de la fiscalité automobile, les taxes sur le CO_2 et les autres émissions, les taxes sur les carburants et les combustibles, ainsi que les redevances ciblées sur les sources fixes et mobiles), les programmes d'échange de droits d'émission (tels que le système communautaire d'échange de quotas d'émission de gaz à effet de serre (SCEQE) dans l'UE et l'*Acid Rain Program* (programme sur les pluies acides) des États-Unis), les subventions (notamment les primes à la casse ou les subventions en faveur des énergies renouvelables), les normes de rendement, ainsi que tout un éventail d'autres mesures (par exemple les programmes publics visant à accroître la part de marché des véhicules électriques).

(2) *La croissance verte peut se définir de plusieurs manières, et les instruments utilisables pour la promouvoir sont très divers.*

En règle générale, on entend par croissance verte une croissance économique soumise à des contraintes environnementales, assimilable à ce que l'on désigne couramment par l'expression « croissance durable ». Les finalités qui ont inspiré la notion de croissance verte sont multiples, à savoir la conservation de l'environnement, la sécurité énergétique, l'innovation, les emplois verts, la promotion des industries naissantes et la politique industrielle, entre autres. Bien entendu, une telle diversité de raisons d'être débouche sur des priorités différentes, et incite à vouloir mettre en place une panoplie de mécanismes d'action publique. Au cours de la table ronde, les intervenants et les délégués ont mis en évidence diverses mesures applicables pour promouvoir une croissance verte, notamment les taxes sur les émissions, les redevances, les subventions, ainsi que les crédits négociables basés sur des normes de performance. Les délégués ont présenté des exemples concrets de ces instruments d'action ainsi que des programmes moins connus, tels les accords bilatéraux de conversion de créances à des fins écologiques. Il s'en dégage un enseignement important : les choix des pouvoirs publics seront fonction (et il convient qu'ils le soient) de la situation particulière d'un pays aussi bien que des objectifs spécifiques dont celui-ci s'est inspiré pour favoriser une croissance verte.

(3) *La préférence pour l'utilisation d'instruments obéissant aux lois du marché dans les politiques d'environnement était manifeste. Un certain nombre d'arguments avancés dans la note de référence, et sur lesquels les observations des délégués ont mis l'accent, plaident en faveur de l'adoption, chaque fois qu'il en existe la possibilité, d'approches axées sur le marché plutôt que contraignantes.*

Nombre de communications écrites et d'interventions des délégués marquaient une préférence pour le recours à des politiques fondées sur les mécanismes du marché pour atteindre les objectifs d'environnement. Dans le même temps, quelques délégations se sont déclarées toujours favorables à des politiques d'environnement ne s'appuyant pas sur le jeu du marché dans certaines circonstances. Néanmoins, d'une manière générale, les avis penchaient davantage pour les approches obéissant aux lois du marché que pour nombre de solutions contraignantes envisageables. Les principales considérations qui plaident en faveur d'une politique d'environnement faisant appel à des instruments économiques sont notamment la plus grande souplesse que ceux-ci autorisent pour la mise en conformité, l'efficacité par rapport aux coûts et les incitations à l'innovation technologique.

(4) *Les raisons conduisant dans certains cas à utiliser plusieurs instruments d'action pour remédier à un seul problème d'environnement devraient être clairement explicitées.*

L'un des débats de la table ronde a porté sur la raison d'être du maintien des subventions allouées aux énergies renouvelables quand une externalité négative est déjà internalisée, c'est-à-dire quand le prix des dommages occasionnés à la marge par les émissions de CO_2 est correctement fixé. En particulier, il a été signalé qu'avec une politique contraignante de plafonnement et d'échanges en place, des réductions des émissions ne peuvent pas être invoquées pour justifier de nouvelles mesures de protection de l'environnement, lesquelles peuvent toutefois se révéler avantageuses pour d'*autres* motifs. Dans le domaine des énergies renouvelables, par exemple, les subventions se justifieraient aux motifs que les inventions et les innovations sont des biens publics (autrement dit, l'investissement dans les énergies renouvelables ne serait pas socialement optimal), que l'apprentissage par la pratique a des retombées, et que la sécurité énergétique est un bien public.

Les participants ont souligné la distinction importante à opérer entre les mesures qui, comme dans le cas d'une taxe sur les émissions, reposent sur un prix fixé, et celles qui, comme dans les systèmes de plafonnement et d'échanges, reposent sur un prix endogène. Ce que les nouvelles mesures apportent doit être considéré à la lumière de cette distinction. Par exemple, la mise en œuvre de mesures supplémentaires visant à réduire les émissions sera sans effet sur les émissions dans un régime de prix endogènes, étant donné que le prix des quotas s'adaptera aux réductions visées par la mesure supplémentaire (et finalement les neutralisera).

(5) *Les décideurs doivent appréhender les répercussions des mesures multiples qui se chevauchent.*

La table ronde a été en partie consacrée à la réflexion sur les conséquences du recours, dans les politiques d'environnement, à de multiples instruments qui se recoupent. A titre d'exemples, on peut citer les taxes sur les émissions, les exonérations fiscales au titre de la production d'électricité renouvelable, les normes d'émission, les certificats verts, les tarifs d'achat d'électricité renouvelable, les subventions à la production, les subventions à l'investissement et les subventions à la R-D. La distinction entre les instruments utilisés dans les politiques d'environnement qui prévoient les effets sur les prix du chevauchement des mesures et ceux qui n'en tiennent pas compte est importante. Dans un système de plafonnement et d'échanges, les mesures qui se superposent afin de réduire encore plus les émissions seront inefficaces, car elles

ne servent qu'à abaisser le prix des émissions, ce qui aboutit à une augmentation des émissions dans d'autres secteurs de l'économie. Ces exemples amènent à se préoccuper du rapport coût/efficacité de la politique dans son ensemble, dès lors que le coût de la réalisation d'un objectif donné de réduction des émissions s'alourdit. En conséquence, la promotion de la croissance verte doit trouver un équilibre délicat entre les différents moyens d'action et bien cerner le problème à résoudre, dans le souci d'éviter les mesures superflues et les pertes d'efficience.

(6) Les décideurs doivent analyser un certain nombre d'aspects importants au moment de concevoir des politiques d'environnement fondées sur les mécanismes du marché.

La note de référence et des experts invités ont évoqué une série de considérations à prendre en compte pour concevoir des politiques relatives aux taxes, redevances et droits applicables aux émissions. Il s'agit notamment de la définition de l'assiette fiscale, du calcul du taux de la taxe/redevance, de la désignation des entités auxquelles il appartient de les payer, de l'utilisation des recettes de l'État, et de l'effet de la structure du marché sur les résultats. Dans le cas des subventions, les décideurs doivent examiner quelles sont les entités (et les activités) qui bénéficient des subventions, quel est le niveau des subventions et sous quelle forme elles se présentent, et quelle est la source de recettes utilisée pour les financer ; ils doivent aussi analyser l'influence de la structure du marché sur l'efficacité ou la justification du subventionnement en soi.

(7) Certains aspects des mesures de protection de l'environnement fondées sur le jeu du marché ont souvent des conséquences sur le plan de la concurrence, et inversement. Conscients de cette réalité, plusieurs délégués ont suggéré qu'il convient de donner plus de poids au rôle des autorités de la concurrence dans l'élaboration des politiques d'environnement qui s'appuient sur les mécanismes du marché.

Un thème important abordé à l'occasion de cette table ronde concernait l'interconnexion des politiques d'environnement et de concurrence, et notamment les effets sur la compétitivité des normes applicables aux produits, ainsi que l'influence déterminante de la structure du marché sur les résultats des politiques d'environnement. Dans la mesure où ces politiques d'environnement peuvent elles aussi influencer les résultats sur le plan de la concurrence, les autorités de la concurrence ont la possibilité de veiller à ce que cette influence soit constructive. Certains délégués ont mis en relief le rôle que les organismes chargés de la concurrence pourraient jouer dans la mise au point de mesures d'environnement fondées sur les mécanismes du marché, notamment en procédant à des évaluations approfondies *ex ante* des effets sur la concurrence des changements de politique proposés. Il se peut, bien entendu, que ces évaluations soient conduites par l'organisme promoteur du changement de politique, mais les autorités de la concurrence son à même de donner des orientations spécifiques concernant les questions de concurrence. Dans les pays qui n'ont pas mis en place un processus d'évaluation de cette nature, il est possible d'y recourir de façon ponctuelle. Dans l'ensemble, il est prévu que de nouvelles possibilités de participation des autorités de la concurrence se présenteront au fur et à mesure que seront mises en œuvre des politiques nouvelles favorisant une croissance verte. En particulier, les autorités de la concurrence peuvent contribuer à faire en sorte que les futures mesures de protection de l'environnement obéissant aux lois du marché soient solidement étayées du point de vue des règles de concurrence. Plusieurs voies s'ouvrent aux autorités de la concurrence pour aller dans le sens de l'objectif visé, parmi lesquelles figurent tant les activités de promotion que les mesures de coercition.

BACKGROUND NOTE *

Market-based environmental policy: An overview

This paper considers the role of market-based environmental policies and compares them with more traditional command-and-control approaches. We examine three types of market-based policies: emissions fees and taxes, environmental subsidies, and tradable performance and portfolio standards. For each type of policy, we provide a conceptual overview, offer examples, and discuss implementation and related issues. We also consider the potential effects of using multiple policy instruments to address a single environmental goal.

1. Introduction

Environmental policymaking typically involves two decisions, namely, identifying the environmental outcomes that are desired and selecting the means by which those ends are to be achieved. Ideally, these decisions are made together, weighing both the costs and benefits of actions. Often, the ends are determined independently by law, science, and/or political consensus. In any case, the choice of means is critical to determining the costs of the outcomes, as well as the actual environmental outcomes themselves. While recognising the importance of goal setting in environmental policy, this paper is primarily focused on examining the means by which the goals are achieved.

Issues of means involve further choices about command-and-control (CAC) vs. market-based approaches. Even when described as performance standards, CAC regulations are typically prescriptive measures that involve requirements to use a particular technology and/or set maximum emissions levels (or rates) for each affected firm. For example, all new power plants might be required to install and use scrubbers to reduce SO_2 emissions. In contrast, market-based policy instruments favour the use of economic incentives to achieve environmental protection. That is, each firm or relevant actor decides how much to emit, and how to reduce those emissions, by weighing the financial costs and rewards for its behaviour. CAC policies were once the dominant choice around the world, but market-based instruments have been steadily growing in popularity, especially over the past two decades.

Although CAC regulations were instrumental in many of the dramatic improvements in environmental quality and emissions performance of heavy industry in the 1970s, they have several drawbacks. For one, CAC policies tend to promote inefficiencies because regulators often have limited information about the range and cost of firms' alternative abatement opportunities. Without knowing how much it will cost to reduce pollution at each firm, regulators are likely to set requirements that do not achieve the desired outcomes at least cost, i.e., are not cost-effective. Second, CAC instruments offer firms little or no incentive to exceed their compliance obligations. Since excess compliance may signal to regulators that costs are lower than they had thought, firms may avoid overcomplying with today's standard lest it become the basis of tomorrow's more stringent standard, resulting in a "regulatory ratchet." Finally, CAC policies can also hinder the development of new technologies by giving firms little incentive to invest in R&D. If all firms must use a particular existing technology to reduce emissions, they will not invest in other technologies that achieve the same result, even if at a lower cost. On the other hand, if the CAC regulation mandates adoption of the best available technologies, incentives to innovate the next best technology can be very strong.

* This paper was prepared for the OECD Secretariat by Carolyn Fischer, Richard Morgenstern and Eric Moore from Resources for the Future (RFF).

Market-based instruments "encourage behaviour through market signals rather than though explicit directives regarding pollution control levels or methods" (Stavins 2000, 31). The word *encourage* is important: it captures the primary distinction between market-based instruments and their CAC counterparts—namely, reliance on the freely chosen actions of firms and individuals to achieve an environmental goal. Market-based instruments change the rules of the game, so to speak, but leave individuals and firms free to make their own decisions. If well designed and implemented, market-based instruments can align the interest of firms and individuals with the broader environmental goal (Stavins 2000, 32). In contrast with CAC policies, the use of emissions pricing mechanisms gives firms incentives to continually improve emissions performance over time, beyond initial targets.

This paper examines CAC and market-based policies in both conceptual and practical terms. Three types of market-based policies are considered: emissions fees and taxes, environmental subsidies, and tradable performance and portfolio standards. Sections II, III, and IV examine the three types of market-based instruments, respectively. For each one we discuss the basic theory and provide examples in practice of how these economic incentives have been implemented to promote attainment of an environmental goal. Section V looks at the political economy of instrument choice. In Section VI we examine some implications of using multiple market-based policies to achieve a single environmental goal. In Section VII we summarise the actual benefits compared with the theoretical advantages of each type of policy. Section VIII offers some broad conclusions along and expands beyond the initial focus of the paper to highlight some important questions that could arise as new environmental policies come under consideration.

2. Emissions taxes

Emissions taxes go by many names: fees, charges, levies and, of course, taxes. By any name, they place a monetary cost on behaviour that causes environmental degradation. In principle, they serve as a mechanism to internalise the external social costs of pollution, although they also may serve to finance environmental (or other) initiatives. While they may be applied to a wide range of behaviour and economic actors, we will focus primarily on specific examples affecting the industrial sector.

2.1 Emissions taxes in theory

Emissions fees and taxes impose direct financial costs on emitters based on some measure of their polluting behaviour. These costs are intended to create incentives for environmentally cleaner, more responsible means of production.

The underlying idea is related to the "polluter pays principle" (PPP), by which the cost of remediating damage caused by a discharge of pollutants is borne by the party responsible for the discharge. It should be noted that the OECD adopted in 1972 an interpretation of the PPP, such that a polluter must bear all the costs of required pollution prevention and control measures, without assistance from the government (OECD 1972). However, economic theory would extend that responsibility beyond the direct costs of abatement to include the damages imposed on others by the remaining emissions. Although those revenues might not actually be transferred to the damaged parties, economic efficiency would be achieved by ensuring that polluters at least take into account the full value of the costs their behaviour imposes on society. In 1991, the OECD adopted a Recommendation on the use of economic instruments so as to fully internalise all of these costs of pollution prevention, control, and damages (OCDE/GD(92)81).

Key issues in the design of emissions tax instruments include the definition of the tax base, the determination of the tax rate itself, the entities that should be subject to the tax, the use of revenues, the implications of market structure for policy design, and the effects on innovation.

2.1.1 What is the basis of the tax?

Taxes or fees may be assessed based on monitored emissions, imputed emissions, polluting inputs, or some other measure. Since the incentive effect is related to the metric ultimately used, the closeness of the relationship between that measure and actual emissions has important effects on the efficiency and efficacy of the tax. Thus, a carbon tax is a more efficient way of reducing CO_2 emissions than a broader based tax on energy consumption, such as a BTU-based levy[1].

2.1.2 How does one determine tax rates and fees?

From a theoretical point of view, the optimal tax rate depends upon the external damages that the pollution causes. Pigou (1932) developed the now-familiar result that the tax rate on a pollutant, in a perfectly competitive market setting, should be set equal to the marginal damages (the additional external costs of one more unit of emissions). The result changes in different market settings (see the discussions below on how revenues are used, on market structure, and on issues of competitiveness and emissions leakage).

Additionally, the determination of tax rates is also subject to such factors as political constraints, revenue goals, and uses of the revenue. At times, consumer resistance or political constraints may prevent adoption of the Pigouvian tax rate that would reflect the full societal burden of emissions. Arguably, the inability of the US to adopt a carbon pricing scheme at this time reflects such constraints. At other times, the primary objective of emissions taxes may not be to provide incentives but rather to fund water resource or other environmental initiatives; in these cases, the revenue target is set by these latter goals, and any incentive effect of the accompanying rate is viewed as a side bonus.

2.1.3 What entities should be taxed?

Depending on the overall goals of the program, a tax might be imposed on only a limited number of sectors or be comprehensive in scope and incorporate all sources of emissions. Since the number of entities included raises the amount of enforcement required, it is important to balance the relative benefits of being comprehensive with the administrative costs of ensuring compliance. For an emissions tax, accurate reporting of emissions is essential to ensure that the policy has its intended effect. If enforcement is inadequate, firms may underreport their emissions, thereby lowering the overall tax base and limiting the incentive effect.

The extent of tax coverage may also be affected by arguments that the tax will adversely affect certain sectors of the economy. In current climate policy debates, these include the "energy-intensive" and "trade-exposed" sectors. Considerations involve not just the number of industries or firms covered, but also the stringency of coverage. For example, vulnerable industries may seek lower tax rates, although when they do there is often inadequate analysis of the potential impacts on the environment or on other industries that must pay more.

2.1.4 How should the revenue be used?

The revenue from an emissions tax or charge system can be returned to firms (e.g., via rebates), allocated to other entities (e.g., low-income households that might be disproportionately affected by the policy), used to lower other taxes in the economy (e.g., payroll or capital taxes), or used to subsidise "clean" technologies. Some of the arguments for these allocations are political (to garner support for more stringent regulation), distributional (to ease impacts across different segments of society), or based on economic efficiency.

[1] BTU is a measure of energy content and stands for British thermal unit.

Since taxation of productive factors like labour and capital can introduce distortions into the economy, several economists have proposed that environmental taxes be used to reduce both pollution and tax distortions simultaneously. This notion has on occasion been termed the "green tax shift," by which the tax system would turn to taxing "bads" (pollution) rather than "goods" (labour). Although the evidence to support it is quite limited, some have even postulated that the economy could reap a "double dividend," by which the environmental improvement would be reached at negative costs by improving the functioning of the economy.

Goulder et al. (1997) have demonstrated a "tax interaction" effect between a new environmental tax and existing taxes. The idea is that, by raising the costs of polluting goods, environmental regulation lowers the real wage, which exacerbates the pre-existing disincentive to work (invest) that is created by the labour (capital) tax. This interaction ultimately raises the costs of pollution taxes relative to the case with no existing taxes. They found that the recycling of pollution tax revenue to lower distorting taxes could partially offset this effect. Parry (1995) determined that without full recycling of tax revenues, the optimal pollution tax could be considerably lower than when revenues were recycled, and yet lower than the Pigouvian tax rate in the absence of tax interactions.

In general, there is mixed evidence for the double dividend. Environmental policies still have costs, but those costs are smaller if the revenue is recycled properly. However, other authors show that additional distortions or situations can indeed theoretically lead to a double dividend. For example, labour may be complementary with environmental quality, as fewer sick days from respiratory illness boost productivity.

In a context in which competitors in other jurisdictions or sectors do not face comparable emissions prices, trade distortions can be as important as tax distortions. In this case, raising costs for covered firms lowers the relative costs of uncovered firms; as consumers shift their buying patterns toward more unregulated products, emissions will shift as well, resulting in "leakage." Bernard et al. (2007) show that the importance of such leakage depends on the relative emissions rates and the extent to which the regulated and unregulated goods are strong substitutes.

The potential for emissions leakage can be used to argue for a weakening of the emissions tax, but the environmental and welfare costs of not being able to regulate all relevant sources to the appropriate extent can be quite high. Thus, exempting key sectors has the potential to create significant economic distortions and simultaneously undermine the environmental objectives. Note that both of these tax and trade interactions arise due to the fact that production costs are increased due to the emissions tax (or environmental regulation more generally). Rather than weakening the emissions price signals, one can use some of the revenues to offset those marginal cost increases. Output-based rebating does just that, by refunding revenues back to participants in proportion to their production. Full rebating relieves a sector on average of the cost of the remaining emissions, much like a tradable performance standard (discussed later). The tax on emissions remains as a signal to mitigate, while the rebate offers a subsidy to production. As a result, output-based rebating creates a smaller tax interaction effect than lump-sum redistribution of revenues, though not as small as revenue recycling to lower labour tax rates (e.g., Goulder et al. 1999). Output-based rebating also lessens the trade interaction and leakage effect (Bernard et al. 2007). However, rebating has important tradeoffs: since the costs of embodied emissions are not fully passed forward, output-based rebating weakens the signal to conserve and reduce emissions by consuming less of the polluting product or finding lower-emitting substitutes.

2.1.5 How does market structure affect the outcome?

Several researchers, including Levin (1985), Ebert and Hagen (1998), Requate (1993), and Simpson (1995), have considered the effect of environmental taxation under different market structures. In a competitive market setting, the Pigouvian tax rate on pollution would equal the marginal damages from the

pollution, and a tax set in this manner will always be welfare enhancing. However, these results can change in different market settings. For instance, Buchanan (1969) showed that a tax that would be optimal in a competitive setting can be welfare decreasing under a monopoly. The reason is that two different externalities are affected: one is the pollution externality, and another is the ability of a monopoly to restrict output and raise prices above marginal costs. When a tax is introduced in this setting, a trade off is necessarily made between the gains from a reduction in pollution and the social costs of even lower output. When a corrective tax rate (i.e. Pigouvian taxation) for a monopoly is set at less than the difference between the price the firm charges and its marginal revenue, then the result will ultimately reduce welfare.

While Buchanan (1969) did not specifically examine a first-best outcome in this setting, his analysis did highlight the need for a mechanism to correct for under-provision of output that is exacerbated by a Pigouvian tax. Barnett (1980) highlighted this reality by writing that

> *"A tax based only on marginal external damages ignores the social cost of further output contraction by a producer whose output already is below an optimal level. An ideal solution to this problem would incorporate two policy actions: a device to increase production of final products together with a tax to control external diseconomy" (1037).*

Similar to Buchanan (1969), Barnett did not examine this first best setting, rather determining if a second-best outcome could be achieved through the use of a single mechanism. A second-best outcome in this context balances the marginal benefits of reduced pollution with the marginal costs associated with further output reductions. In this world, a second-best outcome can be achieved by setting the tax at a rate *less than* the marginal external damages. The optimal tradeoff between these two opposing considerations depends crucially on the elasticity of demand within the market. Furthermore, Barnett found that the optimal second-best tax rate is higher for firms that have *more elastic* demands. This result was the exact opposite of Baumol and Oates [see Baumol (1972) and Baumol and Oates (1975)]. However, Barnett highlights that a lack of distinction between corrective taxation (i.e. Pigouvian taxation) and non-corrective taxation (e.g. taxes for revenue purposes) will lead one to believe markets with more inelastic demands will have higher optimal second-best corrective tax rates. He writes that

> *"in the usual case, social losses from taxation are minimized by minimizing distortions in the market-dictated resource utilization. However, the purpose of a tax on pollutants is to reduce the social cost of market imperfections where the starting point is not ideal" (1040).*

Others have extended these analyses to consider environmental taxation in the case of monopolistic competition. For instance, Levin (1985) examined some of the qualitative effects of alternative forms of environmental taxation in a monopolistic market setting. Levin finds that uniform taxation across firms in a monopolistic setting can lead to *increased* pollution when firms have asymmetric cost functions. The logic is that an emissions tax will result in a reallocation of output among firms with different costs, leaving open the possibility that some firms increase total output in response. Additionally, Simpson (1995) examined the optimal pollution tax in a Cournot duopoly in which the firms have different production costs. He found that the optimal pollution tax may exceed the marginal rate of damage from pollution because the tax can have the result of reallocating output between firms based on their relative efficiencies. Considering taxation more generally, Katz and Rosen (1983) developed a theoretical model that highlights conditions under which the imposition of a tax in a monopolistic setting can result in an *increase* in industry profits. Specifically, they found that a firm's expectation about the response of a rival firm to any output change can result in the imposition of a tax "enforcing a collusive output restriction" (5). While the analysis in Katz and Rosen was focused on corporate income taxes, it does serve to further highlight the importance of market structure in determining the ultimate effects of new taxes.

2.1.6 How does market structure affect the efficacy of emissions taxes with rebating?

Gersbach and Requate (2004) looked at rebating programs in both perfectly and imperfectly competitive market structures. Under perfect competition, rebating is harmful because the rebate is essentially a subsidy to production that distorts the firm's incentives, causing higher production than would be efficient. Under imperfect competition, the rebate could offset an incentive to use market power to drive up prices by restricting production.

Gersbach and Requate (2004) assumed a fixed number of firms in the market. In the long run, firms are free to enter and leave a market after a new pollution tax or rebate system has been implemented, and thus some of the results may change. Cato (2010) showed that when free entry is an option, an environmental tax, along with a rebating system based on market shares and entry-license tax achieves a first-best outcome. The inclusion of an entry-license tax is used to reduce inefficiencies that result from excessive entry in the market by new firms.

Fischer (forthcoming) raises a different cautionary point: these optimal tax and rebate strategies work only when the market participants are identical, as assumed in the preceding studies. She showed that when imperfectly competitive markets had players with significantly different costs and market shares, rebating emissions taxes could lead to additional distortions that raised overall costs. A firm with a larger market share will recognise that a larger share of the revenues will be returned to it, so that it perceives a lower effective emissions tax after the rebate than a firm with a smaller market share; as a result, marginal abatement costs will not be equalised. Fischer then studies a Cournot duopoly, in which firms with higher production costs (but identical abatement costs) have lower market shares. She shows that, for an equivalent tax rate, a refunded tax raises output and emissions compared with a fixed subsidy that is also revenue neutral; therefore, to achieve the same emissions intensity as with a fixed subsidy, the emissions tax must be higher. For an equivalent emissions intensity, then, a refunded tax raises average abatement-related costs compared with a fixed subsidy, but the full marginal production costs are lower for each firm. Overall output and emissions are thus higher than with a fixed subsidy. Furthermore, the refunded tax shifts more production to the higher-cost firm, further raising the costs of meeting an emissions target.

Although a rebating system is not a necessary component of a pollution tax, many policies do include systems for rebating revenues back to firms. The complexities, interactions, and unintended consequences identified in the literature highlight the importance of designing pollution taxes and fees for particular markets and industries rather than a one-size-fits-all approach.

2.1.7 How do cap-and-trade approaches compare with emissions fees and taxes?

A discussion of the relative merits of price- and quantity-based approaches to environmental regulation began with Weitzman (1974), who compared them in a context in which the marginal costs and benefits of actions are uncertain. He found that the choice between these instruments depended on the relative slopes of those marginal costs and benefits—i.e., on regulators' expectation of how quickly the additional benefits from emissions reductions decline relative to how quickly the additional costs of abatement rise as the level of abatement increases. If the marginal damages from emissions are relatively steep, then a quantity mechanism is preferred; however, if marginal damages are relatively flat, a tax is preferred since a slight deviation from the intended environmental outcome will have relatively modest impacts. For greenhouse gases, this results in a preference for price-based approaches over quantity ones because the additional benefits of slightly reducing emissions from a given baseline are rather small, whereas the expected costs of CO_2 abatement can be quite large for significant levels of abatement. More recent studies have expanded the comparison in the context of climate change.

Pizer (2002) considered relative merits of price and quantity policies and also hybrid policies, which combine characteristics of both instruments. Specifically, it was found that optimal price-based policies (i.e. an emissions tax) result in an expected welfare gain *five* times larger than an optimal quantity-based policy (e.g. a cap-and-trade program). This result embodies the logic found in Weitzman's analysis that highlighted the relative importance of the slopes of marginal costs and benefits functions when uncertainty is present. Furthermore, Pizer examined whether "hybrid" policies, or those that combine characteristics of taxes and tradable permits, were preferable to either policy alone. He found that optimal hybrid policies, defined by their inclusion of price ceiling triggers or "safety valves", tend to dominate quantity-based mechanisms in terms of their overall impacts on economic well-being. This result even holds for sub-optimally designed hybrid policies. Additionally, hybrid policies can provide similar expected welfare effects as an optimal price-based policy. This latter consideration, combined with the political economy preference for quantity-based policies leads the author to consider them an important substitute for a pure tax approach that might gain little ground in the face of political opposition.

Fell and Morgenstern (2010) examined the effectiveness of alternative policies to contain costs in a cap-and-trade system. Specifically, they examined the relative merits of price, quantity, and hybrid policies. They found that restrictions on the ability of firms to bank emissions allowances will raise the expected cost of the policy. The ability to bank emissions allowances can result in lower costs because firms have more flexibility in choosing *when* then should abate. Constraining this choice via restrictions on banking in a cap-and-trade program gives firms less inter-temporal flexibility and hence higher costs overall. Additionally, Fell and Morgenstern find that price controls (e.g. safety valves and price collars) can significantly reduce expected costs. The reason is rather straightforward: if you introduce a price ceiling in a cap-and-trade program, then there is flexibility in the overall cap if compliance costs turn out adversely high. However, while expected *compliance costs* would be lower in this case, there would still be external damages associated with the increased emissions beyond the initial cap itself.

Emissions taxes and permits have also been compared in the context of innovation. Under emissions taxes, innovation tends to lower both compliance costs and emissions; if marginal abatement costs fall, given a fixed emissions price, abatement will expand until marginal costs are equated to the price again. Under an emissions cap, compliance costs fall, but overall emissions by definition stay the same; instead, the emissions price falls to equate to the new marginal abatement costs. Milliman and Prince (1989) show that the potential benefits to an industry of innovation are larger with an auctioned cap-and-trade system, since they benefit from lower compliance payments for their remaining emissions as emissions prices fall. However, Fischer et al. (2003) show that in a decentralised setting, the falling carbon price means that technology adopters, having a cheaper outside option, will be willing to pay innovators less for new technologies, so taxes will tend to induce more R&D than auctioned permits, unless the innovator has a very large emissions compliance liability itself.

2.2 Emissions taxes in practice

In theory, environmental taxes and fees should be set at a rate that is dependent on the marginal damage that results from pollution. In practice, this requires detailed information about all of the mechanisms by which a given pollutant causes harm, accurate measures of the resulting damage, and an understanding of the market structure—information that may be inaccurate or missing. In practice, many water and energy taxes are principally designed for revenue-raising rather than to provide incentives for emission reductions; in some cases the overall rate is set to raise revenue for subsidies to offset investment in control equipment.

2.2.1 Emissions fees in Sweden and France

Beginning in the mid-1980s, France instituted a tax on NO_x emissions from the energy sector and industrial boilers. Starting in 1992, a similar charge was applied for emissions in Sweden[2]. Both countries also levy fees for the emissions of SO_2. In France, the initial impetus was acid rain (Millock and Sterner 2004), and the tax addressed only SO_2 emissions. The tax in Sweden, however, was initially designed to reduce emissions of NO_x specifically. As a result of the 1999 signing of the Gothenburg Protocol, developed under the auspices of the United Nations Economic Commission for Europe Convention on Long-Range Transboundary Air Pollution, limits were set on the emissions of SO_2, NO_x, volatile organic compounds, and NH_3 of European Union member states. A subsequent European Union directive required member states to set emissions ceilings, which for France and Sweden implied 54 percent and 56 percent reductions, respectively, of 1990-level NO_x emission to be achieved by 2010.

In Sweden, taxes for SO_2 and NO_x (specifically, NO and NO_2 but not N_2O) were set at $3,000 and $4,000 per tonne, respectively. Initial implementation of the NO_x charge was based on a production threshold; all emissions from industrial boilers, stationary combustion engines, and large gas turbines that meet a particular energy threshold were subject to the charge. The initial threshold was eventually lowered to include more sources, based on the initial success of the program and lower costs associated with emissions monitoring. SO_2 emissions can be calculated on the basis of fuel content; NO_x emissions are based on a nonlinear process and depend on the technological equipment and its "fine tuning." As a result, verification of NO_x reductions requires close monitoring by multiple stakeholders. Nevertheless, the revenues from NO_x charges are significantly larger than the administrative costs of the program, and the balance is refunded to firms based on a complex measure of "useful energy output." According to Millock and Sterner (2004), administrative costs are approximately 0.5 percent of the revenues, for net revenues of approximately SEK 500 million ($50 million).

The French tax began at a higher energy production threshold level than in Sweden and the fee initially amounted to FF 150 (approximately $23) per tonne (Millock and Sterner 2004). Firms compute their own emissions, using either direct measurements or, more commonly, fuel consumption data. Administrative costs represent a small proportion of the overall money raised; almost all of the remaining revenues from the tax are used to finance subsidies for abatement measures taken by firms subject to the charge, and almost every application for a subsidy has been accepted (Millock and Sterner 2004).

Not surprisingly, the distributional impacts of the Swedish and French rebating systems are different. Whereas the Swedish rebates go to firms that produce more energy, the French system requires that individual firms take the initiative to apply for subsidies. Given the relative sizes of the tax rates, the incentives for abatement are significantly higher under the Swedish program than in its French counterpart. In general, as the Swedish program proved successful, the policy was expanded to encompass a broader range of emissions sources. The Swedish NO_x tax is believed to provide firms with a strong incentive to adopt specific abatement equipment and also for fine-tuning the use of production technologies in order to reduce emissions. Regarding the effectiveness of the French tax, Millock and Sterner write that "rather than driving technological development, the French tax on NO_x emissions can be regarded as a complementary policy instrument to give firms additional incentives to implement command-and-control regulation by investing in subsidised equipment" (129).

[2] Sulphur dioxide emissions depend on the sulfur content of coal and the control technology, if any, used to remove sulphur. NO_x emissions depend, to some degree, on the nitrogen content of coal but, most importantly, on the boiler combustion temperature. Boiler temperature, in turn, depends on the particular technology used.

2.2.2 Effluent charges in the Netherlands

The Netherlands established an effluent fee system to improve the quality of surface water after enacting the Surface Water Pollution Act of 1970, which authorized fees to cover investments in sewage water treatment (Bressers and Lulofs 2004). Payments were based on a tiered fee system. The system incorporates the polluter-pays principle yet seeks to minimise the burden of administration. Firms with the lowest discharge levels pay a small flat fee, medium-sized firms use a wastewater coefficients chart to determine their discharges and pay accordingly, and the largest firms must calculate and pay for actual emissions.

Because the fees are set by district water boards to cover their costs of administering the system, fees differ from locale to locale. Thus the resulting charges are unlikely to equate with the "optimal" level, in the sense that the marginal cost of effluent discharge (i.e., the fee) is equal to the marginal damages. Nevertheless, the fee system has been effective in reducing wastewater pollution from the industrial sector.

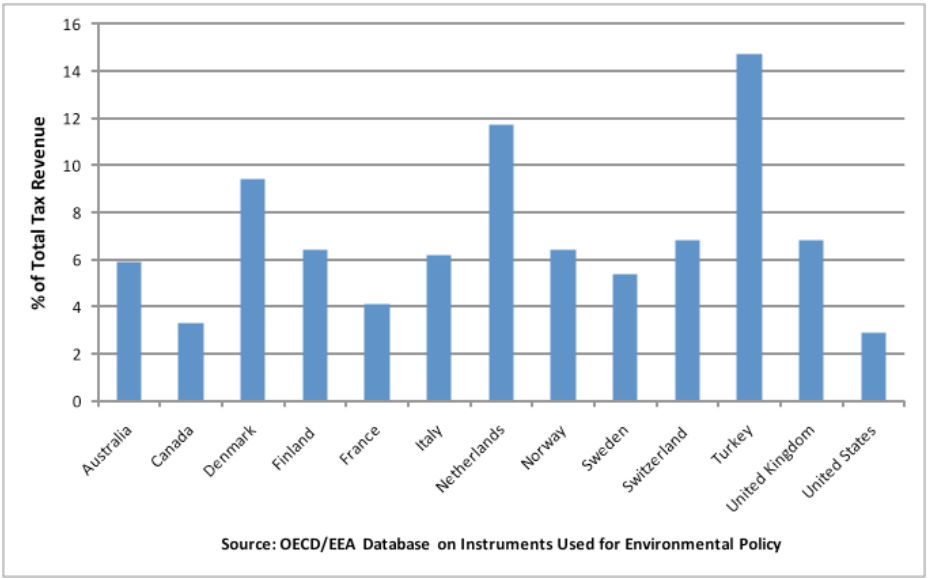
2.2.3 Effluent charges in Germany

Germany developed its first system of charges for wastewater pollution after passage of the Water Household Act in 1957 (Anderson 2001). After the passage of the Waste Water Levy Act in 1976, a wastewater levy was introduced in 1981. Rates across Germany are uniform, but the revenue generated is controlled by the *Länder* (states) and used to subsidise the construction of public sewage plants. Only firms that discharge directly into surface waters must pay; some can get exemptions if they demonstrate compliance with technological standards. Thus market-based measures are combined with command-and-control approaches.

2.2.4 Emissions fees in OECD countries

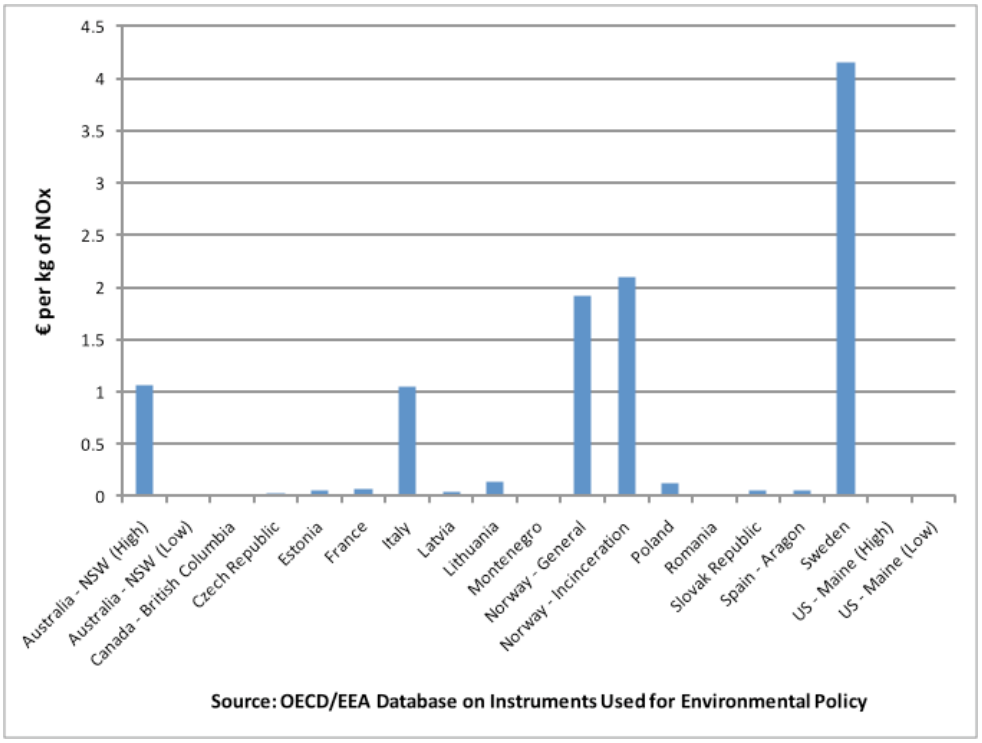
Other OECD countries have also implemented charges for emissions. Figure 1 displays the share of environmentally related taxes as a percentage of total tax revenue, which varies from a low of 2.9 percent in the United States to slightly above 14 percent for Turkey. Across OECD countries, the average revenue from environmentally related taxes is between 1.7 (a weighted average) and 2.3 percent (an arithmetic average). The share has been declining in recent years because petrol as a percentage of gross domestic product (GDP) has been falling (OECD n.d.).

Figure 1. Environmentally related tax revenue as percentage of total tax revenue, 2007.



Despite their relatively small share of total taxes, environmentally related taxes can have large incentive effects, especially when the tax base is shrinking (OECD 1997). Figure 2 shows the tax rates on emissions of NO_x in OECD countries.

Figure 2. Tax rates on NO_x emissions, 2009



The tax rates for NO_x emissions across OECD countries vary significantly, with a high of slightly over 4€ per kg in Sweden. Most tend to be low, less than 1€ per kg, but New South Wales (Australia), Italy, and Norway have rates between 1 and 2€ per kg.

Beyond the examples considered above, other EU countries have also implemented similar taxes and/or charge systems. EEA (2005) highlights a number of the cases in Europe where environmental taxes (and charge systems) have been applied. In addition to charges for NO_x and SO_2 in France and Sweden, levies for SO_2 emissions are also in place in Denmark, Norway, and Switzerland. Furthermore, a number of EU Member States have implemented CO_2 taxes, including Finland, Denmark, Germany, the Netherlands, Norway, Poland, Slovenia, Sweden, and the UK. In 2000 Estonia also introduced a charge on CO_2. Some Member States have comprehensive systems for multi-pollutant charges, including Czech Republic, Estonia, Latvia, Lithuania, Poland, and Russia, among others. Russia has a charge system for over 200 different air pollutants (EEA 2005).

3. Subsidies for environmental performance

Subsidies are financial incentives intended to promote certain activities that enhance environmental outcomes, such as reducing emissions below baseline, adopting low-emitting technologies, or conducting environmentally friendly R&D. Subsidies can take various forms: direct payments, investment and production tax credits, preferential financing, accelerated depreciation, R&D incentives, and preferential pricing for clean technologies (with mandatory purchase requirements, such as with feed-in tariffs). Such measures have been applied to the production of renewable fuels and to R&D in many OECD nations.

3.1 Environmental subsidies in theory

By lowering the cost of engaging in an environmentally friendly (or less environmentally harmful) activity, a subsidy can be an effective way to change firms' behaviour. In theory, one can create the same price differential between polluting and clean behaviour by subsidising mitigation as by taxing emissions.

However, in the long-run, subsidies cannot achieve the same efficiency as an emissions tax. Essentially, the PPP is violated: instead of paying for causing pollution, the polluter is paid for avoiding pollution. Thus, although the marginal benefits of pollution reduction may be internalised in the short run, the absence of market discipline means that in the long run the average costs of pollution control are not fully taken into account. The result is overinvestment in polluting industries.

3.1.1 When might subsidies be preferred over taxes?

In general, taxes are better at internalising negative externalities, while subsidies are better at internalising the positive externalities. A good example of a situation potentially suitable for subsidies involves innovation spillovers. Thus, policymakers might subsidise R&D expenditures if they believe that without external support, the level of R&D for green innovation would be suboptimal.

Even in cases where subsidies are not efficient, they can still be preferred to suboptimal taxes. For example, if opposition to taxes or other political economy considerations prevents the full value of emissions damages to be charged, a subsidy that more fully reflects the value of reducing emissions could help achieve the desired environmental outcome.

3.1.2 How should subsidies be designed?

The design principles for subsidies are similar to those for taxes. The closer the measured base for the subsidy is to the actual beneficial behaviour, the better. The optimal subsidy rate should reflect the marginal external benefit of that behaviour.

In designing environmental subsidies, it is critical to align the long-run incentives. In principle, subsidies are most attractive as transitional policies. For example, renewable energy subsidies may be used to support clean technologies in the absence of sufficiently large carbon prices. However, the subsidies should phase out over time, as the unique spillover benefits diminish and the environmental externalities are more fully priced.

3.1.3 Where should the revenues come from?

Paying for environmental subsidies out of the general coffers is a common practice, typically in the form of foregone tax revenues. In that case, however, the replacement of the lost revenues with distorting labour or capital taxes, which can distort labour force participation and capital investment decisions, can increase the costs of the overall environmental policy.

Another option is to use environmental taxes to support environmental subsidies. For example, revenues from a modest carbon tax can be used to subsidise investments in low-carbon technologies. Feed-in tariffs in effect pay for a subsidised rate premium for renewable energy generation by an implicit tax on overall electricity consumption. In the next section, we will see that tradable performance standards are another form of combining taxes on one kind of behaviour with subsidies to another.

3.2 Environmental subsidies in practice

In practice, direct subsidies for emissions abatement are rare. Instead, environmental subsidies appear to be a common policy tool for promoting the adoption of new, cleaner technologies and practices. They have been used throughout OECD countries to support renewable energy, retire old vehicles, adopt pollution control equipment, promote the purchase of energy-efficient appliances, and encourage weatherisation of buildings.

Table 1 lists some examples of environmental subsidies that have been implemented in some OECD countries.

Table 1. Examples of Environmental Subsidies in OECD Countries

Location	Subsidy/ Grant/ Rebate	Purpose
US	Grants for low-emission school buses	Promotion of new pollution control technologies
US	Corporate tax credits for wind and solar power	Promotion of the adoption of renewable energy technologies
US	Vehicle conversion rebate	Promote the conversion of vehicles to run on alternative fuels
US	Alternative energy loan programme (Soft loan)	Provide financing for installation of alternative energy systems
Canada	Cash for clunkers programme	Provide financial incentives for retiring old vehicles
Denmark	Grant for reduction of solid particle pollution in heavy vehicles	Incentivise vehicle upgrades and/or new vehicle purchase
Japan	Soft loans for pollution control investment	Accelerated adoption of pollution control technologies
Netherlands	Subsidy for biomass generated electricity	Promotion of biomass production of electricity
United Kingdom	Environmentally sensitive areas scheme	Offer incentives for farmers to adopt certain agricultural practices

Source: OECD/EEA Database on Instruments used for Environmental Policy

3.2.1 Subsidies for renewable energy

Most European countries offer subsidies for renewable energy that guarantee access to the electricity grid at above-market rates. Known as feed-in tariffs, these subsidies provide renewable producers with stable long-term contracts, which reduce price uncertainty and promote investment. Feed-in rates typically decrease over the course of the contracts, and they also tend to provide stronger incentives for relatively expensive renewable technologies. For example, solar photovoltaics require a greater subsidy than more cost-effective technologies, such as wind generation. Many programs limit the size of renewable installations that are eligible for contracts. However, there is considerable heterogeneity in feed-in tariff policies across Europe, Australia, Canada, US states, and the developing world.

Production subsidies represent a more straightforward means of incentivising renewable electricity generation. Although they may take the form of tax credits, rebates, or tenders, these subsidies typically compensate producers per unit of electricity produced from select renewable sources. Unlike feed-in tariffs, production subsidies do not guarantee long-term price stability or access to the electricity grid; hence, demand and price uncertainties over time may make investment less attractive than under a feed-in tariff regime. While green quotas and feed-in tariffs have superseded most production subsidies in Europe, in the US federal and state production subsidies remain an important component of renewables policies. Most policy portfolios also feature some type of direct subsidies for investment in renewable energy installations.

In practice, feed-in tariffs have often been credited with increasing renewables deployment, usually in combination with other renewables subsidies. According to a 2008 IEA report, the most effective policy portfolios for promoting onshore wind deployment have consisted primarily of feed-in tariffs with relative modest payment levels. The study also finds that production tax credits in the US have lacked stability and consistency across states, resulting in suboptimal wind deployment (IEA, 105-8). Mulder (2008) finds that the European countries with the greatest adoption of wind energy (Denmark, Spain, and Germany) have combined feed-in tariffs with subsidies for production and capital investment. Buen (2006) reaches a similar conclusion with regard to Danish wind policy, citing the long-term stability of its feed-in tariffs and investment subsidies.

Further, most renewable energy policy portfolios include subsidies for R&D. These grants, loans, and tax incentives aim to stimulate future cost reductions, while correcting for technological spillover effects. Empirical studies have found that R&D subsidies have tended to increase learning rates in renewable technologies. These studies also show that R&D subsidies coupled with feed-in tariffs or investment subsidies have helped Denmark to increase both innovation and diffusion in wind power technologies (Söderholm and Klaassen, 2007; Klaassen et al., 2005). Johnstone et al. (2010) and Unger and Ahlgren (2005) both find that feed-in tariffs targeted at more expensive renewable technologies can help to encourage innovation.

3.2.2 Subsidies for energy efficiency

Energy efficiency is another common target for subsidies, since many consumers are viewed as insufficiently sensitive to the economic benefits of conservation. These programs typically lower the up-front capital cost of investing in energy efficiency improvements, by offering grants, tax credits, or low-interest loans.

For example, the US Federal government offers income tax credits for the purchase of certain energy-efficient appliances, doors, and windows. The *U.S. Low-Income Weatherization Program* was designed to help achieve energy conservation, while simultaneously aiding low-income residents with their energy bills. As described in Gillingham et al. (2004), low-income families spend a large proportion of their overall budget on energy consumption and also tend to have homes in greater disrepair, thus making them an attractive group to subsidise. A somewhat similar programme has been established under the auspices of the Department of Health and Human Services, called the Low-Income Home Energy Assistance Programme.

Interestingly, other programmes under the label of "Demand-Side Management" have been implemented by public utilities, offering subsidies to all customers, not only low-income families. US experience with these policies includes information campaigns that are combined with subsidised loans, rebates, and other incentives for the installation of insulation and/or the purchase of new energy efficient appliances. These policies highlight the fact that money used to fund subsidies for adoption of technologies that result in environmental improvement does not necessarily have to come directly from governments. (Gillingham et al. 2004).

3.2.3 Vehicle scrappage programmes

Subsidies to scrap old vehicles became especially popular during the global recession, as a way to improve fleet fuel efficiency and stimulate the economy. "Cash for Clunkers" in the US offered sizeable rebates to trade-in older, less fuel-efficient vehicles, and similar programmes were also implemented in Canada, France, and Germany in 2008-2009.[3]

[3] http://www.iea.org/textbase/pm/?mode=pm.

These programmes are limited in their effectiveness, in part due to their temporary nature, and in part due to their indirect impacts on fuel consumption. As a temporary tax credit—particularly in the US, where initial funding for the programme lasted less than two months (but was oversubscribed in one week)—much of the effect of the subsidy is to accelerate the purchases that were going to be made anyway. Li et al (2010) find that most of the Cash for Clunkers boost in car sales in mid-2009 was due to a shift in sales from other months. They calculate that the cost per ton of the associated CO_2 emissions reductions ranges from $91 to $301. This relatively high cost reflects the fact that such subsidies influence a small number of transactions, some of which would occur anyway, and they have no influence on driving behaviour or the rest of the fleet of vehicles in use.

3.2.4 Leveraging non-environmental subsidies for environmental purposes

A report by the European Environment Agency (EEA 2005) highlights a number of considerations relevant to the use of subsidies. Specifically, they note that:

- Not all economic subsidies are harmful to the environment
- Not all environmentally motivated subsidies are actually good for the environment
- Getting rid of subsidies seen as environmentally harmful may not always serve to improve the environment

While the first observation is relatively straightforward, the second one highlights the fact that some environmental subsidies may create incentives to increase production and actually worsen environmental quality. At the same time, removing subsidies perceived as environmentally harmful can involve critical trade-offs between economic efficiency and environmental protection.

In practice, a number of concerns arise with both the long-term efficiency and efficacy of subsidies. As the EEA report highlights, "subsidies can help create markets, and speed the development of markets and technologies, but they can also slow market development and encourage 'lock-in' to existing systems" (101). Pre-existing subsidies not aimed at the environment, e.g., those applicable to the production of fossil fuels, may reduce the efficacy of newly introduced environmental policies. Furthermore, subsidies can introduce significant economic inefficiencies, e.g., when they are "too large" and result in overproduction, generate large economic rents, or detract from the incentive to innovate in other new environmentally friendly technologies.

For example, agricultural subsidies have been prevalent in OECD countries for more than half a century. The EU's Common Agriculture Policy (CAP) began in the 1950s and primarily reflected a desire to promote self-sufficiency in the production of food and other agricultural commodities. The US has a long history of agricultural supports as well. While the initial development of these policies was not primarily concerned with environmental improvements, eventually the focus expanded to include "environmentally sound farming." For example, the CAP offers financial assistance to farmers who agree to adapt their agricultural practices, assisting in the cost of nature conservation and encouraging compliance with environmental laws and proper land management. Similarly, the US Conservation Reserve Programme, which offers payments for converting cropland in environmentally sensitive areas to vegetative cover, has evolved from a primary concern for erosion control to an orientation toward a broad range of conservation goals, including wildlife habitat.

Establishing standards that farmers must meet in order to receive government support is often referred to as a cross-compliance (EEA 2005). Obligatory cross-compliance was established under reforms to the CAP made in 2003.

The inclusion of cross-compliance obligations under the CAP is an important example of how policies initially designed for other purposes can be used as a mechanism for environmental improvement. Undoubtedly beneficial in many respects, such policies can be costly in both budgetary and economic terms. Agricultural subsidies represented almost half of the EU-15 budget in the year 2003 (EEA 2005). Arguably, subsidies of such magnitude may encourage excess production, potentially worsening local environmental quality.

4. Tradable performance or portfolio standards

Tradable performance standards (TPS) are a flexible, market-based instrument for achieving an average performance goal. Typically, these standards are measured per unit of output, such as an average rate of emissions or an average share of renewable energy per kWh. In the event a firm's emission intensity exceeds the standard, they are required to purchase credits for those excess emissions. Firms with below-average emissions (or above-average performance) are able to sell those credits. While they do use credit trading, unlike a cap-and-trade programme, the quantity of emissions is not fixed.

4.1 Tradable performance standards in theory

Tradable performance standards are perhaps most easily distinguished from *nontradable* performance standards. In the latter, a regulator sets the maximum allowable emissions per unit of output and requires that firms lower their emissions until this intensity target is reached. Firms have two options: they can install new equipment that reduces emissions or substitute away from the use of the polluting input, say fossil fuels. All firms have to meet their individual targets on their own, meaning that marginal abatement costs are unlikely to be equalised across firms, implying that the nontradable performance standard may not be cost-effective.

To capture the potential cost savings that could result if marginal abatement costs were equalised, firms must be allowed to interact in a market setting where excess compliance by one firm can be used to offset less abatement at others. By making a performance standard tradable, high emissions-intensity firms have a lower-cost alternative to in-house abatement (they can purchase credits to meet the standard), and firms that can abate emissions at a relatively low cost have an incentive to overcomply (they realise financial gain from selling credits for excess abatement).

If the nontradable performance standards were binding for all firms, the result would be an equal average emissions intensity at relatively low cost. If, on the other hand, some firms were overcomplying with the standard prior to trade, average emissions intensity could rise (this concern has been raised in the context of fuel economy standards in the US). However, the cost savings imply that there is room for some ratcheting to allow the same average emissions intensity to be achieved as before, while preserving cost savings.

4.1.1 Are tradable performance standards efficient?

Tradable performance standards are an efficient means of meeting an emissions intensity goal, certainly more cost effective than nontradable standards meeting the same goal. But are they more or less cost-effective than an emissions tax (or cap-and-trade) at meeting an equivalent *absolute* emissions goal? In general, they are less cost-effective, but in some situations tradable standards may be preferred.

The rationale lies in understanding that tradable performance standards can be viewed as combining a tax on emissions, since credits must be forfeited for additional emissions, with a corresponding subsidy to production, since each unit of output garners the right to emit the average amount of pollution (Fischer 2001). The resulting effects are generally similar to a rebated emissions tax. Even if a performance standard were set equal to the socially optimal level, the resulting output and emissions by firms would diverge from the outcomes under a socially optimal Pigouvian tax rate. Because of the implicit subsidy, the equilibrium output

price under a performance standard is lower for a given emissions tax price, output is higher, and therefore emissions under a tradable performance standard will be higher than under a tax policy. Basically, although the emissions price encourages abatement, the rebate embodied in the standard discourages conservation. Thus--absent any additional distortions--tradable performance standards are somewhat less efficient than an optimal emissions pricing (see also Fischer and Newell 2008 and Dissou 1995).

4.1.2 When should tradable performance standards be used?

From a practical standpoint, tradable performance standards can only be used in sectors in which the unit of production can be clearly defined. The electricity sector is a good example, since a kWh is uniform, but in manufacturing, a ton of one product may not be functionally equivalent to a ton of another product produced within the same sector. If small changes can be made to a product to qualify for a more generous standard, then large gains may be realised with that distortion. For example, removable rear seats in a small vehicle can help allow it to qualify as an SUV for the purposes of Corporate Fuel Economy (CAFE) standards.

From an efficiency standpoint, tradable performance standards can be useful in settings in which increased product prices are undesirable. The main examples are again tax interactions and emissions leakage. Since performance standards do not require payments for average inframarginal emissions, the associated price increases are limited, meaning that these mechanisms can outperform a system of emissions pricing without revenue recycling (Goulder et al. 1999; Parry et al. 1999; Fullerton and Metcalf 2001). Tradable performance standards can also outperform emissions taxes when emissions leakage to unregulated sectors is a concern, but the conditions must be such that the unregulated goods are close substitutes with similar emissions profiles) (Bernard et al. 2007).

Tradable standards can be desirable from a political economy standpoint, as they are revenue neutral, so they neither look like a tax nor do they cost the government money (at least directly).

4.1.3 What about tradable portfolio standards?

Tradable portfolio standards are a variant in which the standard is based on market share of an eligible technology, rather than on emissions performance. In effect, they subsidise the preferred technology by taxing all the unpreferred ones equally. In general, if the goal is emissions reductions, tradable portfolio standards are less efficient than tradable performance standards, since the tax component of the portfolio standard does not distinguish between more and less polluting versions of the unpreferred technologies (Fischer and Newell 2008).

4.2 Tradable performance standards in practice

Although the concept behind tradable standards is straightforward, their use has not been widespread within OECD countries. Much more common are nontradable performance standards, such as the Renewables Obligation programme in the United Kingdom.

Perhaps the most prominent example of a tradable performance standard is the US lead phasedown programme, which began in the mid-1970s and culminated in a complete ban on lead in gasoline in 1996. Regulators used progressively tighter performance standards that required refineries to reduce the average lead content in gasoline. From late 1982 until the end of 1987, refineries were allowed to trade lead permits to meet the standards. This highly successful programme allowed firms to "choose how much unleaded gasoline to produce and to purchase lead permits to maintain a high level of lead in leaded gasoline if they choose" (Kerr and Newell 2003, 322).

Several US states have introduced tradable renewable energy certificates to help companies comply with renewable portfolio standards (which require that a certain percentage of energy come from renewable

sources). For example, California's Renewable Portfolio Standard (Senate Bill 1078, 2001–2002) requires that a regulated entity increase its use of renewable resources by at least 1 percent per year until "20% of its retail sales are procured from eligible renewable energy sources." Although the initial standard did not specifically allow for trading, new rules under discussion permit regulated entities to comply by trading in renewable energy certificates. Table 2 lists renewable portfolio standards in US states, most of which allow for trading to some degree.

Table 2. US States with Renewable Portfolio Standards

State	Standard	Allows for trading?
Arizona	15% by 2025	Yes
California	20% by 2010 and 33% by 2020	Currently under discussion
Colorado	Ranges from 10-30% by 2020 depending on regulated entity	Yes
Connecticut	27% by 2020	Yes
Delaware	25% by compliance year 2025-2026	Yes
District of Columbia	20% by 2020	Yes
Florida	7.5% by 2015	-
Hawaii	40% by 2030	No
Illinois	25% by compliance year 2024-2025	Yes
Kansas	20% of peak demand capacity by 2020	Yes
Maine	Varies by class from 10-40% by 2017	Yes
Maryland	20% by 2022	Yes
Massachusetts	Varies from 7.1-15% for existing and new resources	Yes
Michigan	10% by 2015 with other specific standards	Yes
Minnesota	Ranges from 25-35% by 2025 and 2020 respectively	Yes (limitations apply)
Missouri	15% by 2022	-
	15% by 2021 for investor-owned utilities	Yes
Montana	15% by 2025	Yes
Nevada	25% by 2025	Yes
New Hampshire	23.8% by 2025	Yes
New Jersey	22.5% by compliance year 2020-2021	Yes
New Mexico	Ranges from 10-20% by 2020	Yes
New York	29% by 2015	Currently under discussion
	25% by 2013 for municipal utilities	-
North Carolina	Ranges from 10-12.5% by 2018 and 2021 respectively y utility	Yes
North Dakota	10% by 2015	Yes
Ohio	25% by 2025	Yes
Oklahoma	15% by 2015	No
Oregon	Varies from 5% to 25% by 2025	Yes
Pennsylvania	18% by compliance year 2020-2021	Yes
Rhode Island	16% by 2019	Yes
South Dakota	10% by 2015	Yes
Texas	5.880 MW by 2015 and 10.000 MW by 2025	Yes
Utah	20% of adjusted retail sales by 2025	Yes
Vermont	20% by 2017	-
Virginia	15% by 2025	Yes
Washington	15% by 2020	Yes
West Virginia	25% by 2025	Yes
Wisconsin	Statewide 10% by 2015 w/ different requirements by utility	Yes (limitations apply)

Source: Database of State Incentives for Renewables And Efficiency (DSIRE)

In several OECD countries, fuel economy regulation is bearing greater resemblance to tradable performance standards. In the US, Corporate Average Fuel Economy (CAFE) set fleetwide standards for automobiles and light trucks that each manufacturer has to meet. Rather than meet a standard for each type of vehicle, manufacturers can average across their fleets. New flexibility mechanisms will allow manufacturers to trade credits across car and light truck fleets, as well as with other manufacturers,

resulting in a true tradable performance standard. The EU also has moved to allow pooling of targets across manufacturers to comply jointly with its vehicle CO_2 standard, although trading is not yet explicit. Japan allows manufacturers to accumulate credits in one vehicle weight category for use in another.

Anderson et al. (forthcoming) survey fuel economy regulations in the US and other countries. They note several drawbacks to relying on new vehicle performance standards for reducing fuel consumption. First, these regulations are limited to improving fuel economy in new automobiles, while the vehicle stock takes many years to turn over. Second, they do not encourage other forms of conservation; in fact, they lower the cost of driving, which leads to some "rebound effect" that exacerbates other external costs associated with vehicle miles travelled, such as congestion and accidents. For these reasons, economists prefer direct taxes on oil or on carbon, which not only promote fuel economy in new automobiles, but also discourage driving by owners of new and used vehicles alike, and reduce emissions and oil use beyond the automobile sector.

Still, the cost-effectiveness of the standards remains contentious, due in large part to a lack of consensus and clear evidence about how consumers value fuel-saving benefits. If consumers systematically undervalue the benefits of improved energy efficiency when they purchase their vehicles, this market failure would form a rationale for regulating fuel economy. However, the empirical evidence is still mixed, and even when consumers do neglect apparently beneficial opportunities, it may not be clear whether this behaviour reflects real myopia, a lack of information that could be otherwise corrected, or unmeasured costs to the consumer in tradeoffs for higher fuel economy.

By revealed preference, though, standards seem to be more popular than higher fuel taxes, particularly in the US Looking forward, a benefit of clear standards may be in fostering a more stable environment for innovators of clean technologies, given the risks of uncertain fuel prices. Less well understood is whether alternative instruments like technology prizes, fuel taxes, fuel price floors, or feebates, might perform better.

4.2.1 Alternative trading approaches

US experience has almost entirely surrounded the use of tradable credit approaches, not only based on a performance or portfolio standard, but also based on an absolute cap, a primary example being the SO_2 allowance trading programmes. Outside of the United States, a number of OECD countries have implemented tradable permit systems for a variety of different reasons. Table 3 below gives some examples of tradable permit systems that have been implemented at various points in time in OECD countries.

Table 3. Tradable Permit Systems in OECD Countries

Location	Programme	Purpose
Australia	Statutory fishing rights	Allocating fishing rights
Australia (NSW)	Greenhouse gas reduction scheme	Reduction of GHGs from production and use of electricity
Australia (NSW)	Hunter river salinity trading scheme	Control of pollution discharges
Canada	Methyl bromide allowance system	Control of ozone depleting substances
Denmark	Electricity sector carbon trading	Control of carbon emissions from electricity sector
EU	Emissions Trading Program (EU ETS)	Reduction of CO_2 emissions
Italy	Energy Efficiency Certificates (TEE) Trading	Promotion of energy efficiency
New Zealand	GHG Emissions trading programme	Reduction of greenhouse gas emissions
US (Illinois)	VOM emissions trading programme	Reduction of volatile organic materials
Japan (Tokyo)	Carbon emissions trading programme	Reduction of carbon emissions

Source: OECD/EEA Database on Instruments used for Environmental Policy and Natural Resource Management; Programme websites

Each of the programmes differs in a number of respects, but each utilises a permit trading programme of some sort. As one can see, the range of applications for tradable permit systems is far larger than just for the control and reduction of greenhouse gases. Permit systems are used for allocating fishing rights (as in the example of Australia and other OECD countries), reducing surface water pollution, and to control volatile organic chemicals (e.g. the US state of Illinois). In the case of the Hunter River Salinity Trading Scheme in New South Wales, this trading programme represents an alternative approach to reducing surface water pollution as compared with the earlier OECD examples of charge systems in the Netherlands and elsewhere. Specifically, the trading programme in New South Wales is designed to reduce the discharges of saline water from mines and power stations.

5. The choice of market-based policies

In the United States, most market-based approaches have taken the form of tradable permits as opposed to taxes. Outside the United States, taxes and charges have been used more often, with EU ETS being a notable exception. A number of broad considerations are important in choosing among alternative environmental policy instruments. These include whether a policy will meet the environmental objective for which it was designed and, additionally, whether it will do so efficiently. Further considerations include whether the policy is consistent with broadly held values. These could include equity, nonintrusiveness, and public participation (Harrington et al. 2004). A number of other important factors come into play. These include the role of professional backgrounds and the preference for certain types of policy approaches, public understanding of policy alternatives, and the influence of interest groups on the political process. Stavins (2000, 57) highlights that those who have economics or business backgrounds or are "market-trained thinkers" generally favour incentive-based approaches. CAC policies, on the other hand, may prevail elsewhere because of the bureaucratic skill set and legal background of many regulators, the administrative difficulties of using market-based instruments in some applications, the general public's lack of understanding of market-based policies, interest groups' scepticism about the flexibility created by market-based policies, and political ideology.

Stavins (2000) explains the public scepticism component:

> *The benefits to consumers of market instruments typically are not visible, and the perceived costs can be transparent. Under traditional command-and-control policies, consumers may see prices go up, but they clearly find it difficult to associate those price increases with environmental regulations. For example, it is not readily apparent to consumers that gasoline and electricity prices are lower than they otherwise would have been because of the use of market-based programs to phase out lead or reduce SO_2 emissions (58).*

Accordingly, politicians have little incentive to adopt market-based approaches. Some interest groups may think that market-based approaches undermine the integrity of environmental policy and "inappropriately condone" a right to pollute (Stavins 2000, 57). A change in opinion among some groups toward market-based approaches is considered one reason for the broad-based support of the US Clean Air Act Amendments of 1990, which formed the basis of the SO_2 emissions trading programme. Kelman (1981) argued that choice among environmental policies can often hinge on ideological grounds. In these cases, an understanding of the advantages or disadvantages of different policies may not be valued.

Faced with a comprehensive environmental tax or fee, many regulated entities argue for protection or exemption. Vulnerable industries may seek a weaker environmental goal and or *gratis* allocations of emissions allowances via grandfathering or some output benchmark. Hence the prevalence of exemptions for particular industries in many countries. Ekins and Speck (1999) offered examples where particular industries, often the manufacturing sectors, received some form of exemption from market-based environmental policies measures. In 1993, for example, the manufacturing industry paid only 25 percent of

the CO_2 tax rate in Europe, although that was subsequently raised to 50 percent in 1997. Additional tax exemptions were also available for the cement and lime manufacturing industries. In the Netherlands, energy-intensive industries received tax relief for large-scale consumption of natural gas, among other fuels. The Netherlands' regulatory tax on energy applies only up to a threshold of energy consumption, thereby exempting large electricity consumers from the full tax, primarily out of competitiveness concerns.

A report by the OECD (OECD 1997) highlights issues that policymakers can consider when developing environmental regulations and implementing market-based instruments. One important consideration is the policy's effect on the competitiveness of emissions-intensive and trade-exposed industries. Such industries are often protected from adverse consequences through tax exemptions. Although exemptions reduce the overall cost-effectiveness of the policy by reducing the range of abatement opportunities, they do serve a politically pragmatic purpose, particularly when other countries' regulations are weaker. If one or a few countries implement a CO_2 tax policy, their industrial production can be substituted for by foreign firms—or domestic firms may relocate to a country that does not have a comparable policy.

In addition to competitiveness concerns, governments must examine the distributional effects of alternative market-based policies. For instance, many environmental taxes, "especially energy taxes, can have a *direct* regressive impact on the income distribution of households" because of the relative proportions of their budgets that low- and high-income households spend on energy (OECD 1997, 4). Market-based environmental policies may be cost-effective overall, but distributional effects may play an equally important role in policy development. Politically successful market-based policies will likely strike a balance between cost-effectiveness and equity considerations by correcting for at least some of the adverse distributional effects. For example, low-income households could receive exemptions, lower tax rates, or cash payments.

Administrative and enforcement costs are another consideration. A comprehensive market-based policy, such as an emissions tax that includes all industrial sectors or all firms in a given sector, will be more challenging to implement than a more restricted policy. It may be better to design and implement a policy with incomplete coverage, provided it covers the largest and most-easily-regulated emitters.

6. Implications of multiple policy instruments

In some circumstances, more than one environmental policy has been implemented to achieve a single environmental objective. Are multiple market-based policies better than a single approach? After exploring the rationales for the use of multiple instruments, we consider some real-world examples and examine some of the issues. Finally, we discuss the harms that can arise from using multiple market-based policies and discuss some possible ways to mitigate the risk of adverse effects.

6.1 Rationales for multiple environmental policy instruments

Multiple policies may be implemented to provide a stronger basis for meeting renewable energy intensity targets, improve on the design of an emissions pricing programme, correct for market failures not addressed with an emissions trading programme, achieve other goals besides emissions reductions (e.g., jobs creation), or provide early-adopter advantages (Fischer and Preonas 2010). One of the more plausible rationales, as highlighted by Sijm (2005) and Goulder and Parry (2008), is that households simply do not invest in cost-effective energy efficiency options: if market signals from a pricing policy are insufficient to induce individuals to undertake cost-effective investments, then complementary policies may be justified. Fischer and Newell (2008) discuss knowledge-based market failures that may also justify overlapping environmental policies, such as externalities from CO_2 emissions, R&D spillovers, and learning spillovers.

The specific policy proposal they discuss entails an established emissions price combined with subsidies for renewables R&D and production.

6.1.1 Examples of multiple environmental policy instruments

A report by the OECD (2007a) gives examples of how multiple environmental policy instruments were used to solve problems—household waste generation, nonpoint sources of water pollution, residential energy efficiency, and regional air pollution. We focus here on regional air pollution in Canada and Sweden.

In Canada, the federal government sets SO_2 and NO_x emissions standards by establishing national guidelines, but responsibility for achieving emissions reductions lies with the provincial governments. Although the national standards are not legally binding, an informal process has evolved whereby the standards are accepted as goals that the provincial governments will work to implement. Provincial policies for emissions control range from site-specific emissions permits to, less commonly, tradable permit markets. For example, Ontario has regulations for each of the major source types for NO_x and SO_2 emissions, along with a tradable permit system established in 2001. Alberta has specific standards for gas and coal electricity generation units that also interact with an emissions trading programme for the same sector.

The federal government of Canada, meanwhile, runs programmes to support the development of clean technologies. In particular, under the auspices of Natural Resources Canada, the Programme of Energy Research and Development provides funding for R&D research programmes. Another federal programme involves clean and efficient combustion technologies for large electric utilities. The result is a combination of federal grant money for technological development and a range of localised measures for achieving emissions reductions. While the OECD (2007a) did not specifically examine the effectiveness of these policies, anecdotal evidence suggests these programmes are successful. However, to the authors' knowledge no rigorous evaluation shave been conducted. In Sweden, the charge system for SO_2 and NO_x emissions interacts with other regulatory policies. Originally, Sweden adopted a CAC approach for SO_2 and NO_x control. A 1991 sulphur tax, introduced in 1991, then complemented but did not substitute for the CAC regulations. These two approaches have also been supplemented by programmes designed to stimulate innovation.

Examples of multiple environmental policy instruments to promote renewable energy in the electricity sector are highlighted in Fischer and Preonas (2010). They consider a number of different policies, including emissions cap-and-trade systems, carbon taxes, performance standards, feed-in tariffs, and investment incentives among others. Multiple policy examples in Germany include an emissions cap-and-trade programme, feed-in tariffs, and incentives for investment/R&D. The Netherlands has a non-renewable generation tax, a renewable portfolio standard, and investment incentives among other policies. A number of other countries also have multiple environmental policy instruments, including Norway, Denmark, Spain, and the UK, as do several US states.

6.1.2 Potential unintended consequences of mixed policies

Fischer and Preonas (2010) review the literature on overlapping policy instruments, with a focus on renewable energy. They distinguish between fixed-price policies (taxes or subsidies) and "flexible price" policies (cap-and-trade programmes or tradable portfolio standards). Combining fixed-price policies is relatively transparent: if an emissions tax is in place, the incremental incentive effect of an additional tax is similar to the incremental effect of that policy on its own (other than perhaps some diminishing returns). But since tradable credit systems allow overall market conditions to set the credit price—which determines the incentive effect of the policy—any other policy that changes

those market conditions will also change the credit price. As a result, the net incentive effect of the overlapping policy can be quite different than if it were implemented alone.

For example, Böhringer and Rosendahl (forthcoming) consider the interaction between the European Union's Emission Trading Scheme (EU ETS) and a renewable portfolio standard (RPS). They find that a binding RPS, by encouraging more renewable energy than the ETS alone, makes it easier to comply with the emissions cap, reducing the permit price. This price reduction confers a greater advantage on relatively dirty producers (e.g., coal-fired generators), while the burden of buying green credits falls on dirty producers equally. The net effect is that the dirtiest producers actually *increase* their output (and emissions), while the relatively clean nonrenewable sources are displaced.

Fischer and Preonas (2010) showed that this result holds more generally for renewable policies that overlap with a trading scheme. Furthermore, the RPS can have its own unexpected interactions. In essence, an RPS ties the fates of renewable and nonrenewable energy sources, since the standard is a market-share mandate. Thus, any additional subsidy for renewable energy makes the RPS easier to meet, lowering the cost of green credits and allowing nonrenewable energy sources to expand more cheaply, which increases overall emissions from the electricity sector. Similarly, any additional emissions or energy taxes on fossil energy sources reduce demand for electricity, in turn reducing demand for green credits and decreasing support for renewable energy. More generally, Fischer and Preonas (2010) cautioned that policies be evaluated in the context of the entire portfolio, not individually.

Policies may overlap not just because of multiple goals but also because of multiple jurisdictional authorities. Goulder and Stavins (2010) examined what might happen if a federal climate change policy in the United States met the state-level policy being developed in California and the regional approach of the Northeast's Regional Greenhouse Gas Initiative. Overlapping requirements in cap-and-trade programmes could, depending on the relative stringencies of the policies, render the federal policy ineffectual in the states with more stringent measures or, alternatively, make the state and regional policies ineffectual. In the former case, higher state-level stringency has the effect of lowering the demand for national emissions allowances, which lowers the equilibrium price and causes emissions to "leak" to states with weaker policies. The end result, compared with a federal-only policy, is more emissions in the lax states, the same total national emissions, and less cost efficiency. This can be overcome in certain circumstances by essentially "carving out" a more stringent state-level policy from the national policy, resulting in two distinct policies that no longer overlap.

Although Goulder and Stavins (2010) have suggested that overlapping state and federal climate policies are likely to do more harm than good by reducing cost-effectiveness, they identified a few cases where state-level policies may still be beneficial in the presence of federal policy. First, states can correct market failures not addressed by federal policy. For example, renters whose utilities are not separately metered have little incentive to conserve electricity; this "agency" problem can be addressed through local building codes. Second, states can serve as testing grounds for novel policies and inform future federal policy development. Third, stringent state-level policy can lead by putting pressure on federal policymakers. Finally, stringent state-level policies can pressure manufacturers to adopt the tighter standards nationwide.

Policies other than cap-and-trade may also overlap. For instance, if a US state or region implements fuel economy standards that are more stringent than the national corporate average fuel economy standards (CAFE) set by the US Environmental Protection Agency, similar concerns that interstate emissions leakage could undermine the state-level reductions will arise. Considering actual state-level policies to reduce CO_2 emissions per mile travelled, Goulder et al. (2009) found that about 65 percent of the emission reductions that would occur under the more stringent state policies would be offset by increased emissions in other states that did not adopt comparable policies. Similarly, De Jonghe et al. (2009) found that when an

emissions trading system overlapped with renewable energy quotas, a highly stringent policy could render the other nonbinding.

The OECD (2007a) report highlighted a few additional potential negative interactions of multiple environmental policies. First, different administrative levels have different approaches to establishing and implementing environmental policy, and the different regulations may be difficult to harmonise or even contradictory. For example, both the Netherlands and Denmark have regulated nonpoint source water pollution by designing measures at the sectoral or national level, but the EU Nitrate Directive requires regulation at the farm or soil level. Second, overlapping regulatory requirements create additional administrative costs and can "prevent polluters from utilising opportunities for seeking low-cost compliance options offered by an economic instrument" (OECD 2007a, 27).

7. Benefits of market-based policies: What is the evidence?

Several empirical studies have addressed the effectiveness of market-based instruments. Reviewing such studies, Tietenberg (1990) looked at the relative cost-effectiveness of market-based and command-and-control policies for air pollution management in the United States. Table 4 provides the ratio of command-and-control costs to least-cost market-based approaches. The ratio of compliance costs in a command-and-control based programme to the least-cost option varies considerably, with a high of 22.0 for particulates in the Lower Delaware Valley to a low of 1.07 for sulphate standards in Los Angeles. Although the latter case suggests that, in some circumstances, market-based approaches add relatively little, the majority of cases involve ratios well above unity.

Table 4. Empirical Studies of Air Pollution Control

Pollutants Covered	Geographic Area	CAC Benchmark	Ratio of CAC Cost to Least Cost
Particulates	St Louis	SIP Regulations	6.00
Sulphur Dioxide	Four Corners in Utah	SIP Regulations	4.25
Sulphates Standards	Los Angeles	California Emission	1.07
Nitrogen Dioxide Regulations	Baltimore	Proposed RACT	5.96
Nitrogen Dioxide Regulations	Chicago	Proposed RACT	14.40
Particulates	Baltimore	SIP Regulations	4.18
Sulphur Dioxide	Lower Delaware Valley	Uniform Percentage Regulations	1.78
Particulates	Lower Delaware Valley	Uniform Percentage Regulations	22.00
Airport Noise	United States	Mandatory Retrofit	1.72
Hydrocarbons	All Domestic DuPont Plants	Uniform Percentage Reduction	4.15
CFC Emissions from Non-Aerosol Applications	United States	Proposed Emission Standards	1.96

Source: Adapted from Table 1 of Tietenberg (1990).

Notes: CAC= command and control, the traditional regulatory approach /SIP = state implementation plan /RACT = reasonably available control technologies, a set of standards imposed on existing sources in nonattainment areas.

Given the wide range of relative costs, what factors influence the merits of market-based policies versus CAC regulations? Newell and Stavins (2000) developed a few simple approaches for determining the relative cost-effectiveness, based on two sources of cost heterogeneity among firms: baseline emissions

(and hence emissions intensities), and the slope of each firm's cost function. The latter indicates one how quickly a firm's costs rise at it seeks additional emissions reductions. For SO_2 emissions reductions, they then estimated the cost savings from using a market-based policy to reduce SO_2 relative to a uniform emissions standard set at the level to result in the initial emission allocations under the SO_2 trading programme. Using only data on baseline emissions heterogeneity, they estimated cost savings of 38 percent (Newell and Stavins 2000). Taking into consideration the second source of cost heterogeneity would only increase the estimated savings (see Carlson et al. 2000).

Farrell et al. (1999) examined the relative costs of reducing emissions of NO_x based on the CAC approach to the marketable emissions allowance system under development at that time (the NO_X Budget Trading Programme, which sought to reduce NO_x emissions from power plants and other large combustion sources in the north-eastern United States). The policy options they considered ranged from a pure CAC approach to market-based programmes with varying degrees of flexibility for trading and banking permits for future compliance periods. Based on a detailed model of compliance decisions at the unit level, they saw significant cost savings—approximately 45 percent—in moving from a CAC approach to a market-based policy. Although the examples come from the US experience, the main factor that drives higher cost-effectiveness with market-based instruments, cost heterogeneity, is not unique to the United States.

8. Conclusion

At a fundamental level, environmental policymaking involves a choice between traditional command-and-control regulation and market-based instruments. Even when described as performance standards, CAC approaches usually consist of directives about which technologies a firm must use to achieve a given environmental goal. Market-based environmental policy instruments rely on economic incentives for firms and individuals to make decisions that result in environmental improvement.

Comparatively speaking, CAC policies provide limited or no incentive for firms to over-comply or to innovate, and tend to promote an allocation of compliance obligations that is not cost-effective. In contrast, market-based policies generally give firms incentives to exceed the standards, encourage investments in technology development, and create a decentralised mechanism for compliance that in most circumstances achieves a given environmental standard at the lowest possible cost to society.

The underlying idea of taxes, fees and other market based policies which place a financial burden on behaviour that results in environmental degradation is the well-established Polluter Pays Principle. Subsidies, whether in the form of direct payments, investment or production tax credits, preferential financing, accelerated depreciation, or R&D support, are the most common of the economic incentive-based approaches for encouraging decisions that will result in environmental improvement. Tradable performance standards, such as renewable performance standards or the reformed fuel economy standards in the US, represent a flexible, market-based solution to meeting an average performance goal, typically measured per unit of output.

Notwithstanding these broad scale observations, many important questions surrounding market-based policies arise in specific economic, political, social, and legal contexts. To stimulate discussion of such issues, we highlight a number of questions that often arise when considering the role of alternative market-based policies.

As noted, it is important to consider how existing taxes or other policies not aimed at protecting the environment influence the effectiveness and ultimate success of a newly introduced market-based environmental policy. One clear example involves the use of fossil fuel subsidies that exist in many countries, with which newly introduced incentives for low-carbon technologies will still compete. Other

examples might include regulatory policies that inhibit a "full" market response to a new market-based policy. For instance, policies like licensing or other requirements may inhibit the entry of new firms into a given market or restrict investment options. Arguably, such a situation could also diminish the effectiveness of market-based environmental policy, particularly incentives for innovation.

Given the existing evidence concerning the potential to stimulate innovation with environmental policy, one must consider the opportunity costs of environmental policy induced innovation. Specifically, while some studies have shown a connection between regulatory policy and investment decisions, what projects must be forgone due to the increase in expenditures on innovation of green products? Are the benefits of this increased innovation in green technologies and products outweighed by the costs of having to delay or stop financing other projects? Furthermore, how does one go about measuring these tradeoffs? The experiences of a range of OECD countries with different regulatory and market-based innovation policies could serve to highlight important answers in this domain.

As new policies are developed, in many cases they may serve to create new markets. Market structure can play an important role in the ultimate effect of environmental policy, as we have highlighted with emissions taxes. As a result, what factors determine the structure of recently developed markets for environmental protection? Furthermore, what role does market structure play in more specific contexts? For example, in the case of local recycling systems, does it matter if these markets develop out of an organic market-based process or, alternatively, out of a political process (e.g. through the establishment of a new programme or passage of a new law)?

If incentives are created through government involvement, does this tend to result in competitive markets that achieve environmental goals or monopolies? What are the factors that lead to one outcome over another? In other words, does the political process tend to favour local monopoly production in these circumstances even though competitive markets have an obvious advantage in terms of cost effectiveness? One important advantage of market-based instruments over CAC policies is that they can economise on the informational requirements of meeting an environmental policy objective. If informational constraints are significant under CAC policies, does this mean that, assuming a CAC approach, the incentives of regulators favour one market structure over another? What other key factors are involved?

In the case of newly created markets for environmental protection, an open question is whether policies effectively "jumpstart" new markets for products and services that solve environmental problems. If so, are they cost-effective? What empirical evidence exists, and how do we know that these technologies would not have developed anyway, i.e., without the government programme in place? What other factors or characteristics of the specific environment influence how useful government taxes, subsidies, and/or tradable performance standards might be in developing these new markets? A common approach used to justify such subsidies is to point to countries that are big innovators in a particular arena which have also received significant government support for these technologies (e.g. solar energy production). In these cases, was government support the initial cause or did governments begin to support a new development that was already under way prior to any external financial support? Do the outcomes depend on the market structure that is promoted?

If environmental policy making is done in a decentralised, less than comprehensive manner, policy makers should be aware of possible unintended consequences of multiple market-based environmental policies. Fischer and Preonas (2010) have highlighted a number of important issues relevant to the use of multiple environmental policy tools. For example, when emissions are sufficiently priced, further policies are unlikely to offer environmental benefits unless there are additional market failures in existence. Given the unlikely situation that comprehensive emissions pricing will occur, the interaction of alternative policies will inevitably be an important issue. In this case, how is optimal environmental

policy affected when multiple instruments are used to achieve a single goal? What are the justifications for multiple policies in OECD countries and to what extent do technological spillovers, learning-by-doing, and assumptions about technological development play into policy choice and overall design?

Focusing on comparative experience and lessons from actual implementation, discussion among OECD countries can help shed light on these empirical questions and serve to guide future policymaking in this area.

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NOTE DE RÉFÉRENCE*

Politiques de l'environnement fondées sur le marché : Tour d'horizon

Le présent document analyse le rôle des mesures de protection de l'environnement fondées sur les mécanismes du marché et compare ces instruments aux approches traditionnelles, reposant sur une réglementation contraignante. Nous examinons trois types d'instruments de marché : les taxes et redevances sur les émissions, les subventions environnementales et les normes de résultats et de portefeuille négociables. Pour chaque type d'instrument, nous faisons une description théorique, donnons des exemples et examinons la mise en œuvre de l'instrument ainsi que les questions qu'elle soulève. Nous nous intéressons aussi aux effets qu'est susceptible d'avoir l'utilisation conjointe de plusieurs instruments pour atteindre un même objectif environnemental.

1. Introduction

En principe, l'élaboration des politiques en matière d'environnement suppose deux décisions : la définition des résultats environnementaux à obtenir d'une part et le choix des moyens à mettre en œuvre pour atteindre ces objectifs d'autre part. Dans l'idéal, ces décisions sont prises simultanément, sur la base d'une évaluation des coûts et avantages des différentes interventions. Les objectifs sont cependant souvent définis séparément, résultant de la loi, de la science ou d'un consensus politique. Quoi qu'il en soit, le choix des moyens est déterminant, à la fois pour les coûts qui devront être engagés pour obtenir les résultats voulus et pour l'obtention même de ces résultats. Le présent document reconnaît la place importante qu'occupe la définition des objectifs des politiques de l'environnement, mais porte en priorité sur l'examen des moyens qui permettent d'atteindre ces objectifs.

Le choix des moyens à mettre en œuvre suppose lui-même un arbitrage entre les mesures réglementaires contraignantes et les instruments qui font appel aux mécanismes du marché. Même lorsqu'elles prennent la forme de normes de résultats, les réglementations contraignantes sont, par définition, des mesures prescriptives qui imposent l'utilisation d'une technologie particulière et/ou fixent, pour chaque entreprise concernée, des niveaux (ou taux) d'émission à ne pas dépasser. Par exemple, toutes les nouvelles centrales électriques sont tenues d'installer et d'utiliser des dispositifs d'épuration pour réduire leurs émissions de dioxyde de soufre (SO_2). Au contraire, les instruments de marché reposent sur l'utilisation de mécanismes d'incitation économique pour atteindre les objectifs de protection de l'environnement. En d'autres termes, chaque entreprise ou acteur concerné détermine le niveau de ses émissions et les mesures à mettre en œuvre pour l'abaisser en évaluant les coûts financiers de ces mesures et les avantages obtenus en contrepartie. Alors que les réglementations contraignantes ont longtemps été privilégiées dans le monde entier, les instruments de marché suscitent un intérêt croissant, en particulier depuis une vingtaine d'années.

Bien qu'elles aient joué un rôle déterminant dans nombre des avancées spectaculaires réalisées en matière de qualité environnementale et de niveau d'émission dans le secteur de l'industrie lourde dans les années 70, les réglementations contraignantes comportent plusieurs limites. Premièrement, elles tendent à

* Cette note a été préparée pour le Secrétariat de l'OCDE par Carolyn Fischer, Richard Morgenstern et Eric Moore, *Resources for the Future* (RFF).

favoriser les inefficiences parce que les autorités chargées de la réglementation ont souvent peu d'informations sur la nature et le coût des différentes solutions dont disposent les entreprises pour réduire leurs émissions. Ne connaissant pas le montant des dépenses à engager par les entreprises pour devenir moins polluantes, les autorités risquent de fixer des obligations qui ne permettent pas d'atteindre les objectifs visés au moindre coût, c'est-à-dire qui ne présentent pas un rapport coût-efficacité satisfaisant. Deuxièmement, les réglementations contraignantes n'incitent guère, voire n'incitent pas, les entreprises à aller au-delà du respect de leurs obligations réglementaires. En allant au-delà, elles risqueraient en effet de signaler aux responsables de la réglementation que les coûts sont inférieurs à ce qu'ils pensaient, si bien qu'elles évitent d'appliquer des normes plus exigeantes que celles en vigueur, de peur qu'elles ne servent de base à l'adoption de normes plus strictes à l'avenir et n'entraînent un durcissement inexorable de la réglementation. Enfin, les réglementations contraignantes sont aussi susceptibles de faire obstacle à la mise au point de nouvelles technologies parce qu'elles n'encouragent pas les entreprises à investir dans la recherche et développement. Si toutes les entreprises doivent utiliser une technologie existante donnée pour réduire leurs émissions, elles n'investiront pas dans d'autres technologies permettant d'obtenir les mêmes résultats, fût-ce à moindre coût. Toutefois, si les réglementations rendent obligatoire l'adoption de la meilleure technologie disponible, l'incitation à innover pour trouver ce qui sera la meilleure technologie disponible de demain peut être très forte.

Les instruments de marché « encouragent l'adoption de certains comportements à travers les signaux envoyés par le marché plutôt qu'à travers des directives officielles en matière de niveaux ou de méthodes de réduction des émissions » (Stavins, 2000, 31). L'emploi du verbe *encourager* est important, parce qu'il traduit la principale différence entre les instruments de marché et les réglementations contraignantes – à savoir le fait que la réalisation d'un objectif environnemental dépend des mesures que les entreprises et les individus choisissent librement de prendre. En quelque sorte, les instruments de marché changent les règles du jeu, mais laissent les individus et les entreprises libres de prendre elles-mêmes leurs décisions. Lorsqu'ils sont bien conçus et correctement appliqués, ils peuvent permettre de concilier les intérêts des entreprises et individus et les objectifs environnementaux plus larges (Stavins, 2000, 32). Ainsi, contrairement aux mesures réglementaires contraignantes, les mécanismes de tarification des émissions incitent les entreprises à réduire de plus en plus leurs émissions, jusqu'à des niveaux inférieurs aux objectifs initiaux.

Le présent document examine les réglementations contraignantes et les instruments de marché d'un point de vue théorique et d'un point de vue pratique. Trois types d'instruments de marché sont examinés : les taxes et redevances sur les émissions, les subventions environnementales et les normes de résultats et de portefeuille négociables. Les parties 2, 3 et 4 portent tour à tour sur chacun de ces trois types d'instruments. Elles décrivent leurs principales caractéristiques, puis présentent des exemples concrets qui illustrent la façon dont ils ont été mis en œuvre pour favoriser la réalisation d'un objectif environnemental. La partie 5 porte sur l'économie politique du choix des instruments. La partie 6 examine certaines conséquences de l'utilisation conjointe de plusieurs instruments de marché pour atteindre un même objectif environnemental. La partie 7 compare de façon synthétique les avantages réels et théoriques des différents instruments. La partie 8 présente quelques conclusions générales et, allant un peu au-delà du champ initial de la présente note, met en évidence certains problèmes importants susceptibles de se poser à mesure que de nouvelles politiques en matière d'environnement sont envisagées.

2. La taxation des émissions

De nombreux termes sont utilisés pour désigner la taxation des émissions : redevances, droits et, bien sûr, taxes. Quel que soit le terme utilisé, la taxation a pour but de faire supporter un coût financier aux auteurs de comportements dommageables pour l'environnement. En principe, elle permet d'internaliser les coûts sociaux externes de la pollution, mais peut aussi servir à financer des mesures en faveur de l'environnement (entre autres). Bien qu'elle puisse être appliquée à un large éventail de comportements et

d'acteurs, nous nous concentrerons essentiellement sur certains exemples de taxes appliquées au secteur industriel.

2.1 La taxation des émissions : aspects théoriques

Appliquer des redevances et taxes sur les émissions revient à faire supporter un coût financier direct aux émetteurs en fonction d'un indicateur quelconque de leur comportement en matière de pollution. Ce coût est censé les inciter à adopter des méthodes de production plus respectueuses de l'environnement et plus responsables.

Les écotaxes sont sous-tendues par le principe « pollueur-payeur », selon lequel le coût des mesures destinées à remettre en état l'environnement à la suite de dommages causés par la pollution doit être imputé à la partie responsable de ladite pollution. À noter que selon l'interprétation de ce principe adoptée en 1972 par l'OCDE, le pollueur doit assumer le coût des mesures nécessaires pour prévenir et réduire la pollution sans l'aide des pouvoirs publics (OCDE, 1972). Toutefois, selon la théorie économique, cette responsabilité s'étend au-delà du coût direct des mesures de réduction de la pollution et englobe le coût des dommages causés aux tiers par les émissions résiduelles. Même s'il est possible que les recettes correspondantes ne soient en réalité par versées directement aux parties lésées, faire en sorte que les pollueurs prennent au moins en compte l'intégralité des coûts de leur comportement pour la société permettrait d'atteindre l'efficience économique. En 1991, l'OCDE a adopté la Recommandation relative à l'utilisation des instruments économiques dans les politiques de l'environnement, selon laquelle une gestion durable et économiquement efficace des ressources de l'environnement requiert l'internalisation des coûts de prévention et de lutte contre la pollution ainsi que des coûts des dommages (OCDE/GD(92)81).

Lors de la mise au point de taxes sur les émissions, il importe notamment de définir l'assiette et le taux de la taxe, de déterminer les entités qui doivent y être assujetties, de décider de l'utilisation qui sera faite de son produit, d'examiner les implications de la structure de marché pour la conception des instruments et les effets de la taxe sur l'innovation.

2.1.1 Quelle doit être l'assiette de la taxe ?

Les taxes ou redevances peuvent être calculées sur la base de niveaux d'émission mesurés ou imputés, des consommations intermédiaires polluantes ou d'un autre indicateur. L'effet incitatif variant en fonction de l'indicateur utilisé, le caractère plus ou moins étroit du lien entre ledit indicateur et les émissions effectives a une forte incidence sur l'efficience et l'efficacité de la taxe. Ainsi, une taxe carbone est un moyen de réduction des émissions de dioxyde de carbone (CO_2) plus efficace qu'une taxe reposant sur l'assiette plus large qu'est la consommation d'énergie, par exemple un droit assis sur la teneur en énergie d'un combustible[1].

2.1.2 Comment déterminer le taux de la taxe et les redevances ?

D'un point de vue théorique, le taux optimal dépend des dommages externes causés par la pollution. Selon la désormais célèbre thèse de Pigou (1932), dans un régime de concurrence parfaite, le taux de la taxe appliquée à un polluant doit être égal aux dommages marginaux (les coûts externes supplémentaires induits par une unité d'émission supplémentaire). Les résultats varient selon les caractéristiques du marché (voir ci-après les observations sur l'utilisation des recettes, la structure de marché, la compétitivité et les fuites d'émissions).

[1] Le BTU, abréviation de *British thermal unit*, est une unité de mesure de la teneur en énergie.

En outre, d'autres facteurs interviennent dans la définition du taux de la taxe, notamment des considérations politiques, l'objectif de recettes et l'utilisation de ces recettes. Il peut arriver que la résistance des consommateurs ou des difficultés politiques empêchent l'adoption du taux pigouvien, qui tiendrait compte de la totalité du coût des émissions pour la société. Ce sont probablement des difficultés de ce type qui expliquent que les États-Unis ne soient jusqu'à présent pas parvenus à mettre en place un mécanisme de tarification du carbone. Il arrive aussi que les taxes sur les émissions aient d'abord pour finalité, non pas de créer des incitations, mais de financer des projets environnementaux, par exemple dans le domaine des ressources en eau ; en pareil cas, l'objectif de recettes est fixé en fonction de cette finalité, tandis que l'éventuel effet incitatif du taux qui permet d'atteindre cet objectif est considéré comme un avantage accessoire.

2.1.3 Comment déterminer les entités qui doivent être assujetties à la taxe ?

Selon ses objectifs généraux, une taxe peut être appliquée à un petit nombre de secteurs ou, au contraire, avoir un champ d'application plus vaste et concerner toutes les sources d'émissions. Les moyens à mobiliser pour s'assurer de la mise en œuvre du système étant d'autant plus importants que les entités visées sont nombreuses, il importe d'apprécier les avantages d'une taxe visant un grand nombre d'assujettis et de les comparer au coût des mesures à prendre pour s'assurer que les assujettis respectent leurs obligations. Dans le cas d'une taxe sur les émissions, il est indispensable que la déclaration des émissions soit fiable pour obtenir les résultats attendus. Si les moyens visant à assurer l'application du dispositif sont insuffisants, les entreprises risquent de ne pas déclarer l'intégralité de leurs émissions, ce qui aboutirait à une réduction de l'assiette et limiterait l'effet incitatif de la taxe.

Des arguments sur les effets négatifs que la taxe pourrait avoir sur certains secteurs de l'économie sont aussi susceptibles d'influer sur l'étendue de son champ d'application. Les secteurs évoqués dans le cadre des débats actuels sur la politique climatique sont notamment les secteurs « à forte intensité énergétique » et ceux qui sont « ouverts aux échanges internationaux ». Parmi les questions en jeu figurent non seulement le nombre de secteurs d'activité ou d'entreprises couverts, mais aussi la rigidité du champ d'application. Par exemple, il arrive que les secteurs fragiles aient la possibilité de demander à bénéficier d'un taux réduit, même si, lorsque tel est le cas, l'analyse de l'impact qu'une telle mesure risque d'avoir sur l'environnement et sur les autres secteurs, contraints de payer davantage, est souvent insuffisante.

2.1.4 Comment les recettes doivent-elles être utilisées ?

Les recettes d'un système de taxe ou de droits sur les émissions peuvent être reversées aux entreprises (sous forme de restitutions par exemple), allouées à d'autres entités (par exemple aux ménages modestes, sur lesquels la taxe risque d'avoir une incidence disproportionnée), utilisées pour financer la baisse d'autres prélèvements (par exemple les prélèvements sur les salaires ou l'impôt sur le capital) ou pour subventionner des technologies « propres ». Ces utilisations sont aussi motivées par des arguments politiques (visant à favoriser l'adhésion à un durcissement de la réglementation) ou redistributifs (visant à répartir l'impact de la taxe entre les différents segments de la société) ou par des considérations d'efficience économique.

La taxation des facteurs de production, comme le travail et le capital, pouvant être à l'origine de distorsions économiques, plusieurs économistes ont proposé d'utiliser les écotaxes pour réduire à la fois la pollution et les effets de distorsion de la fiscalité. Selon ce processus, parfois qualifié de « réforme fiscale verte » *(« green tax shift »)*, le système fiscal imposerait « ce qui est mauvais » (la pollution) plutôt que « ce qui est bon » (le travail). Bien que les éléments à l'appui de cette thèse soient assez peu nombreux, d'aucuns sont allés jusqu'à avancer que cette stratégie permettrait d'obtenir un « double dividende », les progrès de la qualité de l'environnement étant réalisés à un coût négatif grâce à l'amélioration du fonctionnement de l'économie.

Goulder *et al.* (1997) ont démontré l'existence d'un effet « d'interaction fiscale » entre une nouvelle écotaxe et les taxes existantes. Selon leur argumentation, en augmentant le coût des biens polluants, la réglementation sur l'environnement abaisse les salaires réels, aggravant ainsi l'effet dissuasif sur le travail (l'investissement) qu'exerce déjà la fiscalité du travail (du capital). Cette interaction entraîne, *in fine*, une hausse du coût des écotaxes par rapport à la situation qui prévaudrait en l'absence de taxes existantes. Ils constatent aussi que l'utilisation des recettes de l'écotaxe pour réduire les prélèvements qui ont un effet de distorsion pourrait compenser en partie cette hausse. Parry (1995) a constaté qu'en l'absence de recyclage total des recettes, le niveau optimal de l'écotaxe serait nettement inférieur à ce qu'il serait si les recettes étaient recyclées et serait même inférieur au taux pigouvien en l'absence d'interactions fiscales.

Globalement, la question de l'existence d'un double dividende n'est pas tranchée. Les politiques en faveur de l'environnement ont certes un coût, mais ce coût diminue si les recettes sont correctement recyclées. D'autres auteurs mettent toutefois en évidence d'autres situations ou distorsions susceptibles de conduire à un double dividende. Par exemple, le travail et la qualité de l'environnement peuvent être complémentaires, dans la mesure où la diminution du nombre de jours d'arrêt de travail pour affection respiratoire induit des gains de productivité.

Dans un contexte où les concurrents d'autres pays ou d'autres secteurs n'ont pas à assumer les mêmes taxes sur les émissions, les distorsions commerciales peuvent être aussi fortes que les distorsions fiscales. En pareil cas, la hausse des coûts imposée aux entreprises assujetties se traduit par une baisse des coûts relatifs des entreprises non visées ; les consommateurs modifiant leurs habitudes pour se tourner vers des produits moins réglementés, les émissions se déplacent aussi, ce qui entraîne des « fuites ». Bernard *et al.* (2007) montrent que l'ampleur de ces fuites dépend des niveaux relatifs des émissions et varie selon que les produits réglementés et non réglementés sont, ou non, facilement substituables entre eux.

Le risque de fuite d'émissions peut être utilisé comme argument pour limiter les taxes sur les émissions, mais le fait de ne pas être en mesure d'imposer des mesures de réduction de la pollution suffisantes à tous les émetteurs peut être très préjudiciable à l'environnement et au bien-être. Ainsi, exempter des secteurs clés peut à la fois produire des effets de distorsion économique non négligeables et compromettre la réalisation des objectifs environnementaux. À noter que les interactions fiscales et commerciales sont dues au fait que la taxe sur les émissions (et, plus généralement, les règles environnementales) renchérit les coûts de production. Il est cependant possible, pour éviter d'affaiblir le signal émis par la taxe, d'utiliser une partie des recettes pour compenser cette hausse des coûts marginaux. C'est précisément ce que font les systèmes de restitution sur la base de la production, qui permettent de reverser le produit de la taxe aux entreprises assujetties proportionnellement à leur production. En cas de restitution totale, le secteur d'activité est, en moyenne, dispensé du coût des émissions résiduelles, comme avec un système de normes de résultats négociables (examiné plus loin). La taxe sur les émissions continue à agir comme un signal incitant à prendre des mesures de réduction de la pollution, tandis que le mécanisme de restitution constitue une subvention à la production. De ce fait, la restitution basée sur la production crée moins d'effets d'interaction fiscale qu'une redistribution forfaitaire des recettes de la taxe, même si ces effets restent supérieurs à ceux observés lorsque les recettes sont recyclées pour abaisser la fiscalité du travail (voir, par exemple, Goulder *et al.*, 1999). Ce mécanisme limite également les interactions commerciales et les fuites d'émissions (Bernard *et al.*, 2007). Toutefois, il a aussi des inconvénients de taille : le coût des émissions visées n'étant pas intégralement répercuté, la restitution proportionnelle à la production entraîne un affaiblissement de l'incitation à réduire les émissions en diminuant la consommation du produit polluant ou en trouvant des substituts moins polluants.

2.1.5 Quels sont les incidences de la structure de marché ?

Plusieurs chercheurs, dont Levin (1985), Ebert et Hagen (1998), Requate (1993) et Simpson (1995), ont examiné l'impact des écotaxes en fonction de différentes structures de marché. Dans un régime concurrentiel, le taux pigouvien serait égal aux dommages marginaux causés par la pollution et une taxe à

ce taux aurait systématiquement un impact positif sur le bien-être. Toutefois, des résultats différents peuvent être obtenus dans d'autres structures de marché. Par exemple, Buchanan (1969) montre qu'une taxe optimale dans un contexte concurrentiel peut fort bien avoir un impact négatif sur le bien-être dans un marché monopolistique. La raison en est que deux externalités différentes sont concernées, à savoir la pollution d'une part et la capacité d'un monopole à restreindre la production et à augmenter les prix au-delà des coûts marginaux d'autre part. Lorsqu'une taxe est introduite dans ce contexte, un arbitrage est nécessairement effectué entre les avantages d'une diminution de la pollution et les coûts sociaux qui résulteraient d'une réduction supplémentaire de la production. Dans un marché monopolistique, lorsque la taxe correctrice (taxe pigouvienne) est fixée à un taux inférieur à la différence entre le prix pratiqué par l'entreprise et ses recettes marginales, il s'ensuit, *in fine*, une diminution du bien-être.

Bien que Buchanan (1969) n'ait pas spécifiquement cherché à déterminer un résultat de premier rang dans ce contexte, son analyse a mis en évidence la nécessité de prévoir un mécanisme pour corriger la restriction de la production aggravée par une taxe pigouvienne. Barnett (1980) l'a également souligné en écrivant que :

> *« Une taxe reposant uniquement sur les dommages marginaux externes ne tient pas compte du coût social d'une baisse supplémentaire de la production de la part d'un producteur dont la production est déjà inférieure au niveau optimal. La solution idéale à ce problème comporterait deux mesures : un mécanisme destiné à accroître la production de produits finals et une taxe pour réduire la déséconomie externe » (1037).*

Comme Buchanan (1969), Barnett n'a pas examiné cette solution de premier rang et a préféré chercher à savoir si un résultat de second rang pourrait être obtenu au moyen d'un seul mécanisme. Dans ce contexte, le résultat de second rang procède d'un arbitrage entre les avantages marginaux d'une baisse de la pollution et les coûts marginaux d'une baisse supplémentaire de la production. En l'occurrence, il peut être obtenu en fixant le taux de la taxe à un niveau *inférieur* aux dommages externes marginaux. L'élasticité de la demande au sein du marché est déterminante pour le résultat optimal de l'arbitrage entre ces deux aspects opposés. Barnett démontre également que le taux de second rang optimal est plus élevé pour les entreprises dont la demande est *plus élastique*. Ce résultat est diamétralement opposé aux conclusions de Baumol et Oates [voir Baumol (1972) et Baumol et Oates (1975)]. Toutefois, Barnett fait observer que ne pas faire la distinction entre une taxe correctrice (c'est-à-dire pigouvienne) et une taxe non correctrice (dont le but est de dégager des recettes, par exemple) conduira à penser que le taux optimal de second rang d'une taxe correctrice est plus élevé dans un marché où la demande est plus inélastique. Il souligne que :

> *« Habituellement, les coûts sociaux de la fiscalité sont réduits à leur minimum du fait de la diminution des distorsions dans l'utilisation des ressources dictée par le marché. Toutefois, l'objectif d'une taxe sur les polluants est de diminuer le coût social des imperfections du marché lorsque la situation de départ n'est pas idéale » (1040).*

D'autres auteurs ont élargi ces analyses et examiné les taxes environnementales dans un contexte de concurrence monopolistique. Ainsi, Levin (1985) a étudié certains des effets qualitatifs d'autres formes d'écotaxes dans un marché monopolistique. Il constate que dans ce contexte, l'application d'une fiscalité uniforme à toutes les entreprises peut conduire à une *hausse* de la pollution si les entreprises ont des fonctions de coût asymétriques. En effet, en pareil cas, une taxe sur les émissions entraîne une réallocation de la production entre les entreprises qui ont des coûts différents, ce qui peut conduire certaines d'entre elles à réagir en augmentant leur production. En outre, Simpson (1995) s'est intéressé à la taxe sur la pollution optimale dans un duopole de Cournot dans lequel les entreprises n'ont pas toutes les mêmes coûts de production. Il constate que le taux de taxe optimal peut être supérieur aux dommages marginaux de la pollution parce que la taxe peut entraîner une réallocation de la production entre les entreprises en fonction de leur efficience relative. S'intéressant à la fiscalité de façon plus générale, Katz et Rosen (1983) ont mis

au point un modèle théorique qui montre dans quelles conditions l'application d'une taxe dans un contexte monopolistique peut entraîner une *augmentation* des bénéfices des entreprises. Plus précisément, ils constatent que les anticipations d'une entreprise au sujet de la réaction d'une entreprise concurrente à une variation quelconque de la production peuvent conduire au fait que l'application d'une taxe « entraîne une réduction concertée de la production » (5). L'étude de Katz et Rosen était consacrée à l'impôt sur les sociétés, mais elle n'en confirme pas moins que la structure de marché est un facteur important à prendre en compte dans l'analyse des effets de nouvelles taxes.

2.1.6 Quelles sont les incidences de la structure de marché sur l'efficacité des taxes assorties d'un mécanisme de restitution ?

Gersbach et Requate (2004) se sont intéressés aux dispositifs de restitution dans des régimes de concurrence parfaite et de concurrence imparfaite. Dans un contexte de concurrence parfaite, ces dispositifs sont préjudiciables parce qu'ils agissent comme une subvention à la production qui fausse les mécanismes incitatifs destinés aux entreprises, si bien que la production atteint un niveau supérieur au niveau efficient. Dans un contexte de concurrence imparfaite, la restitution est susceptible de compenser la tentation des entreprises d'exploiter leur pouvoir de marché pour augmenter les prix en réduisant la production.

Gersbach et Requate (2004) ont supposé que le nombre d'entreprises présentes sur le marché était fixe. À long terme, les entreprises sont toutefois libres d'entrer sur un marché ou d'en sortir après l'introduction d'une nouvelle taxe sur la pollution ou d'un nouveau dispositif de restitution, ce qui peut modifier certains résultats. Cato (2010) montre que dans un contexte de libre entrée sur le marché, une écotaxe, associée à un dispositif de restitution reposant sur les parts de marché et à une taxe à l'entrée sur le marché, permet d'obtenir un résultat de premier rang. La taxe à l'entrée est utilisée pour réduire les pertes d'efficience liées à l'entrée d'un trop grand nombre de nouvelles entreprises sur le marché.

Fischer (à paraître) attire l'attention sur un autre point : ces mécanismes de taxe et de restitution optimaux ne fonctionnent que si tous les acteurs du marché sont identiques, comme le présupposent les études précédentes. Elle montre que dans des marchés où la concurrence est imparfaite et où les coûts et parts de marché varient fortement d'une entreprise à l'autre, les mécanismes de restitution risquent d'entrainer des distorsions supplémentaires aboutissant à une hausse générale des coûts. Lorsqu'une entreprise qui détient une plus grande part de marché prend conscience qu'une part plus élevée du produit de la taxe lui sera restituée, elle a l'impression de payer, après restitution, une taxe sur les émissions plus faible que celle versée par les entreprises détenant une part de marché plus petite ; de ce fait, il n'y a pas égalisation des coûts marginaux de dépollution. Fischer étudie ensuite un duopole de Cournot dans lequel les entreprises qui ont des coûts de production plus élevés (mais des coûts de dépollution identiques) détiennent des parts de marché plus faibles. Elle montre que, pour un taux de taxe équivalent, le mécanisme de restitution se traduit par une augmentation de la production et des émissions comparativement à une subvention fixe, également sans incidence sur les recettes ; par conséquent, pour obtenir la même intensité d'émission avec ce mécanisme qu'avec une subvention fixe, il faut imposer une taxe sur les émissions plus élevée. Dans ce cas, pour une intensité d'émission équivalente, le mécanisme de restitution entraîne une hausse des coûts de dépollution comparativement à une subvention fixe ; en revanche, les coûts de production marginaux diminuent pour toutes les entreprises. Le niveau général de la production et des émissions est donc plus élevé avec ce mécanisme qu'avec une subvention fixe. De surcroît, le mécanisme de restitution entraîne une réallocation de la production vers l'entreprise dont les coûts sont les plus élevés, si bien qu'il est encore plus coûteux de respecter un objectif d'émissions.

Bien que le mécanisme de restitution ne soit pas une composante obligatoire des taxes sur la pollution, de nombreux dispositifs comportent un système qui permet de restituer des recettes aux entreprises. La complexité, les interactions et les effets inattendus mis en évidence par la littérature montrent à quel point il est important de définir des taxes et redevances sur la pollution pour des marchés et secteurs spécifiques plutôt que d'adopter une approche uniforme.

2.1.7 Comparaison des systèmes de plafonnement et d'échange et des taxes et redevances

La réflexion sur les avantages relatifs des instruments de politique environnementale fondés sur les prix et de ceux fondés sur les quantités a commencé avec Weitzman (1974), qui les a comparés dans un contexte d'incertitude au sujet des coûts et avantages marginaux des mesures en faveur de l'environnement. Il a constaté que le choix de l'instrument dépendait des pentes relatives des coûts et avantages marginaux – autrement dit, des attentes des autorités chargées de la réglementation quant au rythme auquel les avantages supplémentaires induits par la réduction des émissions diminuent par rapport à celui auquel les coûts supplémentaires liés à la dépollution augmentent à mesure que le niveau de réduction croît. Si la courbe des coûts marginaux des émissions est relativement abrupte, il faut privilégier un mécanisme reposant sur les quantités ; en revanche, si elle est relativement plate, une taxe est préférable puisqu'un léger écart par rapport aux résultats environnementaux visés aura une incidence relativement modeste. S'agissant des gaz à effet de serre, il faut donc préférer les instruments fondés sur les prix à ceux fondés sur les quantités parce que les avantages supplémentaires qui découlent d'une légère réduction des émissions par rapport à un niveau de référence donné sont relativement faibles, alors que les coûts des mesures de réduction des émissions de CO_2 peuvent être élevés en cas de réduction de grande ampleur. Des études plus récentes ont effectué cette comparaison dans le contexte du changement climatique.

Pizer (2002) a comparé les avantages des mesures fondées sur les prix, des mesures fondées sur les quantités et de mécanismes hybrides, associant des caractéristiques de ces deux instruments. Il a constaté que les mesures fondées sur les prix optimales (une taxe sur les émissions) se traduisaient par un gain de bien-être attendu *cinq* fois supérieur à celui obtenu avec des mesures fondées sur les quantités (par exemple un dispositif de plafonnement et d'échange). Ce résultat suit la même logique que l'analyse de Weitzman, qui démontrait l'importance relative de la pente des fonctions de coûts marginaux et avantages marginaux en présence d'incertitude. Pizer a également cherché à déterminer si les mesures « hybrides », qui associent des caractéristiques des taxes et des permis négociables, étaient préférables à l'un ou l'autre de ces deux instruments utilisé seul. Il a constaté que les politiques hybrides optimales, caractérisées par des prix plafond ou des « soupapes de sécurité », tendent à être supérieures aux mécanismes qui reposent exclusivement sur les quantités en termes d'impact global sur le bien-être économique. Ce résultat vaut même pour des politiques hybrides sous-optimales. De surcroît, les mécanismes hybrides peuvent produire des effets attendus sur le bien-être similaires à ceux d'un instrument fondé sur les prix optimal. Cette dernière observation, ajoutée à la préférence de l'économie politique pour les instruments fondés sur les quantités, conduit l'auteur à considérer ces instruments hybrides comme un substitut important à une approche reposant uniquement sur une taxe, qui risquerait d'avoir du mal à s'imposer en cas d'opposition politique.

Fell et Morgenstern (2010) ont évalué l'efficacité de différentes mesures de maîtrise des coûts dans le cadre d'un système de plafonnement et d'échange. Plus précisément, ils ont comparé les avantages de mécanismes fondés sur les prix, sur les quantités et de mécanismes hybrides. Ils ont constaté que la limitation de la capacité des entreprises à mettre en réserve des droits d'émission entraîne une augmentation du coût attendu de l'instrument. La possibilité de mettre en réserve des droits peut se traduire par une diminution des coûts parce qu'elle permet aux entreprises de disposer d'une plus grande latitude quant au choix du *moment* où elles vont réduire leurs émissions. Lorsque ce choix est entravé par une limitation de la capacité à mettre en réserve des droits dans un système de plafonnement et d'échange, la flexibilité intertemporelle offerte aux entreprises est moindre, si bien que globalement, leurs coûts augmentent. De plus, Fell et Morgenstern constatent que les mécanismes de contrôle des prix (comme les soupapes de sécurité et les prix encadrés par un plafond et un plancher) peuvent entraîner une baisse non négligeable des coûts attendus. La raison en est relativement simple : l'introduction d'un prix plafond dans un dispositif de plafonnement et d'échange permet de bénéficier d'une souplesse au niveau du plafond d'émission global si les coûts de mise en conformité deviennent trop élevés. Toutefois, dans ce cas, les *coûts de mise en conformité* attendus seraient certes plus faibles, mais l'augmentation des émissions au-delà du plafond entraînerait des dommages externes.

Les taxes sur les émissions et permis d'émission ont également été comparés dans un contexte d'innovation. Lorsque le système en place est un système de taxes sur les émissions, l'innovation tend à abaisser à la fois les coûts de mise en conformité et les émissions ; pour un prix donné des émissions, si les coûts marginaux de dépollution diminuent, la réduction de la pollution augmente jusqu'à ce que les coûts marginaux soient de nouveaux égaux au prix. Lorsque le système en place est un dispositif de plafonnement et d'échange, les coûts de mise en conformité diminuent, mais, par définition, le niveau global des émissions ne varie pas ; en revanche, le prix des émissions diminue jusqu'à atteindre les nouveaux coûts marginaux de dépollution. Milliman et Prince (1989) montrent que les avantages potentiels de l'innovation pour les entreprises sont plus importants dans le cas d'un système de plafonnement et d'échange avec attribution des permis par voie d'enchères, les coûts de mise en conformité pour les émissions résiduelles diminuant à mesure que le prix des émissions baisse. Toutefois, Fischer *et al.* (2003) montrent que, dans un contexte décentralisé, si le prix du carbone diminue, le prix que les entreprises non innovatrices sont prêtes à payer aux entreprises innovatrices pour adopter une nouvelle technologie est moins élevé puisqu'elles ont à leur disposition une autre solution, moins coûteuse ; par conséquent, un système de taxes favorise davantage la recherche et développement qu'un système de plafonnement et d'échange avec attribution des permis par voie d'enchères, sauf si l'entreprise qui innove doit, elle-même, assumer des coûts de mise en conformité très élevés.

2.2 La taxation des émissions dans la pratique

D'un point de vue théorique, le taux auquel il faut fixer les taxes et redevances environnementales doit dépendre des dommages marginaux de la pollution. Dans la pratique, la détermination du taux suppose de disposer d'informations précises sur tous les mécanismes par lesquels un polluant donné cause des préjudices, d'indicateurs précis sur les dommages causés et d'une bonne connaissance de la structure de marché ; or, ces informations peuvent se révéler inexactes ou faire défaut. En réalité, bon nombre de taxes sur l'eau et sur l'énergie visent davantage à dégager des recettes qu'à créer des incitations à réduire les émissions ; dans certains cas, le taux global est fixé pour dégager des recettes qui seront utilisées pour financer des subventions destinées à compenser les investissements dans les équipements de réduction de la pollution.

2.2.1 Redevances sur les émissions en Suède et en France

À partir du milieu des années 80, la France a instauré une taxe sur les émissions d'oxydes d'azote (NO_x) produites par le secteur de l'énergie et les chaudières industrielles. La Suède a introduit un droit comparable en 1992[2]. Ces deux pays appliquent également des redevances au titre des émissions de SO_2. La France a d'abord été motivée par le problème des pluies acides (Millock et Sterner, 2004) et la redevance ne visait que les émissions de SO_2. En revanche, la taxe suédoise a d'abord été conçue pour réduire les émissions de NO_x. À la suite de la signature, en 1999, du Protocole de Göteborg rédigé sous les auspices de la Commission économique des Nations Unies pour l'Europe, Convention sur la pollution atmosphérique transfrontière à longue distance, des limites aux émissions de SO_2, de NO_x, de composés organiques volatils et d'ammoniac (NH_3) des États membres de l'Union européenne ont été imposées. Par la suite, une directive européenne a fait obligation aux États membres de fixer des plafonds d'émission, ce qui supposait que la France et la Suède réduisent respectivement, à l'horizon 2010, de 54 % et 56 % leurs émissions de NO_x par rapport à leur niveau de 1990.

[2] Les émissions de dioxyde de soufre dépendent de la teneur en soufre du charbon et de la technologie de désulfuration utilisée, le cas échéant. Les émissions d'oxydes d'azote dépendent, dans une certaine mesure, de la teneur en azote du charbon mais surtout de la température de combustion de la chaudière. Cette température varie elle-même selon la technologie utilisée.

En Suède, les taxes sur les émissions de SO_2 et de NO_x (plus précisément de monoxyde et de dioxyde d'azote, mais pas de protoxyde d'azote) ont été fixées respectivement à 3 000 et 4 000 USD par tonne. Au départ, l'application de la taxe sur les émissions de NO_x était basée sur un seuil de production d'énergie : les chaudières industrielles, moteurs à combustion fixes et grosses turbines à gaz étaient soumis à la taxe sur l'ensemble de leurs émissions à partir d'un certain seuil de production d'énergie. Par la suite, le dispositif se révélant efficace et le coût du suivi des émissions étant en baisse, le seuil initial a été abaissé de façon à ce que la taxe s'applique à un plus grand nombre de sources de pollution. Les émissions de SO_2 peuvent être calculées à partir de la teneur en soufre du combustible ; les émissions de NO_x résultent d'un phénomène non linéaire et dépendent de la technologie et de son « réglage ». Il s'ensuit que le contrôle de la réduction des émissions de NO_x suppose un suivi étroit par de multiples intervenants. Néanmoins, les recettes dégagées par la taxe sur les émissions de NO_x sont beaucoup plus élevées que les coûts administratifs du dispositif et le solde est restitué aux entreprises sur la base d'un calcul complexe de « la production d'énergie utile ». Selon Millock et Sterner (2004), les coûts administratifs représentent environ 0.5 % des recettes, pour des recettes nettes d'environ 500 millions SEK (50 millions USD).

En France, la taxe s'est d'abord appliquée à partir d'un seuil de production d'énergie supérieur à celui retenu en Suède et s'établissait à 150 FRF (environ 23 USD) par tonne (Millock et Sterner, 2004). Les entreprises calculent elles-mêmes leurs émissions, soit à partir de mesures directes, soit, ce qui est le plus fréquent, à partir des données sur leur consommation de combustible. Les coûts administratifs représentent une faible proportion des recettes et le solde est presque intégralement utilisé pour financer des subventions au titre des mesures prises par les entreprises assujetties pour réduire leurs émissions ; presque toutes les demandes de subvention sont acceptées (Millock et Sterner, 2004).

Comme on pouvait s'y attendre, les systèmes de restitution français et suédois n'ont pas le même impact redistributif. En Suède, les recettes sont reversées aux entreprises qui produisent plus d'énergie, alors qu'en France, les entreprises doivent prendre individuellement l'initiative de déposer une demande de subvention. Compte tenu des niveaux relatifs du taux de taxe, l'incitation à réduire la pollution est nettement plus forte en Suède qu'en France. Le dispositif suédois s'étant révélé fructueux, il a été étendu pour couvrir davantage d'émetteurs. On estime que la taxe suédoise sur les émissions de NO_x offre aux entreprises une forte incitation à adopter un équipement spécifique ainsi qu'à régler avec précision leurs technologies de production afin de réduire leurs émissions. S'agissant de l'efficacité de la taxe française, Millock et Sterner soulignent que « plus qu'un instrument visant à stimuler le développement technologique, la taxe française sur les émissions de NO_x est un instrument complémentaire, qui offre aux entreprises une motivation supplémentaire pour respecter la réglementation contraignante en investissant dans les équipements subventionnés » (129).

2.2.2 Taxe de pollution des eaux de surface aux Pays-Bas

Les Pays-Bas ont instauré un système de taxe de pollution des eaux de surface dans le sillage de l'adoption de la loi de 1970 sur la pollution des eaux de surface, qui autorisait l'application de redevances pour couvrir les investissements dans le traitement des eaux usées (Bressers et Lulofs, 2004). Le montant de la redevance reposait sur un mécanisme à plusieurs niveaux. Le système respecte le principe « pollueur-payeur », mais cherche à réduire le plus possible les charges administratives. Les entreprises les moins polluantes paient une redevance forfaitaire peu élevée, les entreprises de taille moyenne utilisent le tableau des coefficients de rejet d'eaux usées pour évaluer leurs rejets et calculer leur redevance et les plus grandes entreprises sont tenues de mesurer leurs rejets réels et de payer une redevance en conséquence.

La redevance étant fixée par les agences locales de l'eau pour couvrir les coûts liés à la gestion du système, leur montant varie d'un lieu à l'autre. Il est donc peu vraisemblable qu'elle corresponde au niveau « optimal », c'est-à-dire que le coût marginal des rejets (en d'autres termes la redevance) soit égal aux dommages marginaux. Ce système a cependant apporté la preuve de son efficacité en termes de réduction de la pollution par les eaux usées causée par le secteur industriel.

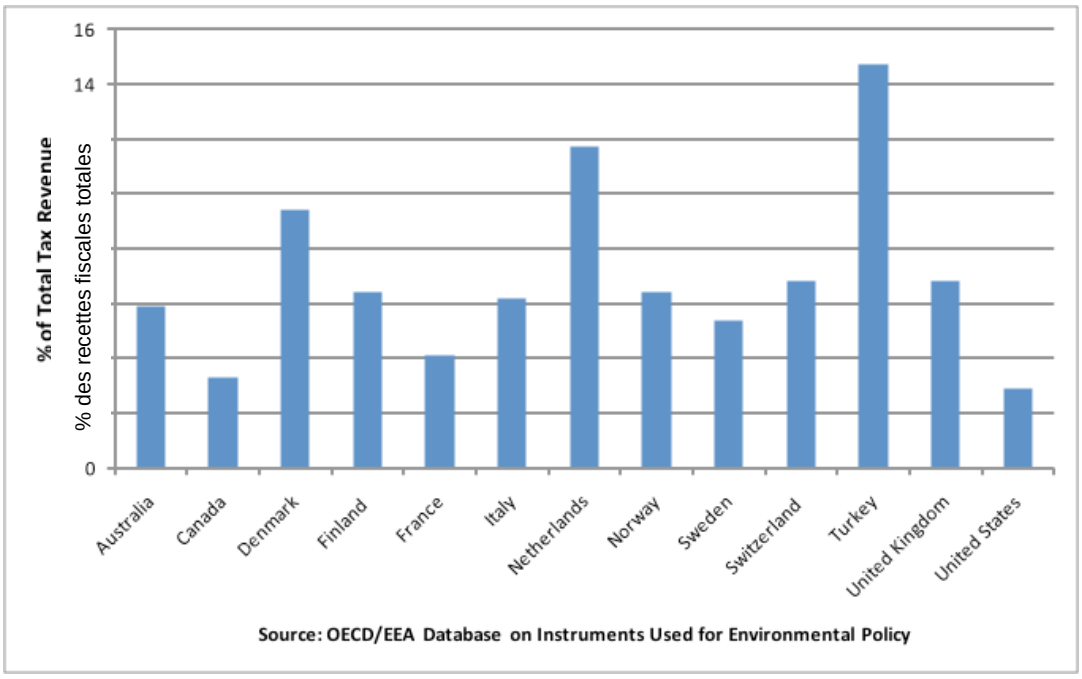
2.2.3 Taxe de pollution des eaux en Allemagne

L'Allemagne a mis au point son premier système de taxe de pollution par les eaux usées après l'adoption de la loi fédérale de 1957 sur les ressources en eaux, en 1957 (Anderson, 2001). Puis, après l'adoption de la loi de 1976 relative à la taxe sur les eaux usées, elle a introduit, en 1981, une taxe sur les eaux usées. Un taux identique est appliqué sur l'ensemble du territoire allemand, mais le produit de la taxe est géré par les *Länder* et sert à subventionner la construction de stations d'épuration publiques. Seules les entreprises qui rejettent des effluents directement dans les eaux de surface sont assujetties ; elles peuvent obtenir une exemption si elles apportent la preuve de leur conformité aux normes technologiques. Dans ce cas, il y a donc association d'instruments de marché et d'instruments réglementaires contraignants.

2.2.4 La taxation des émissions dans les pays de l'OCDE

D'autres pays de l'OCDE ont aussi instauré des taxes sur les émissions. Le graphique 1 présente la part que représente le produit des taxes liées à l'environnement en pourcentage des recettes fiscales totales ; cette part varie de 2.9 % aux États-Unis, ce qui est faible, à légèrement plus de 14 % en Turquie. Pour l'ensemble de l'OCDE, la part moyenne du produit des taxes liées à l'environnement est comprise entre 1.7 % (moyenne pondérée) et 2.3 % (moyenne arithmétique). Cette part a diminué ces dernières années parce que la consommation d'essence par unité de PIB a reculé (OCDE, non daté).

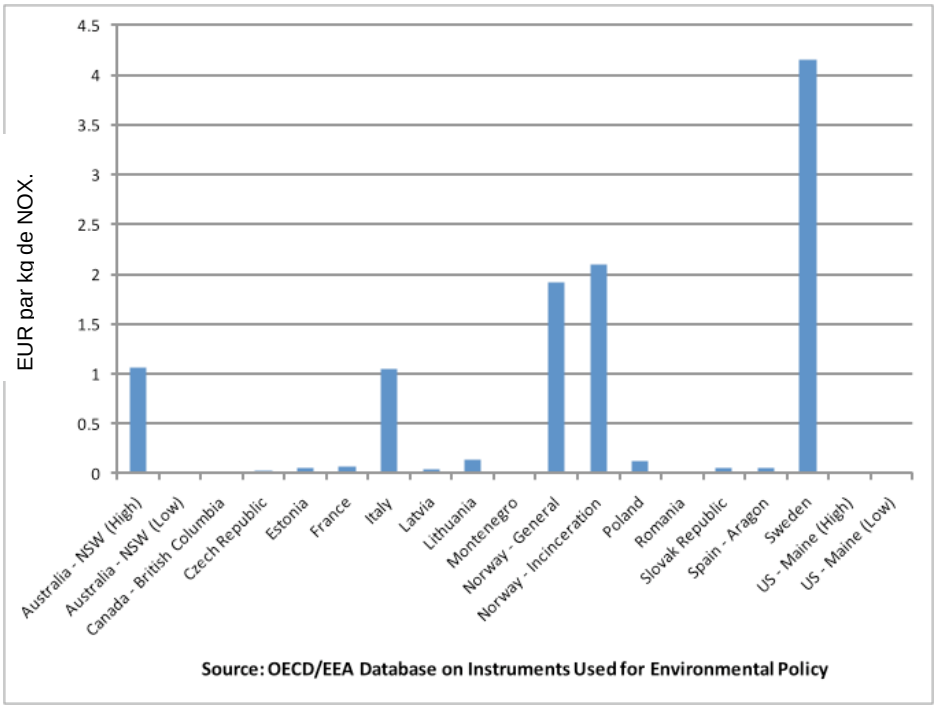
Graphique 1. Produit des taxes liées à l'environnement en pourcentage des recettes fiscales totales, 2007



Source : Base de données OCDE/AEE sur les instruments employés dans la politique de l'environnement et la gestion des ressources naturelles.

Bien qu'elles représentent une part relativement limitée des recettes fiscales totales, les taxes liées à l'environnement peuvent avoir un effet incitatif très fort, en particulier lorsque leur assiette diminue (OCDE, 1997). Le graphique 2 présente le taux des taxes sur les émissions de NO_x dans les pays de l'OCDE.

Graphique 2. Taux des taxes sur les émissions de NO_x, 2009



Source : Base de données OCDE/AEE sur les instruments employés dans la politique de l'environnement et la gestion des ressources naturelles.

Le taux de la taxe sur les émissions de NO_x varie fortement d'un pays de l'OCDE à l'autre, le taux maximum, de 4 EUR par kg, étant appliqué par la Suède. La plupart des pays appliquent un taux faible, inférieur à 1 EUR par kg, mais la Nouvelle-Galles du Sud (Australie), l'Italie et la Norvège appliquent un taux compris entre 1 et 2 EUR par kg.

D'autres pays de l'Union européenne que ceux examinés ci-dessus ont mis en place des taxes ou redevances similaires. L'Agence européenne pour l'environnement (AAE, 2005) présente des exemples de pays européens qui ont introduit des taxes (ou redevances) environnementales. En plus des taxes sur les émissions de NO_x et de SO_2 appliquées en France et en Suède, des taxes sur les émissions de SO_2 sont aussi en place au Danemark, en Norvège et en Suisse. Par ailleurs, plusieurs États membres de l'Union européenne, dont la Finlande, le Danemark, l'Allemagne, les Pays-Bas, la Norvège, la Pologne, la Slovénie, la Suède et le Royaume-Uni, ont instauré une taxe sur les émissions de CO_2. L'Estonie en a introduit une en 2000. Certains États membres, dont la République tchèque, l'Estonie, la Lettonie, la Lituanie, la Pologne et la Russie, sont dotés d'un système complet de taxes reposant sur une approche multipolluant. La Russie a mis en place un système qui couvre 200 polluants atmosphériques différents (AAE, 2005).

3. Subventions en faveur de l'environnement

Les subventions sont un mécanisme d'incitation financière destiné à favoriser des actions de nature à améliorer les résultats environnementaux, par exemple la réduction des émissions en-deçà du niveau de référence, l'adoption de technologies peu polluantes ou la mise en œuvre d'activités de recherche et développement dans le domaine de l'environnement. Elles peuvent revêtir des formes diverses : subventions directes, crédits d'impôt à l'investissement ou à la production, solutions de financement à conditions préférentielles, autorisation d'amortissement accéléré, mesures incitatives en faveur de la recherche et développement et application de tarifs préférentiels aux technologies non polluantes (avec obligation d'achat, par exemple dans le cas de l'application de tarifs d'achat). Ces mesures ont été appliquées à la production d'énergie renouvelable et aux activités de recherche et développement dans bon nombre de pays de l'OCDE.

3.1 Les subventions à l'environnement : aspects théoriques

Parce qu'elle abaisse le coût des actions destinées à protéger l'environnement (ou à moins lui nuire), une subvention peut être un outil efficace pour influer sur le comportement des entreprises. En théorie, il est possible de créer le même différentiel de prix entre un comportement polluant et un comportement non polluant en subventionnant les mesures de réduction de la pollution qu'en taxant les émissions.

Toutefois, à long terme, les subventions ne sont pas aussi efficientes que les taxes sur les émissions. Par leur principe même, elles ne respectent pas le principe pollueur-payeur : au lieu de payer pour la pollution qu'il cause, le pollueur est payé pour éviter de polluer. Par conséquent, bien que les avantages marginaux de la réduction de la pollution puissent être internalisés à court terme, l'absence de discipline de marché implique qu'à long terme, les coûts moyens de dépollution ne sont pas pleinement pris en compte. Il s'ensuit un surinvestissement dans les activités polluantes.

3.1.1 Quand faut-il préférer les subventions aux taxes ?

En règle générale, les taxes sont un outil plus efficace pour internaliser les externalités négatives, alors que les subventions sont un moyen plus efficace d'internaliser les externalités positives. Les retombées sur l'innovation constituent un bon exemple de situation dans laquelle les subventions pourraient être adaptées. Ainsi, les responsables de l'action publique peuvent subventionner les dépenses de recherche et développement s'ils estiment qu'en l'absence d'aide extérieure, les activités de recherche et développement dans le domaine de l'innovation verte risquent d'être insuffisantes.

Même lorsqu'elles ne sont pas efficientes, les subventions sont parfois préférables à des taxes sous-optimales. Ainsi, si l'opposition aux taxes ou autres considérations d'économie politique empêchent d'imposer une taxe égale à l'intégralité des dommages causés par les émissions, il est possible qu'une subvention reflétant plus pleinement la valeur de la réduction des émissions constitue un meilleur moyen d'obtenir les résultats environnementaux visés.

3.1.2 Comment les subventions doivent-elles être conçues ?

Les principes qui président à la conception des subventions sont les mêmes que ceux auxquels obéit la mise au point des taxes. Ainsi, il convient que l'indicateur pris en compte pour l'octroi de la subvention reflète le plus fidèlement possible le comportement favorable à l'environnement adopté par l'entreprise. Le montant optimal de la subvention est celui qui reflète l'avantage marginal externe de ce comportement.

Il est essentiel, lors de la mise au point d'un régime de subventions à l'environnement, d'adapter les mécanismes d'incitation à long terme en conséquence. En principe, c'est lorsqu'elles sont conçues comme des mesures transitoires que les subventions présentent le plus d'intérêt. Par exemple, les subventions à l'énergie renouvelable peuvent être utilisées pour soutenir les technologies non polluantes en l'absence de prix du carbone suffisamment élevé. Il convient cependant de les supprimer progressivement, à mesure que leur effet positif diminue et que la tarification des externalités environnementales reflète les externalités réelles.

3.1.3 Comment doivent-elles être financées ?

Il est fréquent que les subventions environnementales soient financées par le budget général, en particulier sous forme d'abandon de recettes fiscales. Toutefois, en pareil cas, le remplacement des recettes perdues par des prélèvements sur le travail ou le capital susceptibles d'avoir un effet de distorsion sur le taux d'activité et les décisions d'investissement risque de renchérir le coût global de la politique de l'environnement.

Il est aussi envisageable d'utiliser les écotaxes pour financer les subventions environnementales. Par exemple, le produit d'une taxe carbone d'un montant modeste peut être utilisé pour subventionner les

investissements dans les technologies à faible émission de carbone. Le système des tarifs d'achat consiste en réalité à offrir un tarif subventionné pour la production d'énergie renouvelable à travers un impôt implicite sur la consommation d'électricité totale. Nous verrons, dans la partie suivante, que les normes de résultats négociables sont également des systèmes qui taxent certains comportements et en subventionnent d'autres.

3.2 Les subventions environnementales dans la pratique

Dans la pratique, il existe peu de subventions directes destinées à encourager la réduction des émissions. En revanche, les subventions environnementales sont souvent utilisées pour favoriser l'adoption de nouvelles technologies et pratiques moins polluantes. Elles ont été utilisées dans l'ensemble de l'OCDE pour promouvoir les énergies renouvelables, le retrait de la circulation des vieux véhicules, l'installation d'équipements destinés à réduire la pollution, l'achat d'appareils ayant un bon rendement énergétique ainsi que l'isolation thermique des bâtiments.

Le tableau 1 recense quelques exemples de subventions environnementales introduites dans certains pays de l'OCDE.

Tableau 1. Exemples de subventions environnementales introduites dans quelques pays de l'OCDE

Lieu	Subvention/aide financière/remise	Objectif
États-Unis	Aides financières pour l'achat d'autobus scolaires peu polluants	Promouvoir les nouvelles technologies de réduction de la pollution
États-Unis	Crédits d'impôt sur les sociétés au titre de l'énergie éolienne et solaire	Promouvoir l'adoption de technologies liées aux énergies renouvelables
États-Unis	Remise pour la conversion de véhicules	Inciter à convertir les véhicules pour qu'ils fonctionnent avec des carburants de substitution
États-Unis	Dispositif de prêts en faveur des énergies de substitution (prêts consentis à des conditions avantageuses)	Financer l'installation de systèmes utilisant des énergies de substitution
Canada	Dispositif de prime à la casse	Offrir une incitation financière au retrait de la circulation des vieux véhicules
Danemark	Aide financière pour la réduction de la pollution par les particules solides occasionnée par les poids lourds	Favoriser la modernisation des véhicules et/ou l'achat de véhicules neufs
Japon	Prêts à des conditions avantageuses pour les investissements visant à réduire la pollution	Accélérer l'adoption de technologies de réduction de la pollution
Pays-Bas	Subvention en faveur de l'électricité produite à partir de la biomasse	Promouvoir la production d'électricité à partir de la biomasse
Royaume-Uni	Dispositif en faveur des zones protégées	Inciter les agriculteurs à adopter certaines pratiques agricoles

Source : Base de données OCDE/AEE sur les instruments employés dans la politique de l'environnement et la gestion des ressources naturelles.

3.2.1 Subventions aux énergies renouvelables

La plupart des pays européens ont instauré des subventions qui garantissent aux producteurs d'énergie renouvelable un accès au réseau électrique à un tarif supérieur à celui du marché. Connues sous le non de « tarifs d'achat », elles permettent à ces producteurs de bénéficier de contrats de longue durée, ce qui réduit l'incertitude sur les prix et favorise l'investissement. En principe, les tarifs d'achat diminuent au fur et à mesure de l'exécution du contrat ; ils tendent aussi à être plus incitatifs en ce qui concerne les technologies renouvelables relativement coûteuses. Par exemple, la technologie photovoltaïque nécessite une subvention plus élevée que certaines technologies plus rentables, comme la technologie éolienne. Par ailleurs, bon nombre de dispositifs limitent la taille des installations qui peuvent bénéficier de contrats. Toutefois, il existe des différences considérables entre les systèmes de tarifs d'achat en place en Europe, en Australie, au Canada, aux États-Unis et dans les pays en développement.

Les subventions à la production sont un moyen plus simple de subventionner la production d'électricité renouvelable. Elles peuvent revêtir des formes diverses, telles que crédits d'impôt, remises ou appels d'offres, mais consistent, en règle générale, à indemniser les producteurs pour chaque unité d'électricité produite à partir de certaines sources renouvelables. À la différence des tarifs d'achat, les subventions à la production ne garantissent ni la stabilité des prix à long terme ni l'accès au réseau de distribution d'électricité. Par conséquent, les incertitudes quant à l'évolution de la demande et des prix sont susceptibles de rendre les investissements moins attrayants qu'ils ne le sont dans le cadre d'un système de tarifs d'achat. Alors qu'en Europe la plupart des subventions à la production ont été supplantées par les quotas d'énergie verte et les tarifs d'achat, aux États-Unis, les subventions à la production accordées par l'État fédéral et les États fédérés continuent de constituer une composante importante de la politique en faveur des énergies renouvelables. Le plus souvent, la panoplie d'instruments utilisés comporte aussi une forme quelconque de subventions directes à l'investissement dans les installations de production d'énergie renouvelable.

Dans la pratique, on estime que le système de tarifs d'achat stimule le développement des énergies renouvelables, en particulier lorsqu'il est associé à d'autres subventions aux énergies renouvelables. Selon un rapport publié en 2008 par l'Agence internationale de l'énergie (AIE), les panoplies d'instruments les plus efficaces pour favoriser le développement de l'énergie éolienne terrestre comportent essentiellement des tarifs d'achat d'un montant relativement modeste. Il ressort également de cette étude qu'aux États-Unis, les systèmes de crédits d'impôt à la production ont manqué de stabilité et d'homogénéité entre États, si bien que le développement de l'énergie éolienne n'a pas été optimal (AIE, 105-8). Mulder (2008) constate que les pays d'Europe où la pénétration de l'éolien est la plus forte (Danemark, Espagne et Espagne) ont associé tarifs d'achat et subventions à la production et à l'investissement. Buen (2006) parvient à la même conclusion eu égard à la politique éolienne du Danemark, mentionnant la stabilité dans le temps des tarifs d'achat et subventions à l'investissement.

Par ailleurs, la plupart des politiques destinées à favoriser les énergies renouvelables comportent des subventions à la recherche et développement. Ces subventions, prêts et incitations fiscales visent à favoriser des réductions de coûts à l'avenir tout en tenant compte des retombées technologiques. Des études empiriques montrent que les subventions à la recherche et développement tendent à accroître l'effet d'apprentissage dans le domaine des technologies renouvelables. Ces études montrent aussi que des subventions à la recherche et développement associées à des tarifs d'achat ou à des subventions à l'investissement ont aidé le Danemark à accroître à la fois l'innovation dans le domaine des technologies éoliennes et la diffusion de ces technologies (Söderholm et Klaassen, 2007 ; Klaassen *et al.*, 2005). Johnstone *et al.* (2010) et Unger et Ahlgren (2005) constatent que les systèmes de tarifs d'achat ciblant des technologies renouvelables plus coûteuses peuvent contribuer à promouvoir l'innovation.

3.2.2 Subventions en faveur du rendement énergétique

L'amélioration du rendement énergétique est un autre objectif fréquemment visé par les subventions, de nombreux consommateurs étant considérés comme trop peu sensibles aux avantages économiques d'une moindre consommation d'énergie. Ces dispositifs de subvention ont un principe pour but d'abaisser le coût initial des investissements dans l'amélioration du rendement énergétique à travers des aides financières, des crédits d'impôt ou des prêts à taux bonifié.

Par exemple, aux États-Unis, l'État fédéral octroie des crédits d'impôt sur le revenu au titre de l'achat de certains appareils, portes et fenêtres présentant un bon rendement énergétique. Le dispositif d'aide à l'isolation thermique pour les ménages à bas revenu *(U.S. Low-Income Weatherization Program)* était conçu pour favoriser les économies d'énergie et aider simultanément les ménages modestes à s'acquitter de leurs factures d'énergie. Comme décrit par Gillingham *et al.* (2004), les familles à faible revenu consacrent une forte proportion de leur budget aux dépenses d'énergie et ont généralement des logements plus vétustes, si bien qu'ils constituent une cible intéressante pour l'octroi de subventions. Un programme

comparable, dénommé programme d'aide à l'énergie pour les familles à faible revenu *(Low-Income Home Energy Assistance Programme)*, a été mis en place sous l'égide du ministère fédéral de la Santé et des Services humains.

À noter que les entreprises de services d'utilité publique ont mis en œuvre, dans le cadre de la « gestion par la demande » (*Demand-Side Management*, DSM), des programmes consistant à offrir des subventions à tous les consommateurs au lieu de les attribuer exclusivement aux ménages modestes. Aux États-Unis, ces dispositifs associent campagnes de sensibilisation et prêts subventionnés, remises et autres mécanismes destinés à favoriser l'isolation thermique et/ou l'achat d'appareils neufs présentant un meilleur rendement énergétique. Ces mesures montrent que les subventions destinées à favoriser l'adoption de technologies respectueuses de l'environnement ne doivent pas obligatoirement être financées par l'État. (Gillingham *et al.* 2004).

3.2.3 Dispositifs de prime à la casse

Les subventions destinées à favoriser la mise à la casse de véhicules anciens ont connu un véritable engouement pendant la crise mondiale, parce qu'elles ont été vues comme un moyen de rendre le parc automobile moins gourmand en carburant et de stimuler l'économie. Le dispositif de prime à la casse *(« Cash for Clunkers »)* mis en place aux États-Unis offrait des remises généreuses pour la reprise de véhicules anciens, consommant davantage de carburant, et des dispositifs similaires ont aussi été mis en place au Canada, en France et en Allemagne en 2008-2009.[3]

Ces dispositifs ont une efficacité limitée, d'une part parce qu'ils sont de nature temporaire, d'autre part parce qu'ils n'ont qu'un impact indirect sur la consommation de carburant. Prenant la forme d'un crédit d'impôt temporaire – en particulier aux États-Unis, où le budget initialement prévu n'a financé le programme que pendant moins de deux mois (alors qu'il y avait déjà trop de demandes dès la première semaine) – la subvention a essentiellement pour effet de conduire les clients à anticiper un achat qu'ils auraient de toute façon effectué. Selon Li *et al.* (2010), la hausse des ventes imputable aux dispositifs de prime à la casse observée mi-2009 correspond en majeure partie à une anticipation des achats. D'après leurs calculs, la réduction des émissions de CO_2 liée au dispositif a coûté entre 91 USD et 301 USD par tonne. Ce coût relativement élevé montre que les subventions de ce type n'influencent qu'un petit nombre de transactions, parmi lesquelles certaines auraient, de toute façon, été effectuées, tandis qu'elles n'ont aucune influence sur le comportement au volant et sur le reste du parc automobile en circulation.

3.2.4 Exploiter les subventions non liées à l'environnement à des fins environnementales

Un rapport de l'AEE (AEE, 2005) contient plusieurs observations relatives à l'utilisation des subventions. Il relève en particulier que :

- les subventions économiques ne sont pas toutes dommageables pour l'environnement ;
- les subventions en faveur de l'environnement ne sont pas toutes positives pour l'environnement ;
- l'élimination des subventions jugées dommageables pour l'environnement n'est pas toujours bénéfique pour l'environnement.

Si la première observation est relativement simple, la deuxième montre que certaines subventions à l'environnement peuvent en réalité créer des incitations à accroître la production et nuire à la qualité de l'environnement. Dans le même temps, la suppression de subventions perçues comme dommageables pour l'environnement peut obliger à un arbitrage délicat entre efficience économique et protection de l'environnement.

[3] http://www.iea.org/textbase/pm/?mode=pm.

Dans la pratique, des réserves sont émises quant à l'efficacité et l'efficience à long terme des subventions. Comme le souligne le rapport de l'AEE, « les subventions peuvent certes faciliter la création de marchés et accélérer leur développement et celui des technologies, mais elles peuvent aussi ralentir ce développement et contribuer à pérenniser les systèmes existants » (101). Les subventions non liées à l'environnement déjà en place, comme celles versées pour la production de combustibles fossiles, risquent de nuire à l'efficacité de nouvelles mesures introduites pour protéger l'environnement. En outre, les subventions peuvent être à l'origine d'importantes inefficiences économiques, par exemple si elles sont « trop généreuses » et entraînent une surproduction, donnent naissance à des rentes économiques considérables ou encore dissuadent d'innover dans de nouvelles technologies respectueuses de l'environnement.

Par exemple, depuis plus d'un demi-siècle, les subventions agricoles sont très courantes dans les pays de l'OCDE. La Politique agricole commune (PAC) de l'Union européenne est entrée en vigueur dans les années 50 et répondait en premier lieu à une volonté de favoriser l'autosuffisance dans la production de denrées alimentaires et autres produits agricoles. Les États-Unis subventionnent aussi leur agriculture de longue date. Bien que ces politiques n'aient, au départ, pas été conçues pour améliorer la qualité de l'environnement, leur objectif est devenu plus large et comprend maintenant la promotion d'une « agriculture respectueuse de l'environnement ». Par exemple, la PAC attribue des aides financières aux agriculteurs qui acceptent d'adapter leurs pratiques, prenant en charge une partie du coût de la protection de la nature, encourageant le respect de la législation sur l'environnement et favorisant une bonne gestion des terres. De même, aux États-Unis, le *Conservation Reserve Programme*, qui prévoit des aides financières pour la conversion de terres cultivées en terres à couverture végétale dans des zones écologiquement fragiles, poursuit aujourd'hui un ensemble d'objectifs environnementaux, par exemple la protection de l'habitat naturel, alors qu'il avait au départ essentiellement vocation à lutter contre l'érosion.

L'établissement de normes à respecter par les agriculteurs pour bénéficier d'aides publiques est souvent désigné par le terme éco-conditionnalité (AEE, 2005). Depuis la réforme de la PAC intervenue en 2003, l'éco-conditionnalité est obligatoire.

Le fait que l'éco-conditionnalité soit obligatoire dans le cadre de la PAC offre un exemple intéressant de la façon dont des politiques visant initialement d'autres finalités finissent par être utilisées pour améliorer la qualité de l'environnement. Ces politiques qui, à n'en pas douter, ont des effets positifs à maints égards, peuvent aussi se révéler coûteuses sur les plans budgétaire et économique. En 2003, les subventions agricoles ont représenté près de 50 % du budget de l'Europe des Quinze (AEE, 2005). Selon toute vraisemblance, des subventions aussi généreuses risquent d'encourager la surproduction et de nuire à la qualité de l'environnement local.

4. Normes de résultats négociables et normes de portefeuille

Les normes de résultats négociables constituent un instrument de marché souple pour atteindre un objectif moyen de résultats. En principe, ces normes se calculent en unités de production, par exemple en niveau d'émission moyen ou en part moyenne d'énergie renouvelable par kWh. Lorsqu'une entreprise a une intensité d'émission supérieure à la norme, elle est tenue d'acheter des droits pour ses émissions excédentaires. Les entreprises dont l'intensité d'émission est inférieure à la norme (ou qui affichent des résultats supérieurs aux résultats moyens) peuvent vendre ces droits. Ce système repose sur l'échange de droits, mais, à la différence d'un système de plafonnement et d'échange, il ne fixe pas de volume d'émissions.

4.1 Les normes de résultats négociables : aspects théoriques

C'est peut-être des normes de résultats *non négociables* que les normes de résultats négociables sont le plus facile à distinguer. Dans un système de normes non négociables, une autorité chargée de la réglementation fixe le plafond d'émission à ne pas dépasser par unité de production et impose aux entreprises l'obligation d'abaisser leurs émissions jusqu'à ce niveau. Les entreprises ont alors deux

possibilités : installer de nouveaux équipements qui réduisent les émissions ou cesser d'utiliser des consommations intermédiaires polluantes, par exemple les combustibles fossiles, en les remplaçant par d'autres produits. Toutes les entreprises sont tenues de respecter individuellement le plafond qui leur est imposé, si bien qu'il est peu vraisemblable qu'il y ait égalisation des coûts marginaux de dépollution entre entreprises, ce qui signifie que les normes de résultats non négociables peuvent ne pas afficher un bon rapport coût-efficacité.

Pour apprécier les économies de coûts qui pourraient être réalisées s'il y avait égalisation des coûts marginaux de dépollution, il faut permettre aux entreprises d'interagir entre elles dans un marché où, lorsqu'une entreprise est moins polluante que la norme, cette réduction excédentaire des émissions peut être utilisée pour compenser le fait que les autres entreprises réduisent moins leurs émissions que ne l'exige la norme. Si les normes de résultats sont négociables, les entreprises qui affichent une intensité d'émission élevée ont à leur disposition une solution moins coûteuse que de se doter, en interne, de moyens de réduction des émissions (elles peuvent acheter des droits pour se conformer à la norme), tandis que les entreprises qui peuvent réduire leurs émissions à un coût raisonnable ont intérêt à faire mieux que la norme (elles dégagent des gains financiers en vendant les droits correspondants).

Dans l'hypothèse où les normes de résultats non négociables étaient contraignantes pour toutes les entreprises, la conséquence serait une intensité moyenne d'émission égale, à un coût relativement faible. Si, au contraire, certaines entreprises faisaient mieux que la norme avant qu'il y ait possibilité d'échange, l'intensité moyenne d'émission risquerait d'augmenter (ce problème a été soulevé dans le contexte des normes applicables à la consommation de carburant aux États-Unis). Toutefois, du fait des économies de coûts réalisées, il existe une marge de manœuvre pour durcir la norme de façon à atteindre la même intensité d'émission moyenne qu'auparavant, sans pour autant compromettre les économies de coûts.

4.1.1 Les normes de résultats négociables sont-elles efficientes ?

Les normes de résultats négociables constituent un moyen efficient d'atteindre un objectif d'intensité d'émission et offrent certainement un meilleur rapport coût-efficacité que des normes non négociables visant le même objectif. Reste toutefois à savoir si elles offrent un rapport coût-efficacité plus ou moins satisfaisant qu'une taxe sur les émissions (ou un système de plafonnement et d'échange) lorsqu'il s'agit d'atteindre un même objectif d'émission *absolu*. En règle générale, elles présentent un rapport coût-efficacité moins satisfaisant, mais peuvent être privilégiées dans certaines situations.

Pour en comprendre la raison, il faut analyser les normes de résultats négociables comme des systèmes qui associent une taxe sur les émissions, puisqu'il y a abandon des droits au titre des émissions supplémentaires, et une subvention à la production équivalente, chaque unité de production donnant le droit de produire la quantité d'émissions moyenne (Fischer, 2001). Ce mécanisme produit généralement les mêmes effets qu'une taxe avec restitution. Même si la norme était fixée à un niveau socialement optimal, la production et les émissions par entreprise ne seraient pas les mêmes que celles obtenues avec un taux de taxe pigouvien socialement optimal. Du fait de l'existence d'une subvention implicite, le prix d'équilibre de la production pour un taux de taxe sur les émissions donné est plus faible dans un système de normes de résultats négociables ; la production est plus élevée, si bien que le niveau d'émission est plus élevé avec ce système qu'avec une taxe. Schématiquement, la composante correspondant à une tarification des émissions incite à réduire la pollution, mais le mécanisme de restitution que comportent les normes dissuade de la diminuer. Par conséquent – en l'absence d'autres distorsions – les normes de résultats négociables sont un peu moins efficientes qu'une tarification optimale des émissions (voir aussi Fischer et Newell, 2008 et Dissou, 1995).

4.1.2 Quand convient-il d'utiliser les normes de résultats négociables ?

D'un point de vue pratique, l'utilisation de normes négociables doit être limitée aux secteurs dans lesquels l'unité de production peut être clairement définie. Le secteur de l'électricité constitue un bon exemple, le kWh étant une unité uniforme ; en revanche, dans le secteur manufacturier, une tonne d'un

produit peut ne pas être équivalente, fonctionnellement, à une tonne d'un autre produit fabriqué dans le même secteur. S'il est possible de modifier légèrement un produit pour le rendre conforme à une norme plus généreuse, il y a là une distorsion qui peut être à l'origine de gains substantiels. Par exemple, l'installation de sièges arrière amovibles dans un petit véhicule peut permettre qu'il soit considéré comme un véhicule utilitaire sport (VUS) aux fins d'application des normes de consommation moyenne de carburant en vigueur aux États-Unis (*Corporate Fuel Economy standards*, CAFE).

En termes d'efficience, les normes de résultats négociables peuvent être utiles lorsqu'il n'est pas souhaitable que le prix des produits augmente. Là encore, les principales illustrations qui peuvent être citées sont les interactions fiscales et les fuites d'émissions. Les normes de résultats n'imposant pas de payer au titre des émissions moyennes inframarginales, la hausse des prix qu'elles entraînent est limitée, si bien qu'elles peuvent se révéler supérieures à un système de tarification des émissions ne comportant pas de recyclage des recettes (Goulder *et al.*, 1999 ; Parry *et al.*, 1999 ; Fullerton et Metcalf, 2001). Elles peuvent aussi se révéler supérieures à des taxes sur les émissions en cas de risque de fuites d'émissions vers des secteurs non visés par la réglementation, à condition que les biens non visés par la réglementation soient des substituts proches ayant le même profil d'émissions (Bernard *et al.*, 2007).

Les normes négociables peuvent aussi être des instruments intéressants en termes d'économie politique parce qu'elles sont sans incidence sur les recettes, si bien qu'elles ne ressemblent pas à une taxe et ne coûtent rien au budget de l'État (du moins pas directement).

4.1.3 Les normes de portefeuille négociables

Les normes de portefeuille négociables sont une variante dans laquelle la norme repose sur la part de marché d'une technologie, plutôt que sur des résultats en matière d'émissions. En réalité, elles subventionnent la technologie recommandée en taxant uniformément toutes celles qui ne le sont pas. En général, lorsque le but recherché est la réduction des émissions, ces normes sont moins efficientes que les normes de résultats négociables, parce que leur composante « taxe » est appliquée à toutes les technologies non recommandées, sans distinction entre celles qui polluent plus et celles qui polluent moins (Fischer et Newell, 2008).

4.2 Les normes de résultats négociables dans la pratique

Bien que les normes de résultats négociables reposent sur un concept simple, elles sont relativement peu utilisées dans les pays de l'OCDE. Les normes non négociables, comme le programme de promotion des énergies renouvelables baptisé *Renewables Obligation* au Royaume-Uni, sont beaucoup courantes.

Le dispositif de suppression progressive du plomb dans l'essence, qui a été mis en place aux États-Unis à partir du milieu des années 70 et a débouché sur la suppression totale du plomb contenu dans l'essence en 1996, est peut-être le meilleur exemple d'application d'une norme de résultats négociable. Les autorités chargées de la réglementation ont durci progressivement les normes qui obligeaient les raffineries à réduire la teneur en plomb moyenne de l'essence. De fin 1982 à fin 1987, les raffineries ont été autorisées à échanger leurs droits d'incorporation de plomb pour se conformer à la norme. Ce dispositif, qui a été une véritable réussite, permettait aux entreprises de « choisir la quantité d'essence sans plomb qu'elles produisaient et d'acheter des droits d'incorporation de plomb pour pouvoir continuer de produire une essence à forte teneur en plomb si elles en faisaient le choix » (Kerr et Newell, 2003, 322).

Aux États-Unis, plusieurs États ont créé des certificats verts négociables pour aider les entreprises à respecter les normes de portefeuille relatives aux énergies renouvelables (qui imposent qu'un certain pourcentage de l'énergie produite le soit à partir de sources renouvelables). Par exemple, en Californie, le programme *Renewables Portfolio Standard* (projet de loi du Sénat 1078, 2001–2002) exige qu'une entité visée par la réglementation augmente son utilisation de ressources renouvelables de 1 % par an au moins,

jusqu'à ce que « 20 % de ses ventes de détail aient été produites à partir de sources renouvelables ». La norme initiale n'autorisait pas expressément les échanges, mais de nouvelles règles, actuellement en cours d'examen, permettent aux entités visées d'échanger des certificats verts pour se conformer à la norme. Le tableau 2 recense les normes de portefeuille relatives aux énergies renouvelables en place dans les États fédérés, normes dont la plupart autorisent plus ou moins l'échange de certificats.

Tableau 2. États américains appliquant des normes de portefeuille relatives aux énergies renouvelables

État	Norme	L'échange est-il autorisé ?
Arizona	15 % à l'horizon 2025	Oui
Californie	20 % à l'horizon 2010 et 33 % à l'horizon 2020	Actuellement en cours d'examen
Colorado	De 10 à 30 % à l'horizon 2020 selon l'entité visée	Oui
Connecticut	27 % à l'horizon 2020	Oui
Delaware	25 % à l'horizon 2025-2026	Oui
District de Columbia	20 % à l'horizon 2020	Oui
Floride	7.5 % à l'horizon 2015	-
Hawaii	40 % à l'horizon 2030	Non
Illinois	25 % à l'horizon 2024-2025	Oui
Kansas	20 % de la capacité de pointe à l'horizon 2020	Oui
Maine	De 10 à 40% selon la catégorie de ressource à l'horizon 2017	Oui
Maryland	20 % à l'horizon 2022	Oui
Massachusetts	De 7.1 à 15 % pour les ressources nouvelles et les ressources existantes	Oui
Michigan	10 % à l'horizon 2015 ; d'autres normes sont applicables à des entreprises spécifiques	Oui
Minnesota	25 à 35 % à l'horizon 2025 et 2020 respectivement	Oui (avec des restrictions)
Missouri	15 % à l'horizon 2022	-
	15 % à l'horizon 2021, entreprises de services d'utilité publique à capitaux privés	Oui
Montana	15 % à l'horizon 2025	Oui
Nevada	25 % à l'horizon 2025	Oui
New Hampshire	23.8 % à l'horizon 2025	Oui
New Jersey	22.5 % à l'horizon 2020-2021	Oui
Nouveau-Mexique	De 10 à 20 % à l'horizon 2020	Oui
New York	29 % à l'horizon 2015	Actuellement en cours d'examen
	25 % à l'horizon 2013 pour les entreprises municipales de services d'utilité publique	-
Caroline du Nord	De 10 % à l'horizon 2018 à 12.5 % à l'horizon 2021 selon l'entreprise de services d'utilité publique	Oui
Dakota du Nord	10 % à l'horizon 2015	Oui
Ohio	25 % à l'horizon 2025	Oui
Oklahoma	15 % à l'horizon 2015	Non
Oregon	De 5 % à 25 % à l'horizon 2025	Oui
Pennsylvanie	18 % à l'horizon 2020-2021	Oui
Rhode Island	16 % à l'horizon 2019	Oui
Dakota du Sud	10 % à l'horizon 2015	Oui
Texas	5.880 MW à l'horizon 2015 et 10.000 MW à l'horizon 2025	Oui
Utah	20 % des ventes de détail corrigées à l'horizon 2025	Oui
Vermont	20 % à l'horizon 2017	-
Virginie	15 % à l'horizon 2025	Oui
Washington	15 % à l'horizon 2020	Oui
Virginie occidentale	25 % à l'horizon 2025	Oui
Wisconsin	10 % à l'horizon 2015 sur l'ensemble du territoire de l'État avec des obligations qui diffèrent selon l'entreprise	Oui (avec des restrictions)

Source : Database of State Incentives for Renewables And Efficiency (DSIRE)

Dans plusieurs pays de l'OCDE, les règles applicables à la consommation de carburant s'apparentent davantage à des normes de résultats négociables. Ainsi, aux États-Unis, le système CAFE a imposé à chaque constructeur des normes applicables à l'ensemble du parc de véhicules de tourisme et de véhicules utilitaires légers. Un constructeur peut donc, au lieu de respecter la norme pour chaque catégorie de véhicules, s'y conformer en moyenne pour l'ensemble de son parc. De nouveaux mécanismes, destinés à assouplir le système, vont être introduits pour permettre aux constructeurs d'échanger des droits entre leur parc de véhicules de tourisme et leur parc de véhicules utilitaires ainsi qu'avec d'autres constructeurs, ce qui fera du système une véritable norme de résultats négociable. L'Union européenne a également pris des mesures permettant que plusieurs constructeurs regroupent leurs objectifs d'émission de façon à respecter ensemble la norme européenne sur les émissions de CO_2 des véhicules ; elle n'a pour l'instant pas expressément prévu de mécanisme d'échange. Le Japon permet aux constructeurs d'accumuler des droits d'émission dans une catégorie de poids pour les utiliser dans une autre.

Anderson *et al.* (à paraître) examinent les réglementations sur la consommation de carburant en vigueur aux États-Unis et dans d'autres pays. Ils constatent que la stratégie qui consiste à se fonder sur les normes de consommation applicables aux véhicules neufs présente quelques limites. Premièrement, ces règles ne portent que sur la diminution de la consommation de carburant des véhicules neufs, alors que la rotation du parc automobile prend des années. Deuxièmement, elles ne favorisent pas d'autres formes de réduction de la consommation de carburant ; en réalité, elles rendent l'usage de la voiture moins coûteux, ce qui entraîne un « effet de rebond » qui s'ajoute à d'autres coûts externes liés au kilométrage parcouru, comme les embouteillages et les accidents. C'est la raison pour laquelle les économistes sont plus favorables à la taxation des produits pétroliers ou des émissions de carbone : en plus de favoriser une réduction de la consommation de carburant des véhicules neufs, les taxes incitent les propriétaires de véhicules, neufs ou non, à moins utiliser leur voiture et permettent une diminution des émissions et de la consommation de carburant au-delà du secteur automobile.

La question de l'efficacité des normes par rapport à leur coût reste controversée, en raison, notamment, d'une absence de consensus et d'éléments univoques sur la valeur que les consommateurs accordent aux économies de carburant. S'ils sous-évaluent systématiquement l'intérêt de l'amélioration du rendement énergétique lorsqu'ils achètent un véhicule, il y a là une défaillance du marché qui justifie l'adoption de règles sur la consommation de carburant. Or, les éléments empiriques disponibles restent contrastés et, même lorsque les consommateurs restent insensibles à des offres apparemment avantageuses, il est parfois difficile de déterminer si leur comportement reflète une réelle incapacité à voir à long terme, un manque d'information auquel il serait possible de remédier ou des coûts non mesurés pour le consommateur lorsqu'il arbitre en faveur d'un véhicule moins gourmand en carburant.

Toutefois, d'après les préférences révélées, les normes semblent être préférées à une hausse des taxes sur les émissions, en particulier aux États-Unis. À l'avenir, la définition de normes claires pourrait présenter l'intérêt de créer un environnement plus stable pour les entreprises qui innovent dans le domaine des technologies propres, compte tenu des risques liés au caractère incertain du prix des carburants. En revanche, il est plus difficile de se prononcer sur le point de savoir si d'autres instruments, comme les concours technologiques, les taxes sur les carburants, l'application de prix plancher au carburant, les systèmes de bonus/malus écologiques, permettraient d'obtenir de meilleurs résultats.

4.2.1 Autres types de marchés de droits négociables

Les États-Unis ont expérimenté presque tous les types de marchés de droits négociables, parmi lesquels certains reposent sur une norme de résultats ou de portefeuille, mais d'autres, dont le marché des droits d'émission de SO_2 constitue l'un des meilleurs exemples, sur un plafond d'émission absolu. En dehors des États-Unis, un certain nombre de pays de l'OCDE ont également créé des marchés de droits négociables à diverses fins. Le tableau 3 présente des exemples de marchés de droits négociables mis en place à différentes périodes dans les pays de l'OCDE.

Tableau 3. Les marchés de droits négociables dans les pays de l'OCDE

Lieu	Programme	Objectif
Australie	Droits de pêche	Attribution de droits de pêche
Australie (Nouvelle-Galles du Sud)	Programme de réduction des émissions de gaz à effet de serre	Réduction des émissions de gaz à effet de serre dues à la production et à la consommation d'électricité
Australie (Nouvelle-Galles du Sud)	Système de droits négociables pour le fleuve Hunt	Réduction des rejets polluants
Canada	Système de quotas d'utilisation du bromure de méthyle	Réduction de la consommation de substances qui appauvrissent la couche d'ozone
Danemark	Échange de droits d'émission de carbone dans le secteur de l'électricité	Réduction des émissions de carbone provenant du secteur de l'électricité
UE	Droits d'émission négociables (EU ETS)	Réduction des émissions de CO_2
Italie	Certificats de rendement énergétique négociables (TEE)	Promotion du rendement énergétique
Nouvelle-Zélande	Droits d'émission de gaz à effet de serre négociables	Réduction des émissions de gaz à effet de serre
États-Unis (Illinois)	Droits négociables de rejet de composés organiques volatils	Réduction des émissions de composés organiques volatils
Japon (Tokyo)	Droits négociables d'émission de carbone	Réduction des émissions de carbone

Source : Base de données OCDE/AEE sur les instruments employés dans la politique de l'environnement et la gestion des ressources naturelles ; sites Internet des dispositifs.

Ces dispositifs diffèrent à divers égards, mais tous reposent sur un système quelconque de permis négociables. On observe qu'ils ont beaucoup d'autres applications que la réduction des émissions de gaz à effet de serre. Ils sont utilisés pour attribuer des droits de pêche (en Australie et dans d'autres pays de l'OCDE), pour réduire la pollution des eaux de surface ou les rejets de composés chimiques organiques volatils (dans l'Illinois, aux États-Unis, par exemple). Le Système de permis négociables pour le fleuve Hunt, mis en place en Nouvelle-Galles du Sud, représente une autre stratégie de réduction de la pollution des eaux de surface que celle reposant sur la taxation adoptée par les Pays-Bas et par d'autres pays de l'OCDE. Plus précisément, le système mis en place en Nouvelle-Galles du Sud vise à réduire les rejets d'eau salée provenant des mines et centrales électriques.

5. Le choix des instruments de marché

Aux États-Unis, la plupart des instruments de marché sont des systèmes de permis négociables plutôt que des taxes. Ailleurs, les taxes et redevances sont plus souvent utilisées, à l'exception de l'EU ETS. Un certain nombre de considérations jouent un rôle important dans l'arbitrage entre les divers types d'instruments de politique environnementale. Parmi elle, figure la question de savoir si l'instrument permettra d'atteindre l'objectif environnemental pour lequel il a été conçu et ce, de façon efficiente. Il importe aussi de se demander s'il est cohérent par rapport aux valeurs largement acceptées, telles que l'équité, le respect de la liberté individuelle et la participation publique par exemple (Harrington *et al.*, 2004). D'autres facteurs, comme le milieu professionnel et la préférence pour certains types d'instruments, la compréhension qu'a le public des différentes mesures envisageables et l'influence des groupes de pression sur l'action politique, jouent aussi un rôle important. Stavins (2000, 57) montre que les individus qui sont issus du monde économique ou des affaires ou qui ont « une culture de marché » privilégient généralement les stratégies qui reposent sur des mécanismes d'incitation économique. En

revanche, les instruments réglementaires contraignants peuvent être privilégiés en raison de la culture administrative et de la formation juridique qui caractérisent beaucoup de responsables de la réglementation, des problèmes administratifs que peuvent poser certaines applications des instruments de marché, d'une méconnaissance des instruments de marché par l'opinion, du scepticisme des groupes de pression vis-à-vis de la souplesse que permettent les instruments de marché ou encore pour des raisons d'idéologie politique.

Stavins (2000) décrit ainsi l'influence du scepticisme de l'opinion :

> *En principe, les avantages des instruments de marché ne sont pas visibles pour les consommateurs, tandis que les coûts perçus peuvent être évidents. Lorsqu'une approche réglementaire traditionnelle est appliquée, les consommateurs s'aperçoivent parfois que les prix augmentent, mais il leur est à l'évidence difficile d'associer ces hausses de prix aux réglementations environnementales. Il n'est pas évident pour les consommateurs que les prix de l'essence et de l'électricité sont plus faibles qu'ils devraient l'être en raison de la mise en place d'instruments de marché visant à éliminer le plomb de l'essence ou à réduire les émissions de SO_2 (58).*

Les responsables politiques sont donc peu enclins à opter pour des instruments de marché. Il arrive que certains groupes de pression estiment que ces instruments nuisent à l'intégrité de la politique environnementale et « cautionnent indûment » le droit de polluer (Stavins, 2000, 57). On estime que le fait que certains groupes soient devenus plus favorables aux approches fondées sur le marché explique l'énorme adhésion à l'adoption de la loi de 1990 amendant la loi sur l'air aux États-Unis *(Clean Air Act Amendments)*, sur la base de laquelle a été créé le marché des droits d'émission de SO_2. Selon Kelman (1981), le choix entre les différentes mesures de protection de l'environnement dépend souvent de considérations idéologiques. En pareil cas, on ne s'attache pas nécessairement à comprendre les avantages et inconvénients des divers instruments.

Face à une taxe ou à une redevance environnementale largement applicable, bon nombre d'entités visées par la réglementation demandent à bénéficier d'une protection ou d'une exemption. Les secteurs fragiles demandent par exemple à ce qu'un objectif environnemental moins ambitieux leur soit fixé ou à bénéficier de quotas d'émission gratuits, attribués sur la base des émissions passées ou d'un indicateur de production. C'est pourquoi certains secteurs sont exclus du champ d'application des mesures de protection de l'environnement dans de nombreux pays. Ekins et Speck (1999) citent des exemples dans lesquels certaines activités, généralement dans le secteur manufacturier, ont été dispensées, d'une manière ou d'une autre, de l'application d'instruments de marché. En 1993, par exemple, en Europe, le secteur manufacturier ne payait que 25 % du taux de la taxe sur les émissions de CO_2, même s'il a fini par en payer 50 % en 1997. Les entreprises fabriquant du ciment et de la chaux bénéficiaient d'exonérations supplémentaires. Aux Pays-Bas, les activités à forte intensité énergétique ont bénéficié d'allègements au titre de leur forte consommation de gaz naturel, entre autres combustibles. Dans ce pays, la taxe réglementaire sur l'énergie ne s'applique que jusqu'à un certain seuil de consommation d'énergie, si bien que les grands consommateurs sont dispensés du paiement intégral de la taxe, essentiellement pour des raisons de compétitivité.

Un rapport de l'OCDE (OCDE, 1997) recense les aspects que les responsables de l'action publique doivent examiner lorsqu'ils mettent au point des réglementations en matière d'environnement et appliquent des instruments de marché. Parmi ces aspects figurent notamment les effets des mesures sur la compétitivité des secteurs à forte intensité énergétique et de ceux qui sont ouverts aux échanges internationaux. Ces secteurs sont souvent protégés des conséquences négatives des mesures par des exonérations de taxe. Bien que ces exonérations aient une incidence négative sur le rapport coût-efficacité global de la taxe parce qu'elles réduisent les perspectives de diminution de la pollution, elles servent bel et

bien un objectif politique pragmatique, en particulier lorsque les autres pays appliquent une réglementation moins exigeante. Si un ou plusieurs pays appliquent une taxe sur les émissions de CO_2, leur production industrielle risque d'être remplacée par celle d'entreprises étrangères – ou des entreprises nationales risquent de délocaliser leur production vers un pays qui ne met pas en œuvre la même politique.

Outre les questions de compétitivité, les pouvoirs publics doivent aussi analyser les effets redistributifs des différents instruments de marché. Par exemple, beaucoup de taxes environnementales, « en particulier les taxes sur l'énergie, peuvent avoir un impact régressif *direct* sur la répartition du revenu des ménages » du fait de la part relative des dépenses d'énergie dans le budget des ménages à faible revenu et dans celui des ménages à revenu élevé (OCDE, 1997, 4). Les politiques environnementales qui font appel aux mécanismes du marché présentent peut-être, globalement, un bon rapport coût-efficacité, mais les effets redistributifs peuvent jouer un rôle tout aussi important dans l'élaboration des politiques. Selon toute vraisemblance, pour qu'une politique fondée sur les mécanismes du marché soit concluante sur le plan politique, il faut trouver un compromis entre coût-efficacité et équité en éliminant au moins une partie de ses effets redistributifs négatifs. Il peut par exemple être envisagé de permettre aux ménages modestes de bénéficier d'exonérations, d'un taux de taxe plus faible ou d'aides financières.

Les coûts administratifs et de contrôle sont un autre aspect à prendre en compte. Une politique environnementale fondée sur le marché est plus difficile à appliquer si elle a une portée générale – par exemple une taxe d'émission visant l'ensemble des secteurs d'activité ou toutes les entreprises d'un secteur – que si elle a une portée plus limitée. Il peut donc être préférable de mettre au point et d'appliquer un instrument dont la couverture est incomplète, dès lors qu'il couvre les plus gros pollueurs et ceux auxquels il est plus facile d'appliquer des règles.

6. Conséquences de l'association de plusieurs instruments de marché

Dans certains cas, plusieurs instruments ont été mis en œuvre conjointement pour atteindre un objectif environnemental. L'association de plusieurs instruments de marché est-elle préférable à l'utilisation d'un seul instrument ? Nous étudions les raisons qui justifient l'association de plusieurs instruments, puis donnons des exemples tirés de l'expérience et analysons certains des problèmes soulevés. Enfin, nous examinons les effets négatifs que peut avoir l'association de plusieurs instruments de marché ainsi que certains des moyens qui pourraient limiter le risque d'effets négatifs.

6.1 Raisons justifiant l'association de plusieurs instruments de marché

L'association de plusieurs instruments peut se justifier par la volonté de disposer d'une base plus solide pour atteindre les objectifs en matière d'énergie renouvelable, d'améliorer les caractéristiques d'un dispositif de tarification des émissions, de remédier à des défaillances du marché non corrigées par un système d'échange de permis d'émission, d'atteindre d'autres objectifs que la seule réduction des émissions (par exemple, des objectifs de création d'emploi) ou de tirer parti d'un engagement précoce (Fischer et Preonas, 2010). Comme le soulignent Sijm (2005) et Goulder et Parry (2008), l'une des justifications les plus plausibles est que les ménages n'investissent pas dans des solutions avantageuses offrant un bon rendement énergétique ; si les signaux envoyés par une politique de tarification ne suffisent pas à inciter les individus à faire ce type d'achats, il peut être justifié d'adopter des mesures complémentaires. Fischer et Newell (2008) examinent les défaillances du marché liées aux externalités de connaissance qui pourraient justifier le cumul de plusieurs instruments de politique environnementale, par exemple les externalités des émissions de CO_2, les retombées de la recherche et développement et de l'apprentissage. La solution qu'ils examinent associe un système de tarification des émissions, déjà en place, et des subventions à la recherche et développement et à la production dans le domaine des énergies renouvelables.

6.1.1 Exemples de politiques associant plusieurs instruments

Un rapport de l'OCDE (2007a) présente des exemples dans lesquels plusieurs instruments ont été utilisés pour faire face à un problème environnemental – déchets ménagers, sources diffuses de pollution de l'eau, rendement énergétique dans le secteur résidentiel et pollution atmosphérique régionale. Nous nous intéresserons ici à la pollution atmosphérique régionale au Canada et en Suède.

Au Canada, le gouvernement fédéral fixe des normes d'émission de SO_2 et de NO_x en établissant des lignes directrices nationales, mais c'est aux autorités des provinces qu'il incombe d'atteindre les objectifs de réduction des émissions. Bien que les normes nationales ne soient pas d'application obligatoire, un processus informel s'est mis en place dans le cadre duquel ces normes sont reconnues comme des objectifs que les autorités des provinces vont s'efforcer d'atteindre. Les mesures prises par les provinces en matière de réduction des émissions prennent des formes diverses, de la délivrance d'autorisations d'émission à des installations individuelles à, plus rarement, la création de marchés de droits négociables. Par exemple, l'Ontario applique une réglementation pour chaque grande catégorie d'émetteurs de NO_x et de SO_2 et a créé un marché de droits négociables en 2001. L'Alberta applique des normes spécifiques aux centrales électriques au gaz et au charbon et dispose d'un marché de droits d'émission pour le même secteur.

Parallèlement, les autorités fédérales mettent en œuvre des programmes pour favoriser la mise au point de technologies non polluantes. En particulier, des activités de recherche et développement sont financées dans le cadre du Programme de recherche et de développement énergétiques administré par Ressources naturelles Canada. Un autre programme fédéral s'adresse aux grandes compagnies d'électricité et vise à favoriser la mise au point de technologies de combustion non polluantes et offrant un bon rendement énergétique. La politique mise en œuvre se caractérise donc par l'association de subventions fédérales destinées à favoriser le développement technologique et de mesures de réduction des émissions appliquées localement. Bien que le rapport de l'OCDE (2007a) n'analyse pas précisément l'efficacité de ces politiques, les observations ponctuelles semblent montrer qu'elles sont probantes. Cependant, aucune évaluation rigoureuse n'a été réalisée à la connaissance des auteurs. En Suède, la taxe sur les émissions de SO_2 et de NO_x est associée à des instruments réglementaires. Initialement, le pays avait opté pour un instrument réglementaire contraignant pour lutter contre les émissions de SO_2 et de NO_x. La taxe sur les émissions de SO_2 introduite en 1991 est venue compléter cette réglementation contraignante mais ne l'a pas remplacée. Ces deux catégories de mesures sont par ailleurs complétées par des dispositifs destinés à stimuler l'innovation.

Fischer et Preonas (2010) présentent des exemples dans lesquels plusieurs instruments ont été utilisés conjointement pour promouvoir les énergies renouvelables dans le secteur de l'électricité. Ils examinent plusieurs instruments, notamment des systèmes de plafonnement et d'échange des émissions, des taxes sur les émissions de carbone, des normes de résultats, des tarifs d'achat et des mesures d'incitation à l'investissement. L'Allemagne a notamment mis en place un dispositif de plafonnement et d'échange, des tarifs d'achat et des incitations à l'innovation et à la recherche et développement. Les Pays-Bas ont instauré, entre autres instruments, une taxe sur l'énergie produite à partir de sources non renouvelables, une norme de portefeuille relative aux énergies renouvelables et des incitations à l'investissement. D'autres pays, dont la Norvège, le Danemark, l'Espagne, le Royaume-Uni et plusieurs États américains, ont aussi opté pour l'association de plusieurs instruments.

6.1.2 Éventuels effets indésirables de l'association de plusieurs instruments

Fischer et Preonas (2010) procèdent à une revue de la littérature sur le cumul de plusieurs instruments, en s'attachant plus particulièrement aux énergies renouvelables. Ils distinguent les instruments qui reposent sur des prix fixés à l'avance (taxes ou subventions) et ceux fondés sur des prix variables (systèmes de plafonnement et d'échange ou normes de portefeuille négociables). Associer plusieurs instruments

reposant sur des prix fixés à l'avance est une démarche relativement transparente : si une taxe sur les émissions est déjà en place, l'effet incitatif cumulatif d'une taxe supplémentaire est identique à l'effet cumulatif de l'instrument utilisé seul (hormis, peut-être une légère diminution des rendements). En revanche, étant donné que dans un système de droits négociables, le prix des droits – qui détermine l'effet incitatif de la mesure – dépend de l'état du marché, tout autre instrument susceptible de modifier cet état va aussi faire évoluer le prix des droits. De ce fait, l'effet incitatif net de l'instrument supplémentaire peut être très différent de ce qu'il serait si l'instrument était appliqué seul.

Par exemple, Böhringer et Rosendahl (à paraître) analysent l'interaction entre le Système communautaire d'échange de quotas d'émission (SCEQE) et une norme de portefeuille relative aux énergies renouvelables. Ils constatent qu'une norme de portefeuille obligatoire, parce qu'elle favorise davantage l'utilisation de sources renouvelables que le SCEQE seul, facilite le respect du plafond d'émission, abaissant ainsi le prix des permis. Cette réduction de prix avantage les producteurs les plus polluants (par exemple les exploitants de centrales à charbon), alors que la charge que représente l'achat de certificats verts est la même pour tous les pollueurs. En termes d'effet net, il s'ensuit que les producteurs les plus polluants augmentent leur production (et leurs émissions), tandis que les producteurs d'énergie non renouvelables moins polluants sont évincés du marché.

Fischer et Preonas (2010) montrent que ce résultat se confirme de façon plus générale en cas de cumul d'instruments de promotion des énergies renouvelables et d'un système d'échange. De plus, une norme de portefeuille relative aux énergies renouvelables produit, en elle-même, des interactions inattendues. Par définition, cet instrument crée une dépendance entre sources renouvelables et sources non renouvelables, puisque la norme impose une part de marché obligatoire pour les sources renouvelables. Par conséquent, toute subvention supplémentaire en faveur des énergies renouvelables facilite le respect de la norme de portefeuille, abaissant le prix des certificats verts et permettant à la production d'énergie non renouvelable de croître à moindre coût, ce qui entraîne une hausse du total des émissions du secteur de l'électricité. De même, l'application d'une taxe supplémentaire sur les émissions ou sur l'énergie aux sources d'énergie fossiles se solde par une diminution de la demande d'électricité, qui entraîne elle-même une baisse de la demande de certificats verts et du soutien en faveur des énergies renouvelables. De façon plus générale, Fischer et Preonas (2010) insistent sur la nécessité d'évaluer les instruments en tenant compte de l'ensemble des mesures mises en place et non individuellement.

Il arrive que plusieurs instruments se chevauchent à cause de la pluralité, non seulement des objectifs, mais aussi des autorités compétentes. Goulder et Stavins (2010) ont examiné ce qui se passerait si une politique fédérale de lutte contre le changement climatique coexistait avec la politique mise en place à l'échelon de l'État de Californie et avec la *Regional Greenhouse Gas Initiative* (RGGI), initiative régionale pour la réduction des gaz à effet de serre lancée dans le Nord-Est des États-Unis. Le cumul des obligations fixées dans le cadre des différents dispositifs de plafonnement et d'échange risquerait, selon le degré relatif d'exigence des instruments, de priver l'instrument fédéral de tout effet dans les États où les autres instruments sont plus exigeants, ou, au contraire, de rendre inopérantes les mesures adoptées au niveau de l'État ou à l'échelon régional. Dans le premier cas, le fait que le système mis en place par l'État soit plus exigeant se traduit par une diminution de la demande de quotas d'émission nationaux, abaissant le prix d'équilibre et entraînant des « fuites » d'émissions vers des États qui appliquent des politiques moins exigeantes. Par conséquent, comparativement à un scénario dans lequel seul un instrument fédéral serait appliqué, le cumul des instruments entraîne, *in fine*, une hausse des émissions dans les États dont les règles sont peu exigeantes tandis que le niveau national des émissions est identique et que le rapport coût-efficacité est moins bon. Dans certains cas, il est possible de pallier ces limites en élaborant, au niveau de l'État, un instrument plus exigeant permettant de sortir du champ d'application du dispositif fédéral, ce qui aboutit à la création de deux instruments distincts qui ne se chevauchent plus.

Tout en soulignant que le cumul de mesures de lutte contre le réchauffement climatique adoptées à l'échelon des États et de mesures fédérales est susceptible d'avoir plus d'inconvénients que d'avantages parce qu'il nuit au rapport coût-efficacité, Goulder et Stavins (2010) ont identifié quelques cas dans lesquels les mesures adoptées au niveau des États pourraient avoir des effets positifs malgré l'existence de mesures fédérales. Premièrement, les États peuvent corriger les imperfections du marché auxquelles les mesures fédérales ne remédient pas. Par exemple, les locataires qui n'ont pas de compteur individuel d'électricité sont peu incités à faire des économies d'énergie ; ce problème « d'agence » peut être réglé par les codes de la construction locaux. Deuxièmement, les États peuvent servir de laboratoire pour l'expérimentation de nouvelles mesures et éclairer l'évolution future des politiques fédérales. Troisièmement, un État qui applique une politique exigeante peut montrer la voie à suivre en exerçant sur une pression sur les décideurs fédéraux. Enfin, des mesures exigeantes au niveau de l'État peuvent obliger les fabricants à se conformer à des normes plus sévères sur l'ensemble du territoire.

Il arrive que d'autres instruments que les systèmes de plafonnement et d'échange se chevauchent. Par exemple, aux États-Unis, si un État ou une région adopte des normes sur la consommation de carburant plus strictes que les normes nationales CAFE fixées par l'Agence pour la protection de l'environnement (*Environmental Protection Agency*, EPA), des problèmes similaires à celui des fuites d'émissions entre États pourraient venir compromettre la réduction des émissions à l'échelon de l'État. Examinant les politiques effectivement mises en place par les États pour réduire les émissions de CO_2 par kilomètre parcouru, Goulder *et al.* (2009) constatent qu'environ 65 % de la réduction des émissions qui se produirait dans les États appliquant une politique exigeante seraient annulés par une hausse des émissions dans ceux qui n'appliquent pas de mesures comparables. De même, De Jonghe *et al.* (2009) observent qu'en cas de coexistence d'un système d'échange de droits d'émission et d'un système de quotas d'énergie renouvelable, le fait qu'un instrument soit très exigeant pourrait rendre l'autre non contraignant.

Le rapport de l'OCDE (2007a) recense d'autres interactions négatives susceptibles de découler de l'association de plusieurs instruments. Premièrement, les différents niveaux de l'administration n'ont pas tous la même approche de l'établissement et de la mise en œuvre des mesures de protection de l'environnement et les règles instaurées à ces différents niveaux peuvent se révéler difficiles à harmoniser, voire contradictoires. Ainsi, les Pays-Bas comme le Danemark ont, pour lutter contre les sources diffuses de pollution de l'eau, adopté des instruments au niveau sectoriel et au niveau national ; or, la Directive concernant la protection des eaux contre la pollution par les nitrates à partir de sources agricoles adoptée par l'Union européenne exige une réglementation au niveau des exploitations agricoles ou des sols. Deuxièmement, le chevauchement des instruments risque d'engendrer des coûts administratifs supplémentaires et d'« empêcher les pollueurs de profiter de moyens peu coûteux de mise en conformité qu'un instrument économique peut offrir » (OCDE, 2007a, 29).

7. Avantages des instruments de marché : état des données disponibles

Plusieurs études empiriques ont été consacrées à l'efficacité des instruments de marché. Dans une revue de ces études, Tietenberg (1990) compare le rapport coût-efficacité des instruments de marché à celui des instruments réglementaires contraignants dans le domaine de la gestion de la pollution atmosphérique aux États-Unis. Le tableau 4 présente le rapport entre le coût des instruments réglementaires et celui de l'instrument de marché le moins onéreux. Ce rapport est extrêmement variable, d'un maximum de 22 pour les particules dans la partie inférieure de la Vallée du Delaware à tout juste 1.07 pour les normes relatives aux sulfates à Los Angeles. Bien que ce dernier exemple semble indiquer que, dans certaines situations, l'apport des instruments de marché est relativement limité, le rapport est nettement supérieur à 1 dans la majorité des cas.

Tableau 4. Études empiriques sur les mesures de lutte contre la pollution atmosphérique

Polluants couverts	Zone géographique	Base de la réglementation contraignante traditionnelle	Rapport coût de la réglementation contraignante/ coût de la solution la moins onéreuse
Particules	St Louis	Réglementations SIP	6.00
Dioxyde de soufre	Four Corners, Utah	Réglementations SIP	4.25
Normes relatives aux sulfates	Los Angeles	Normes sur les émissions de l'État de Californie	1.07
Règles relatives au dioxyde d'azote	Baltimore	RACT (proposition)	5.96
Règles relatives au dioxyde d'azote	Chicago	RACT (proposition)	14.40
Particules	Baltimore	Réglementation SIP	4.18
Dioxyde de soufre	Par	Règles fixant un pourcentage uniforme	1.78
Particules	Partie inférieure de la Vallée du Delaware	Règles fixant un pourcentage uniforme	22.00
Bruit produit par les aéroports	États-Unis	Mise en conformité obligatoire	1.72
Hydrocarbures	Tous les sites DuPont locaux	Réduction sur la base d'un pourcentage uniforme	4.15
Émissions de CFC provenant d'autres sources que les aérosols	États-Unis	Normes sur les émissions (proposition)	1.96

Source : d'après Tietenberg (1990), tableau 1.

Notes : SIP = *state implementation plan* (plans d'application adoptés par les États) /RACT = *reasonably available control technologies* (technologies de lutte contre la pollution raisonnablement disponibles), ensemble de normes imposées aux émetteurs dans les zones qui ne respectent pas les normes sur la qualité de l'air.

L'éventail des coûts relatifs étant très large, il convient de s'interroger sur les facteurs qui font que les instruments de marché sont avantageux par rapport aux instruments réglementaires. Newell et Stavins (2000) ont mis au point des modèles simples pour déterminer le rapport coût-efficacité relatif en fonction de deux sources d'hétérogénéité des coûts entre entreprises : le niveau d'émission de référence (et par conséquent l'intensité d'émission) et la pente de la fonction de coût de chaque entreprise. Cette pente permet de savoir à quelle cadence les coûts d'une entreprise augmentent à mesure qu'elle cherche à réduire davantage ses émissions. Les auteurs ont ensuite évalué, pour les émissions de SO_2, les économies de coûts découlant de l'utilisation d'un instrument de marché de préférence à une norme de réduction des émissions uniforme définie de façon à ce que l'on obtienne les quotas d'émission initialement alloués dans le cadre du système d'échange de droits d'émission de SO_2. Ils ont estimé cette économie à 38 %, en ne tenant compte que de l'hétérogénéité liée au niveau d'émission de référence (Newell et Stavins 2000). Prendre en compte la deuxième source d'hétérogénéité des coûts ne peut qu'aboutir à une hausse de ce pourcentage (voir Carlson *et al.* 2000).

Farrell *et al.* (1999) ont comparé les coûts d'une réduction des émissions de NO_x au moyen d'une approche réglementaire et au moyen du système de quotas d'émission négociables en cours de mise au point à l'époque (le *NO_X Budget Trading Programme*, qui visait à réduire les émissions de NO_x des centrales électriques et autres grandes sources de combustion dans le Nord-Est des États-Unis). Ils ont examiné diverses solutions, d'approches purement réglementaires à des instruments de marché autorisant plus ou moins de souplesse en ce qui concerne l'échange et la mise en réserve de droits d'émission pour les

périodes ultérieures. Ils se sont fondés sur un modèle précis des décisions de mise en conformité au niveau des entreprises individuelles et ont constaté que le passage d'une approche réglementaire à un instrument de marché permettait de réaliser des économies de coûts substantielles – environ 45 % –. Ces exemples concernent certes les États-Unis, mais le facteur qui explique que les instruments de marché présentent un meilleur rapport coût-efficacité que les réglementations contraignantes, à savoir l'hétérogénéité des coûts, n'est pas propre aux États-Unis.

8. Conclusion

Pour l'essentiel, la formulation des politiques de l'environnement suppose un arbitrage entre l'approche réglementaire traditionnelle et les instruments de marché. Même lorsqu'ils sont présentés comme des normes de résultats, les instruments réglementaires contraignants sont généralement des directives sur les technologies qu'une entreprise doit utiliser pour atteindre un objectif environnemental donné. En revanche, les instruments de marché font appel à des mécanismes d'incitation économique pour conduire les entreprises et les particuliers à prendre des décisions de nature à améliorer la qualité de l'environnement.

Si l'on se place dans une perspective comparative, les instruments réglementaires incitent peu, voire n'incitent pas, les entreprises à aller au-delà du respect de leurs obligations réglementaires ou à innover et tendent à favoriser une répartition des obligations de mise en conformité peu satisfaisante en termes de rapport coût-efficacité. Au contraire, les instruments de marché incitent habituellement les entreprises à aller au-delà des normes, favorisent les investissements technologiques et créent des mécanismes décentralisés pour les décisions de mise en conformité qui, le plus souvent, permettent d'obtenir de bons résultats environnementaux à moindre coût pour la société.

Les taxes, redevances et autres instruments de marché qui font supporter un coût financier aux auteurs de comportements dommageables pour l'environnement sont sous-tendus par le principe pollueur-payeur, désormais bien connu. Les subventions, qu'elles prennent la forme d'aides financières directes, de crédits d'impôt à l'investissement ou à la production, de solutions de financement à conditions préférentielles, de possibilités d'amortissement accéléré ou de mesures incitatives en faveur de la recherche et développement, sont les mesures d'incitation économique les plus souvent utilisées pour favoriser des décisions susceptibles d'aboutir à une amélioration de la qualité de l'environnement. Les normes de résultats négociables, comme les normes de portefeuille relatives aux énergies renouvelables ou les normes révisées sur la consommation de carburant aux États-Unis, sont une solution fondée sur le marché qui offre une certaine souplesse et peut être utilisée pour atteindre un objectif environnemental, en général exprimé par unité de production.

Au-delà de ces observations générales, l'utilisation d'instruments de marché dans des contextes économiques, politiques, sociaux et juridiques spécifiques soulève nombre de questions importantes. Espérant stimuler les débats sur ces aspects, nous présentons un certain nombre des questions qui se posent souvent lorsque l'on examine le rôle des différents instruments de marché.

Comme souligné, il est important d'examiner si les taxes et mesures ayant une autre finalité que la protection de l'environnement ont une incidence sur l'efficacité d'un instrument de marché destiné à protéger l'environnement et sur les résultats qu'il permettra d'obtenir. Les subventions aux énergies fossiles qui sont en place dans beaucoup de pays et avec lesquelles les nouveaux dispositifs introduits pour promouvoir les technologies à faible émission de carbone sont en concurrence sont une bonne illustration. Les réglementations qui empêchent que le marché réagisse « pleinement » à une nouvelle mesure fondée sur le marché constituent un autre exemple. Ainsi, les obligations comme celle d'obtenir une autorisation peuvent faire obstacle à l'entrée de nouvelles entreprises sur un marché ou limiter les possibilités d'investissement. Selon toute vraisemblance, une telle situation est aussi susceptible de compromettre l'efficacité des mesures environnementales fondées sur le marché, en particulier les incitations à innover.

Compte tenu des éléments dont on dispose au sujet de la possibilité de stimuler l'innovation à travers des politiques environnementales, il convient d'examiner les coûts d'opportunité de l'innovation induite par ces politiques. Plus précisément, certaines études ont démontré l'existence d'un lien entre la politique réglementaire et les décisions en matière d'investissement, mais il conviendrait de déterminer les projets auxquels il faudrait renoncer en raison d'une hausse des dépenses d'innovation dans le domaine des produits verts. Les avantages de cette augmentation de l'innovation dans le domaine des technologies et produits verts sont-ils neutralisés par la nécessité de différer ou d'interrompre le financement d'autres projets ? En outre, comment mesurer cette incidence ? L'expérience des pays de l'OCDE qui ont utilisé des instruments réglementaires et de marché différents pour stimuler l'innovation pourrait permettre de dégager des réponses intéressantes à cet égard.

Dans bien des cas, les nouvelles mesures mises au point peuvent servir à créer de nouveaux marchés. Comme nous l'avons montré pour les taxes sur les émissions, la structure de marché joue un rôle important dans les résultats des politiques environnementales. Par conséquent, il faut rechercher quels facteurs déterminent la structure des marchés nouvellement créés dans le cadre de la protection de l'environnement. Il importe aussi de chercher à connaître le rôle de la structure de marché dans des contextes plus spécifiques. Par exemple, dans le cas des systèmes de recyclage locaux, la situation diffère-t-elle selon que ces marchés sont le fruit d'un processus interne, fondé sur le marché, ou résultent d'un processus politique (de la création d'un nouveau programme ou de l'adoption d'une nouvelle loi par exemple) ?

Si les mécanismes incitatifs résultent de l'intervention publique, conduisent-ils à la création de marchés concurrentiels qui atteignent les objectifs environnementaux ou à la formation de monopoles ? Quels sont les facteurs qui conduisent à une de ces situations plutôt qu'à l'autre ? En d'autres termes, dans ces circonstances, le processus politique favorise-t-il la formation de monopoles locaux, même si les marchés concurrentiels présentent un avantage évident en termes de rapport coût-efficacité ? L'un des avantages des instruments de marché par rapport aux instruments réglementaires contraignants réside dans le fait qu'ils allègent les obligations d'information sur l'objectif environnemental à atteindre. Si ces obligations sont contraignantes dans le cadre des mesures réglementaires, faut-il en déduire, dans l'hypothèse d'une approche fondée sur de telles mesures, que les incitations créées par les autorités chargées de la réglementation avantagent une structure de marché par rapport à une autre ? Quels autres facteurs essentiels jouent un rôle ?

En cas de création de nouveaux marchés liés à la protection de l'environnement, la question de savoir si les instruments permettent réellement le décollage de nouveaux marchés de produits et services qui remédient à des problèmes environnementaux n'est pas tranchée. Dans l'affirmative, quel en est le rapport coût-efficacité ? De quels éléments empiriques dispose-t-on et comment sait-on que ces nouvelles technologies n'auraient pas été mises au point en l'absence de programme public ? Quels autres facteurs ou caractéristiques propres au contexte influencent l'utilité des taxes et subventions publiques ou des normes de résultats négociables pour la création de ces nouveaux marchés ? Pour justifier ces subventions, on invoque souvent les pays qui affichent un niveau d'innovation élevé dans un domaine qui a bénéficié d'un soutien substantiel de l'État (par exemple celui de la production d'énergie solaire). Dans ces situations, le soutien public est-il à l'origine de l'innovation ou l'État a-t-il soutenu une nouvelle technologie qui était déjà en cours d'élaboration avant de bénéficier d'un soutien financier extérieur ? Les résultats dépendent-ils de la structure de marché promue ?

Si la politique de l'environnement est élaborée de façon décentralisée, plutôt que globale, les décideurs doivent avoir conscience des conséquences indésirables que peut avoir l'utilisation conjointe de plusieurs instruments de marché. Fischer et Preonas (2010) ont mis en évidence un certain nombre de problèmes importants liés à l'association de plusieurs instruments. Par exemple, lorsque la tarification des émissions est suffisante, il est peu probable que d'autres instruments aient des effets positifs au plan de l'environnement, sauf en présence de défaillances du marché supplémentaires. Comme il est peu

vraisemblable qu'un système global de tarification des émissions soit mis en place, l'interaction avec d'autres instruments constitue inévitablement une question importante. Dans ce cas, il faut se demander quelle est l'incidence sur la politique environnementale optimale de l'utilisation conjointe de plusieurs instruments pour atteindre un seul et même objectif. Quelles sont les raisons qui justifient le cumul de plusieurs instruments dans les pays de l'OCDE et dans quelle mesure les retombées technologiques, les effets d'apprentissage par la pratique et les hypothèses quant à l'évolution technologique interviennent-il dans le choix et les caractéristiques des politiques ?

Un échange, fondé sur la comparaison des expériences et sur les leçons tirées des solutions déjà mises en œuvre, entre les pays de l'OCDE devrait apporter un éclairage sur ces questions empiriques et guider l'élaboration des politiques qui seront mises en œuvre dans ce domaine à l'avenir.

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AUSTRALIA

Executive summary

The green growth concept encourages policymakers to take into account the value of the environment as they attempt to develop policies to improve people's lives.

However, green growth as a concept in itself has limitations – it can overlook the trade-offs involved in many policymaking decisions and may not consider all of the factors that contribute to people's wellbeing.

- Environmental policy is valuable where it improves people's lives over time and across generations by contributing to the efficient use of, and investment in, society's resources.

There is a clear role for governments in designing environmental policies that address environmental market failures.

- Improving the level of information available concerning the state of the environment can help policymakers to assess the trade-offs involved in designing environmental policy.
- Well-targeted policies are more likely to address market failures directly and with minimal flow-on costs to other areas of society.

There are a range of mechanisms for implementing environmental policy.

- Market-based mechanisms can be superior to command-and-control policy approaches as they provide incentives to encourage behavioural change from those most able to change.
- However, non-market mechanisms may be more suitable where it is difficult to monitor the activities of private individuals, and where the impacts of their activities are confined to a particular location.

Environmental policies that promote competition are more likely to achieve their objectives in a cost effective way, by driving the allocation of resources to their most valued use.

- Market-based mechanisms can harness the efficiency of competitive markets to achieve an environmental outcome at least cost.
- Where non-market mechanisms are used, integrating elements of competition (such as through a competitive tender process) can improve the efficiency of the policy and provide better value for money for taxpayers.

1. Introduction

Whilst green growth has been interpreted in many ways, generally it refers to a shift in the focus of economic policy to more explicitly consider environmental factors. This is an acknowledgement that the environment has direct and indirect benefits for people's lives. However, while green growth is useful for broadening our considerations beyond narrowly defined economic growth, it should not be seen as an end

in itself. Other factors, such as higher levels of human and social capital and the extent of opportunity and freedom that people enjoy are also important to wellbeing.

With this in mind, policy that focuses on addressing environmental market failures in a targeted, cost effective way is most likely to improve people's lives. Market-based mechanisms to address environmental externalities are often superior to other policy interventions, such as regulation and subsidies, because they harness the competitive forces of markets to achieve environmental objectives at least cost. While some environmental market failures cannot be addressed with market mechanisms, competition is often important in promoting the efficient achievement of policy objectives.

2. The implications of green growth for policymaking

The green growth concept is generally premised on the idea that governments should pursue policies with the joint aim of promoting economic growth and ensuring environmental sustainability. The Organisation for Economic Co-operation and Development (OECD) assert that 'green growth is the means by which the current economy can make the transition to a sustainable economy. It involves promoting growth and development while reducing pollution and greenhouse gas emissions, minimising waste and inefficient use of natural resources, maintaining biodiversity, and strengthening energy security'.[1]

However, there are divergent views on what green growth actually is and how it should be defined. Some definitions purely focus on lowering greenhouse gas emissions whilst promoting economic growth, whereas others imply a broader and deeper transformation of economies into 'green economies', in line with traditional sustainable development thinking.

While its definition is contested, the green growth concept is useful as it attempts to recognise the value of the environment to humans – both in providing the resources used in the economy and in the non-market value that humans gain from of the environment itself, including provision of ecosystem services, recreation and intrinsic values. The green growth concept encourages policymakers to take into account the value of the environment as they attempt to develop policies to improve people's lives.

While attempts to broaden the concept of growth to include consideration of environmental sustainability are valuable, green growth as a concept in itself has limitations. Green growth does not consider all of the different factors that are important to people's lives. In addition to economic and environmental factors, levels of human (such as education and training) and social capital (such as social relationships and civic institutions) and the extent of opportunity and freedom[2] within a society contribute to people's wellbeing, although these are generally not included in the green growth concept.

Further, the green growth concept does not acknowledge that maximising societal wellbeing often involves trade-offs between using and investing in the different factors that contribute to the quality of people's lives, including across generations. In some instances, this could involve trading off environmental outcomes for other benefits where this would deliver a net improvement in overall wellbeing. For example, in planning urban areas there may be a trade-off between the preference of some residents for large blocks of land and addressing the environmental effects of urban sprawl. The appropriate policy outcome should depend on the relative contribution to wellbeing of these (and any other relevant) factors, and could involve a balance of the two competing benefits – such as restricting the size of residential blocks of land to limit urban sprawl, but incorporating parks and open space into urban areas to provide residents with recreational areas.

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1 Organisation for Economic Co-operation and Development (2009) *OECD and Green Growth*, available at http://www.oecd.org/dataoecd/42/28/44273385.pdf

2 Opportunity and freedom refers to the capacity for people to choose lives that they have reason to value.

Environmental policy should not be seen as an end in itself, but as a contributor to societal wellbeing. This means that reducing pollution, greenhouse gas emissions and waste and strengthening energy security should be pursued only to the extent that they improve people's lives.

From this perspective, green growth policies are valuable where they improve people's lives by optimising the use of society's economic, human, environmental and social resources. It can be seen that environmental sustainability fits into a wider sustainability framework, with the objective of improving people's lives over time and across generations through the efficient use of, and investment in, society's resources.

3. Principles for developing environmental policy

Environmental assets often have public good characteristics. The lack of property rights over these assets means that they are often undervalued by businesses and individuals. Similarly, the benefits (or costs) of the environment often cannot be fully captured by individuals, so that there is little incentive to better manage environmental assets. There is therefore a clear role for government intervention to protect environmental assets by efficiently addressing these market failures where it is of a benefit to society to do so. However, the pursuit of environmental outcomes must be weighed up against alternative policy objectives that may also be of value to society.

Balancing potentially competing policy objectives can be complicated by difficulties in measuring the value of environmental assets. In many cases, policymakers will need to make subjective assessments of relative value. While representative governments are often best placed to reflect society's values, in many cases policymakers do not even have full information about the effects of their decisions. The historical focus on economic growth reflects the fact that what societies pursue is based on what they measure – nation states have developed comprehensive systems of economic indicators, but few indicators to measure the condition of the environment. Improving the level of information regarding the state of the environment would assist policymakers in assessing the complex trade-offs between different policy outcomes.[3]

A key way to assess policies to promote environmental sustainability is whether they appropriately target market failures that lead to poor societal outcomes. Well-targeted policies are more likely to address market failures directly and with minimal flow-on costs to other areas of society. Policies that provide economic incentives to encourage (but not mandate) behaviour are likely to better facilitate efficient trade-offs between environmental outcomes and other outcomes important to people's lives, since they provide freedom for individuals to make their own choices.

4. Types of environmental policy

Environmental policies can take various forms. These include undertaking and supporting environmental research, public ownership and management of environmental assets (such as in national parks) and influencing private behaviour. Influencing private behaviour can be achieved through education campaigns; regulation and mandatory standards; support for property rights; subsidies and purchases; taxes and trading regimes; and the removal of subsidies and concessions for environmentally-damaging behaviours.

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[3] For further discussion of this concept see Stiglitz, Sen and Fitoussi (2009) *Report of the Commission on the Measurement of Economic Performance and Social Progress*, available at http://www.stiglitz-sen-fitoussi.fr.

The establishment of secure and flexible property rights can be important for environmental protection. Property rights that are secure over the long term encourage resource owners to take into account future benefits, and hence encourage resource conservation to the benefit of future generations. Property rights that are flexible – allowing the aggregation, disaggregation and trading of relevant components – encourage the allocation of resources to those who value them most, in terms of both immediate benefit and conservation for future generations.

A number of environmental policies that seek to influence private behaviour are referred to as market-based mechanisms. These include permit trading schemes, in which a market is created for tradeable permits that represent an environmental outcome, by obliging certain parties to acquire the permits. Taxes that are levied on environmental externalities (for example, pollution) can be used to compel firms to take into account the cost of the externality on society. Market-based mechanisms can be superior to regulations and/or command-and-control policy approaches as they encourage (or reward) behavioural change from those most able to change. Provided that markets are competitive and the mechanism is sufficiently broad to provide the private sector with freedom over how they respond to incentives (including through innovation), this promotes the achievement of the environmental objective at least cost. Further, market-based mechanisms provide ongoing incentives for private individuals to improve their practices in order to increase their avoidance of costs (or receive further rewards).

Non-market mechanisms include direct regulation and grant programs. Direct regulation involves governments setting standards and rules that control the activities of individuals and firms or the technologies they can use. For example, in response to water shortages, governments may place water restrictions on how and when households can use water. Alternatively, grant programs involve the use of public funds to achieve a particular purpose, such as providing free water-efficient showerheads or subsidising dual flush toilets.

Non-market mechanisms are often a blunt instrument to achieve environmental outcomes. This is because they often indirectly target the objective that they are aiming to achieve. For example, policies to increase the adoption of energy efficiency may reduce greenhouse gas emissions indirectly, by reducing demand for electricity. However, electricity generation is not always directly linked to emissions, and in any case, reducing demand for electricity is not always the cheapest way to reduce emissions. A blanket policy to reduce emissions through energy efficiency policy ignores this, and is likely to increase the overall cost of abatement.

However, market-based mechanisms may not be suited to addressing every market failure, necessitating a consideration of other types of policy intervention. Market-based mechanisms are generally more effective where policymakers are able to measure the particular activity that they wish to encourage or discourage, and where the costs (or benefits) are incurred across the jurisdiction (rather than location specific). For instance, a market-based mechanism is unlikely to be the best way to address the cost associated with the dumping of hazardous chemicals. Monitoring the release of these chemicals is likely to be difficult, while the effects will vary depending on how populated the area is in which they were released and the nature of the local ecosystem. Regulation and criminal sanctions are likely to be more effective at preventing dumping.

Regardless of the type of mechanism, policymakers should consider the cost effectiveness of any environmental policy. Worthwhile environmental policy will improve people's lives not only by enhancing the benefits that people derive from the environment, but also by minimising the costs associated with that benefit. This assessment should include all costs, not only economic costs. Policies that encourage competition are likely to promote cost effectiveness.

5. Competition and environmental policy

Competition is an important consideration when designing environmental policies. Competition in a market drives the allocation of resources to their most valued use. Environmental policies that impede competition are more likely to channel society's resources into less efficient uses and are less likely to provide value for money to taxpayers.

Market-based mechanisms can harness the efficiency of competitive markets to achieve an environmental outcome at least cost. Policymakers have a role in establishing the architecture of the market, by creating a system of incentives for participants to undertake activities that are environmentally beneficial. It is important in a market-based mechanism that the market is effectively competitive – meaning that the market has sufficient buyers and sellers, has minimal barriers to exit and entry and information is readily available. In a competitive market, firms have incentives to improve their current position, by employing more cost-effective ways of producing an environmental outcome or improving the quality of their products. Governments have a role in promoting competition under a market-based mechanism – both in setting the architecture of the scheme (including in some cases, setting standards for the quality of environmental products) and providing secure property rights for scheme participants and as part of their broader competition policy agenda.

Policies that provide individuals and businesses with flexibility to adapt as circumstances change are more likely to promote competition. Policies that provide flexibility are less likely to need regular adjustments (for example, in response to technological change), which provides a stable policy environment for business investment decisions. This will attract more players into the market and strengthen the level of competition. Inflexible policy mechanisms are more likely to hinder competition by raising regulatory barriers to entry for new suppliers of an environmental outcome. This advantages incumbents, thereby diminishing the ability of a market-based mechanism to achieve the desired environmental and economic outcome. Flexible policies provide business with incentives to innovate and develop cheaper methods to achieve the environmental outcome, whereas inflexible policies may result in resources being locked up in inefficient firms, when they could be used more efficiently elsewhere.

With this in mind, it is possible to build competition into a non-market mechanism to promote more efficient policy outcomes. For example, the efficiency of a subsidy program can be increased through the use of a competitive tender process. Under this model, the public sector provides the funding to achieve a policy objective, but contracts a private firm to achieve it. The government issues a statement outlining the objectives of the program and calls for firms to submit offers that state how the firm will achieve the program objectives and at what price. The government is then able to select the firm that provides the most attractive offer, which leads to better value for money for taxpayers. Competitive tenders can promote competition, where there are a sufficient number of bidders able to supply the service and the duration of contracts is not so long as to hinder innovation, by locking-in a particular service provider over the long-term.

6. Conclusion

Green growth is a useful concept that highlights the importance of embedding consideration of environmental factors into long-term economic policymaking. However, green growth should not be seen as the end point in terms of considering how policy can improve people's lives. Along with economic and environmental capital, the levels of human capital, social capital and opportunity and freedom will

contribute to the quality of people's lives. Economic policy should seek to use society's resources in a way that contributes to sustainable improvements in people's lives.[4]

An environmental policymaking process that aims to improve people's lives should recognise that trade-offs will be required. Information helps to guide policy trade-offs and is essential for the efficient operation of markets.

Environmental policy should focus on addressing market failures in a cost effective way. Using market-based mechanisms is often a superior way to achieve environmental policy objectives, as they allow governments to implement a system of incentives, but leave it to market competition to achieve an environmental outcome at least cost. Moreover, while market-based mechanisms do not always lend themselves to addressing every type of environmental market failure, integrating competitive elements in even these circumstances is likely to improve efficiency and reduce costs.

[4] The works of Amartya Sen discuss how different factors contribute to improving people's lives. For example, see Sen (1999) *Development as Freedom*.

CHILE

1. Chile's legal and institutional environmental framework

Chile's economic growth stands strong upon its natural resources, the main ones being mining, fishing, forestry, aquaculture, and agriculture. In this context, one of the main challenges of the country has been to develop the ways and means necessary to establish a sound relationship between the economy, nature and the community.

The main legal body regarding environmental protection – Act No. 19.300, General Environmental Act of 1994 – was substantially amended in 2010 by Act No. 20.417[1] (hereinafter, the Act). This Act originally established a set of regulations and definitions, environmental management instruments, areas of responsibility, enforcement mechanisms, the environmental protection fund, and government institutions in charge of addressing issues related to the environment. It also defined key concepts for generating and ascribing duties and liabilities regarding biodiversity, climate change, pollution, conservation of environmental heritage, nature preservation, and environmental impact or damage.

Since the enactment of this legal body, the concept of sustainable development has supported all legal, institutional and instrumental aspects of environmental management. It also involves the seven main principles that guide Chile's environmental management, namely, gradualness, realism, prevention, "polluter pays", efficiency, and citizen participation.

A number of management instruments –actually, the main topics of the General Law No. 19.300 and related legal bodies, are also provided**:** Environmental Impact Assessment System; Environmental Quality Standards, Nature Preservation and the Conservation of the Environmental Heritage; Emission Standards; Management, Prevention and Decontamination Plans; Citizen Participation; Liability for Damage to the Environment; Education and Research; Environmental Protection Fund; and Strategic Environmental Assessment [2].

From 2010 onwards the new institutional arrangement will add in the Environmental Ministry, in charge of environmental policies and regulations**;** the Environmental Evaluation Service, for the administration of the Environmental Impact Assessment System**;** and the Superintendence of the Environment as an enforcement and compliance agency. The Superintendence's powers of supervision and sanction will be effective once the bill establishing the Environmental Tribunals, which is now before Congress, is enacted.

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1 This amendment included the redesign of environmental institutions, by creating the Environmental Ministry, the Environmental Evaluation Service, the Superintendence of the Environment and a Ministerial Sustainability Council. Complementing these environmental institutions, a bill establishing Environmental Tribunals was sent to Congress in November 2009 and is currently under discussion.

2 The 2010 amendment introduced the Strategic Environmental Assessment instrument, which will come in force together with its related regulation.

2. Use of economic and of command & control instruments in environmental management

Chilean environmental law and regulations allow the use of command & control, as well as economic instruments, in environmental policies and management. Specifically the Act's article 47 provides for the use of economic instruments as part of a range of tools designed to prevent and/or monitor pollution: *"Prevention or decontamination plans may employ the following regulatory or economic instruments, according to the specific characteristics of the case: i) Emissions regulations; ii) Tradable emission permits; iii) Taxes on emissions or user fees that shall take into account the environmental cost implicit in the production or use of certain goods or services; and iv) Other instruments designed to foster environmental improvement and reparation actions."*

Articles 32 and 40 of the Act state the general procedure for the definition of environmental quality and emissions standards, respectively, both of which include an economic and social assessment report on their performance.

Regarding emission fees and taxes, Chile has a very good experience in the management of water for human consumption and the disposal thereof. A drinking water and sewage treatment concessions regime is in place whereby operators can charge a price (fee) high enough for normal returns on capital. The proactive process of privatization, coupled with well-targeted social subsidies, generated a rapid progress in sewage treatment. By the end of 2007, 82.3% of urban housing was connected to it and a target of 99% was set for 2014. Industrial water discharges are subject to emission and secondary standards, the design of which must consider the economic aspects of their operation.

With the purpose of supporting cleaner household heating appliances, Act No. 20.365 came in force in August 2009, granting a tax credit for the building of houses that include solar water-heating devices. This credit amounts to all or part of the cost of adding the latter to new housing projects. It will be applicable to houses up to approximately USD 150,000 (land and construction sale price) and payable to the constructor by a credit against its corporate income tax. The credit ranges from 20% to 100% depending on the price of the house, with a maximum per house of approximately USD 1,100 (decreasing to USD 990 by 2013).

Another example of tax refund corresponds to Act No. 20.259 of 2008 that encourages the use of less pollutant vehicles. Given that in Chile vehicles are subject to an annual tax ("circulation permits"), hybrid vehicles received for two to four years a refund of up to 100% of the tax, depending on their sale price. This tax refund remained in force until March 2010, resulting in the doubling-up of sales of these vehicles throughout the period.

3. Economic instruments for air contamination control

Economic instruments (taxes, subsidies, and consumer information) comprise any mechanism likely to influence consumers' demand so as to instil in their decisions the environmental and/or social costs thereof. Mechanisms such as tradable circulation permits belong to the economic instruments class because they allow for the management of emission reduction. The transactions' equilibrium price should mirror the environmental damage they cause, finally affecting demand for the contaminating source

One of the advantages of these mechanisms is their efficiency in the control of pollution as compared to command & control instruments, as well as the opportunity they represent for the recollection of public income to finance the affected cities decontamination. This is not directly the case for ordinary taxes, which are legally integrated into the National Treasury with no predetermined end.

For the period 2010-2014 the Ministry for the Environment is currently considering the following economic instruments:

- Economic incentives and fewer restrictions on vehicles with low and zero emissions;
- Subsidy for thermal insulation and solar panels in housing;
- Replacement of heating subsidy: starting with a pilot program in 2011;
- Consumer Information on emissions levels: includes light vehicle tagging and labelling of artefacts, and information on fuel efficiency and emissions;
- Road pricing in saturated cities;
- Emissions offsetting, with the aim of lowering transaction costs and inefficiencies.

For large emitters such as power plants, boilers and functions, command & control instruments are under consideration concerning emission limits. These aim at controlling the impact of said sources from 2012 onwards. In this scenario there are two alternative economic instruments, so far under design: i) a carbon tax, which transfers to prices the externality generated by greenhouse gases like CO2; and b) "Cap and trade" system, intended for reducing or offsetting emissions, at a cost lower than that of other instruments'.

4. The case for clean energy

Like other OECD countries, Chile enacted legislation for the promotion of Renewable Energies, which correspond to a tradable performance standard. Most of Chile's energy sector –generation, transmission and distribution– is in private hands, while the State ensures compliance with environmental legislation. It does so by promoting private investment in clean technologies and by urging the removal of market and non-economic barriers that curb the speedy development of both renewable energies and energy efficiency.

The privatisation process of the electricity industry took place from 1980s to 1998. Private companies transmit electricity sold by generators to power distributors, final customers and other generators. Competition law prevented generators from having a stake in transmission and so was provided by legislation. Foreign investment can go to all activities, including transmission and hydropower generation.

The Act Nº 20.257 (2008) that amends the Electricity Act (1982), provides that by 2024, 10% of the electricity sold must come from non-conventional renewable sources. Between 2010 and 2014 that figure must be 5%, a figure that is to grow by 0.5% annually starting in 2015 until it reaches 10% in 2024. This obligation will be in force until 2035. Companies failing to reach this percentage shall be subject to a fine, shared out among final consumers and distributers.

This technology-based guideline seeks to overcome the major barrier facing non-conventional renewable energy, which is, higher costs than those of conventional fossil fuels generators.

The State has likewise set up several programs and subsidies in order to promote the development of that type of energy in the country. Among others, it offers subsidies for conducting studies and assessing the feasibility of projects on non-conventional renewable energy; special programs for exploration of geothermal energy; and for the gathering of information on the country's endowment of non-conventional renewable resources[3].

[3] For details on the instruments see http://www.cer.gov.cl/.

5. Competition authorities and green growth developments

Decision No.992/1996 of the former Preventive Commission[4] set a precedent regarding competition authorities' attention to environmental matters, particularly those related to the allocation of water rights as an essential input for hydroelectric generation. Said decision advised the General Water Directorate, or DGA[5], to refrain from approving new rights of non-consumptive use of water, up until a legal and/or regulatory mechanism comes into force in order to ensure proper use of water. Specific projects of general interest were exempted, whereupon the Directorate puts forward any such requirement to the National Energy Commission[6] for it to resolve whether these qualify as that kind of projects.

Sector-specific regulation based on the Water Code, Decree Law No. 1.122/1981 states that "water is a national property for public use, people having the right to make good use of it". The initial allocation is free and grants the right, possibly in perpetuity if supply sources are not exhausted. Should there be more than one individual interested in those, rights must be auctioned.

Act No. 20.017/2005 amends the Water Code in view to encourage the sound and sustainable use of water resources and bring to its end the situation of keeping them idle subject to no tax whatsoever[7]. This is in compliance of Decision 18/2006 whereby the Competition Tribunal orders the National Energy Commission to report any application for non-consumptive water rights for hydroelectric uses. The allocation of these rights is then not only regulated by law but becomes a State monopoly as well, passed on to private parties ("privilege monopoly").

That notwithstanding, two large hydroelectric generation firms (together accounting for nearly 68% of the Central Interconnected System's gross installed power) requested a Competition Tribunal decision aimed at assessing the risks for competition raised by a joint venture they were planning, for building and operate five hydroelectric plants in the south of the country. In its Decision No.22/2007, the Tribunal addressed the issue considering the risks of concentration of water rights and ordered open access to the transmission line.

Decision 30/2009 of the Competition Tribunal deals with new non-consumptive water rights for the building of power plants to supply the Aysen Electric System. The rights were to be use exclusively for hydroelectric generation projects seeking to reduce the cost of electricity, in accordance with the provisions of the Water Code and the reports of both the sectoral regulators and the competition authority. All of them advocated specific conditions for the concession of said rights, among them, that the rights be publicly transferable and that within twelve months of their dispensation, its beneficiaries should surrender the one not used in the two plants under construction.

Today Chile faces the challenge of redefining its energy matrix. According to the National Energy Commission, the power sector's projections show major changes in the energy matrix expected for coming decades, with improved energy efficiency and increased non-conventional renewable energy. This one is expected to account for about 20% of the additional energy requirements for the period 2008-2020.

4 Competition agency, one of the predecessors of the current Competition Tribunal, TDLC).

5 Regulatory agency responsible for promoting the management and administration of water resources.

6 Regulatory agency for the production, generation, transmission and distribution of energy.

7 See Act No. 20.017, Art.129 bis 4.

CZECH REPUBLIC

1. Introduction

The green economy has been experiencing the growing role in the market economy. The environmental policy uses various means with the aim of mitigating the consequences of the post-industrial society, thus influencing the competition policy. This paper examines the practise of environmental policy instruments regulating actions of the market participants in the Czech Republic, on the one side, and economic incentive approaches encouraging more amicable behaviour of the participants, on the other, both in the interaction with competition rules and potential distortion of market conditions.

Up to the present time, the Office for the Protection of Competition in the Czech Republic (hereinafter referred to as the "Office") has no decision-making practise in the matter of green growth and the market economy, even though the green economy gained the public concern namely through emission fees, ecological tax reform and increasing use of renewable energy sources, the solar energy and in particular through wind-power installations.

As far as the question of emission permits is concerned (the State Environmental Policy 2004-2010 has conceived them as "a key instrument for reduction of greenhouse gases in the industrial sphere"[1] since the entry to the European Union), it is intended to be covered by the roundtable to be held on 25 October 2010. The first part aims at describing the ecological tax reform, the frame of which was adopted at the beginning of the year 2007 in compliance with Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity.

The second part analyses the situation concerning the solar panels and wind-power installations in the Czech Republic (the most preferred technologies in the Czech Republic) and subsidies for them. The key question regarding renewable energy sources is the question of the Energy Return on Energy Invested (hereinafter referred to as the "ERoEI"), or simply energy return. The parameter for the current solar energy is between 2 and 5, for the current wind energy between 5 and 10 and for biofuels between 0.9 and 4 (depending on the growth)[2]. Events during the last months have stirred up furore in the Czech public which is far from being terminated.

2. Ecological tax reform in the Czech Republic

The effort to rate products participating in polluting the environment dates back to the year 1997 in the Czech Republic when the first legislative plan was drawn; however, its scope was obscure and individual steps unpremeditated. The initially slow process quickened due to the accession to the European Union. The Czech government committed itself to immediate initialisation of works on yields-neutral ecological tax reform. It consists of three phases which started in 2008. The first process concentrated on taxation of natural (and some other) gases, solid fuels and electricity, while:

1 State Environmental Policy 2004-2010, p. 25 (http://www.mzp.cz/C125750E003B698B/en/sep_cz/$FILE/OPZP-SEP-20081229.pdf)

2 Cílek V., Kašík M.: Nejistý plamen, Dokořán 2008, p. 17.

- Both suppliers and operators of distribution and transmission systems and underground gas storages are obliged to pay tax for natural gas[3]. The same obligation applies to those having used the gas under lower taxation for the purpose under the higher taxation. Tax rate in CZK for 1 GJ of combustion heat differs depending on the codes of nomenclature set in paragraph 4 of the Act. No. 261/2007. The tax-exempt gas is the gas destined for production of heat in households, for electricity production, as a fuel for sailing, in metallurgical processes or in mineralogical procedures.

- Rules valid for taxation of solid fuels[4] are the same as those mentioned above. In addition, the taxation refers also to the entities which spent untaxed fuels or used solid fuels free of tax for the purposes the tax-exemption does not provide for. Tax base is derived from the amount of solid fuels in GJ in an original sample; tax rate is CZK 8.50 for 1 GJ of combustion heat in an original sample. Combustion heat has been proved by the results not older than 1 year measured by the accredited laboratory[5]. If it is not possible to prove the combustion heat in an original sample this way, then the combustion heat is fixed at 33 GJ for 1 tonne of solid fuels. The objects of tax are essentially black and brown coal, carbon coke and carbon semi-coke, and other hydrocarbons (exclusively for thermal production – utilisation and sale). Fuels for electricity production, e.g. coke as a fuel for sailing or for technological purposes in the company where solid fuels had been produced, are free of tax.

- The electricity tax base is the electricity amount in MWH. The tax rate itself is CZK 28.30 for 1 MWH. Tax-exemption may be applied to electricity that is environmentally friendly, produced in traffic means (and spent there), produced from taxed products (if they are objects of tax for natural gas, solid fuels and consumer tax).

Green tax application should have been compensated by decrease in other charges in the frame of the so called reform neutrality – the more the energy grows, the more social and health security charges fall. According to the plan, the whole tax burden should have stayed on the same level. Nevertheless, green tax receives were not so high and the economic was stroke by the recession.

However, the ecological tax reform does not take into account any non-taxable consumption threshold, a fundamental and simple method how to content basic energy demand necessary for primary needs (because everyday life, essentially in contemporary society, is impossible without the use of energy), while the upper standard shall be concurrently upper paid. The ecological tax should be determined so that it educates a consumer.

3. The growing importance of renewable energy sources

The renewable energy sources (hereinafter referred to as “RES”) are mentioned in media on a daily basis thanks to solar energy (photovoltaic panels), wind energy (wind power plant) and biomass. However, the position of those three most politically (on the level of the European Union and the Czech government) supported promising resources initially enjoying the intrinsic parallel boom now appear to be hiding many barriers and restraints that had not been taken into account sufficiently. Some of them are uncontrollable as the conditions of the market and industry structure and development are changing. The others deal with the mere character of the resources. Simply, RES do not pay off in themselves.

3 Act No. 261/2007 Sb., on public budgets stabilization - part 45-47.

4 Act No. 261/2007 Sb., on public budgets stabilization - part 45-47

5 The conditions are set in § 6(4) of the Act No. 261/2007 Coll.

The Czech RES area and its support is regulated by the Act on the promotion of electricity production from renewable energy sources[6], implementing relevant community legislation[7]. The notice No. 475/2005 determines the parameters of the subsidy regulation, the way of regulation is then stated in the notice No. 140/2009. The business conditions, public administration execution and energy sector regulation are regulated by the Energy Act[8]. Some other rules regarding power market organization, grid connection and distribution system, technical data measurement and reporting are set by some other laws and implementing regulations.

In the Czech Republic, the support for environmental energy program is implemented in two alternatives: the system of guaranteed redemption prices and the so-called green bonus. The choice is voluntary, i.e. it is up to the producer, whereas the key criterion for the choice is the total price the producers gain for the RES electricity (the price conditions negotiated between a specific electricity producer and a specific customer rather than those for the mandatory purchase). The subsidy range turns on the RES type and installation output of the plant.

3.1 Solar energy – photovoltaic plants

Solar energy utilisation necessitates great investments accompanying the R&D in materials, installation of solar constructions, grid connection, construction and destruction of batteries and accumulators for energy preservation in the event that solar energy is not at disposal, ensuring secure and trouble-free operation. The solar energy represents the most discussed proposition for the future of RES. The increased installation of solar panels illustrates the number of active licensed plants; installation power in megawatt-hours owing to generous state subsidies is apparent from the diagram below[9].

The number of solar power-plants increased tenfold in 2009, according to data granted by the Energy Regulatory Office (hereinafter referred to as "ERO") the power installation in September 2009 counted 65.74 MW, one year later, it was yet 693.64 MW.

The visible growth of solar energy production is caused by the enormous decrease in the purchase costs of solar panel building – the price of solar panels for electricity production has dropped to a half.

The incidental effect of the boom is a leap rise in the electricity price – the total electricity price i.e. implicates the RES allowance – and is exceeding the technical limits of the electricity supply system. The dramatic increase in costs connected with the support in 2010 is caused by the expected volume of electricity generated by photovoltaic plants of about 240 GWH, which will bring costs in the amount of approximately CZK 2.8 billion. The state-wide contribution as a RES electricity production support instrument is CZK 166.34 per MWH, which is more than three times than it was in 2009.

"The crisis of the solar energy" – how the situation of solar energy is called in the Czech Republic – was unloosed in February 2010 when ČEZ and E-On (another Czech power producer) answered to a call of the transmission system operator CEPS and ceased to receive requests from new photovoltaic and wind plants for grid connection.

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6 Act No. 180/2005 Coll., on the promotion of electricity production from renewable energy sources and amending certain acts.

7 Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market.

8 Act No. 458/2000 Coll., on business conditions and public administration in the energy sectors and on the amendment of certain acts, as amended.

9 Source: Energy Regulatory Office; state on the 10th September 2010 (http://www.eru.cz/?bl=y)

The final price for the year 2011 will be derived from a number of solar panels that will be connected by the end of 2010[10].

Both the aforementioned problems arise from the provision of the Act on the promotion of electricity production from renewable energy sources according to which a redemption value must not drop more than by 5 % a year. The solar energy thus became an advantageous deal[11]. The amendment to the Act endorsed in the spring 2010 (on 15th September 2010, the government therefore decided to enact the amendment to the Act No. 180/2005) authorizes the ERO to decrease redemption values by more than 5 %. If the recovery investment does not reach 11 years, this will not be probable before 2011. At present, they are guaranteed for 20 years and drop in prices could be realised only owing to energy-consumption increase, and that would not count more than a few per cents (according to the most optimistic version). It is possible that the plan to construct 1200 MWp[12] of solar installations will not be fulfilled, but that is rather unlikely because stakeholders will endeavour to turn profit from such an advantageous investment environment.

The minister of finance Miroslav Kalousek proposed to impose a specific tax. In practise, the electricity generating companies would pay the set redemption value to operators; the state consequently would withdraw the tax of 50 % (the tax under consideration) and returns the price to consumers. This proposition will have to be thoroughly analyzed to preclude it being contrariety to the law.

The aforesaid amendment to the Act also cancels the state subsidy for solar panel construction in open spaces, whereas anticipating subsequent measures that will support positive price evolution.

At the same time, the Czech government decided to cancel income tax-exemption for photovoltaic plants, including those in operation. The retroactive effectiveness will have a negative impact upon the plants because of their bank credits.

Last but not least, the government promotes demand for minimum electricity power production effectivity at 22 % on photovoltaic arrangements of power exceeding 20 KWp. The declared reason is to protect the market against weak photovoltaic technology. The demanded effectivity is almost unreachable using the technologies available in the Czech Republic, possibly reachable only in the lab environment, according to the most of the solar technology specialists. The existing technology reaching the effectivity at 22 % is not apt to be used under the conditions of the Czech Republic, especially because of the great amount of light-diffuse scattering and unsatisfactory direct light intensity. The demand is thus discriminatory towards the solar technologies in relation with the other RES arrangements generally (because the novel does not apply the same requirement here), and those photovoltaic arrangements with the power exceeding 20 KWp.

The abovementioned measures promoted by the Czech government are in conflict with the aim to reach minimal proportion of RES energy at 12 % from the whole consumption. It implies that the generous "uncontrollable" support for the photovoltaic energy system caused harm to the final consumer and other than photovoltaic energy plants operators.

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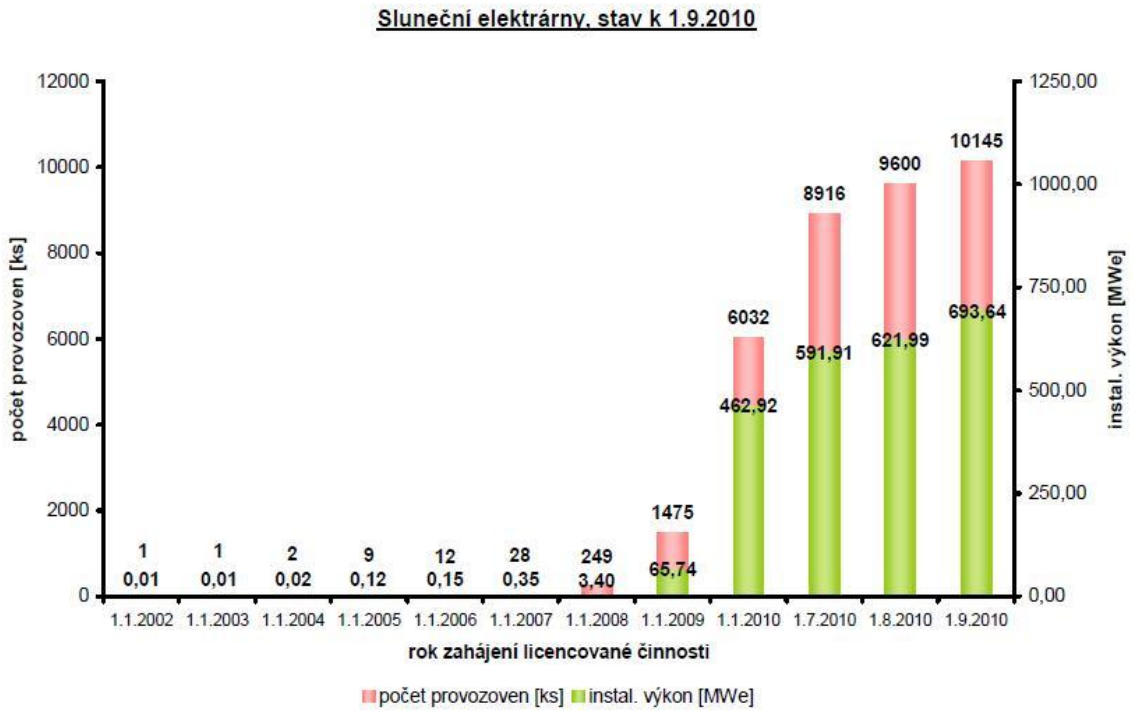
10 Individual estimations of the electricity prices in 2011 differ: the Czech Photovoltaic Industry Association estimates that it will grow about 7-8 %, the internal analysis of the ČEZ (Czech leading power producer) expects 15-22 %, and nongovernmental organizations indicate 5 %.

11 KWH produced in photovoltaic plant is purchased (depending on the size) for 12.25 CZK (power supply with installation power up to 30 KWH), or for 12.15 CZK (power supply with installation power above 30 KWH). Households purchase 1 KWH for about 4.5 CZK.

12 Wp = watt peak – in this case maximum output of a concrete solar system.

Solar power stations, 1 September 2010



***Source*: Energy Regulatory Office**

3.2 Wind energy – wind-power installations

The wind (besides the sun) is the next irregular and uncertain source of energy.

Firstly, regarding the wind conditions in the Czech Republic it is inevitable to construct a sufficient system of back-up power supplies that will assure the energy supply in the case of windlessness. The inappropriate weather conditions make back-up supplies running oftener in comparison with wind-power installations.

Secondly, wind-power installations are constructed in mountain spaces which demands construction of energy transmission often traversing conservation areas.

Thirdly, back-up sources are represented by the coal and gas combustion (i.e. non-renewable resources), fossil fuels saving is thus limited and highly expensive.

Fourthly, the expenses for the wind energy are too high – the real value of 1 KWH of electric energy produced by the wind-power installations exceeds CZK 4, which is four times more than average market price.

The question weather policies should treat the technologies like solar and wind energy differently can be answered only after thorough consideration of the risks and losses mentioned above. For the Czech Republic we can assume that with the current accessible technology these sources of energy are currently unsuitable.

4. Conclusions

The environmental policy is a new phenomenon slowly developing not only in the Czech Republic, so the individual political and economical tools and technological evolutions are still changing and being specified and clarified. The inquiry should always be judged from the key point of view, i.e. the environmental and ecological access. All the instruments ought to be used to preserve the environment. The Office fully respects the government's effort to support the use of RES by granting subsidies for RES power production. In order to meet the demands and goals, i.e. environmental protection and competition preservation, it is inevitable to select instruments that are, if possible, neutral (regarding the competition conditions) and shall have as little negative effect on set prices as possible. According to the Office, the support for RES electricity evokes the rise in final electricity prices for consumers, even if the non-renewable resources energy prices drop deeply. At the same time, non-existence of transmission system and distribution system capacity may have a negative effect on the entry of new electricity producers, both those aspiring for offering RES electricity at a cheaper price (e.g. due to new technologies), and those generating electricity from non-renewable resources, but more effectively. This would distort the competition in the energy market. Any support shall aim to enhance efficiency of technology applied and to educate the public to behave in accordance with the rules of environmental protection.

The questions concerning the issue are difficult to answer unambiguously. It will always be moving among economy, ecology and society; looking for the balance includes choosing the main position at the expense of the rest. Almost all of the human activities are not in consent with environmental protection. The industrial sector is regarded to be the greatest environmental polluter, that is why the limits and subsidies are targeted mainly there. Such a policy has the adverse effect on the competition and intra-destructive effect on the industry competitiveness in relation with the countries not pursuing the same aim. The support for RES electricity contributes to great growth in final electricity prices for consumers, even in the deep fall of energy prices of the non-renewable resources. The situation has been dramatized by the legislative shortages favouring speculations that are discordant with the competition rules.

Every (alternative) energy source should be treated in accordance with the territorial, climate and traditional conditions of the country. The parameter ERoEI differs from country to country, for example, the biofuels shall be obviously the energy of the future in Brazil, where ERoEI goes around 9 in economic sense (at the same time ignoring the environmental point of view, which means following tropical soil exhaustion and erosion), while the persistency of the European countries to use biofuels implies more economic damages than earnings. So, if the state supports single-way sources of energy and at the same time the sources are not easily available, than the negative effect on competition, economics and environmental principles multiply.

Taxes imposed on non-renewable energy resources and state support of the RES have adverse effect on the entry of new electricity producers who would generate electricity from non-renewable resources, but more effectively. The RES area is approximating to self-sustainability due to such unstinted financial support and it should be opened to market competition at present.

DENMARK, FINLAND, ICELAND, NORWAY AND SWEDEN

Competition Policy and Green Growth

Green growth is a concept that involves rethinking economic growth, mainly how economies can grow in a more sustainable way. It has evolved out of a strong and increasing policy emphasis on the development of a new economic and social framework that would enable economic growth and development while at the same time preventing environmental degradation and enhancing quality of life. Thus it has been argued that together with innovation, the greening process can be a long-term driver of economic growth through for instance investments in renewable energy and improved efficiency in the use of energy and materials. Reflecting this new policy focus, the OECD has adopted a mandate to develop a Green Growth Strategy.[1]

A successful shift towards the ambitions underlying the green growth strategy can only be achieved through cost efficient and coherent policies. Competition policy has an important role in this context. It is up to the competition authorities to ensure that this relationship receives due attention.

Economic theory and empirical evidence support the view that competition is desirable because it contributes to efficiency in economic activity, thereby increasing the welfare of consumers and society. The rivalry between competing firms ensures that only the most efficient and innovative firms develop and stay in the market. While it is difficult to measure the degree to which effective competition affects productivity and the economy more generally, a number of extensive studies have found a link between stronger competition and higher productivity growth. So competition contributes to economic growth.

There are also important links between competition and environmental policy. Using market mechanisms is important in green growth strategies, as it allows appropriate prices to be determined. These price signals ensure that the correct incentives are in place for pollution abatement and innovation in green technology. Ensuring effective competition is important in this context, since otherwise price signals reflecting environmental externalities can not be effectively transmitted.

Effective competition and low barriers to entry are also crucial to innovation and market dynamics, which again play an important role in achieving environmental goals at a lower cost. Thus, given a well designed environmental policy, competition supports the achievement of environmental goals in a cost efficient way.

Environmental regulations, practices or enforcement may affect competition negatively. This in turn may increase the social costs of achieving environmental goals. However, pro-competitive legislation is becoming stronger and is being more effectively enforced in many countries. Thus, one of the challenges the competition authorities face in this regard is to contribute to ensure that green legislation will not affect competition negatively and that, instead, pro-competitive legislation is employed. Various means of advocacy channels can be used towards this aim.

[1] OECD (2009). "A Proposal for Developing a Green Growth Strategy", (2009)147/REV1.

As explained above, the growing political emphasis on environmental policy does impact markets and competition. At their semi-annual meeting in the Faroe Islands in March 2010 the Directors General of the Nordic competition authorities discussed some of the challenges facing their organisations as a result of the shift towards green growth.

To establish a common ground for the task of addressing future challenges in this context, they agreed to produce a joint Nordic report focusing on the relationship between environmental and competition policies.

Perhaps the most important conclusion to be drawn from the report is that competition policy has an important role to play in the development and implementation of a green growth strategy, and in facilitating a successful shift to green growth. The report consists of three main chapters: First, it explores the relationship between competition policy and environmental policy. Thereafter it takes a closer look at certain environmental policy aspects and some of the conflicts that have arisen or might arise between these and competition policy. Finally, it describes how environmental policies are reflected in the practices of market participants through different green schemes. The report concludes with some forward looking perspectives.

A brief summary of the main features and recommendations is presented below. The report is available in an electronic format at the respective competition authorities' websites[2].

1. The relationship between competition policy and environmental policy

Environmental and competition policy share the common objective of safeguarding and promoting social welfare.

Effective competition can support environmental policy by allowing price signals that reflect environmental externalities to be effectively transmitted. Competition also reinforces environmental policy in that competition-induced innovation efforts and efficiency improvements may be considered important components in a successful environmental policy.

However, environmental policy may harm competition by for instance increasing barriers to market entry. Thus, the OECD recommends that environmental regulatory agencies routinely undertake competition impact assessments with regard to their environmental proposals. The national competition authorities can assist in such assessments, and they must be vigilant in pointing out the restrictive effects on competition of various regulations in the environmental area.

Environmental benefits might be argued as a defence for horizontal practices or arrangements otherwise deemed restrictive under competition law. However, there are strict requirements to be fulfilled in this regard. The measure in question must be proportional to its aims. There must also be net economic benefits in terms of reduced environmental pressure resulting from the practices or arrangements, as compared to a baseline where no action is taken, and the expected economic benefits must outweigh the costs. Such costs include the effects of reduced competition, along with compliance costs for economic operators and effects on third parties.[3]

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2 The Competition Authorities websites are respectively: http://www.konkurrencestyrelsen.dk/en/ (Denmark); http://www.kilpailuvirasto.fi/cgi-bin/english.cgi? (Finland); http://www.samkeppni.is/samkeppni/en/ (Iceland); http://www.konkurransetilsynet.no/en/ (Norway) and http://www.kkv.se/default____218.aspx (Sweden).

3 See Commission notice: "Guidelines on the applicability of Article 81 of the EC treaty to horizontal cooperation agreements" (2001/C 3/02).

2. Environmental policy instruments and competition implications

Governments can choose between two broad categories of policy tools in seeking to respond to and correct for negative environmental externalities: economic and administrative policy tools. Economic tools such as taxes and subsidies work indirectly via the price mechanism while tradable permits work in terms of regulated quantities traded in a market. Regulations of a more administrative character are those that include for example specifications of maximum permitted emissions or detailed requirements for products, production processes or technologies. Such approaches are often referred to as command and control approaches.

The workings and competitive ramifications of the main environmental policy tools are summarised below.

2.1 Taxes and subsidies

Environmental taxes are an important tool for solving the environmental externality problem, not least because direct taxes on emissions are considered economically efficient. Environmental taxes give polluters an incentive to reduce their pollution to the point where further reduction would cost more than paying the tax. There are, however, important challenges. One is to determine the correct tax level. Another relates to the fact that efficiency requires all polluters to face the same tax level at the margin. Tradable emission permits can resolve the problem of how to determine the correct environmental tax level, provided that certain requirements are met.

Subsidies can refer to a variety of transfers, payments, supports (such as tax exemptions) and protections associated with government policies. When considering the introduction of subsidies as a means of achieving environmental goals, it is important to conduct a broad analysis of the net effects on welfare before reaching a decision. Conversely, environmental policies that involve the elimination of environmentally harmful subsidies are generally in line with competition policy.

2.2 Tradable emission permits

The EU Emission Trading Scheme (ETS) is regarded as one of the cornerstones of EU climate policy. The price of tradable emission permits plays a role similar to that of a tax. In the ETS, the total number of permits issued and the marginal abatement costs together determine the price for carbon emissions. Thus, for a given total quota, the actual carbon emissions price is determined by the market. The Nordic competition authorities have on several occasions argued that emission permits in general should be auctioned and should cover as many emission sources as possible, and also that incumbents should have no preferential treatment compared to newcomers.

For an emission trading scheme to function properly, competition in the permit market must be effective. When auctioning emission permits, auction design is important to ensure efficient pricing and avoid collusion. Thus, the competition authorities must seek to deter and detect collusive practices before, during and after the auction process.

2.3 Green public procurement

Public procurement is in itself a powerful tool, given its size in relation to GDP in the respective Nordic countries. Green public procurement (GPP) can hasten the development of markets for green goods. But a certain amount of caution should be exercised before it is used.

GPP should only be used if the external effect is not internalized by other regulatory instruments. If other regulatory instruments fulfil the object of internalizing an external effect, adding further regulatory

instruments, for instance by imposing environmental criteria in public procurement may lead to inefficiencies from a socio-economic point of view. If the external effect is partly internalized by other regulatory instruments, GPP could be used and be designed to complement the policy tool in place.

It is also important to be aware that GPP can have a negative impact on competition if the restrictions imposed lead to significantly fewer firms being able to submit bids. This may increase the costs for the procuring entities. GPP can also lead to higher prices due to investments being required to enable actors to submit bids. Finally, if the use of GPP is to have a real impact on the environment, it is important that the procuring entity identifies product groups for which there is considerable procurement and that the volume of product used actually has a significant impact on the environment.

More fundamentally, the criteria and procurement process must comply with the basic principles of European Community law on public procurement, including non-discrimination, equal treatment, transparency, proportionality and mutual recognition.

2.4 Restrictive effects of green measures and the importance of advocacy

The transition to green growth implies that a host of green instruments will be implemented in many different areas. Promoting correct pricing of environmental goods is crucial to a cost-efficient environmental policy and proper innovation incentives. This can best be achieved through effective competition, since otherwise price signals reflecting environmental externalities cannot be effectively transmitted. Thus the competition authorities have the essential task of advocating market based instruments in environmental policy.

Competition authorities also have an important role in identifying and analysing regulations that may unduly distort or restrict competition. When assessing the competitive impact of specific regulatory green measures, the OECD Competition Assessment Toolkit offers valuable guidance, both for the competition authorities and the relevant sector authorities. In many instances, green measures can be restructured to minimise harm to competition.

Furthermore, competition authorities should advocate green measures that are less distorting to competition and endeavour to promote an efficient compromise between competition and environmental policy where appropriate. This role of the competition authorities may also contribute significantly to the task of improving regulatory quality in the environmental area.

To succeed, initiatives must be timely, and political support should be sought. In addition, it is clear that changes take time and therefore perseverance may be required.

3. Business practices in green markets

Environmental policies can be reflected by business practices related to various green schemes, for instance recycling or waste management or different certification arrangements. Many of the schemes have given rise to concern from a competition policy viewpoint. However, many of them can be designed in such a way that competition in fact supports environmental goals more cost efficiently.

3.1 Antitrust and green markets

In the European Commission's guidelines,[4] the section focusing on horizontal environmental agreements, it is stated that, by nature, such agreements should be considered in breach of Article 101(1)

[4] See Commission notice: "Guidelines on the applicability of Article 81 of the EC treaty to horizontal cooperation agreements" (2001/C 3/02).

TFEU if the cooperation does not truly concern environmental objectives but serves to conceal anti-competitive practices. And even though a particular environmental scheme may be endorsed by the authorities, this can not be used as an excuse for practices implying abuse of dominance.

Although some cases may be relatively clear-cut, there may be a host of borderline cases. Moreover, it is possible that even though some particular environmental agreement may raise concern from a competition point of view, i.e. since the agreements falls under Article 101(1) TFEU, or the national equivalents, the agreement might also bring economic benefits. These benefits may even at individual or aggregate consumer level outweigh the negative effects on competition. For this to be the case, it should be clear that the measure cannot be achieved through less restrictive means, i.e. that it is proportionate to the aim. The economic benefits should furthermore stem from reduced environmental pressure resulting from the agreement, as compared to a baseline where no action is taken, to pass the test in Article 101(3) TFEU, i.e. the expected economic benefits must outweigh the costs in terms of reduced competition.

3.2 Restrictive practices in recycling and waste management

Recycling and waste management are booming industries in many countries. Industry wide arrangements through for instance branch organisations or industry-owned schemes have become quite common, and are in many cases endorsed by the environmental authorities. This applies in particular to recycling and waste management. Most environmentally related cases encountered by the Nordic competition authorities in recent years have related to recycling and waste management.

As these cases clearly show, while there may be good arguments in favour of industry wide arrangements, including economies of scale, operational efficiency, and avoidance of non-participating producers getting a 'free ride', various aspects of these schemes may also cause serious competition concerns through:

- risk of spillover effects,
- bundling of demand, and
- pricing and fee structure.

The cases also show that in many instances, there are alternative approaches based on competition, or at least approaches involving a less restrictive impact on competition, via which the environmental authorities can reach their objectives in a more cost efficient way. The competition authorities have important roles, both in applying the competition law to such cases where the anti-competitive effects outweigh any benefits and in advocating competition based solutions more widely.

It is also worth noting that a significant share of the considered by the Nordic competition authorities related to green schemes have been closed through the application of 'soft enforcement', where the elements in the schemes causing concern were changed voluntarily in response to the views expressed by the competition authorities.

3.3 Certification arrangements and competition concerns

Product certification highlights the specific characteristics of a product. Certification is primarily used to signify that a product has one or more credence attributes, which are characteristics that are invisible and difficult to judge. For that reason, certification can significantly reduce the transaction costs associated with information gathering. When buyers get more information it will become easier for them to adapt their consumption choices according to preferences. More information may also lead to a better functioning of the market due to increased consumer mobility.

Certification has become a key element in marketing organic food products and has also been receiving growing attention in sectors like construction and taxi services. When certification is introduced, producers have a greater incentive to develop product qualities that consumers demand.

Businesses may, however, have incentives to influence the certification criteria so that their own products are favoured compared to competing products. Furthermore, increasing the costs to rivals may be attempted, e.g. by lobbying for a narrow product category definition or monitoring mechanisms that disfavour competitors. In cases where the certification standard places foreign producers at a disadvantage, this may have a negative impact on international trade flows and international competition.

The effect of certification on welfare depends on how well the certification standard is designed (it needs to be non-discriminatory) and whether effective competition prevails. The competition authorities have an important role in this context through advocacy and, where appropriate, enforcement.

4. Forward looking perspectives

Competition has a significant impact on the efficiency of environmental policy. Consequently, competition policy and the efficient enforcement of competition law should be an integral part of any green growth strategy. Environmental and competition policies share the common objective of safeguarding and promoting social welfare so we must strive to make the execution of environmental policy and competition policy mutually supportive.

Experience has shown that existing environmental policies or schemes may restrict competition by raising barriers to entry and limiting incentives or opportunities for effective competition. The Nordic competition authorities have been active in pointing out these limiting effects.

The Nordic competition authorities have been firm and outspoken advocates of market based approaches in environmental policy. In the design of market based policy instruments, it is important to consider how well the ‘newly created’ markets will function. If it appears likely that price formation in a newly formed market, for example, will be strongly affected by market power, a different design would be welcome.

Competition advocacy and competition enforcement focusing on the restrictive effects of various green schemes on competition will remain an important task for the competition authorities in the future and constitute an important contribution to the overall success of green growth strategies.

Advocacy efforts on the part of competition authorities will lend important support to the OECD Ministers’ aim of “establishing appropriate regulations and policies to ensure clear and long-term price signals encouraging efficient environmental outcomes”.

Box 1. Main Points and Recommendations

- Environmental and competition policy share the common objective of safeguarding and promoting enhanced social welfare
- Effective competition facilitates the transmittance of relevant price signals that reflect environmental externalities. It also ensures economically correct prices of externalities where markets for emission permits are practicable
- Environmental policy involving the abolishment of environmentally harmful subsidies is in general in harmony with competition policy
- Environmental benefits might be argued as a defence for horizontal agreements otherwise deemed restrictive under competition law
  - To be accepted, such arguments must show that the measure is proportional towards its aim
  - The net economic benefits in terms of reduced environmental pressure resulting from the practices or the arrangements must be clear
- Environmental regulation may harm competition, for instance by raising barriers to entry into the market
  - The OECD recommends that environmental regulatory agencies routinely conduct competition impact assessments of their environmental proposals. The competition authorities can assist in such assessments
- In order to maximise social welfare with respect to both competition and environmental policy, we must strive to make the execution of environmental policy and competition policy mutually supportive

KOREA

1. Introduction

With ratification of the Kyoto Protocol aimed to cut greenhouse gas emission in 2005, the issue of environmental preservation has been attracting global attention. Accordingly, regulations on greenhouse gas emission have been strengthened around the world. Currently, Korea is a non-annex country which is not obliged to cut emission level, but the nation is highly likely to be mandated to cut emission under the post-Kyoto framework[1] starting after the end of the 1st commitment period.

As carbon dioxide (CO_2) was recognized as the main culprit of the global warming and the CO_2 emission started to be regulated after the signing of Kyoto Protocol, the "carbon credit market"[2] was created with major advanced countries including some OECD countries considering or in the course of introducing the Emission Trading Scheme (ETS) or carbon tax. Furthermore, market-based policy approaches such as energy tax policy which is strengthened with aspects of environment tax are being actively adopted.

Korea uses the Command and Control (CAC)[3] system which imposes the maximum permissible level of pollutant emission to control production of pollutants such as greenhouse gases, along with market-based economic incentives. Prior to 1990, the CAC system was in active use, but various economic incentive programs[4] have been introduced as part of the environment regulation since then.

This report provides insight into the CAC and economic incentive system of Korea to curb release of pollutants, and explores how to harmonize policy instruments and competition policies in environment issues and what role a competition agency should play in implementing environmental policies.

2. Environment policy instruments to curb release of pollutants

As mentioned above, Korea's environment policy instruments for pollutants control are divided into 1) the CAC which imposes duty and forces the compliance to curb discharge of pollutants and achieve other objectives of environmental regulations, and 2) economic incentive system which uses a market-based approach to regulate pollution by charging an emitter with the prices for release of pollutants to internalize environmental costs.

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1 As the Kyoto Protocol expires in 2012, the international community is under negotiation to expand the existing framework into the post-Kyoto era.

2 The carbon market, which was a $60 billion market in 2007, is projected to reach $150 billion in 2010.

3 The CAC system includes setting the maximum permissible emission level of pollutants, approving construction of facilities emitting pollutants, prohibition of certain conduct and order to improve business behavior, suspend operation, close facilities or pay fines for violators.

4 The economic incentive program which employs market-based approach to regulate greenhouse gas emissions, includes Emission Charge system, Emissions Trading Scheme and greenhouse gas taxes such as carbon tax.

The pollutants regulation of Korea had been largely focused on the CAC. The economic incentive program currently in operation is the *Emission Charge System* which requires a workplace discharging pollutants to make payment for it. With enactment of *the Framework Act on Low-Carbon Green Growth*, the nation is in the midst of an active effort to adopt the ETS and considering introduction of carbon tax.

2.1 Command and control system

The CAC system allows the government to restrict or prohibit acts or regulate facilities that have potential to cause environmental degradation through administrative measures based on legal grounds. Under the system, violators are forced to comply with regulations or subject to administrative penalty.

Specifically speaking, the government issues approval or receives notifications, and conducts monitoring or inspection on construction of a pollutant-emitting facility. And it sets emission standard of the facility and mandates compliance with the standard. Those who fail to meet the standard face legal penalty such as order to make improvement, stop the use of facility or suspend operation, cancelation of approval, imposition of fines, etc.

The following is description on setting maximum permissible emission level and approving construction of facilities emitting pollutants, the representative examples of the CAC system in Korea.

2.1.1 Setting maximum permissible emission level

Setting maximum permissible emission level is the most frequently used way of the CAC in Korea. Operators of facilities that discharge air pollutants or wastewater are assigned with the designated emission level decided by law and, if exceed the level, are ordered to make improvement, suspend operation, close the facilities or faced cancelation of approval or surcharges. Maximum emission level is set for 27 air pollutants (sulfur oxides, nitrogen oxides, dusts, etc.) and 29 water pollutants (BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), SS (Suspended Solids)).

2.1.2 Approval or notification of construction of pollutants-emitting facilities

Those who intend to build facilities that emit air pollutants should seek approval from or notify to the Minister of Environment according to the relevant law. And construction of wastewater-discharging facilities requires approval of the Minister of Environment. Those who build or use such facilities without permission or notification are subject to measures to stop the use of the facilities.

This approval and notification system is intended to mandate an emitter of pollutants to provide information on their pollutants-emitting facilities to ensure efficient control of such facilities by regulating the construction or requiring the equipment that prevent pollution in the facilities.

2.2 Economic incentive system

2.2.1 Overview

Contrary to CAC, economic incentive system is a market-based approach to prevent and address environmental degradation by having direct or indirect impact on producer or consumer behavior rather than directly regulating behavior that causes pollution. The incentive system not only encourages pollutants emitters to adopt innovative technology and make the best possible decision. It also secures financial resources necessary to undo the environmental damage from pollution.

The Framework Act on Environmental Policy is based on the market-based approach to economically motivate a polluter to cut discharge of pollutants by providing that “the government shall promote the

effective use of resources and design economic incentives to induce voluntary effort to reduce emission of pollutants".

Market-based approach to pollutants control of Korea includes environment-related taxation, Emission Charge System and subsidy, and the ETS and carbon tax are in the process of adoption or under review.

2.2.2 Environment-related taxation

Environment-related taxation is applied to cars, energy products, garbage, gas emissions, natural resources and other tax sources related to the environment. It is intended to enhance economic efficiency by imposing taxes on goods and services that pollute the environment while cutting taxes for environmentally friendly tax sources.

The environment-related taxation is generally divided into energy tax, greenhouse gas tax (imposed for emission of CO_2, sulfur and other greenhouse gases) and waste tax. These taxes are assessed based on the content of energy (energy tax), content of greenhouse gases such as CO_2 and sulfur (greenhouse gas tax) and the amount of waste generated (waste tax). The foremost objective of the environment-related tax system is to reduce pollutants, and secondary objective is to secure tax sources, raise financial resources and redistribute income.

Environment taxes of Korea are classified into: 1) national taxes including transportation/ energy/environment tax[5] imposed on transportation fuel such as gasoline or light oil, education tax levied in addition to transportation tax, excise tax on kerosene, LNG, LPG and vehicle and 2) local taxes such as automobile tax, automobile acquisition and registration tax, license tax and driving tax. Currently, these taxes are only related to energy consumption, and taxes aimed to cut emission of greenhouse gases including CO_2 have yet to be introduced into Korea.

Environment taxes of Korea	
National Tax	Transportation/energy/environment tax (transportation fuel: gasoline or light oil) education tax (levied in addition to transportation tax), excise tax (kerosene, LNG, LPG, automobiles)
Local Tax	Automobile tax, education tax (added to automobile tax), automobile acquisition and registration tax, license tax, driving tax

2.2.3 Emission Charges System (ECS)

The Emission Charge System (ECS) is intended to impose economic burden on construction and operation of pollutants-discharging facilities based on the amount and density of emissions. The ECS is seen as an economic incentive program in that it provides companies economic motives to cut emission of pollutants, holding them responsible for their own emissions. In other words, it is aimed to charge polluters for the costs incurred to prevent or alleviate environmental damage caused by their own emissions.

Emission charges are levied for those who discharge pollutants, and who set up pollutants-discharging facilities or make changes into such facilities without proper approval or notification. Also, person who

[5] The previous "transportation tax" changed into "transportation/energy/environment tax" in November, 2007 which additionally includes goals of environmental preservation and financing projects related to energy and natural resources. The transportation/energy/environment tax which was collected to secure tax revenues and make investment in transportation facilities is now used to build transportation infrastructure.

builds the facilities without approval or notification shall face order to stop the use of facilities and pay the emission charges.

Emission charges are divided into basic charges[6] and excess emission charges[7]. First of all, basic charges are imposed on emissions of sulfur oxides and dusts when the emissions do not exceed the permissible level. The charges are assessed based on the amount and density of emissions. Excess emission charges, on the other hand, are imposed on emission of 9 pollutants including sulfur oxides, dusts, ammonia, hydrogen sulfide and carbon disulfide which exceed the permissible level. The charges are levied based on the amount and density of pollutants emitted in excess of the designated level.

Collected revenues from emission charges revert to the special account for environmental improvement and are spent on environmental improvement projects of local governments, construction of fundamental environmental facilities, etc. What is notable here is that the tax revenues are used as part of the overall environmental funds rather than being spent limited to projects relevant to the kind of pollutants.

2.2.4 Environment subsidy

Environment subsidy is part of the environmental regulation that is intended to promote the effort to alleviate environmental pollution or the use of facilities that lessen pollution with financial means. Subsidies are provided to support cost of using pollution prevention/treatment facilities or pollution treatment activities. Subsidies are provided in the forms of loans and tax credits.

First of all, loans[8] are provided at low interest rates and long-term repayment terms for companies to support costs incurred from their environment improvement effort, e.g. building pollution prevention equipment. This promotes companies' environment-related investment and reduces pollution by raising environmental awareness, which ultimately contributes to the nation's effort to conserve the environment.

Tax credits[9] are given for companies which make investment in environment conservation equipment. Tax benefits are preferred subsidy program by companies, because tax credits eliminate the need to pass the increased costs from pollution prevention facilities onto consumers while reducing companies' tax payment with direct impact on profits.

2.2.5 Emissions Trading Scheme (ETS)

The most common market-based approach toward cutting greenhouse gas emissions is Emissions Trading Scheme (ETS). Even though the ETS has yet to be introduced into Korea, the nation has created legal grounds for introduction of the trading system with establishment of the Framework Act on Low-Carbon Green Growth. According to Article 46 of the Framework Act, the provision regarding

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6 Amount of pollutants emitted not exceeding the designated level (kg) × charge per kg of pollutant × yearly charge index × regional coefficient × density coefficient

7 Amount of pollutants emitted exceeding the designated level (kg) × charge per kg of pollutant × excess rate coefficient × yearly charge index × regional coefficient × violations coefficient

8 In 2009, a KRW 60 billion (about $53 million) budget was allocated for loans provided for companies' environment improvement effort and spent under the name of "pollution prevention equipment building funds", "environment facility construction funds" "green technology industrialization funds", etc. This 7-year adjustable-rate loan is provided up to KRW 5 billion (about $4.4 million) for a single company with 3 years of grace period.

9 10% of investment in environment facilities (20% for investment in energy conservation facilities) is exempted from income tax or corporate tax.

introduction of Cap and Trade Scheme, the government may use market-based approach to prepare for the world's expanding emission trading market by setting the maximum permissible level of emission and implementing the emissions trading system.

Before adopting the ETS, detailed operational plans such as initial emission quota and the right environment for the implementation should be established. Currently, the Presidential Committee on Green Growth is in the course of enacting Act on Emissions Trading which includes the plans on allocation of emissions quota, registration and management of emission, establishment of the trading market, the timing of introduction of the system, etc.

3. Environmental policy and market economy

To achieve the special goal of environment policy, environment protection, the government sometimes intervenes in the market or uses incentive system to lead companies into good behavior that suits the policy goal. For this objective, regulation is inevitable. It should be noted, however, that the regulation could serve as an entry barrier, and establishing regulations advantageous for companies with environmentally friendly practices could risk directly or indirectly affecting the competitive situation in the relevant market.

Environmental policies could inevitably lessen competition in the course of achieving policy goals of environmental protection and green growth. Yet, efforts are still needed to choose policy alternatives with the least possible competitive impact and keep the adverse impact to the minimum level.

In Korea, the CAC and economic incentive system are both in use. The CAC, direct regulation based on legal or administrative measures, has been widely used so far as it promptly delivers simple, strong and effective effects.

This approach, which forces polluters to adopt certain technology or facilities or comply with the unilaterally designated emission standards, however, is not cost-effective, as it neglects to consider difference in marginal costs of emission reduction for each polluter. Also it does not incentivize companies to develop technology or make investment to reduce their emissions. This could weaken companies' competitiveness.

In the meantime, the economic incentive system, indirect regulatory approach, is widely promoted for following reasons.

First, the incentive system allows more effective allocation of resources for pollution reduction than the CAC does. If the government tries to set pollution reduction level for each polluter, it should have sufficient information on individual costs incurred and business status of each company. Under the incentive system, however, each company can simply make decision on emission amount that best fits its condition with Emission Charge System or tax credits, etc.

Second, the incentive system motivates polluters to make technological innovation to cut pollution. In other words, as polluters shoulder the cost burden depending on how much they cut the amount of emissions, they naturally double the effort to reduce emission of pollutions with technological innovation.

Particularly, the ETS is seen as the most effective approach among other incentive systems since it induces voluntary effort to cut pollution and develop technology for pollution prevention by employing market economy principles to address economic costs caused by emission of greenhouse gases. Introduction of the ETS, however, requires active involvement of a competition agency, as competitive concerns could be raised in the process over the method of allocating emission quota and trading emissions.

4. Role of competition authority

4.1 Strengthening competition advocacy when establishing environmental policy

Competition advocacy efforts need to be strengthened so that pro-competitive regulations can be introduced in the course of establishment of environment regulations such as ETS, carbon tax. Prior Statutory Consultation or Competition Impact Assessment should be actively implemented when environment-related laws are established.

As the emission trading system seems to change competitive structure depending on how the system is designed, the scope of participation, the method of allocation and trade, and other operational plans require close review. Considering this, the KFTC will actively participate in the relevant legislative process including the establishment of *"Act on Emissions Trading (provisional name)"*.

4.1.1 Prior statutory consultation

Article 63 of the MRFTA requires government agencies to consult with the KFTC before enacting potentially anticompetitive laws, making such amendments, or issuing approval or taking measures that have anticompetitive effect. The KFTC will make active use of the statutory consultation to prevent anticompetitive aspects from being included when introducing environment policy tools such as ETS, carbon tax.

4.1.2 Competition impact assessment

Competition Impact Assessment was first started in January, 2009 in order for the KFTC to review potential anti-competitiveness in newly established or reinforced regulations.

For operation of this institution, each ministry produces and sends "Regulatory Impact Analysis Report" for its newly created or reinforced regulations to the KFTC and Regulatory Reform Committee (RRC)[10]. Based on the provided report, the KFTC assesses impact of those regulations on competition and delivers the result to the concerned Ministry and RRC. Then the Ministry voluntarily accepts the result and changes the content of their regulations or the RRC uses it as reference materials when examining the concerned regulation.

Actually, in the process of legislation of the Framework Act on Low-Carbon Green Growth, the KFTC suggested an opinion that the provision that has the expression "joint implementation of greenhouse gas reduction target by companies" raises concern over possible cartel conduct, and RRC adopted the KFTC's opinion and deleted the expression.

4.2 Antitrust enforcement considering environmental effect

The Monopoly Regulation and Fair Trade Act (MRFTA), general competition law of Korea, provides two exceptional cases where anticompetitive mergers can be approved; 1) when efficiency enhancement from a merger outweighs the potential anticompetitive effect and 2) when a merger transaction involves a non-viable company and meets certain requirements.

[10] The RRC is a presidential committee which was established in April, 1998 with 25 members (6 from the government and 17 from the private sector) including the two Chairpersons (Prime Minister and Head of the private sector). It deliberates and adjusts government regulatory policies and examines and overhauls regulations.

Regarding the former exception, environment-improving effect should be considered as part of increased efficiency from a merger. Such consideration is possible, because the current Merger Review Guidelines of Korea requires that assessment be conducted on whether a merger contributes to addressing environmental pollution as part of the review on the merger's efficiency-enhancing effect.

4.3 Effort to prevent consumer damage regarding green products

With the increasing awareness on eco-friendly, green consumption, the KFTC analyzes prices, quality and other aspects of environmentally friendly products that have impact on consumption, and makes the information public.

For this year's analysis, the KFTC selected 10 product items including organic bath products, bicycles, eco-friendly wall papers and light bulbs with high energy efficiency. Regarding organic bath products for children, it commissioned a consumer group to conduct testing for harmful materials in those products. Products of 17 brands sold in department stores, large retail markets were tested for formaldehyde, surfactant, and cadmium, and the KFTC released the result to the public. This effort to make products information known to the public contributes to consumer welfare by reducing consumers' search costs and promoting price and quality competition among companies.

SPAIN

Introduction

Most green policies in Spain have taken the form of subsidies for environmental performance. Apart from the European Emission Trading Scheme, there are not emissions fees or taxes in the industrial sector.

This contribution focuses on two examples of such policies, one related to demand subsidies aimed at reducing emissions in the automotive sector and another regarding subsidies to promote the development of renewable energy.

1. Policies to reduce emissions in the automotive industry

Several types of policies are being applied for this purpose.

1.1 Tax incentives

Since January 2008, licensing taxes paid by buyers of cars vary according to the CO_2 emissions of the vehicle purchased. The range varies from total tax exemption, in the case of cars under 120 g/km of CO emissions, to up to 14.75%, if the CO_2 emissions are over 200 g/km. For cars between 120 g/km and 160 g/km, the licensing tax is 4.75%, while cars with between 160 g/km and 200 g/km emissions are charged a licensing tax of 9.75% %[1]. The level of CO_2 emissions should be certified by the manufacturer or importer.

1.2 Promotion of production and use of electric cars

A project run by the Institute for Diversification and Energy Saving (IDEA), a unit of the Industry Department, has been approved for these purposes. The project, named MOVELE, aims at the introduction of 2,000 electric vehicles in two years, as well as the installation of 500 charging points for these vehicles. Funding for this project amounts to €10 million, distributed as follows: 80% for vehicle acquisition, 15% for charging infrastructures, and 5% for management, studies and monitoring.

Potential beneficiaries of the aid to buy the electric vehicles include firms, institutions and individual consumers. Regional governments have also established subsidy programmes to promote the acquisition of hybrid cars, with a limit of up to 3,000 € per vehicle.

1.3 Demand subsidies

Several environment related aid schemes have been approved by public authorities, both at the estate and the regional level, over the last years aimed at encouraging demand for less contaminating products. This is the case of the initiatives known as Plan 2000E, for the automotive sector, the Moto-E Plan, applied to motorcycles, and the RENOVE Plans for household electrical appliances and boilers.

[1] In Canarias all these tax percentages are one point lower, while in Ceuta and Melilla, every car, no matter its emissions, is tax-exempt.

This type of public aids usually fall within the *de mínimis* category of the EU regulation, and are therefore of no interest from the point of view of possible incompatibility with community rules on the matter.

Nevertheless, the CNC has decided to use the large prerogatives granted by Spain's Competition Act to examine these aid schemes in its Second Annual Report on Public Aids, published last month. The difficult economic situation has brought up a proliferation of these subsidies, making it convenient to examine both their adequacy to reach their declared goals and their effects on competition conditions in the markets involved.

Among these initiatives, one of the most important is the Plan 2000E for the automotive sector, approved in 2009 to support the renovation of cars with better environmental and road safety features, as well as to reactivate the fall in demand associated to the economic recession.

The Plan has been in force until September 30th 2010, and has granted consumers and SMEs direct subsidies for the purchase of new or up to 5 years old vehicles of less than €30.000 price. Subsidies, *amounting* to around 1500€ per vehicle, have been granted by the Ministry for Industry, Tourism and Trade (€1.000) and by regional governments that chose to participate in the plan (€500).

Conditions have been attached, including in particular: prove of disposal of the used vehicle (at least 10 years old - 12, if a used car is purchased - or 250.000 Kms), and, for access to the regional governments component of the aid, proof of residence of the buyer in the region, as well as purchase of the vehicle in an establishment also located within their boundaries

Several features of this design seem adequate for environmental purposes. For example, access to subsidies require proof of actual final disposal of the used, more contaminant vehicles, and objective criteria are established to determine the environmental performance of the subsidized cars, which must belong to categories M1 y N1, in the emissions ranking. In addition, the establishment of a price cap, as well as the fact that the amount paid to consumers is the same, independently of the price of the vehicle purchased, contributes to incentivize cheaper and therefore les powerful and thus presumably less contaminating vehicles.

However, the additional requirement to purchase the vehicle to a dealer located within the region, in order to have access to the regional component of the subsidy, cannot be justified as a means to improve environmental performance, which obviously does not depend on where the car is purchased, while it contributes to isolate local dealers from the competition of those located in neighbouring territories under different regional governments.

The EC, on its *Communication* of February 2009 on "*Response to the crisis in the European automotive industry"* has called the attention of Member States to the need to avoid State Aids that discriminate among suppliers on the basis of the origin of the products, in particular if such discrimination favours the sale by national dealers of cars with technical characteristics similar to those of vehicles from other member states.

This *Communication* does not apply to the Plan 2000 E examined by the CNC, which in no way discriminates among suppliers from different Members Estates. Its effects refer only to the national market, on which the negative impact of such distortions is aggravated by the fact that such a requirement has been included in the local component of all regional governments participating in the plan, thus extending this artificial creation of geographical barriers to the free movement of goods across the country.

1.4 Conclusions

On the basis of this analysis, the CNC has addressed the following three main recommendations to state and local authorities alike:

First, the goals to be reached with the public aid under consideration, as well as the specific measures adopted to attain them, must be clearly and precisely defined, paying special attention to the adequacy of such measures to the purpose at hand.

Second, efforts to reach several objectives with the same aid scheme are likely to result both in less efficient results, and in the introduction of unnecessary and significant distortions in competition conditions in the markets involved.

Third, public aid schemes should avoid in particular the introduction of discrimination or preferential treatment among the suppliers of the subsidized products based on their geographical location. Such discrimination contributes to create o reinforce especially serious obstacles to competition which, under certain conditions, may be spread across the whole national market.

2. Policies to support the development of renewable energies

As described in our contribution to the last Working Party 2 meeting of this Committee on February, the support scheme for renewable energies in Spain consists of a feed-in tariff that guarantees green energy producers a premium price over the wholesale price resulting from the daily electricity market. Such premium is passed on to the electricity bill and paid by final consumers.

Besides growth of hydropower generation under 50 MW, further development of renewables depends mainly on the development of wind and solar-photovoltaic energy. As mentioned in our response, the feed-in tariff system has proved to be extremely efficient in terms of investment promotion, leading to a rapid expansion of capacity installed in wind capacity, which has more than doubled (from 9.918 MW in 2005 to 20.155 in 2010) in the last five years, and in solar-photovoltaic installed capacity, which has rocketed from hardly 60MW in 2005 to 4.021 MW in 2010.

In fact, recent events indicate that concerns over the possibility of overinvestment in solar-photovoltaic technology appear to have been justified. Installed capacity of solar-photovoltaic energy has increased far beyond the forecasts contained in the renewable energy plan PER (see Chart 2), with a growth of electricity generation from this source far beyond expectations. This trend, together with the high premium paid to promote the use of these renewable energies, has contributed to a significant overcharge in the electricity bill, specially after 2007, when subsidies to renewables were revised upwards, and has generated an extra cost in the case of solar-photovoltaic energy in subsidies amounting to €370 million in 2009.

In addition, such growth has reinforced competition distortions in electricity daily markets, were in particular such competitive technologies as combined cycle plants, which attracted significant investments over the last decade, are being expelled.

Available procedures established to revise the regulatory framework, when required by the existence of important deviations between planned objectives and actual developments, were set in motion in 2008, allowing for a progressive reduction of tariffs and premiums under certain conditions, and introducing a new registration system for pre-allocation of renewable energies that should facilitate planning of future changes in tariffs. Nevertheless, the pace of investment in solar-photovoltaic technology has continued to accelerate, rising installed capacity from 558 MW in 2007 to 4.021 MW in 2010; in 2008, Spain accounted for 40% of installed world capacity.

This indicated the existence of deficiencies in both the design of the premium scheme and the monitoring and control of the new plants benefiting from the scheme which required stronger corrective measures. In particular, the price paid per MWh of solar-photovoltaic energy in Spain has been ten times higher than the price paid for wind generated power (see table 1) while, for example, in Germany the ratio has been five to one. Moreover, these extremely generous subsidies have been guaranteed for a period of 25 years, and no limits to capacity installation were introduced until 2009.

In order to stop the overinvestment process, since 2009 premiums have been reduced, maximum quotas have been set, and requirements and control mechanisms for those installations which could potentially benefit from renewable subsidies have been strengthened[2]. As a result of this regulatory reform, - as well as of the economic recession -, the growth of solar-photovoltaic investment has been sharply halted. Nevertheless, further regulatory modifications are currently under consideration, including greater reductions in premiums paid, the introduction of new technical requirements (possibly with retroactive character) and the establishment of limits to the number of years for which the premium price is guaranteed.

However, the consequences of past excesses are not likely to be easily reversed in the near future. These recent reforms, aimed mostly at containing growth in capacity installed, are insufficient to reduce significantly the use of solar- photovoltaic energy in the short term, specially taking into account the fact that technological innovation has pushed up production from currently plants. As a result, continued overcharge in electricity bills due to the use of this technology, as well as distortions in electricity generation daily markets against competitive technologies, such as combined cycle plants, are not likely to diminish either in the short term.

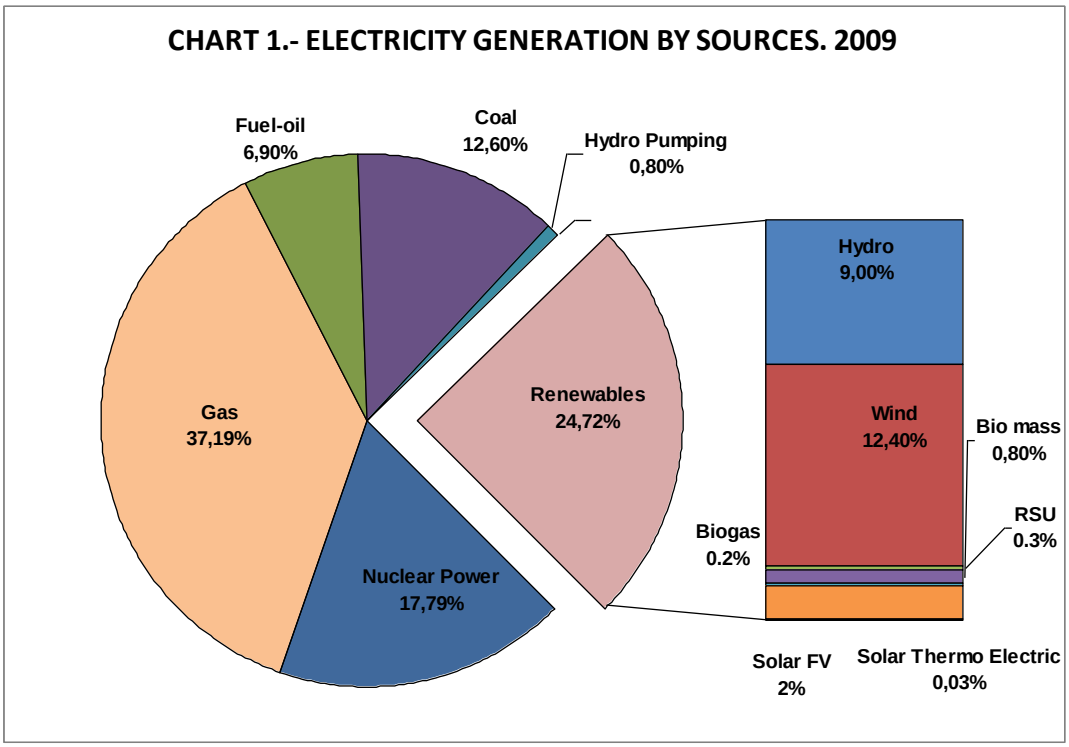
The targets set for renewable energy in the 2005-2010 Green Energy Plan (PER), in line with the Directive 2009/28/CE of the European Parliament and the Council of 23 April 2009, have been to increase the share of renewable energy in total energy consumption up to 22.7% and the share of renewables in power generation up to 42.3%. In 2009, renewable electricity generation represented 24.7% of total generation. The targets are to be replaced shortly with those set in the new 2011-2020 National Green Energy Action Plan (PANER) still under debate.

Experience regarding recent renewable energy policies has provided valuable lessons to be taken into account in the establishment of the new targets, as well as in regard to the support schemes used to reach them. In our opinion, the analysis of the new policies from the point of view of competition can provide valuable insights.

From this point of view, special attention should be paid in the design of the new Plan to avoiding adoption of measures with indirect discriminatory effects among suppliers in the electricity generation markets. This is particularly important after the recent approval of parallel support measures in favour of the electricity use of domestic coal, which will aggravate the competitive distortions in daily electricity generation markets against competitive technologies such as combined cycle or imported coal plants.

In addition, to maximize the environmental efficiency of measures in support of renewable energies, a decision based on a cost-benefit analysis should be made regarding the conflicting nature of policies attempting to promote electricity use of both renewable energies and domestic coal at the same time.

[2] Law 6/2009.



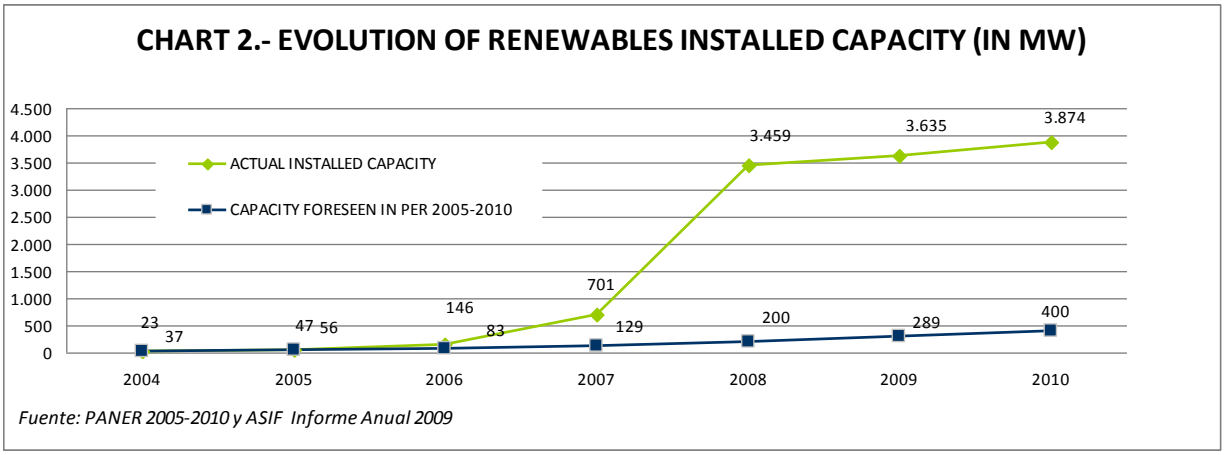


Table 1. Public support by unit of production - 2005-2010

	Public support (€/tep)
SOLAR FOTOVOLTAIC	**4251-4462**
CO-COMBUSTION	78-82
BIOGAS	92-99
BIOMASS	83-133
HYDRO	341-356
WIND	341-365
SOLAR THERMOELECTRIC	479-500

Source: PER 2005-2010

SWITZERLAND

Swiss environmental policy is addressing a wide spectrum of environmental issues in Switzerland, ranging from pollution of air, water and soil, to protecting stratospheric ozone, reducing biodiversity degradation or to mitigating climate change. In order to improve environmental quality in Switzerland, a number of different instruments are applied and combined, including market-based approaches, information instruments, command-and-control instruments and subsidies. Environmental policy and the related choice of instruments are guided by the "polluter pays" principles, as enshrined in the Federal Law on the Protection of the Environment. Key progress was achieved by application of command-and-control instruments in the field of pollution control. In more recent years, market-based mechanisms fostering the internalization of external costs and introducing a price signal have become more important. The focus of environmental policies has thereby shifted from local pollution prevention to an improvement of the natural resource efficiency in the sense of green growth.

The following submission focus primary on Switzerland's experiences with regard to environmentally related taxes and levies applied in the context of climate and transport policy.

Table 1: Overview of environmentally related taxes and levies in the context of climate and transport policy

Heavy Vehicle Transport	Other Transport	Heating/Processes Industry/Private	Heating/Processes Industry	VOC-Emissions Industry	Policy Targets
Heavy Vehicle Fee					financing infrastructures and shifting transport mode
Climate Cent					off-setting GHG-emissions
Petroleum tax					non-environmental, fiscal targets
		CO_2 levy	CO2 levy exemption and ETS[1] upon application		emission reductions
				VOC[2] tax	emission reductions

1. CO2 levy for heating and process fuels

In order to achieve Switzerland's emission reduction objective under the Kyoto Protocol of 8% between 2008 and 2012 (compared to 1990 levels), the federal CO2 law limits CO2 emissions from fossil fuel use for heating and transport to 10% below 1990 levels. This target is further divided into reduction targets of 15% on heating and process fuels and 8% on transport fuels.

1 ETS: Emissions Trading Scheme

2 VOC: volatile organic compounds

These emission reduction targets are pursuit with a mix of instruments:

- Voluntary actions by the industry and society
- Subsidiary CO2 levy for heating and process fuels as well as transport fuels, if the effect of voluntary measures is insufficient to reach the corresponding targets
- Emissions trading scheme
- Mitigation relevant measures in other policy areas, e.g. energy, transport, agriculture

1.1 Objective of the CO2 levy for heating and process fuels

By increasing the price of heating and process fuels, the objective of the CO2 levy is to reduce related CO2 emissions by fostering more efficient use of fossil fuels, promoting investments in energy-efficient technologies as well as the use of low-carbon energy sources.

1.2 Levy rate

As CO2 emissions from heating and process fuels continued to increase, the Parliament adopted in March 2007 the schedule for introducing the CO2 levy as well as the rates. Depending on the development of the related CO2 emissions in comparison with yearly pre-defined interim targets, the CO2 levy is to be increased gradually. That means the gradual rates are based on estimates of the expected impact on emissions and adjusted according to effective emissions. The levy was introduced as of January 2008 at an initial rate of CHF 12 per tonne of CO2 (approx. € 9.6). Because CO2 emissions from heating and process fuels in 2008 were above the pre-defined threshold, the levy was increase to CHF 36 (approx. € 28.8) as per January 2010.

The future increase of the levy rate after 2012 - as proposed by the Government and to be approved by the Parliament - follows the same logic and is based on Switzerland's overall reduction target of at least 20% by 2020 compared to 1990 emission levels. The sub-target for heating and process fuels amounts to a reduction of 25% by 2020. Accordingly, an adjustment of the rate depends on the achievement of interim average reduction targets for heating and process fuels between 2012 and 2014 (reduction of at least 18%) as well as between 2015 and 2018 (reduction of 21%). The maximum rate is set at CHF 120 per tonne of CO2 (€ 96). If emissions are well below the pre-defined interim thresholds, the levy can also be decreased to a minimum rate of CHF 36.

1.3 Use of revenues

The proceeds from the CO2 levy (approx. CHF 660 million at a tax rate of CHF 36) were initially fully and equally refunded to the Swiss population (by a lump sum per capita rebate on health care insurance fees) and to the business community in proportion of wages paid.

In 2009 the Parliament decided to earmark from 2010 on a third of the revenues, or maximum CHF 200 million (€ 160 million) per year to CO2 relevant mitigation measures in the building sector (e.g. refurbishment of buildings, upgrade of heating systems, and use of renewable energies).

1.4 Competition concerns and political acceptability

With regard to effects on income distribution, it is assumed that the refunding mechanism may slightly absorb the potential direct regressive impact without reducing the environmental effectiveness of the levy. Particularly households with many children, often less wealthy, benefit from the per-capita refunding mechanism.

Energy-intensive companies and big emitters can apply for exemption from the CO2 levy. The exception is specifically motivated by competition concerns as those companies could otherwise face a sudden loss of international competitiveness. Still, companies that intend to be exempted have to commit to individual emission reduction targets and can participate in the Swiss emissions trading scheme (ETS, see below). As companies can choose between joining the ETS and paying the CO2 levy, they have in principle greater flexibility and limited compliance cost uncertainty.

The combination of voluntary approach, levy and emissions trading scheme as well as the gradual adjustment of the levy have substantially increased the political acceptability of the CO2 levy.

1.5 Environmental outcome of the CO2 levy

In 2009 CO2 emissions from heating and process fuels have been reduced by 12.1% compared to 1990 levels and have slightly decreased between 2008 and 2009. However, it is too early to assess (ex-post) the impact of the CO2 levy on emissions, as emissions depend on different factors, such as heating days due to cold winters, oil price and others. In principle, the gradual increase of the levy potentially increases the effect of dynamic efficiency as the incentive to reduce emissions is not only maintained but strengthened over time. According to modeling, the CO2 levy is assumed to contribute to 2.2% of the total emission reduction effort by 2020. The environmental outcome of the CO2 levy is closely linked to other instruments in the building sector, such as performance standards and subsidies for refurbishment of building, upgrade of heating systems, and use of renewable energies. These subsidies are generated by an earmarking of the CO2 levy (see above).

2. Swiss Emissions Trading Scheme

The Swiss ETS is operational since January 2008 and covers around 400 companies, with a total emission allocation of approximately 3 million tonnes of CO2 from energy related activities.

2.1 Objective of the Swiss Emissions Trading Scheme (ETS)

The ETS offers an alternative to the CO2 levy for energy-intensive industries, thereby increasing flexibility to companies and fostering cost-efficient mitigation reductions. Thus, participation in the ETS is voluntary.

2.2 Allocation of emission rights

The allocation of emission rights is free and based on a bottom-up approach. The individual emission reduction target takes into account the technical potential, economic viability as well as past emission reduction efforts of the company concerned. The emissions rights are fully tradable and bankable.

2.3 Competition concerns

Recent experience with regard to emissions trading has shown that the liquidity and trading volume on the market is relatively small. With the exception of the Climate Cent Foundation (see below), there is a very modest demand for emission permits. Consequently, the Climate Cent Foundation has paid CHF 70 to CHF 100 (€ 56 to € 80) per tonne of CO2. In view of the CO2 levy rate at CHF 36, it is questionable if this price can be considered as market-price and hence, if the emission trading market is competitive.

Competition concerns are addressed by applying the bottom-up approach in allocating emission rights as well as an ex-post adjustment (until 2010) based on economic growths of the companies.[3]

However, both instruments are linked to other disadvantages and challenges with regard to competition, effectiveness as well as efficiency;

- The ex-post adjustment involves consequentially a dynamic cap, which risks reducing environmental effectiveness of the ETS as well as economic efficiency, as other sectors have to compensate for any potential increase of emissions from the ETS in view of compliance with Kyoto Protocol commitments. Furthermore, recent experiences in Switzerland have shown that ex-post adjustments may initially increase political acceptability and address some competition concerns, but at the cost of increased uncertainty with regard to the allocation of emission permits. That is to say, during the economic downturn, the ex-post adjustment for 2009 resulted in a considerable scaling-down of allocated emission permits. Due to this kind of increased insecurity, make-or-buy decisions can become much more difficult. Furthermore, it is assumed that liquidity challenges within the Swiss ETS are amplified by the ex-post adjustment mechanism as well as related insecurities.
- One of main challenge with regard to the bottom-up approach is that individually defined bottom-up reduction targets can intensify distortions of competition within the ETS, with regard to other sectors (which have less flexibility) as well as at the international level.

As a result and in view of the further development of the Swiss ETS (see below), the government has proposed to amend the bottom-up approach and to abandon the ex-post adjustment what is to be approved by the Parliament.

As Switzerland's most important trading partner is the EU, the most effective instrument to address competition concerns is supposed to be a linking of the two trading schemes. In principle, the effect of linking is comparable to trade liberalization and would ensure a level playing field. Companies participating in the Swiss ETS would have access to a bigger and more liquid market, thereby increasing cost-efficiency and flexibility with regard to compliance and decreasing transaction costs. Consequently, the Swiss government has proposed to continue and improve the Swiss ETS for energy-intensive companies inter alia in view to increase linking opportunities with the EU ETS. Accordingly, further measures related to carbon-leakage concerns would be realigned with the EU provisions (such as free allocation based on an efficiency benchmark etc.).

2.4 Environmental outcome

In principle, the environmental outcome of an emissions trading scheme can be ascertained in advance. Due to the previously mentioned ex-post adjustment, the environmental outcome of Swiss ETS can't be assessed at this point of time. The cap will be reduced by 1.74% annually as of 2013. Compared to the total emission reduction effort, the ETS is supposed to contribute to about 1.5%.

3. Climate cent on transport fuels and petroleum tax

Similar to the CO2 levy for heating and process fuels, a subsidiary levy on transport fuels was supposed to be introduced, if the effect of voluntary measures is insufficient to reach the sectoral target.

[3] The production growth related ex-post adjustment of allocated emission rights takes into account CO2-intensity change of the company (CO2-intensity compares the effective CO2 emissions to hypothetical CO2 emissions without any reduction measures). If the production output of a company increases, more emission rights are allocated. If the output decreases, emission rights are detracted. The objective of the ex-post adjustment is to ensure, that economic growth is not constrained due to environmental policy, i.e. the ETS.

Subsequently, the Swiss industry had to fund the so called Swiss Climate Cent Foundation on a voluntary basis, which charges a levy on all imports of petrol and diesel at a rate of 1.5 cent per liter since 2005. The Foundation committed to reduce 12 million tonnes of CO2 between 2008 and 2012, of which at least 2 million tonnes within Switzerland. This geographical division between emission reduction projects takes into account the difference in reduction costs in Switzerland and abroad. In this sense, although voluntary, the Climate Cent initiative can be considered as a cost-efficient market-based instrument.

In addition to the climate cent on transport fuels, there is an excise tax on crude oil, other mineral oils, natural gas, their processed products, and engine fuels as well as a petroleum surtax on engine fuels.

3.1 Objective of the climate cent

In contrast to the CO2 levy on heating and process fuels, the objective is not to steer directly emissions from the transport sector but to compensate part of the emissions through emission reduction measures in Switzerland and abroad. The investments are funded through the levy of 1.5 cents per liter, which create revenues of about CHF 100 million annually. In Switzerland, offsets are generated either in the transport, the building or the industrial sector (e.g. purchase of emission rights from the Swiss ETS). Abroad, investments are made within the Clean Development Mechanism of the Kyoto Protocol.

The petroleum tax fulfils primarily a fiscal objective.

3.2 Levy rate

As the Climate Cent Foundation is a private sector initiative, the government can neither influence the tax rate nor specific allocations of resources. In principle, the rate depends on mitigation costs of projects in Switzerland and abroad.

With regard to the petroleum tax, the rate varies heavily depending on the product and the use of the product (engine fuel, heating fuel, technical purposes). For instance, the tax per liter is:

- 74.47 cents for unleaded petrol
- 75.87 cents for diesel oil
- 0.3 cents for extra light heating oil

3.3 Use of revenues

As mentioned above, revenues from the climate cent are invested in mitigation project in Switzerland and abroad.

The revenues of the Petroleum tax are important and represented in 2009 8.51 % of federal revenue (i.e. CHF 5.18 billion). CHF 3.6 billion were earmarked for tasks related to road traffic. The rest of the net revenue is allocated to general expenditures of the federal budget.

3.4 Competition concerns and political acceptability

As the Climate Cent corresponds to a market-wide arrangement, covering more than 95% of Swiss imports of transport fuels, the question occurred if such an arrangement is permissible under the national competition law. According to the expert report of the Competition Commission requested by the government, the Climate Cent Foundation is to be classified as an arrangement restraining competition that cannot be justified by economic ground of efficiency, thus resulting in an illicit agreement. In the

following, the government decided on a temporary exception from national competition law, based on the superior, legitimate public interest of environmental protection in virtue of art. 8 Cartels Act.

In order to address the underlying competition concerns with regard to the Climate Cent solution, the government decided within the framework of the post Kyoto climate legislation to adjust the requirements for the transport sector: instead of signing an agreement with a market-wide group of importers, the government obliges individual manufacturers and importers of fossil motor fuels to compensate at least 25% of the related emissions from their fossil fuel imports through reduction measures in Switzerland or abroad. Depending on the development of emissions, the government can adjust the volume of required compensations up to 35%. This legal obligation would supersede the voluntary private sector initiative. Subject to the provision of the competition law, importers are free to arrange a joint procurement of the individually required emission rights and certificates. This legislation is currently in parliamentary consultations.

3.5 Environmental outcome

Domestic emissions from the transport sector have increased by 12.8% (2009) compared to 1990 levels. However, based on the compensation mechanism, the Climate Cent Foundation contributes to achieving the CO2 reduction target under the CO2 law through emission reduction measures in Switzerland and abroad. In order to decrease domestic emissions from the transport sector, other instruments, such as the performance-related heavy vehicle fee (see below) and performance standards of new passenger cars are also applied and planned to be applied respectively. According to modeling results, due to these accompanying instruments, domestic emissions are assumed to decrease by about 2.9% by 2020 compared to 1990 levels.

Although the petroleum tax fulfils primarily the objective of financing the transport infrastructure, it also has an effect on fuel consumption and CO2 emissions. A recent study on the price elasticity of the demand of motor fuel in Switzerland reports a value of -0.27 for the price elasticity in the long term. The study also shows that tax increases have an additional "psychological" short term effect - the increase of the petroleum tax in 1993 (about 25 cents per liter) reduced the demand of motor fuels by 3%, in addition to the ordinary price effect in the long term.[4]

4. Performance-related heavy vehicle fee (HVF)

Switzerland has developed an integrated strategy for transport policy, seeking better coordination between transport modes and taking into account environmental concerns as well as spatial development and infrastructure planning. While a variety of measures are designed to reduce specific energy consumption, many are part of the general transport policy approach that targets shift towards more sustainable modes of transport, i.e. shifting traffic from roads to more environmentally friendly modes, and improvement of intermodal transport chains and interconnectivity. One of the environmentally related key instruments in the transport sector is the performance-related heavy vehicle fee.

4.1 Objective

The objective of the HVF is to foster a shift from road to rail from transalpine freight transport. The HVF is applied to passenger and freight transport vehicles of more than 3.5 tonnes gross weight.

[4] Baranzini B. et al. (2009), Elasticité-prix de la demande d'essence en Suisse, study commissioned by the Swiss Federal Office of Energy and the Swiss Federal Office for the Environment.

4.2 Fee rate

The fee is calculated according to three criteria: the kilometers travelled on Swiss roads, the vehicle specific maximum authorized gross weight and the pollutants according to EURO classes. The fee has been implemented in three stages: the first stage in 2001 introduced a fee of 1.6 Swiss cents per kilometer and tonne, accompanied by an increase in the general Swiss weight limit from 28 to 34 tonnes per truck. With the second stage in 2005, the rate was increased to 2.5 Swiss cents, together with an increase in the weight limit up to 40 tonnes. The final stage followed in 2008 increasing the fee to 3.07 Swiss cents.

4.3 Use of revenues

In 2007 the revenues of the HFV amounted to CHF 1.37 billion (€ 1.1 billion). Two thirds of the revenues are used to finance major railway infrastructure projects, such as the two base tunnels (Lötschberg and Gotthard) and one third is transferred to the cantons.

4.4 Competition concerns

The fee is applied in a non-discriminatory manner and must be paid for all the vehicles and trailers which are licensed in Switzerland and abroad and drive on Switzerland's public roads network. Similarly, with regard to exemptions from the tax[5], domestic and foreign trucks are treated equally.

4.5 Environmental outcome

The impact of the HVF combined with higher weight limits was most clearly reflected by changes in traffic levels (truck-kilometers). Following a significant increase of 5-6% per year before the introduction of the fee, the number of kilometers travelled by heavy goods traffic decreased between 2001 and 2005 by 6.4%. The fact that road transportation of goods increased in the same period by 6.4% proofs the effectiveness of the system: fewer trucks have transported more goods. Projections have shown that the number of kilometers travelled by heavy goods traffic would have been about 23% higher in 2005 without this regulation. Reduced road freight transport emission due to the new regime measured against increased rail transport results in a positive overall environmental balance, in particular with regard to air pollution and CO2 emissions have decreased by 6% compared to the reference scenario (28 tonnes limit, without HFV).

5. Incentive tax on volatile organic compounds (VOC)[6]

VOCs are used as solvents in many industries and can be found in various products, such as paint, varnishes and some detergents. Released into the atmosphere, they interact with nitrous oxides to form high concentrations of ozone at low altitude (summer smog).

The incentive tax on VOCs has been introduced in January 2000. Regarding coverage and implementation, the tax is applied to some products classed as VOCs (containing more than 3% VOCs) and levied on entry into production and on importation into Switzerland.

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5 Exemptions are granted e.g. to military vehicles with military number plates, vehicles of the police, fire brigade, oil and chemical emergency unit, civil protection and ambulances, vehicles used for the concessionary transport of persons or agricultural vehicles (green number plates).

6 OECD (2009), COM/ENV/EPOC/CTPA/CFA(2008)35/FINAL, Effects of the VOC incentive tax on innovation in Switzerland.

5.1 Objective

The objective of the tax is to reduce emissions from VOC, which contribute to the formation of low-level ozone, by pricing the release of VOC into the atmosphere.

5.2 Tax rate

In 2000 the tax has been introduced at a rate of CHF 2 (€ 1.6) per kg and has been increased to CHF 3 (€ 2.4) per kg at the beginning of 2003.

5.3 Use of revenue

The revenues peaked in 2005 at over CHF 140 million (€ 112) and decreased to about CHF 127 million (€ 101.6) in 2006 and 2007. This would represent only about 0.3% of federal revenue and 0.1% of all public authority revenue. However, the tax is redistributed to the population.

5.4 Competition concerns

Companies who have taken measures on a stationary installation and reduced emission significantly below the limit values stipulated in the relevant ordinance can be exempt from the tax. At the same time, in order to address competition concerns with regard to export of Swiss products with a VOC content of more than 3%, exported products are exempted from the tax. However, if production costs increase because of the tax on VOCs, which are released during the production process (but not necessarily contained in the product), related products from Switzerland may be disadvantaged compared to like products abroad.

5.5 Environmental outcome

According to companies interviewed, the tax has managed to cut VOC emissions and use by 20 to 50% in five to eight years and generated greater awareness of the environmental and other problems of VOCs.

6. Conclusions

Switzerland has a long-standing and ambitious legislative and institutional policy regarding the environment. The regulatory framework in environmental policy has been continuously refined inter alia in view to implement the "polluter pays" principle, minimize industries compliance costs and avoid major social incidences. In addition to environmental effectiveness, the economic efficiency and avoidance of market distortions have received increasing attention and importance. Thus, market-based instruments, including environmentally related levies, have been continuously introduced and - with growing awareness of global challenges, like climate change - applied on a broader scale in recent years. Market-based instruments promise to incentivize the decoupling of economic activities from their environmental impacts and to improve the overall efficiency of natural resource use. Although in most cases it is too early to measure the outcomes of the market-based policies, Switzerland has gained so far valuable experiences for further developments of green growth policies.

UNITED KINGDOM

1. Introduction

Like most economies around the world, the UK faces a number of environmental challenges including tackling climate change, preventing damage to ecosystems and controlling depletion of natural capital assets. The scale and importance of such environmental problems has been widely studied and these issues have been given high priority on the policymakers' agenda.

The transition to a sustainable and resource-efficient economy will require large changes to the structure of the economy, moving away from high carbon towards low carbon investments and energy sources. In creating policies to help deliver this ambition, policymakers will have to consider a wide range of potential impacts in the environmental, social and economic spheres. Ensuring competitive markets are preserved will be key to achieving low-cost emissions reductions and to creating the incentives to innovate and develop the new technologies that will be needed.

2. The economic rationale for intervention

The economic rationale for proactive policies to promote green growth arises primarily from market failures[1].

- In the presence of externalities, actions of some economic agents – individuals or firms – affect other agents in the economy but decisions they take fail to consider the wider societal implications. The overarching market failure associated with climate change is the negative externality of greenhouse gas emissions generated by polluters. Public intervention must therefore consider how it can reflect the 'true' price of emissions in a way that will incentivise low-emission technologies.
- The public good nature of the natural environment, which is caused by the use of many environmental resources being non-rival and/or non-excludable. This is related to the problem of well-defined property rights which mean there may be overuse of common resources, leading to a reduction in the pool of resources available for future social use. Some common examples are overfishing and overmining, which can be remedied by imposing quotas or limits on resource use.
- The return on private research and development to benefit the environment may not fully capture the benefits to wider society, leading to lower investment than the socially desirable level. This is due to knowledge spillovers that occur following R&D and to the difficulty in appropriating wider benefits as a part of the return on the investment.
- Alongside natural market barriers, such as economies of scale, other factors can result in underinvestment in green innovation. The development and commercialisation of new technologies may require significant set-up or capital costs. Current infrastructures have also evolved to meet the needs of the existing technologies, rather than encouraging a revolutionary leap with the adoption of new technologies. Another barrier to investment in innovation stems from the

1 *Stern Review on the Economics of Climate Change*, Part IV: Policy responses for mitigation. Part IV of the report is available at: http://www.hm-treasury.gov.uk/d/Part_IV_Introduction_group.pdf

uncertainty firms face: sectors like energy are highly-capital intensive while the deployment of technologies and return on investment occur over the long term. Government interventions to address this market failure can take the form of spending programmes for the development of new technologies, which should raise private returns closer to the social rate of return.

- Sector-specific barriers may prevent socially optimal outcomes from being achieved. These can include barriers to information, barriers to credit and inertia compared to search costs.

Market failures necessitate a proactive policy approach to address environmental problems. But policy choices also need to take into account the impact that regulatory interventions and sometimes conflicting policy instruments can have on markets and the economy. As stated in the recent OECD Secretary-General's note on the GGS synthesis report, 'sound economic policy is also sound environmental policy' which necessitates 'concrete examples of necessary reform such as the removal of environmentally harmful subsidies (fossil fuels, agriculture, fisheries), less distortionary tax systems, regulatory failures, barriers to trade, investment and knowledge flows as well as removing barriers to entry for alternative suppliers of goods and services'[2].

These are exactly the economic issues and the framework the UK government considers when designing policies to reduce greenhouse gas emissions.[3]

3. Different policy approaches

There are a range of policy instruments to help promote green growth. Broadly they can be classified into direct regulation and market based approaches.

Direct regulation is a prescriptive and more traditional approach that specifies what firms can and cannot do. Thus, it involves a degree of 'command and control'. Direct regulation raises the cost of undertaking environmentally damaging activities and places an implicit price on the externality. At times, direct regulation can even outlaw environmentally damaging activities. Compared to market-based approaches, direct regulation is particularly relevant when the risk of non-compliance is deemed too high. Some examples of direct regulation are:

- Vehicle standards, which specify emission levels for cars. These standards are made progressively stricter so that manufacturers have an incentive to innovate and reduce emissions over time.

- Energy-using products policy, where regulations specify a minimum energy efficiency standard for household electrical products.

- Nitrate Vulnerable Zones help reduce water pollution and require farmers to reduce water pollution by requiring farmers to take measures to control the amount of nitrates run off into water courses.[4]

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2 OECD Council, *Outline for the Green Growth Strategy's Synthesis Report* [C(2010)125]

3 Defra, *Making the Right Choices for Our Future*, available at: http://www.defra.gov.uk/evidence/series/documents/economicframework-0309.pdf

4 See Defra, *Nitrates: Reducing water pollution from agriculture*, http://www.defra.gov.uk/environment/quality/water/waterquality/diffuse/nitrate/index.htm

Market-based approaches are more flexible and less stringent than direct regulation. Market-based policies can directly set prices or quantities, and hence indirectly price in the externality to better reflect the full social cost of actions (via subsidisation or taxation). Examples are subsidies for R&D in environmental technologies and for the adoption of new technologies such as carbon capture and storage. Some other examples of market-based approaches are:

- The UK Emissions Trading Scheme (UK ETS) was the world's first economy-wide greenhouse gas emissions trading scheme. It was launched in 2002 and ended in December 2006, and run as a voluntary pilot prior to the mandatory *European Union Emissions Trading Scheme*: 34 organisations ("Direct Participants") committed to reducing their emissions by 3.96m tonnes of carbon dioxide equivalent (CO2e) by the end of the Scheme. Emissions trading is a key instrument in the drive to reduce greenhouse gas emissions. It allows an organisation to decide how and where they will reduce emissions by trading their emissions allowances. This ensures emissions are reduced where the cost of the reduction is lowest. The cost of emissions allowances is determined by the carbon market, and by the demand for, or availability of, allowances.
- UK Landfill tax, which raises the cost of sending waste to landfill, thus internalising some of the external costs as well as encouraging alternative waste disposal techniques[5]
- Environmental Stewardship Programme, which is a subsidy scheme that encourages farmers to take up environmental land management measures including steps to conserve biodiversity and the natural landscape[6]
- The England Catchment Sensitive Farming Delivery Initiative is a 2 year scheme aimed at raising awareness about diffuse water pollution from agriculture and at encouraging changes of behaviours and practices to tackle this problem[7]

Apart from direct regulation and market-based approaches, there are other policy measures aimed at promoting long-term sustainable economic growth, including:

- *Information provision and public engagement* in the form of awareness programmes and appliances energy labelling requirements), which can be used in conjunction with other measures
- *Negotiated agreements*, such as voluntary agreements with the car industry.

Different policy approaches may be appropriate depending on the situation at hand. When the costs of non-compliance are very high, say in case of heavy metal poisoning, direct regulation coupled with strong penalties may be suitable. In other situations where the objective is not to dictate outcomes, but to leave some space for firms to manoeuvre within a set framework, market- based instruments may be desirable as their flexibility encourages the greatest abatement effort for those to whom it is least expensive. Rather than encouraging abatement only to a specific level, they provide ongoing incentives to reduce pollution through innovation. Market instruments are also less demanding than prescriptive direct regulation in terms of the prior information required by policy makers before formulating a policy for such regulation, including its impact on competition (see paragraph 27 below).

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5 See Defra, *Farm waste and recycling: Landfill*, http://www.defra.gov.uk/foodfarm/landmanage/waste/landfill/index.htm

6 See Natural England, *Environmental Stewardship*, http://www.naturalengland.gov.uk/ourwork/farming/funding/es/default.aspx

7 See Natural England, *England Catchment Sensitive Farming Delivery Initiative***,** http://www.naturalengland.org.uk/ourwork/farming/csf/default.aspx

4. The role of competition in successful market-based solutions

Competition has an important role in designing successful market-based solutions to tackle environmental problems. Firstly, competition instils markets with greater efficiency and so ensures that policy interventions realise greater value for money. In competitive markets with no barriers to entry or exit, surplus to consumers is maximised and rents arising from market power are competed away. Second, unlike direct regulation, market-based responses have the advantage of using market signals to address market failures. This results in more efficient markets, which provide industries with greater stability and more incentives for innovation. Such innovative and resilient industries are crucial to withstand the challenges posed by changing environmental circumstances. Finally, market-based mechanisms also create an ongoing incentive to reduce emissions compared to standards which, when met, create no further incentive for improvement.

Below, this paper examines competition issues relating to different types of initiatives, i.e. subsidies (as an example of a market-based solution) and to environmental standards (as an example of the 'command and control' regulatory approach).

5. Potential competition issues: the example of subsidies

Environmental subsidies can be divided into two distinct types. The first aims to promote green innovation where normal market incentives are insufficient. The second seeks to directly reward reductions in environmental damage - typically reductions in emissions. This form of subsidy acts as a market-based solution to offset negative externalities.

Examples of the first type of subsidy include government research and development grants provided to automobile manufacturers to create low-emission vehicles.[8] Similarly, in the UK, government has provided grants to assist the development of offshore windfarms.[9] The UK's Renewables Obligation provides subsidies to electricity suppliers based on the proportion of their electricity that is generated from renewable sources.[10]

Examples of the second type of subsidy in the UK include (or have included):

- Enhanced Capital Allowances, which provide tax deductions on capital expenditure used to reduce carbon emissions.[11]

- The Carbon Reduction Commitment Energy Efficiency Scheme[12], which is a mandatory cap and trade scheme that acts as an effective subsidy for the most energy efficient firms, since emissions allowances are auctioned rather than grandfathered.

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8 See BIS, *Low Emissions Cars to be Built in UK*, http://webarchive.nationalarchives.gov.uk/+/http://www.bis.gov.uk/news/features/2010/3/low-emission-cars-to-be-built-in-uk

9 See DECC, *£10 million grants for UK offshore wind technology*, http://www.decc.gov.uk/en/content/cms/news/pn10_76/pn10_76.aspx

10 See Ofgem, *Renewables Obligation*, http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/Pages/RenewablObl.aspx

11 See Carbon Trust, *Enhanced Capital Allowances*, http://www.carbontrust.co.uk/cut-carbon-reduce-costs/products-services/pages/eca.aspx

Box 1. Possible negative effects of subsidies upon competition

The first risk subsidies pose for competition is that the subsidy increases the potential for anti-competitive behaviour by firms. This might be the case if the subsidy results in the recipient firm significantly increasing its market share to a level where:

- it can act independently of competitive constraints;
- there is consolidation amongst competitors that either reduces competition or increases the risk of collusion;
- entry barriers are raised so that potential future competition is prevented.

A second risk is that the subsidy might undermine the mechanisms that ensure efficiency in the market. For example, the recipient firm could be under less financial pressure to be competitive or a subsidy may mean that an inefficient firm stays in the market. Alternatively, competitors not in receipt of aid could be forced to exit the market, or to take drastic action to ensure short-term survival at the expense of long-term prosperity. Further risks include that significant sums of money might be spent by market participants in seeking subsidies, or that subsidies could distort firms' investment and R&D decisions. No matter how worthy the cause, supporting individual firms and industries could lead to the displacement of other activities, particularly where resources are scarce

Source: OFT, Government in Markets, available at http://www.oft.gov.uk/OFTwork/publications/publication-categories/reports/advocacy/oft1113

- Climate Change Agreements (CCA), which allow energy-intensive industries to obtain an 80 per cent discount from the standard emissions tax, or 'Climate Change Levy' if they meet challenging energy efficiency targets. CCAs were first introduced in 2001, in recognition that the Climate Change Levy could affect the competitive position of energy intensive industry. The aims of the Agreements are to offset the competitive disadvantage and to reduce energy demand, thereby reducing emissions of greenhouse gasses. They play a considerable role in helping the UK meet its carbon budgets[13].

Subsidies can have important effects on competition, particularly where they have a differential impact on firms in a market.

As regards environmental subsidies specifically, grants aimed at stimulating innovation tend to be provided to a limited number of chosen firms in the market and risk being misused as a means to boost national competitiveness at the expense of domestic—and international—competition. If governments do choose to intervene it is typically better to introduce horizontal measures that do not result in their picking technological winners, or discriminating by location, industry, or firm. These outcomes are avoided by the second type of subsidy – those intended to encourage lower emissions across industry.

Moreover, subsidies to incentivise such behaviour tend to harm the competitiveness of the market structure to a lesser degree because payments are not connected to firms' productive output. Grants for

12 The Carbon Reduction Commitment Energy Efficiency Scheme provides a financial incentive to reduce energy use by putting a price on carbon emissions from such use. Organisations must buy allowances equal to their annual emissions. The overall emissions reductions achieved by the scheme will be determined by the emissions 'cap' on the total allowances available to CRC participants. All the money raised through the allowances will be recycled back to participants, according to how well they perform. See http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/crc.aspx#more_about_CRC

13 The Climate Change Levy is a tax on certain forms of energy supplied to the non-domestic sector to encourage the efficient use of energy, and to help reduce energy demand and reduce emissions of greenhouse gasses: see http://www.decc.gov.uk/en/content/cms/what_we_do/change_energy/tackling_clima/ccas/what_are_ccas/what_are_ccas.aspx

research and development can lead to innovations which help a firm expand its market share. This is less likely to be the case for subsidies aimed at encouraging wholesale changes to production processes.

For these reasons, it is necessary to take great care in analysing the effects subsidies may have on competition.

The UK has issued guidance on the assessment of the competition effects of subsidies.[14] The process for assessing competition effects takes account of the characteristics of the relevant market (including market concentration, the level of product differentiation and barriers to entry and exit) as well as the market share of the subsidised undertaking(s), the size of the subsidy and the effect of the subsidy upon undertakings.

These considerations allow subsidy providers to reach one of three conclusions as to the effects of a given subsidy:

- The subsidy is unlikely to distort competition significantly
- The subsidy is likely to give rise to significant distortions to competition, but when the total benefits and costs are considered, the subsidy is justified as it generates an overall benefit
- The subsidy is likely to give rise to distortions to competition that outweigh the benefits that arise from it.

Policymakers may view the benefits of subsidies aimed at addressing environmental problems in a different light to those used to promote or protect nascent or vulnerable domestic industries. Nonetheless, as suggested above, there is a risk that subsidies which are ostensibly aimed at dealing with environmental problems could in practice be used as a tool of traditional national industrial policy. Policymakers must therefore consider whether the intended benefits of environmental subsidies outweigh the dangers to competition that such subsidies may pose.

6. Potential competition issues: the example of environmental product standards

Product standards are an indirect response to market failures as they help correct problems in individual product markets, instead of the overarching problem posed by carbon emissions.

They encompass a wide range of characteristics: standards may be mandatory and can be implemented either by a direct mandate from government or voluntary by way of an agreement between firms. They can take the form of product information or of minimum environmental performance standards.

- Product information should enable and stimulate competition based on the environmental performance of products. It also allows consumers and procurers to make informed choices before buying products. Mandatory energy labelling, like the 'EU Energy Label', provide information to end-users about the energy consumption and performance of domestic appliances.
- Minimum performance standards are set for energy-using products for the energy consumed in the manufacture, while in use and in their eventual disposal. Performance standards normally remove or discourage the worst performing products and tackle poor practice by suppliers, dealers, installers and procurers. Requirements have been set at EU level under the EuP Directive[15].

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14 See *Guidance on How to Assess the Competition Effects of Subsidies*, available at http://www.oft.gov.uk/OFTwork/publications/publication-categories/reports/advocacy/oft829

15 The EUP Directive, or Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of eco-design requirements for energy-using products, required European Union Member States to transpose its provisions in their respective territories by 11 August 2007.

Product standards work by correcting market failures in specific product markets. In doing so, successful standards can help markets function better, promoting competition and contributing to wider policy objectives, such as limiting greenhouse gas emissions. They mostly address the following market failures:

- Difficulties faced by consumers in identifying 'green' products that they would like to purchase,
- Consumers ignoring lifetime product running costs and environmental impacts (both due to, for example, energy consumption) when buying goods.

Product standards often work in conjunction with other policy interventions. For instance, policies aimed at reducing carbon emissions associated with electricity generation – the EU ETS being the main one – work in two ways: they encourage low-carbon energy generation and make electricity as a whole more expensive, discouraging its use. So extra information on product running costs and environmental impact will encourage customers to buy environmentally friendly products. Minimum standards may also be required to remove the option for customers to buy products with excessive running costs.

Before introducing new mandatory standards, policy makers in the UK are required to consider the impact – the costs and benefits – of proposed policies through Impact Assessments. An Impact Assessment also requires a competition assessment, which focuses on the impact and direct/indirect effects of a proposed policy on competition in affected markets[16]. On the other hand, firms participating in voluntary agreements are subject ex post to competition law[17] and will only be exempted from the provisions which prohibit unlawful agreements if they provide broader benefits that outweigh the potential harm on competition.[18]

In 2008, the UK published a report into the possible effects of environmental product standards on competition. Specifically, the research looked at when and how regulations might affect competition, and what actions could be taken to mitigate any competition concerns that arise[19].

The pro-competitive effects of product standards are easy to detect:

- Performance standards and labelling help correct market failures arising from excessive focus on up front costs and signalling issues
- they improve market transparency and help consumers make more informed choices
- common international standards can promote market entry by allowing firms to exploit economies of scale

But more than any other approach, the implementation of performance standards is likely to affect the way firms in markets compete with each other. The impact, and competition effects, that are likely to materialise depend upon the interaction between the type of standard (label, voluntary, mandatory minimum), the type of costs the standard affects or the structure of the market in which the standard is imposed.

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16 See *Completing Competition assessments in Impact Assessments: Guideline for Policy Makers*, available at http://www.oft.gov.uk/shared_oft/reports/comp_policy/oft876.pdf.

17 Agreements between competitors may be constrained by the Competition Act (1998).

18 Unilateral conduct, on the other hand, cannot be exempted from competition rules. See the UK contribution to the OECD Competition Committee Roundtable on 'Horizontal Agreements in the Environmental Context', October 2010 (DAF/COMP/WD(2010)95).

19 See *The Competition Impact of Environmental Product Standards*, available at http://www.oft.gov.uk/shared_oft/economic_research/oft1030.pdf.

Box 2. Possible negative effects of product standards

The OFT report on the competition impact of environmental product standards identifies 5 ways product standards have the potential to negatively affect competition.

- Asymmetric cost impact:
    - Differential impact on firm production costs: meeting a standard might be more costly for some firms, putting them at a short or longer-term competitive disadvantage vis-à-vis rivals;
    - Raising minimum efficient scale: by causing an increase in the fixed costs;
    - Increased barriers to entry

  To alleviate these concerns, policymakers should consider the time offered to firms to comply with the standard, the timing of its introduction and whether an open standard cannot more effectively achieve the same environmental objectives

- Policymakers picking winners:

  There is a danger to choose a standard that can only be met with a specific technology. Policymakers should therefore have regard to outcomes, rather than the means, and the timing of the implementation. Policies could also instil technological changes rather than rewarding a single existing technological solution.

- Encouraging coordinated effects:

  Voluntary agreements expose markets to a possible lessening of competition as they may give rise to unintentional (co-ordinated effects) or intentional (collusion) conducts prohibited by competition law. Co-ordinated effects may arise when an agreement calls or the sharing of commercially sensitive information on production costs.
  To alleviate those risks, firms should take care that the design and institutional arrangements associated with voluntary agreements are developed so as tom:
    - limit the sharing of information at the design stage;
    - limit information sharing about production levels and sales;
    - limit the extent to which firms meet to discuss the operation of the agreement;
    - establish a careful assessment of the proposals to ensure that they do not unnecessarily advantage incumbent firms at the expense of potential entrants,

- Asymmetric product impact:

  This concern stems from the likely effect that product labels have on consumer behaviour: consumers can interpret them as a broader signal of product quality or feel encouraged to pay a price premium that is greater than the value of the carbon saved.
  Clear and unambiguous product information should be able to limit this possible negative effect on competition.

- Facilitating exclusionary behaviour:

  Whilst markets will benefit from firms competing to improve environmental performance, policymakers must remain attentive to the potential for gaming on the part of firms if regulators use dynamic standards which are based on the 'best available technology'. To mitigate that risk, policy makers should ensure that appropriate competition safeguards are built in.

Source: OFT, The Competition Impact of Environmental Product Standards, available at http://www.oft.gov.uk/shared_oft/economic_research/oft1030.pdf.

7. Using a mix of policy approaches

The dangers posed by environmental degradation are—in part, at least—due to multiple market failures as well as a combination of global and local problems. The complexity of the challenge demands a complex response.

The push-pull complementarity between instruments—technological investment subsidies push new technologies into the market while taxes, trading systems and direct regulation all pull them in—can improve the efficiency of the overall policy package. As long as the instruments target different market failures, their co-existence could improve effectiveness of the overall policy.[20] No one instrument is capable of effectively addressing the market failures and policy considerations that need to be taken into account when designing climate change policy.

Using a mix of instruments to tackle climate change has several advantages, including the potential to deliver emissions reductions more efficiently and cost effectively than any single instrument alone, allowing climate change policy to target sector-specific market failures, and providing policy-makers with flexibility to deal with and adapt to changing circumstances. However, care needs to be taken when choosing a mix of instruments to make sure that they are consistent with each other, maintain a reasonable degree of certainty of outcome, and are consistent with policies in related areas.[21]

Like all government interventions, subsidies and environmental standards both have the potential to affect competition. A mixture of policy approaches – combining market-based and regulatory means – may help to minimise the negative side-effects of each when attempting to address environmental problems.

[20] Defra, *Making the Right Choices for Our Future*, p. 27, available at http://www.defra.gov.uk/evidence/series/documents/economicframework-0309.pdf

[21] Defra, *Making the Right Choices for Our Future*, p. iii, available at http://www.defra.gov.uk/evidence/series/documents/economicframework-0309.pdf

UNITED STATES

1. Introduction

In actively pursuing their mission to safeguard a robust competitive process, the U.S. antitrust agencies (Federal Trade Commission (FTC) and United States Department of Justice (DOJ)) work with other governmental agencies on issues related to supporting and improving environmental quality. This submission describes recent antitrust agency initiatives in this field, including comments on energy market policy issues, participation in the U.S. government's interagency Subcommittee on Smart Grid, and reviewing the competitive effects of energy conservation standards proposed by the Department of Energy for appliances. This submission concludes with a description of emissions permit trading systems in the U.S., and carbon offset programs and renewable energy certificates.

2. Energy market policy comments

The FTC recently submitted two comments to the Federal Energy Regulatory Commission (FERC) that address competition and green growth issues in the energy market.[1]

In an April 8, 2010 submission, the FTC commented on the integration of variable energy resources (VERs), such as wind and solar generators, into the United States' electric power grid.[2] VERs are called "variable" because, unlike traditional thermal generators (such as fossil-fueled and nuclear plants) that produce power predictably, they do not produce power at a constant rate. The FTC comment provided recommendations that, if adopted, would modify electricity markets to allow these variable resources to compete more efficiently by rewarding the facilities and programs that can supply power and ancillary services at a competitive cost for consumers. The comment also described how to integrate VERs into the process of balancing the supply of power produced with consumers' consumption of power. The FTC's comment highlighted the need to "support competition among technologies to deliver desired outcomes at the lowest cost to society."[3] Costs to society include the indirect costs from pollution and environmental degradation.[4] In particular, the FTC stated that:

> *"In the short term, efficient markets require existing plants and firms to compete to supply power and meet environmental goals and renewable portfolio requirements at the lowest cost to ratepayers. In the long term, emerging demand- and supply-side technologies should be able to compete with incumbent thermal and renewable technologies."*[5]

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1 Comment *available at* http://www.ftc.gov/os/2010/04/V100009ferccomment.pdf and http://www.ftc.gov/os/2010/05/100521fercdemand.pdf.

2 Comment *available at* http://www.ftc.gov/os/2010/04/V100009ferccomment.pdf

3 *Ibid*., at p. 5.

4 *Ibid.*, at p. 1.

5 *Ibid*., at p. 5.

The comment also stated that "renewable portfolio standards and other environmental policies are efforts to reduce costs to society to make costs to ratepayers better reflect costs to society."[6]

In a subsequent May 13, 2010 submission, the FTC commented on demand response compensation in organized wholesale energy markets.[7] Demand response programs pay customers to reduce their use of electric power to a level below their "normal" usage level during greater scarcity periods, such as during hot summer afternoons when many people are running their air conditioners. By lowering the peak demand for energy, demand response programs reduce the need to construct new generation units necessary for meeting the infrequent "peak" use periods. The FTC's comment highlighted the need for an adequate compensation program for retail consumers, critical drivers of demand response programs, as a necessary factor to improve the competitiveness of organized wholesale energy markets. In particular, the FTC suggested introducing a method to compensate demand response that better reflects the full social costs of power, such as environmental degradation from power plant pollution. An electricity rate that does not fully incorporate social costs necessarily will lead to an inefficient amount of demand response.[8]

3. The Smart Grid project

On July 12, 2010, the U.S. National Science and Technology Council (NSTC) Committee on Technology announced the establishment of a Subcommittee on Smart Grid. The purpose of this subcommittee is to establish an interagency process that will further the goals of President Obama's comprehensive energy plan. The FTC is playing an advisory role in the Subcommittee. The Subcommittee aims to promote and implement the smart grid technology system as a way to reduce harmful emissions and foster competition in the global market for clean energy technologies.[9] The smart grid is defined as:

> *An automated electric power system that monitors and controls grid activities, ensuring the two-way flow of electricity and information between power plants and consumers -- and all points in between. Up and down the electric power system, the Smart Grid will generate billions of data points from thousands of system devices and hundreds of thousands of consumers. What makes this grid 'smart' is the ability to sense, monitor, and, in some cases, control (automatically or remotely) how the system operates or behaves under a given set of conditions.*[10]

Although the Subcommittee has yet to release any public documents, numerous studies already are available on the government's smart grid website. In particular, a study on the smart grid's environmental benefits highlights the role of the smart grid in reducing emissions at a lower cost than many new clean energy technologies. This study also foresees a 4% worldwide emission reduction in 2020 thanks to smart grid technologies.[11] The U.S. submission to the WP2 roundtable on *Electricity: Renewables and Smart Grids* in February 2010 discusses some of the competition issues relating to smart grid technology.[12]

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6 *Ibid.*

7 Comment *available at* http://www.ftc.gov/os/2010/05/100521fercdemand.pdf.

8 *Ibid*., at p. 9. There is no clear consensus on the ideal level of compensation for demand response, and the FTC's position is one of a number of approaches reflected in comments submitted to FERC addressing this matter.

9 *See* Smart Grid's official website http://www.smartgrid.gov.

10 *See* http://www.smartgrid.gov/basics.

11 *See* Alex Zheng, Bruce Renz, Joe Miller, *Your Smart Grid environmental Benefits Toolkit*, available at http://www.smartgrid.gov/sites/default/files/pdfs/your_smart_grid_environmental_benefits_toolkit_11-2008.pdf.

12 DAF/COMP/WP2/WD(2010)9.

4. Comments on competitive effects of energy conservation standards for appliances

The Energy Policy and Conservation Act (EPCA), 42 U.S.C. §6291 *et seq.*, authorizes the Department of Energy (DOE) to establish energy conservation standards for a number of appliances, where DOE determines that those standards would be technologically feasible, economically justified, and result in significant energy savings. The EPCA provides that before the Secretary of Energy may prescribe a new or amended energy conservation standard, the Secretary shall ask the Attorney General to make a determination of "the impact of any lessening of competition … that is likely to result from the imposition of the standard."[13] The Attorney General's general responsibility for responding to requests from other government departments about the effect of a particular government program on competition has been delegated to the Assistant Attorney General for the Antitrust Division. 28 CFR § 0.40(g).

In conducting its statutory analysis, the Antitrust Division examines whether a proposed standard may lessen competition. In addition to harming consumers directly through higher prices, these effects could undercut the ultimate goals of the legislation.

In accordance with the EPCA, over the last 30 years DOJ has written DOE over a dozen such letters relating to proposed energy conservation standards for appliances, some of which have identified competitive problems with the standards. For example, DOE's 1997 final rule instituting room air conditioner energy conservation standards[14] noted that although DOE had simultaneously considered standards for many other products, it did not propose rules for appliances where "the evidence indicates that anticompetitive effects could result" from some of the standards it had considered. DOE's notice cited DOJ's letter of September 16, 1994, which pointed out those competitive problems. DOE subsequently introduced standards for most of those products, taking into account DOJ's comments. In a more recent example, a 2010 DOJ letter to DOE discussing a proposed standard for residential water heaters noted that only three manufacturers currently marketed products in certain categories. Given the substantial capital investment and research and developments costs associated with meeting the proposed standards, competition could be reduced even further, and DOJ urged DOE to consider the possible impact on competition in determining the final standards.[15]

5. Emissions permit trading schemes, carbon offset programs, and renewable energy certificates

The United States does not currently impose mandatory permits for greenhouse gas emissions at the national level. However, one national program addresses sulfur dioxide (SO_2) emissions, and a number of regional or local programs cover greenhouse gas emissions as well as other air and water pollutants. The U.S. antitrust agencies have had limited involvement with emissions trading issues. That involvement is briefly described below, including some consumer protection issues.

5.1 The Acid Rain program

The Acid Rain Program, which is administered by the U.S. Environmental Protection Agency (EPA) as part of the 1990 Amendments to the Clean Air Act (CAA), addresses SO_2 emissions in the 48 contiguous states using a cap-and-trade program, and focuses on emissions from the electric power sector. The first phase of the program started in 1995 and allocated allowances (*i.e.*, permits) to utility companies

13 Section 325(o)(2)(B)(I) of the EPCA, 42 U.S.C. §6295.

14 62 FR 50,122.

15 75 FR 20,235.

that operated the larger, higher emitting plants, based on historical data and a defined formula.[16] The second phase of the program started in 2000 and tightened the overall emission caps at the larger plants and set new restrictions at many smaller plants (generally covering all units larger than 25 MW). Along with the allocated permits, the EPA auctions a small portion (2.8%) of allowances annually. There are two auctions conducted each year: a spot auction for permits that can be used that year, and an advance auction, to allow planning (*e.g.*, new plant construction, expansion of existing facilities), for permits that can be used starting 7 years after the auction date (although they can be traded before then). All of the allowances are tradable and can be bought or sold by anyone, including individuals and companies that are not regulated. The allowances can be banked for use in future years. There is also an opt-in program that allows sources of SO_2 that are not required to participate in the program to opt-in and receive allowances. During the first 11 years of the program, annual SO_2 emissions from U.S. sources decreased by more than 40 percent.[17] By using a flexible, market-based mechanism, significant emission reductions were achieved at a fraction of the anticipated cost. Ex-post analysis of the program estimates annual benefits of the program in 2010 at $122 billion and costs for that year at $3 billion, a 40-to-1 benefit/cost ratio.[18]

In 2003, EPA began to administer the NOx Budget Trading Program under the NOx State Implementation Plan, also known as the "NOx SIP Call." The NOx Budget Trading Program (NBP) was a market-based cap and trade program created to reduce emissions of nitrogen oxide (NOx) from power plants and other large combustion sources in the eastern United States.

5.2 Regional, state, and local permit schemes

In 1994, the South Coast Air Quality Management District (AQMD) in southern California set up the Regional Clean Air Incentives program (RECLAIM), which regulates SO_2 and NO_x emissions in that region.[19] The program began with a focus on facilities that emitted four or more tons of SO_2 or NO_x per year. In RECLAIM, each firm receives trading credits equal to its annual emissions limit. The limits are based on past production and existing rules and control measures. Each year the number of credits is reduced. The credits are annual and can be bought and sold within the year they are issued. Firms can sell any credits that they have beyond their actual emissions.

The State of Illinois adopted the Emissions Reduction Market System (ERMS) for volatile organic compounds in the Chicago area.[20] The program went into effect in 2000 and focuses on major stationary sources that produce volatile organic compounds in the Chicago area; major sources are defined as sources that have baseline volatile organic compound emissions of 10 tons per "Ozone Season" (May 1 through September 30). The program issues trading units based on historical emissions, reduced by approximately

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16 For the first five years of the program, the allowances were allocated at an emissions rate of 2.5 pounds of SO_2/mmBtu (million British thermal units) of heat input, multiplied by the unit's baseline mmBtu (as prescribed by Title IV of CAA). After 2000 the formula allowed 1.2 pounds of SO_2/mmBtu of heat input, multiplied by the unit's baseline. Beginning in 2010, the CAA places a cap at 8.95 million on the number of allowances issued to units each year.

17 See Napolitano et al. (2007), "The U.S. Acid Rain Program: Key Insights from the Design, Operation, and Assessment of a Cap-and-Trade Program" The Electricity Journal 20(7): 47-58, *available at* http://www.epa.gov/airmarkt/resource/docs/US%20Acid%20Rain%20Program_Elec%20Journal%20Aug%202007.pdf.

18 Lauraine G. Chestnut and David M. Mills, "A Fresh Look at the Benefits and Cost of the US Acid Rain Program," Journal of Environmental Management, Vol. 77, Issue 3 (November 2005), 252-266. Year dollars are 2000.

19 *Available at* http://www.aqmd.gov/reclaim/reclaim.html.

20 *Available at* http://www.epa.state.il.us/air/erms/.

12%. The program is seasonal, such that firms must hold enough trading units to cover their emissions solely during this period. Permits can be bought and sold or banked for the following season. The trading units can be bought and sold from October 1 until December 31 during what is called a reconciliation period. The ERMS also has an account of trading units that can be bought if a firm cannot buy trading units on the open market.

The Regional Greenhouse Gas Initiative (RGGI) is a regional CO_2 cap and trade program in the north-eastern U.S. [21] and covers fossil fuel-fired power plants that generate 25MW or more each year. The program commenced in 2009 and applied a regional cap on emissions which will continue to be reduced by 2.5 percent each year from 2015 to 2018. The program has three year compliance periods, meaning that at the end of each period the regulated plant must have an allowance for each ton of CO_2 that was emitted over the preceding three years. The majority of the allowances are distributed through auctions, which are held quarterly by each participating State. The allowances are tradable and can be banked. Given its regional nature, the RGGI recognizes the potential for emissions "leakage," which occurs when polluters move outside of the regulated area while still providing the service that produces the pollution to the regulated area, thereby enabling the polluters to avoid regulation. The RGGI's member states thus are encouraged to monitor for possible leakage. The program also allows greater flexibility through offsets, enabling a limited number of greenhouse gas emission reduction projects outside the electricity sector to count towards compliance towards the program.

Although some of these programs have been in place for a number of years, there has been no evidence of permit market manipulation. At least one empirical study on the effects of banking in the Acid Rain Program found that the amount of banking during the first eight years of the program was efficient.[22]

The EPA's experience with the Acid Rain Program provides a good model for implementing a cap-and-trade program and has greatly influenced the development of other cap and trade programs both in the U.S. and abroad. The Program provides clear and strong incentives along with simple rules. It also uses information technology to collect large amounts of data that is made available to stakeholders, including the public. This allows for multiple levels of assessment to measure progress of the program. A 2007 EPA study[23] of the Acid Rain Program listed "key lessons" about effective design and operation of cap-and-trade programs in the U.S., including:

- Clear, comprehensive legislation makes it easier to implement the program and minimizes legal challenges that can introduce uncertainty, delays, and additional costs;
- A solid, but adaptable, program foundation is a substantial benefit, allowing room for new information, practices, and technologies;
- Flexibility in compliance approaches streamlines the decision-making process, fosters innovation, opens new compliance alternatives, and creates competition among emission reduction options, thereby reducing compliance costs—and lower costs make it possible to seek greater environmental protections where necessary;
- Accountability is a prerequisite for flexibility -- regulated sources must be held accountable for accurately measuring and reporting all emissions, and complying with program requirements;

21 *Available at* http://www.rggi.org/

22 Ellerman, A.D., and J.-P. Montero (2007), *The Efficiency and Robustness of Allowance Banking in the U.S. Acid Rain Program*. The Energy Journal 28: 47-71.

23 See note 2 above.

- Clear, simple rules are easier and less costly to implement; complexity may be required in some cases, but should be minimized whenever possible;
- Clear and strong incentives can encourage better monitoring and improve compliance with allowance holding requirements;
- Regulators can create a cooperative relationship with industry by focusing on results and assisting regulated sources in complying with program requirements;
- Cap-and-trade programs can provide cost-effective, broad, regional reductions of air pollution and should complement efforts to attain and maintain local air quality;
- Transparency of data and program operation provide an additional level of scrutiny to verify enforcement and encourage compliance, and inform stakeholders, including the public, about the program and its results; and
- Assessment is an important tool to measure progress toward the goal of the program.

5.3 Carbon offsets and renewable energy certificates

As noted above, the United States has not established a mandatory federal program for greenhouse gas emission permits, and consequently does not have a market in which Federal emission permits are being traded. It does, however, have a voluntary market for renewable energy certificates (RECs) and instruments that aim to reduce greenhouse gas emissions. REC markets are largely driven by State initiatives requiring a certain level of renewable energy, but also have a voluntary component and fulfill the broader national market demand for renewable energy.[24]

Carbon Offsets. Carbon offsets are credits or certificates representing the right to claim responsibility for greenhouse gas emission reductions, resulting typically from individual projects. To be credible, credits should only be issued for reductions that would not have occurred in the absence of the program (i.e., they should be additional). For example, a carbon offset provider might develop a project to install a landfill methane collection system or plant trees in an effort to reduce greenhouse gasses and, in turn, will sell the emission reduction credits to interested parties once they have been verified and certified by the regulator or an accredited third party. By acquiring these greenhouse gas reduction credits, purchasers, including individuals, businesses, and governments, seek to reduce their "carbon footprint" or to become "carbon neutral." Offsets help these organizations and individuals fulfil environmental goals and provide a basis for their advertising claims (*e.g.*, "our coffee is carbon neutral").

Renewable Energy Certificates. In the United States, retail electricity customers can support renewable energy by purchasing either renewable electricity or renewable energy certificates. Under the first approach, consumers purchase renewable energy through traditional electricity contracts with their local utility or power provider, in areas in which such energy is sold. Such energy is often more expensive than conventional energy; consequently, consumers usually pay a premium for it. Generators can recover some of this premium by splitting their output into two products: the electricity itself, and certificates representing the renewable attributes of that electricity. Under this second approach, generators sell their electricity at market prices applicable to conventionally produced power, and then charge for the electricity's renewable attribute separately by selling certificates to brokers and retailers for resale to individuals and organizational purchasers across the country who use them to characterize the conventional electricity they buy as renewable and lessen their carbon footprint. The REC market, therefore, helps renewable energy generators by expanding the number of potential renewable energy purchasers, possibly

[24] The following summary is based on the Federal Register Notice of the FTC's January 8, 2008 workshop on the marketing of carbon offsets and renewable energy certificates (*available at* http://www.ftc.gov/os/2007/11/P954501carbfrn.pdf).

avoiding transmission costs associated with traditional contracts, and helping to ameliorate supply and demand problems associated with the intermittent operation of some renewable energy facilities *(e.g.*, solar power facilities).

Because there is no Federal mandate for renewable electricity in the United States, the interstate market for RECs is largely voluntary.[25] RECs do, however, play a role in mandatory markets as well. For example, many states require electricity providers to purchase a minimum percentage of their electricity from renewable sources. Since purchasing renewable energy directly is not always practical, most states allow providers to meet their quotas through the purchase of RECs.

Where carbon offsets and RECs are not generated to meet regulatory targets, they are bought and sold in voluntary markets, which are growing rapidly.[26] In these voluntary markets, no federal agency currently has a comprehensive oversight role. In the absence of national regulation, voluntary third-party certification programs have arisen, and more are under development, to help reduce inappropriate practices and provide guidance to marketers through the development of industry standards.

An August 2008 United State Government Accountability Office Report on Carbon offsets found that:

> *"Increased federal oversight of the U.S. voluntary market [for carbon offsets] could enhance the market's transparency and improve consumer protection, but may also reduce flexibility, increase administrative costs, and stifle innovation… Including offsets in regulatory programs to limit greenhouse gas emissions could also lower the cost of compliance….However… concerns about the credibility of offsets could compromise the environmental integrity of a compliance system."*[27]

5.4 U.S. Agency activity in this field

The US Department of Justice Antitrust Division has been a long time proponent of market-based solutions in regulatory contexts, including in emissions trading. In particular, the Division has encouraged the auctioning of permits in situations as far back as the 1986 EPA phase-down of the use of asbestos,[28] and was involved in planning for the Acid Rain Program in the 1990s.

The Federal Trade Commission is currently reviewing its environmental marketing guidelines, also known as the Green Guides.[29] Last updated in 1998, the Green Guides outline general principles for all environmental marketing claims and provide specifics about certain green claims, such as degradability, compostability, recyclability, etc.

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25 RECs can play a role as carbon offsets for compliance, and emerging State and regional programs are actively considering offsets as a key component to achieving emission reduction targets.

26 See United State Government Accountability Office, "*Carbon Offsets: The U.S. Voluntary Market is Growing but Quality Assurance Poses Challenges for Market Participants*" (Report to Congressional Requesters, August 2008), *available at* http://www.gao.gov/new.items/d081048.pdf.

27 *Id.*

28 Comments of the United States Department of Justice on Asbestos; Proposed Mining and Import Restrictions and Proposed Manufacturing Importation and Processing Prohibitions, EPA Docket OPTS-52036 (June 30, 1986).

29 See http://www.ftc.gov/green,

As part of its Green Guides review process, the FTC held a January 8, 2008 workshop on the marketing of carbon offsets and renewable energy certificates (RECs)[30] as detailed in a Federal Register Notice mentioned above.[31] The FTC solicited and received 57 public comments in connection with the workshop, that are available on its web site.[32]

The FTC also combats unfair and deceptive practices in these carbon offset and REC markets as part of its general consumer protection mission. Under the FTC Act, all marketers making express or implied claims about the attributes of their product or service must have a reasonable basis for their claims at the time they make them. In the environmental advertising realm, such reasonable basis often requires competent and reliable scientific evidence.

On October 6, 2010, the FTC released proposed revisions to the Green Guides for public comment.[33] The proposed revised Guides address RECs and carbon offset claims, neither of which were addressed in the older Guides. With respect to RECs, the FTC proposes that marketers should qualify "made with renewable energy" claims by specifying the sources of the energy. In addition, marketers should qualify their renewable energy claims if not all the product or package's significant manufacturing processes were powered with renewable energy or conventional energy offset by RECs. Further, the FTC suggests that marketers that generate renewable energy (*e.g.*, by using solar panels), but sell RECs for all the renewable energy they generate, should not represent that they use renewable energy. With respect to carbon offset claims, the FTC proposes that marketers should support emission reduction claims with competent and reliable scientific evidence, and should not sell the claimed reductions more than once. Furthermore, marketers should disclose if the offset purchase funds emission reductions that will not occur for two years or longer. Finally, the proposed new Guides suggest that marketers should not advertise carbon offsets if the activity underlying them is already required by law.

The Dodd-Frank Wall Street Reform and Consumer Protection Act,[34] signed into law on July 21, 2010, establishes an interagency working group to conduct a study on the oversight of existing and prospective carbon markets. The Chairman of the FTC is a member of this working group.

The US Environmental Protection Agency's Green Power Partnership is a voluntary program that supports the organizational procurement of green power by offering expert advice, technical support, tools and resources. The program encourages organizations to buy green power as a way to reduce the environmental impacts associated with purchased electricity use. The Partnership currently has hundreds of Partner organizations voluntarily purchasing billions of kilowatt-hours of green power annually. Partners include a wide variety of leading organizations such as Fortune 500 companies, small and medium sized businesses, local, state, and federal governments, and colleges and universities.

30 See http://www.ftc.gov/bcp/workshops/carbonoffsets/index.shtml.

31 Supra note 11 above.

32 *Available at* http://www.ftc.gov/os/comments/carbonworkshop/index.shtm.

33 See http://www.ftc.gov/opa/2010/10/greenguide.shtm.

34 H.R. 4173, 12 USC. §5301 *available at* http://www.gpo.gov/fdsys/pkg/PLAW-111publ203/content-detail.html.

EUROPEAN UNION [1]

1. Subsidies for environmental protection: Introduction

Environmental protection is seen as an increasingly important objective of the European Union. One of the key features of environmental protection is the existence of 'negative externalities'. These occur when the private cost of an action is lower than the cost of that action to society, for example, in terms of pollution. In those circumstances, the market produces too many environmentally harmful goods and provides too few incentives for the polluting companies to invest in environmental improvements, even though it would be beneficial for the economy if they did.

To address these negative externalities, governments can apply the 'polluter pays principle' in order to ensure that companies pay for their pollution[2]. If the costs of pollution are monetised and thus taken into account by companies (i.e. are internalised), companies will tend to maximise their profits by reducing this cost component and therefore pollution. In addition, if polluting goods are more expensive, demand will adjust towards less polluting sectors offering cheaper and more environmentally friendly goods and services, thus creating new markets for eco-industries. It is widely accepted however, that environmental costs have for too long been hidden costs, which means that in many cases economic activities do not fully account for their impact on the environment. In such cases, public intervention can change the incentives of the market players so that they do take the costly side effects into account. Public intervention aimed at putting the 'polluter pays principle' into practice generally takes the form of regulation to ensure companies meet certain environmental standards or market-based instruments, for example taxes, charges or tradable permit schemes.

It has been recognised that there are a number of practical and political limitations to the full implementation the polluter pays principle. This is where public subsidies can be a useful complementary tool in cases where the polluter pays principle cannot be applied in full. In the EU, subsidies (know as 'state aid'[3]) are forbidden – in principle – in order to avoid that EU member states engage in an unproductive subsidy race, which distorts competition. However, there are exceptions where EU member states may grant aid, for instance when it increases the level of environmental protection. It may be justified to give companies an incentive to increase investment in environmental protection or relieve firms from the financial burden of enforcing a stricter overall environmental policy. However, if not well targeted, such subsidies may have harmful effects both on the environment and the economic growth in the EU. Therefore, one must be very careful when using subsidies to promote environmental protection.

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1 Note by the services of the European Commission, Directorate General for Competition. This paper owes to the contribution of Justyna Majcher-Williams, Directorate-General for Competition of the European Commission.

2 This is what the Treaty on the Functioning of the European Union prescribes when it sets out, in Article 191(2), that environmental policy should be based on the principle that 'the polluter should pay'.

3 In this paper the term subsidy and aid are used interchangeably.

For those reasons the European Commission issued guidelines explaining under what conditions EU member states may grant subsidies for environmental protection (hereafter 'Environmental Guidelines')[4]. Such guidance is important because both the environment and the economic growth will suffer if subsidies are badly targeted, make it even cheaper to pollute or being disguised as environmental subsidies will result in windfall profits, which may distort competition and thus harm economic growth. The remainder of the paper focuses on the principal features of the environmental subsidies in the EU and their impact on competition.

2. Environmental subsidies in the EU

The European Commission has identified a number of measures in the Environmental Guidelines where aid may be granted under certain conditions[5]. For example, EU member states may grant subsidies in relation to investments which go beyond obligatory standards; acquisition of clear transport vehicles; investments leading to early adaptation to future mandatory standards; environmental studies; costs related to energy saving, renewable energy sources, cogeneration of heat and electricity and high efficient district heating; waste management; remediation of contaminated sites; relocation of high risk or polluting undertakings; tradable permit schemes; or environmental tax reductions and exemptions[6].

In deciding whether those subsidies should be allowed, the European Commission will base its evaluation on a conceptual framework known as a 'balancing test'. In essence, this test asks (i) whether the state aid addresses a market failure or other objective of common interest; (ii) whether the state aid is well targeted (whether there is an incentive effect (i.e. whether the aid affects the behaviour of the recipient in a way which meets the objective) and whether the aid is kept to the minimum necessary); (iii) whether the distortions of competition are sufficiently limited so that the overall balance is positive[7].

Like any other subsidy in the EU, aid for environmental protection must result in the aid recipient changing its behaviour in pursuance of the defined Community objective — which, in this particular case, is to increase the level of environmental protection. Without an incentive effect, firms' behaviour is not affected and consumers are not affected either, since the aid is simply transferred from the tax payer to the firms. In this sense, the incentive effect is a safeguard against windfall profits to firms. For this purpose, it is crucial to determine what would happen without the envisaged aid. For example, the incentive effect

4 Community guidelines on State aid for environmental protection, Official Journal C 82 of 01.04.2008, page 1.

5 For an overview of the subsidies allowed under the Environmental Guidelines see Winterstein, A. and Tranholm Schwarz, B. "Helping to combat climate change: new State aid guidelines for environmental protection", *Competition Policy Newsletter*, Nr 2 (2008).

6 When enterprises receive a reduction or exemption from an environmental tax – this is considered to be state aid. In the Environmental Guidelines the European Commission introduced a stricter and self-standing set of criteria for the assessment of subsidies in the form of reductions or exemptions from environmental taxes. First, any tax reduction or exemption has to contribute, at least indirectly, to an improvement in the level of environmental protection and it should not undermine the general objective pursued. Second, any reduction or exemption from harmonised taxes must be compatible with the relevant applicable EU legislation and comply with the limits and conditions set out therein. Further, the European Commission will accept the aid as being necessary where the following cumulative conditions are met: (a) beneficiaries are selected according to objective and transparent criteria and the aid must be granted in a non-discriminatory way, (b) the environmental tax without the reduction must lead to a substantial increase in production costs; and (c) the substantial increase in costs cannot be passed on to the consumers without leading to significant sales reductions.

7 See Neven, D. and Vincent Verouden, V. "Towards a More Refined Economic Approach in State Aid Control" in *EU Competition Law - Volume IV: State Aid*, W. Mederer, N. Pesaresi and M. Van Hoof, eds., Claeys & Casteels (2008).

would be lacking where the investment concerned would also have been made without the subsidy, e.g. because it would have been economically attractive in its own right or because it is required by EU law[8].

The issue of the incentive effect is related to, but not identical to, the question of the minimum necessary amount of aid (a.k.a. proportionality). While the incentive effect requirement asks whether the aid measure will result in the company adopting the required behaviour, the minimum necessary amount of aid asks whether the same change in behaviour could be obtained with a lower amount of aid. The former question thus relates to the impact of the subsidy, the latter to the efficiency of the subsidy.

To ensure that the amount of aid is limited to the minimum, the European Commission will consider only the extra investment costs that are necessary to achieve a higher level of environmental protection to be eligible for a subsidy. In addition, these extra investment costs must be net of any operating benefits and/or costs. As regards subsidies to operating costs, the minimum necessary amount is ensured by limiting the aid amount to the net extra production costs for a limited period of time (in the case of energy-saving) or to the difference between production cost and the market price of the form of energy concerned (in the case of renewable energy and cogeneration). Similarly, the Environmental Guidelines provide that support schemes using market mechanisms or tenders must not result in overcompensation.

The impact on competition is intrinsically linked to the positive effect of the aid, as the mechanism that leads to a change of behaviour of the aid recipient may also cause harm to competition. In order to make sure that the overall balance for the EU can be considered positive, the third step of the balancing test considers the magnitude of the distortions of competition[9].

In assessing the negative effects of the environmental aid measure, the European Commission focuses its analysis on the distortions of competition on the foreseeable impact the environmental aid has on competition between undertakings in the product markets affected[10]. A profit-seeking undertaking will normally only increase the level of environmental protection beyond mandatory requirements if it considers that this will result at least marginally in some sort of advantage for the undertaking.

First, the likelihood that the recipient will be able to increase or maintain sales as a result of the subsidy are assessed. The following elements are considered here: reduction in or compensation of production unit costs; more environmentally friendly production process compared to competitors; or introduction of a new or higher quality green product.

Second, the fact that subsidies reallocate rents in the markets and interfere with the competitive process may have long term incentive effects. That is, firms anticipating that profits will be affected by

8 In general, aid may not be granted where Community standards are already adopted, even when these standards have not yet come into force. As a rule, State aid for investments made to comply with already adopted EU standards is not likely to change the beneficiary's behaviour and thus will be deemed not to have the required incentive effect. By way of exception, aid for the acquisition of new vehicles for road, railway, inland waterway and maritime transport complying with adopted Community standards is permissible where such acquisition occurs before they enter into force and where the new Community standards, once mandatory, will not apply retroactively to already purchased vehicles. By derogation, aid for early adaptation to future Community standards may also be allowed.

9 See Friederiszick, H., Röller, L-H., Verhouden, V. "European State Aid Control: an economic framework" in Paolo Buccirossi (Ed.) *Advances in the Economics of Competition*, MIT press (2007).

10 A number of markets may be affected by the aid, because the impact of the aid may not be restricted to the market corresponding to the activity that is supported but may extend to other markets, which are connected to it either because they are upstream, downstream or complementary, or where the beneficiary is already present or may be present in the near future.

subsidies in addition to their own efforts may find it optimal to reduce the latter. For instance, subsidies for environmental protection may be used strategically to promote innovative environmentally friendly technologies with the aim to give domestic producers a first mover advantage. Consequently, the aid may distort the dynamic incentives and crowd out investments in the specific technology in other EU member states and lead to a concentration of this technology in one country.

In addition, environmental subsidies may be justified as a transitional mechanism to move towards a full allocation of environmentally negative externalities. They should not be used to grant unnecessary support to undertakings which are unable to adapt to more environmentally friendly standards and technologies because of their low levels of efficiency.

Overall, an assessment of the negative consequences of environmental subsidies on competition should consider the extent to which competitors are affected. This is relevant both for evaluating specific consequences in the market at hand and a as proxy for the significance of the systemic effects. Distortions should be considered less severe when competitors are less affected. Distortions can also be considered from the prospective of consumers and, other things being equal, aid will be more attractive the more it leads to a benefit for consumers. Hence, in addition to the analysis on competitors, the competitive dynamics in the market should be examined to assess the consequences of subsidies for the market as a whole with a particular focus on consumers.

Normally, EU member states must notify all state aid measures to the European Commission and wait for an approval before they may grant the subsidy to an enterprise. However, the type of assessment the European Commission will undertake depends on the aid amount and potential distortions of competition. If the aid amount is below a certain threshold and subsidies are unlikely to have a negative impact on competition they are either exempt from the notification requirement[11] or they benefit from a standard assessment under the Environmental Guidelines, including a number of legal presumptions. If state aid measures are more likely to distort competition they will be subject to a more detailed assessment based on the balancing test, as presented above.

3. Conclusion

The EU approach to environmental subsidies safeguards that one does not merely pay the polluter but that subsidies result in positive environmental effects without unnecessarily distorting the economy. Well targeted environmental subsidies will produce a win–win situation, whereas, badly targeted aid will lead to a loose–loose situation, for the environment as well as for the economic growth.

[11] If they fall within the scope of Commission Regulation (EC) No 800/2008 of 6 August 2008 declaring certain categories of aid compatible with the common market in application of Article 87 and 88 of the Treaty (General block exemption Regulation), Official Journal L 214 of 09.08.2008, page 3.

BULGARIA

1. General legal framework

The Bulgarian environmental legal framework has been completely modernized in the last 15 years in view to fully and comprehensively regulating the environmental protection issues. This legal framework is based on and harmonized with the EU legislation in this area.

The main Bulgarian framework law is the Environmental Protection Act (EPA). It regulates the major issues, aimed at protecting all environmental components - air, waters, soils, landscapes, biological diversity as well as the regulatory regimes, procedures, management and financing of the environmental protection activities. Special laws and numerous by-laws were adopted further detailing the applicable rules to the different environmental components.

Strict environmental protection standards in compliance with the EU requirements, together with the Pollutant Pays Principle, are in the core of the Bulgarian national legislation in this area. The Pollutant Pays Principle is seen as the main pollution deterrence instrument. This principle is applied not only to the greenhouse emissions, but to all possible pollutant substances (emissions of SO and NO, dust, chemical and organic pollutants), affecting adversely the waters, soils, landscapes, etc. All polluting industrial facilities are required to have the corresponding installations in order to limit the amount of industry specific pollutants freed into the environment. The main polluting industries and sectors are the energy, mining, chemicals production, cement and ceramics, timber and wood, textiles, sewage, etc.

The main problem that the Bulgarian industry experiences with regard to the observance of the new environmental protection standards is the fact that most of these facilities were constructed in the second half of the 20th century. During this period, the economy was not market based and, what is more, the environment protection standards were much lower than they currently are. The harmonization of the Bulgarian national environmental legislation with the EU *acquis* put a pressure on the existing installations to invest substantial financial resources in relatively short period of time in order to comply with the new environmental standards. Those undertakings which did not manage to modernize their installations within a certain grace period of time should shut down their production and there are currently such examples in the energy sector. New industrial facilities, on the other hand, can be built only if considered having not detrimenting environmental impact and after an assessment analysis, including of the technology to be used, has been conducted. This positive analysis is a mandatory requirement at the very first stage of collecting the necessary documentation.

To sum up, the deterrent aspect of the system for pollution control in Bulgaria is based on two main instruments – on the one hand, there is an ex-ante control exercised with respect to the environmental protection technology used in the industrial installations in order to achieve compliance with pollution standards. On the other hand, ex-post control, based on the Pollutant Pays Principle, is exercised in case of incidental pollution or in case of exceeding the maximum allowed amounts of freed pollutants.

2. Financing of environment protection activities

The main national and international sources for financing of environment protection activities in Bulgaria are the following:

- the State budget;
- the state Enterprise for Management of Environmental Protection Activities (EMEPA);
- the mechanisms under the Kyoto Protocol to the UN Convention on Climate Change;
- the EU funds;
- the financial mechanism of the European Economic Area (EEA);
- international organizations and financial institutions;
- Bilateral cooperation agreements.

2.1 Ministry of Environment and Waters (MOEW)

The Ministry of Environment and Waters is the main state body responsible for the formulation and implementation of the environment protection policy in Bulgaria. The Ministry is funded by the state budget, but it also has its own revenues, accrued by external sources. It should be noted that the state subsidies for the MOEW are not used for financing investment or non-investment environment protection projects. These projects, with a focus on the areas of waste management, water management, sewage networks, bio-diversity, are financed by the Ministry's revenues, accrued by external sources.

2.2 EMEPA

EMEPA is a special enterprise established pursuant to Art. 60, para 1 of the Environment Protection Act as a state-owned legal person. It is not a commercial venture and it does not pay out dividends. EMEPA accrues revenues from fees and sanctions imposed under the national environment protection legislation.

The budget of the enterprise is spent for investment and non-investment projects[1], for the National Environment and Waters Monitoring System, for research activities, for public awareness activities, etc. The enterprise provides funding for investment and non-investment projects and activities for the purposes of protecting and rehabilitating the environment. The main forms under which the EMEPA provides funding are grants, non-interest or low-interest loans subsidies for partial or full covering of the bank interests due for bank loans that are given for environmental projects or facilities. Waste management installations (waste recycling, separate collection of waste, etc.), water management (protection of underground waters, fight with erosion, etc,), air pollution, rehabilitation of old polluted sites, small local water supply facilities, small hydro power plants are the main priority areas for which the enterprise supports investment projects.

[1] E.g. for ecoturism, ecological agriculture, bio-diversity, bio-resources, protected areas, etc.

2.3 Mechanisms under the Kyoto Protocol to the UN Convention on climate change

The Kyoto Protocol envisages several forms of cooperation for the effective reduction of greenhouse emission, the main ones being: joint implementation, international emission trading and clean development. These three flexible cooperation mechanisms could also serve as sources of financing. Bulgaria's policy is focused mainly on the joint implementation and international emission trading instruments.

2.3.1 Joint implementation instrument

This mechanism covering the period 2008-2012 is seen as a prospective instrument for attraction of investments for the municipal and private sectors and for transferring of modern technologies and know-how for the purposes of complying with the high ecological standards. Due to this reason, Bulgaria has a significant experience in the use of this instrument, with several bilateral agreements[2] signed and successfully implemented over the last decade.

The typical projects financed through the Joint implementation instrument in Bulgaria are projects, related to: change of fuel (e.g. gasification of coal thermal power plants), combined production of heat and electricity (co-generation), energy efficiency measures, renewable energy sources, use of biogases from waste depots, etc. In the most common example, partner countries under Joint implementation agreements have invested into low-carbon installations by supplying modern technologies in Bulgaria and receiving afterwards the corresponding emissions reduction units (ERUs) generated by these installations.

2.3.2 International emission trading under Kyoto Protocol and EU emissions trading scheme

This mechanism allows the countries which have fulfilled their obligations under the Kyoto Protocol, and have free emissions, to sell these emissions to countries that have high obligations for emission reduction and experience problems in fulfilling these obligations with the corresponding national measures. The Kyoto Protocol covers CO_2 emissions as well as other gases like methan, NO and others. The object of international emission trading are the assigned amount units (AAUs), the overall national allowance for 2008-2012, agreed to by Kyoto Protocol countries.

At the same time, Bulgaria, as an EU Member State, is part of the EU emissions trading scheme under Directive 2003/87/EC of the European Parliament and of the Council. The aim of the European emission trading scheme is to ensure in the most effective way the fulfillment by the EU of its obligations under Kyoto Protocol for reducing greenhouse gas emissions and to guarantee the transition to low-carbon industry in the future. The main instruments for achieving these goals are the cap-and-trade principle, aiming at finding a price of the CO2 quotas, and the creation of liquidity market for trading these quotas.

Bulgaria has experienced some difficulties in introducing at national level the necessary legal, administrative and other requirements necessary to allow the country full and active participation in the international emission trading both under the Kyoto Protocol and under the EU emission trading scheme. One of the major steps taken by Bulgaria in order to overcome these obstacles, are the new amendments made to the Environmental Protection Act in June 2010.

The EPA amendments provides for the creation of National Green Investments Scheme (NGIS) with a specific structure and principles of implementation. The revenues, accrued from the AAUs emission

[2] Bulgaria has Joint implementation agreements signed with Austria, Denmark, Finland, France, Japan, Netherlands, Sweden, Switzerland, as well as with EBRD in its individual capacity and as trustee under the Prototype Carbon Fund.

trading, will be collected in a specially designated account for the achievement of the NGIS goals. The money which is collected from the AAUs trading will be spent through the National Eco Trust Fund exclusively for projects and activities that reduce the greenhouse emissions. Only projects leading to the reduction of greenhouse emissions or their absorption or to a significant improvement of the quality of the environment (reduction of the pollution of the air, waters and soils) will be eligible for financing from the AAUs trading revenues. As examples of such eligible projects are projects in the areas of energy efficiency, renewable energy sources, etc. All major polluting industries and sectors as energy, transportation, agriculture, waste and water management, etc. will be in a position to receive funding through this mechanism. The National Eco Trust Fund is charged with choosing the projects to be financed, based on the principle of the transparency. When choosing the successful projects the Fund has to take into account the goals of the national ecological strategies and programs, of the National Green Investments Scheme, as well as the conditions in the specific contracts for AAU trading. In order to achieve transparency, the buyers of AAU will be given access to the projects data and documentation and their representatives will participate as observers in the Consultative Committee[3] of the National Eco Trust Fund.

Another obstacle before Bulgaria's participation in the international emission trading, which was recently overcome, is the approval by the European Commission of the National Plan for the Quotas Allocation for Greenhouse Emissions Trading for the period 2008-2010. The approval of the plan makes Bulgaria part of the Community emissions trading scheme for project activities under the Kyoto Protocol pursuant to Directive 2003/87/EC of the European Parliament and of the Council. There are 132 installations and almost 42 millions of tons of emissions allocated in quotas between undertakings in Bulgaria, included in the plan. The installations and their quotas, as well as the transactions made with the quotas, are entered into a special registry. Each year the operators are required to submit a verified report on the quantities used and spared.

2.3.3 Bilateral cooperation agreements

An interesting example of bilateral cooperation agreement in the area of environmental protection in general and emission reduction in particular is the Agreement between the Government of the Republic of Bulgaria and the Government of the Swiss Confederation on a Debt-for-Environment Swap, signed on 23 October 1995, entered into force on 15 March 1996. The agreement contains the provisions for annulling of ~20% of the official debt of Bulgaria to the Swiss Confederation in exchange to financing of environment protection projects. The implementation of the Debt-for-Environment Swap scheme is done through the National Eco Trust Fund, which may endorse projects for rehabilitation of old polluted sites, reduction of air pollution, incl. greenhouse emission reduction, protection of waters and bio-diversity. The National Eco Trust Fund may finance up to 30% of the total value of the project, in case of grant financing, and up to 50%, where the financing is in the form of a loan.

3. Emissions and the energy sector

Energy sector is undoubtedly one of the main sources of air pollution, emitting not only CO_2, but also other gases, covered by Kyoto Protocol. At the same time this is a regulated sector, where a process of liberalization is taking place. In this process of transition to full market based functioning of the energy industry not only the problems related to environmental protection are the ones to be resolved.

The general rules for environmental protection and emissions in Bulgaria are applicable to all sectors of the economy, incl. energy undertakings. Moreover, some of these undertakings are among the most

[3] The Consultative Committee comprises of representatives of the donors, who have expressed their wish to participate in it.

active in benefiting from the mechanisms for emission trading, especially the Joint Implementation Instrument. Heat and electricity installations which modernize their production facilities by starting using natural gas instead of coal or oil, thus sharply reducing their emissions as well as household gas distribution companies, that extend their pipe network to more cities are good examples of the positive options created by these mechanisms. The amendments made in the legal framework, which are described under p. 16, are envisaged to create even more incentives for the companies from the energy sector to invest into low-emission installations.

What is more, the Bulgarian legal framework with respect to the electricity production from renewable energy sources is very attractive for investment in RES installations. To describe it shortly, the legal incentives for electricity producers from RES include:

- priority and mandatory connection to transmission/distribution networks;
- mandatory purchase of the electricity, produced from RES;
- preferential long-term purchase prices for the electricity, produced from RES, with these preferential prices not being subsidized, but being distributed among all customers and paid by them.

4. Choosing among policies

The choice of particular policies and instruments aimed at protecting environment is a matter of finding the right balance between different factors as: the initial situation in the environmental sector in the specific country (structure of the economy, main industries and their technological level, pollution levels, etc.), the legal framework (incl. the legal obligations, taken under multilateral agreements), the financial situation and the corresponding possibilities for financing environmental protection projects and activities, not confined to reducing emissions of greenhouse and other air pollutants. Therefore, the choice of the policies and instruments is rather predetermined to be made between not so many working options.

As already described in the beginning of this document, 10-15 years ago Bulgaria had to deal with a very heavy heritage in all areas of environmental protection-industry, using technologies quite harmful for the environment, transition from centralized to market based economy with the subsequent economic turmoil, need for big legislative changes, and need for huge financial resources to recover the damaged nature. In this situation, especially in respect of the emission reduction, the burden of the technological modernization was put mainly on the undertakings which were required to become compliant with the new strict and severe ecological standards in a very short period of time. The non-compliance with the standards is penalized under the Pollutant Pays Principle, with the possibility of closing the polluting installation also being an option. At the same time, however, these undertakings could benefit from such instruments like Joint Implementation which enabled the industry to finance part of its modernization projects. The state, with its limited resources to finance environmental protection activities, gave priority to areas like rehabilitation of old polluted sites, soil erosion, water management, etc. which are of general public interest, but are not investment attractive for the profit-oriented private business.

Indeed, the choice of incentives and instruments to protect environment should take into account any possible competition concerns as the government policies might affect competition. This is especially valid regarding the compliance with state aid provisions. Since Bulgaria is an EU Member State, the EU state aid rules for environmental protection are applicable, with the control for their observance being exercised by the European Commission.

CHINESE TAIPEI

1. Introduction

In preparing this submission, the Fair Trade Commission (hereinafter "the FTC") consulted with the competent authority responsible for environmental policy and regulations, the Environmental Protection Administration (hereinafter "the EPA"). The FTC also consulted with other government agencies responsible for environmental protection systems and pollution control, such as the Bureau of Energy and the Industrial Development Bureau, both of which are under the Ministry of Economic Affairs. In addition to pollution control regulations, Chinese Taipei has also adopted the design of economic incentives such as fee systems and subsidies. Emission permits trading will be covered in the legislation for the Greenhouse Gas Reductions Act, which is currently under the review of the Congress.

This submission focuses on issues related to emissions fees and taxes in the industrial sector, subsidies for environmental performance and the implications of multiple policy instruments.

Chinese Taipei is environmentally characterized as a subtropical ecosystem and has an export-oriented economy. With a scarcity of land, a high population density and limited natural resources, it is crucial for it to pursue sustainable development. On June 5, 2008, the Cabinet passed the "Sustainable Energy Policy Convention". The basic principles of a sustainable energy policy include four key elements for an energy consumption and supply system:

- High efficiency: improve the energy consumption and transformation efficiency;
- High value-added: increase the value-added of energy consumption;
- Low emission: adopt energy supply methods and consumption practices that ensure low carbon and low pollution;
- Low dependence: decrease the dependence on fossil fuels and imported energy.
- The target of a sustainable energy policy is to eventually reach the goal of the three-wins of energy security, environmental protection, and economic development.

2. Emissions fees and taxes in the industrial sector

The EPA has collected air pollution control fees according to "the Polluter Pays Principle". The tax revenues are provided exclusively for air pollution control uses and yield satisfactory results. Since the implementation of fee collection in 1995, air quality has significantly improved in Chinese Taipei. The annual average concentration of Sulfur Dioxide has declined from 0.009 ppm in 1995 to 0.004 ppm in 2009. The annual average concentration of Nitrogen Dioxide has been reduced from 0.024 ppm in 1995 to 0.016 ppm in 2009. As the air quality improves, the air pollution control fees have been reduced from NT$ 8.2 billion initially to the current level of NT$ 4.3 billion. We briefly introduce the air pollution control fees, soil and groundwater pollution remediation fees, the administration of general waste, and the resource recycling management fund in the following sections:

2.1 Collection of air pollution control fees

In order to improve air quality, the Polluter Pays Principle and air pollution control fees have been adopted since 1995. According to Articles 16 and 17 of the Air Pollution Control Act, the targets of air pollution control fees include stationary and mobile pollution sources that emit air pollutants. The air pollution fees standard for SOx, particle, NOx, and volatile organic compounds (VOCs) emissions from stationary pollution sources are based on the amount of fuel usage, the type of construction project, and actual emission quantities in sequence. From 2010, an additional 13 hazardous air pollutants (HAPs) are becoming subject to the air pollution control fees. The collection of air pollution control fees prompts enterprises to adopt pollution control measures and reduce pollutant emissions quantities.

Regarding the emissions from stationary pollution sources, the air pollution control fees in the first stage are collected according to the amount of fuel usage and fuel quality. The more sulfur the fuel contains, the higher the payment. Since the implementation of fee collection, most enterprises have stopped using high-sulfur petroleum coke and replaced it with fuel containing less sulfur. In addition, as clean energies such as natural gas and liquefied petroleum gas are not subject to fees, enterprises are encouraged to use clean fuel and reduce their emissions of air pollutants.

From July 1995 to June 2000, when the air pollution control fees were attached to the fuel price, in order to encourage factories reduce the emission quantities of SOx, factories that improved the production process or installed pollution control equipment to a certain level could apply for a reduction in air pollution control fees according to SOx emission quantities.

For mobile pollution resources, the air pollution control fees are collected from the vendors or importers based on the type, composition and quantity of fuel.

The collection of air pollution control fees was meant to improve air quality. Pursuant to Paragraph 1, Article 18 of the Air Pollution Control Act, air pollution control fees shall be provided exclusively for air pollution control uses. These include:

- Matters concerning the implementation of air pollution control work;
- The auditing, improvement, inspection, guidance, and evaluation of air pollution sources;
- Matters concerning air pollution control technology research and development and strategy formulation;
- Matters concerning international environmental protection work involving air pollution;
- Matters concerning air quality monitoring and auditing of the implementation and efficacy of such monitoring;
- Matters concerning the expenses related to the collection of air pollution control fees;
- The hiring of personnel required for work related to air pollution control;
- Related matters concerning air pollution health risk assessments and management;
- Incentives for promoting the use of clean energy and related research and development; and
- Other matters concerning air pollution work.

Since 1995, enterprises have been able to apply for tariff exemptions for imports of air pollution prevention and control equipment, which effectively reduce air pollution. In addition, to encourage enterprises to invest in air pollution control measures instead of paying air pollution control fees, the "Regulations on the Reduction of Air Pollution Control Fees for Air Pollution Control Equipment from

Stationary Pollution Sources in Public and Private Premises" were promulgated on March 7, 2008. Enterprises which install and effectively operate the air pollution prevention and control equipment for stationary pollution resources will be subject to lower air pollution control fees. This reduces such enterprises' expenditure on air pollution control fees, improves air quality and creates a better environment for the public.

2.2 Collection of soil and groundwater pollution remediation fees

The Soil and Groundwater Pollution Remediation Act has now been in effect for a decade since its first promulgation on February 1, 2000. The Act states, "the central competent authority may levy soil and groundwater pollution remediation fees on manufacturers and importers in accordance with the amounts of officially announced substances manufactured and imported by such enterprises, and shall establish a Soil and Groundwater Pollution Remediation Fund (SGPRF)." As a result, the "Regulations Governing Collection of Soil and Groundwater Pollution Remediation Fees" were promulgated on October 29, 2001 and soil and groundwater pollution remediation fees (hereinafter "remediation fees") have been collected since November 2001. After the collection of remediation fees and the establishment of SGPRF, the fund was used to remediate the soil and groundwater pollution. This reduces the environmental pollution and improves the quality of the environment.

In terms of rates for remediation fees, the EPA provides different rates for different substances to encourage enterprises to use low-polluting substances by avoiding high remediation fees.

Funds for the SGPRF shall be mainly derived from the following:

- Revenue from fees collected for soil and groundwater pollution remediation fees (more than 90% of SPGRF);
- The amounts paid by polluters, persons potentially responsible for pollution, and interested parties of the polluted land;
- Payments from land developers.

According to Article 28 of the Act, the SPGRF shall be used for the following purposes: the investigation, verification, adoption of necessary response measures, assessment, control, administration, remediation, quality monitoring, health risk assessment and management, litigations related to the Fund, and international environmental projection work involving soil and groundwater pollution. The purpose of the SPGRF is to establish a fund collecting mechanism and provide exclusively for the above-mentioned matters.

As manufacturing substances consume energy, energy-intensive industries are likely to pay more remediation fees. From the perspective of the energy user, the currently announced substances such as gasoline, diesel, and fuel oil are all considered as fuels subject to remediation fees. Cleaner fuels such as natural gas, however, are not on the list. As a result, those who manufacture or import non-announced substances do not need to pay remediation fees. The objective of the design is environmental protection.

2.3 Management of general waste and the Resource Recycling Management Fund

In line with the trends toward sustainable resources and zero waste, the waste management system in Chinese Taipei has shifted from end-of-pipe control to source management. Chinese Taipei initiated "source minimization" and "resource recycling" to minimize waste, and promoted green manufacturing, green consumption, source minimization, resource recycling, reuse, and regeneration. Implementing these policies or measures will effectively help to recycle resources and gradually lead to the attainment of the goals of full recycling and zero waste.

In 1988, the Waste Disposal Act was amended to include the principle of Extended Producer Responsibility (EPR). The Act stipulates that manufacturers, importers, and sellers have the responsibility to recycle, clear, and dispose of waste products. In 1997, the Waste Disposal Act was amended again, and the recycling fund established by enterprises which jointly recycle, clear, and dispose waste became part of the government's "Resource Recycling Management Fund (hereinafter "Recycling Fund")". The EPA promoted the "Resource Recycling Four-in-One Program" in 1997 and integrated community residents, recycling enterprises, local governments, and recycling funds to carry out resource recycling and waste minimization.

Based on Paragraph 2, Article 15 of the Waste Disposal Act, the EPA divides recyclable waste into 34 categories in 14 groups, which include waste containers, waste motor vehicles, waste electronic and electrical products, waste tires, waste lead-acid batteries, waste lubricating oil, waste light bulbs, and waste batteries, and so on.

Enterprises which manufacture or import products have the responsibility to recycle, clear, and dispose of the waste (hereinafter "responsible enterprises"). Responsible enterprises pay recycling, clearance and disposal fees in accordance with the fee rates approved by the EPA. These fees are the major source of the Recycling Fund. The "Resource Recycling Fee Rate Review Committee" under the EPA has reviewed the fee rates, and submitted its review to the EPA for approval and official announcement.

The "Recycling Fund" is used for the payment of recycling, clearance, disposal subsidies and other uses related to general waste resource recycling. In order to manage waste recycled from households or communities, the responsible enterprises for regulated recyclable waste shall comply with the waste recycling, storage, clearance, and disposal method and facility standards decided by the EPA. The enterprises of a certain scale shall register with local competent authorities pursuant to related regulations. Those who apply for subsidies from the Recycling Fund may be subject to the EPA's auditing and certification pursuant to relevant regulations in order to receive subsidies for waste recycling, clearance, and disposal.

3. Subsidies for environmental performance

3.1 Subsidies for soil and groundwater remediation

In order to encourage enterprises to adopt pollution control and prevention measures, the "Regulations Governing the Collection of Soil and Groundwater Pollution Remediation Fees" regulate fee rebate measures including export refunds, facilities refunds, and insurance refunds, and exemption ratio measures to reduce remediation fees.

The design of a subsidy system serves as an incentive for enterprises to reduce domestic pollution. In terms of export refunds, when imported substances for which remediation fees have already been paid are exported, the actual amounts of those substances exported shall be refunded. Enterprises may apply to the central competent authority for a refund of 95% of the paid remediation fees.

A fee payer that makes a new investment in equipment or project expenses that directly benefits the prevention of soil and groundwater pollution may apply for a refund of a portion of the remediation fees actually paid to the competent authority. The fee payer may receive a refund of up to a maximum of 20% of the remediation fees actually paid during the previous year.

A fee payer that has purchased environmental damage liability insurance or other insurance that is equivalent may apply for a refund of a portion of the remediation fees actually paid. The fee payer may receive a refund of up to a maximum of 5% of the remediation fees actually paid during the previous year.

The subsidy policy encourages enterprises to take preventive measures against pollution. The source control approach creates diversified incentives for installing preventive facilities ex ante to stop pollution from expanding, such as subsidies for facility investment, export refunds and refunds for environmental damage liability insurance. All of these measures help to reduce the risk of domestic pollution.

3.2 Incentives for the use of renewable energy

In July 2009, the "Statute for Renewable Energy Development" was promulgated. The fixed feed-in tariffs system encourages the installation of power generators using renewable energy. The Statute also specifies incentives for the demonstration, thermal use, the merger of the electricity industry in the distribution network, and the feed-in renewable energy so as to promote the development of renewable energy. Since the promulgation of major subordinate regulations at the end of April 2010, the total installed capacity of renewable power generation had reached more than 3.09 GW up to August 2010. The fixed feed-in tariffs system indeed has had a positive effect on the development of renewable energy in Chinese Taipei.

Energy supply shall be diversified to avoid any bias towards a few techniques and to enhance the stability of energy supply. Since most renewable energies are unstable, multiple supply systems will have a smaller impact on the electricity system. As a result, all renewable technologies shall be equally encouraged to develop from a policy perspective. As to which renewable energy develops faster or is more successful will depend on the amount of resources invested.

4. Implications of multiple policy instruments

For benefits associated with energy-conservation and carbon-reduction, since 99% of the domestic energy supply is imported, Chinese Taipei has provided "Four Energy Acts" as the foundation for its energy-conservation and carbon-reduction regulatory framework. The four acts are the "Energy Management Act," "Statute for Renewable Energy Development," "Greenhouse Gas Reduction Act (draft)," and "Regulations on Energy Tax (draft)." The amendments to the Energy Management Act and Statute for Renewable Energy Development were promulgated in 2009. The Greenhouse Gas Reduction Act is still under review by Congress and relevant government agencies are promoting the draft legislation of the "Regulations on Energy Tax."

The four energy Acts have their legislative purposes, respectively. For example, the "Statute for Renewable Energy Development" focuses on reasonable incentives for the development of renewable energy to encourage the utilization of renewable energy and effectively reduce the emissions of greenhouse gas. The "Energy Management Act" is concerned with measures to improve the efficiency and benefits of domestic energy utilization. The "Greenhouse Gas Reduction Act (draft)" sets greenhouse gas emissions reduction measures as well as a carbon trading scheme. The "Regulations on Energy Tax (draft)" levies taxes to internalize the external costs of energy consumption and make energy prices more reasonable. These acts work hand in hand in order to reach the objectives of energy-conservation and carbon-reduction. However, once the legislation on the "Greenhouse Gas Reduction Act (draft)" and the "Regulations on Energy Tax (draft)" is passed, we will further examine the incentive mechanism in relevant regulations if these two Acts provide additional incentives for the development of renewable energy.

As the competent authority for competition laws, in principle, where the environmental protection regulations in the legislative process obviously conflict with the legislative purposes of the Fair Trade Act, the FTC may express its opinion while the Cabinet reviews relevant regulations. If the Congress completes the third reading of such regulations or where the matters provided for in the Fair Trade Act concern other authorities, the FTC could consult with the relevant authorities to deal with the conflicting issues pursuant to Article 9 of the Fair Trade Act.

BIAC

1. Introduction

The Business and Advisory Committee (BIAC) to the OECD appreciates the opportunity to submit these comments to the OECD Competition Committee for its Roundtable on Proactive Policies for Green Growth and the Market Economy. Influenced by the economic crisis and initiatives to stimulate "green growth," the choice, implementation and effects of market-based environmental policy instruments has become both topical and urgent.

BIAC is highly supportive of the Green Growth Strategy and recognizes that environmental and economic growth challenges should be addressed in a mutually reinforcing manner. BIAC is of the opinion that sustainable, long-term economic growth is of fundamental importance for raising the necessary resources for addressing environmental challenges. In this respect, BIAC believes that green growth policies are needed throughout the world, should be comprehensive and require active involvement of all parts of society. Green growth policies should not be confined to "green" sectors, but should aim at "greening" across sectors and economies. Green growth policies should promote interoperable technologies across the entire energy systems, providing the necessary incentives and platforms for innovation in existing and lower-carbon / higher efficiency technologies. This requires supporting innovation, entrepreneurship and green growth across all sectors, focusing on where improvements that are both economically efficient and environmentally effective can best be achieved.

BIAC understands that in some cases government intervention is warranted in the transformation to a greener economy. However, it is important to carefully consider the types of intervention that are appropriate in a particular (country and sector) context to achieve the objective of a greener growth model, as well as to adequately monitor their implementation and the impact and progress made. For instance, "green taxes" may have a major impact on companies' competitiveness and may take away scarce resources that could otherwise be invested in research, development and deployment of technology necessary for achieving green growth. Where taxes or other policy instruments are employed, they should be focused on static and dynamic efficiency considerations, based on a solid cost-benefit analysis, be transparent, non-distortive and be both economically and environmentally effective. More generally, BIAC emphasizes the importance of removing barriers to investment and trade and counsels against green trade measures that may give rise to protectionism. Finally, BIAC requests specific attention to the importance of competitiveness losses resulting from asymmetrical environmental policies among various countries.

BIAC acknowledges that conventional direct environmental regulation may be well-suited in some particular areas[1]. This may for instance be the case in setting pollution limits for specific installations, or "point-source" pollution. Direct regulation may also be the only realistic way of protecting especially precious natural resources, e.g. to preserve biodiversity, endangered species, or special habitats. However, in many other cases, direct Command and Control regulatory methods are not likely to bring about optimal

[1] Part of the factual background on which this paper is based, is drawn from Suzanne Kingston, The Role of Environmental Protection in EC Competition Law and Policy, PhD thesis (2009) and the research cited therein.

results. In those cases, environmental instruments that create incentives and disincentives for market participants by using the market mechanism are more likely to stimulate markets to function most efficiently. A first reason why this is so, is that many of the markets that are intended to be regulated are subject to market failures, are highly complex and technical and display information asymmetries. As a result, sectoral regulators, competition agencies and legislative institutions may lack the knowledge to optimally regulate the economic activities at issue by the use of direct regulatory measures. This information deficit may result in over- and under-regulation and involve significant costs. Direct regulation may also be less suited to regulate environmental harms caused by diffuse, generalised sources and may fail to offer an integrated solution based on the total effects on the environment. Second, direct regulation may be relatively inflexible in remedying new problems and may lag behind the technical innovations in the industry. Direct regulation may in some cases also disincentivise innovation, because industry may have little incentive to develop more cost-effective ways of reducing pollution that go beyond the legislative requirements in force. A third potential disadvantage of direct environmental regulation is that its effectiveness depends on effective enforcement, which in turn depends on a number of variables, such as policy priorities and resources. Fourthly, the effectiveness of direct regulation may be diminished by "regulatory capture" by specific interest groups.

In light of the above potential disadvantages of direct, Command and Control regulatory mechanisms, BIAC believes that in many cases the use of economic, market based instruments, such as subsidies for environmental performance and tradable permits, that are each intended to create incentives and dis-incentives for companies are better suited to remedy environmental problems.

2. General advantages and disadvantages of market-based environmental instruments

Very generally, the use of market-based environmental instruments, such as environmental taxes, depends on the valuation of the environmental resources and a "charging" mechanism that attributes costs on those economic actors that damage them. However, one disadvantage of market-based instruments is that they fail to achieve their objectives if the price of environmental goods is priced incorrectly. This may, for instance, result in environmental taxes that chill efficient conduct and that are, on balance, inefficient. In addition, some specific markets and environmental aims do not lend themselves well to the use of market-based instruments. This may for example occur in areas where certain species or habitats are to be protected.

It is sometimes argued that market-based environmental instruments are objectionable because they would afford the possibility to damage environmental goods to those that can pay for it, or more fundamentally, because participation in the "markets" for these types of economic instruments should not be reserved to economic actors whose existence depends on growth and profit. BIAC respectfully disagrees with these views and believes that market-based environmental instruments, if well-structured and tuned to the particularities of the regulated activities, can contribute significantly to remedying environmental problems and may be more effective that traditional Command and Control mechanisms. However, BIAC does appreciate that market-based instruments do require a regulatory framework and supervision and therefore entail costs. These costs should play a role in devising the optimal way of regulating activities that may have a negative impact on the environment.

Market- based environmental instruments however often enjoy significant advantages. First, internalising externalities, i.e. the cost of pollution, and charging those costs to the polluting actors (rather than imposing those cost on society), may be more effective and efficient than direct regulation. Indeed, often the regulated entities have the best information that allows them to achieve a given environmental result in the least costly way. Also, market-based instruments avoid the "time-lag" problem that direct legislation faces, may be more flexible and reward the internal efficiency and innovation of firms. Finally,

BIAC notes that market-based instruments tend to be more "democratic" in that they increase the participation if firms, which in turn may alleviate enforcement and informational problems.

3. Types of market-based environmental instruments

In economic terms, environmental damage and overexploitation of environmental resources can be viewed as a negative externalitity, i.e. a situation where one actor's conduct has a negative effect on another's utility or profit, resulting in "overpollution." Market-based environmental instruments seek to tackle this problem by internalising negative environmental externalities into market participants' decisions. A common element of each of the environmental instruments is placing a price on pollution, either by public institutions (in the case of environmental charges and taxes), or by market participants (in the case of tradable performance standards). As a consequence, these instruments create economic incentives and disincentives and thereby steer companies' conduct. In theory, they provide an economically efficient, welfare-maximising way of achieving environmental objectives.

Environmental taxes increase the price of the environmentally harmful products and, in doing so, internalise the product's environmental cost. Firms are then expected to base their profit-maximising pricing and output decisions on the cost of the product that includes environmental costs. Examples of environmental taxes are pollution charges, charges for water use and noise charges. In 2006, in the EU, revenues of environmental taxes represented 2.6% of GDP. In contrast to taxes, environmental subsidies lower the cost of engaging in environmentally desirable behaviour. Environmental subsidies tend to be used particularly to promote cleaner technologies, such as renewable energy sources. One example are "feed-in tariffs" that support renewable energy source producers. Thirdly, tradable performance permits afford polluting companies a limited number of pollution rights, which can be traded to other polluters in the event that the owner of the permit pollutes less than allowed by the permit. The most well-known emission trading system is the system for the reduction of greenhouse gas emissions that was set up by the 1997 Kyoto Protocol.

4. Some general considerations for setting up market-based environmental instruments

While BIAC believes that there is no unambiguous ranking of environmental policy instruments, it submits that the following general considerations are particularly important in designing and structuring market-based environmental instruments like environmental taxes, subsidies and tradable permits, to compare their relative benefits and to allow a rational choice between them.

First, it is important to evaluate and estimate as rigorously as possible the estimated static and dynamic gains of the economic incentive scheme at hand, together with the impact the instrument will have on companies' short and long term efficiency and innovation potential. For instance, the choice between a pollution tax-regime and a system of tradable permits may depend on several complex factors, including the market structure and other market-specific factors, the pre-existing regulatory environment, abatement costs, the ability of the tax regime to correctly tax the most damaging pollution sources, the way the two systems affect technological change and the timing of new technologies more generally, the uncertainty about costs and benefits, the transaction costs associated with the trading systems and many more factors.

Second, with a view to developing more efficient market-based environmental instruments in the future, BIAC is in favour of additional empirical research about the impact that existing (and future) environmental instruments have had on the environment, as well as the critical factors that determine the success of programs to achieve their aims. This type of research should go hand in hand with studies on the impact of these programs on companies, in particular their innovation potential.

Third, BIAC believes that there is a positive correlation between the desired technological changes and process innovations on the one hand and the use of flexible market-based instruments on the other hand. As a result, these instruments should preferably be designed to allow for sufficient flexibility (in terms of timing and other relevant factors) and a broad set of compliance alternatives.

Fourth, BIAC is in favor of simple, non-ambiguous and transparent criteria and formulae as a basis for market-based environmental instruments. Indeed, simplicity and transparency are likely to significantly reduce the uncertainty and transaction costs associated with these systems.

Fifth, in the design of market-based instruments, specific attention should be given to monitoring and enforcement mechanisms, which are key to establishing high compliance levels. In this regard, BIAC counsels cost-effective, efficient monitoring mechanisms with minimal administrative burdens for companies. Moreover, these systems should be as non-intrusive as possible and be applied in a non-discriminatory manner, thereby avoiding unlevel playing fields for companies.

Sixth, it is important to concentrate on the political feasibility of market-based environmental instruments and the capabilities of the private sector to make the markets that these environmental instruments establish, work. This includes studies into the way companies are equipped internally to exploit the cost savings associated with the measure at hand and their strategic focus. In BIAC's view, this implies an open and thorough dialogue with the economic entities that are to be regulated with a view to defining the optimal components of future market-based environmental programs.

SUMMARY OF DISCUSSION

By the Secretariat

1. Introduction

Competition Committee Chairman Frédéric Jenny noted that this roundtable takes place at a moment when the OECD is developing a framework for assuring Green growth policies. It is expected that the outcome of these discussions will feed into an OECD strategy. He, then, invited Professor Eirik Amundsen to give an introduction to the economic principles of regulation and green growth (see Appendix I). Amundsen began by defining green growth as growth under environmental constraints and listed a number of factors that characterise green growth, including:

- Low emissions of greenhouse gases or other kinds of waste
- Low loss of biodiversity
- Sound amenity management
- Otherwise efficient use of natural resources

Amundsen also pointed out that green growth is what others refer to as sustainable growth. He discussed the differences in viewpoints regarding the relationship between growth and efforts to internalise negative externalities. In particular, Amundsen mentioned his belief that growth is possible by trying to internalise a range of negative externalities. Many individuals view, however, the pursuit of green growth as a means to achieving growth itself (e.g. through the development of new industries). By internalizing negative externalities, one ultimately changes relative prices and promotes green growth (e.g. through increased energy savings, higher energy efficiencies, and increased R&D).

Amundsen then asked whether, when negative externalities are correctly internalised, i.e. through effective pricing, there are any other arguments for subsidizing the development of renewable energy. He listed a few:

- Inventions and innovations are public goods. As a result, renewables will not be developed to a sufficient level if left to the private market alone.
- Learning-by-doing has spill-over effects.
- Security of energy supplies is a public good (or a public bad in the case of energy insecurity).

He then noted that increasing energy prices alone does not always stimulate energy savings. In particular, in some cases insulating one's home can result in a large gain but many individuals are not aware of that. Such an observation lends support to providing information to households rather than subsidies for energy savings alone.

Amundsen also asked why we should target energy savings itself. Energy, he said, is a factor of production just like labour, capital, and other intermediate goods. From the point of view of society, energy

generation should take place at the lowest possible cost to society. Price the problematic energy sources (e.g., fossil fuels) correctly but otherwise promote the generation of cheap energy sources and the price of energy will probably take care of rationing the amount of fossil fuels used.

Amundsen proceeded to focus on targets and instruments for environmental protection and green growth. He emphasised that many countries have targets for emissions reductions, renewable energy shares, as well as energy efficiency. A simple view is that achieving these three targets requires three separate instruments. However, Amundsen acknowledged that a lot of thinking has gone into examining the role for multiple instruments in this context. He said that using multiple instruments may imply inefficiency. In the face of uncertainty, however, it may be optimal to combine multiple instruments.

Amundsen mentioned some of the challenges he sees ahead. Most importantly, it is necessary to align the quota and non-quota sectors (i.e. the sectors that participate in the EU's Emissions Trading Scheme – EU ETS – and those that face other forms of environmental policy). An important question is how exactly to align these sectors, in particular, the CO_2 allowance price under the EU ETS and CO_2 taxes in the EU. By harmonizing these two systems, one promotes emissions reductions where they are least costly. Additionally, systems should be developed to help promote the gains-to-trade in renewables that result from differential generation costs across countries in the EU.

Amundsen highlighted a few points of caution surrounding promoting green growth:

- It is commonly argued that "stimulating the renewable energy sector" will create new jobs; however, this is not necessarily the case.
- It is often claimed that countries that support the renewable energy sector will have first mover advantages. However, while there may be something to this argument, not all countries can have a first mover advantage.
- Promoting a specific technology may be costly to society.
- The development of a new green industry in developed countries may amount to a form of re-industrialization of developed countries.

2. Market-based environmental policy

2.1 Taxes and subsidies for environmental performance

The Chairman invited Dr. Richard Morgenstern to give an introductory presentation on taxes and subsidies. Morgenstern clarified his focus as one on the means of environmental policy. He took it as given that environmental goals stem from a range of considerations, including law, science, politics, and occasionally cost-benefit analysis. The means of environmental policy are important because they determine the overall cost and likelihood of achieving a given environmental objective. Morgenstern noted that market-based environmental policies may be more likely to achieve a given goal and that due to the prescriptive nature of command-and-control policies the alternative may often be inefficient. Command-and-control policies may often fail to promote innovation, something market-based policies give incentives for firms to invest in. He noted that the popularity of market-based environmental policies was growing.

Turning his attention to emissions fees and taxes, Morgenstern mentioned that the polluter pays principle was adopted by the OECD over 40 years ago as a guiding principle. The initial version was based on "full costs", but it was revised in 1991 to include broader social costs.

When designing emissions taxes, fees, charges, or levies a number of considerations must be made. These concern the tax base, the tax rate, the question of who pays, the question of how revenues are to be

used, the implications of market structure, and the effects on innovation. Morgenstern offered a few comments on each of these:

- The tax base: There are many ways to establish the tax base, with some being better than others. The base should be "closely defined" depending on the actual environmental damages.

- The tax rate: Arthur Pigou argued that the tax rate should be equal to marginal damages in a perfectly competitive market setting. However, the world is more complicated.

- Who pays the tax: In general, a broader tax base is better, but a balance must be achieved between the relative benefits of increasing the tax base and the additional administrative costs involved in achieving a full base. In the context of CO_2, one must also pay attention to the competitiveness concerns created by including additional sectors.

- The revenues: There are many different uses for the revenues. Some examples include rebating them to firms, helping low-income families, reducing other taxes, and subsidizing clean technologies. One example of rebates includes "output-based rebates", which were included in recent US legislative proposals to help mitigate competitiveness and emissions leakage concerns.

- Market structure: This is an important consideration. Certain ways of implementing environmental policy may be efficient in some market structures but not in others. One example includes setting a tax equal to marginal damages in a competitive market setting. In other forms of market structure, e.g. monopoly or monopolistic competition, this may no longer be efficient.

Moving to a consideration of emissions taxes versus cap-and-trade, Morgenstern highlighted that a quantity-based system, e.g. cap-and-trade, has advantages when marginal damages are fairly steep. When marginal damages are fairly flat, price-based systems (e.g. an emissions tax) have advantages. One can also establish a "hybrid system", which combines characteristics of each approach. This would be implemented via the use of a "safety valve" or, alternatively, a "price collar". Morgenstern also noted the difficulty of setting optimal taxes due to the difficulty of getting accurate information on damages.

Morgenstern highlighted a number of roles that subsidies serve, including as "mechanisms to reduce submissions, adopt a low emitting technology such as renewables, and to conduct environmentally friendly R&D." Subsidies can be implemented in several ways, including direct payments, credits, preferential financing, accelerated depreciation, and R&D incentives.

Examining the question of why subsidies might be preferred to taxes, Morgenstern clarified that taxes are best at internalizing negative externalities and subsidies are better at internalizing positive externalities. Subsidies themselves can be funded through a number of sources, including general governmental revenue. However, he cautioned that introducing new distortive taxes to finance subsidies can be counterproductive.

2.2 Tradable performance standards and overlapping environmental policy

Another guest speaker, Dr. Carolyn Fischer (see Appendix II), noted that a range of motivations underlie green growth. In addition to environmental conservation, there are energy security, innovation, green jobs, promoting infant industries and industrial policy. There are many examples of overlapping policies in the context of environmental protection and they need to be evaluated accordingly. Examples in the OECD include a range of policies from emissions taxes, generation tax exemptions for renewable energy, emissions performance standards, tradable performance standards, tradable green tariffs, feed-in-tariffs, production subsidies, investment subsidies, and R&D subsidies. She distinguished fixed-price policies (e.g. emissions taxes) from endogenous-price policies (e.g. cap-and-trade).

Building on the discussion of taxes and subsides, Dr. Fischer highlighted tradable performance standards as another environmental policy option. Non-tradable performance standards can be seen in the case of renewable portfolio standards, which mandate that a certain percentage of a company's generation mix comes from renewable sources. They can be thought of as a combination of a tax and a subsidy. Tradable performance standards are less common than renewable portfolio standards. Tradable performance standards are, however, intensity-based standards. In the US, they have been applied to reduce lead in gasoline and are becoming more popular in fuel economy standards. Firms that operate more efficiently than the standard requires are able to sell credits to firms that operate less efficiently than required.

On the topic of overlapping policies, Fischer said that in contrast to fixed-price policies (e.g. emissions taxation), in a tradable credit system prices respond to other policies. Fischer also said when a binding cap-and-trade policy is in place, any other policy that is implemented will not have any effect on emissions. As a result, emissions reduction cannot be a reason to introduce additional policies when a cap is in place. Policies that seek to subsidise renewable energy production will make it easier to meet the cap and, as a result, lower the allowance price. In the case of renewable portfolio standards, additional policies that benefit renewable energy make credits cheaper and lower the cost of production that is based upon fossil fuel use, which then expands (as would emissions).

Fischer reiterated a point made by Amundsen, namely that once a price on emissions has been established, other motivations must underlie further implementation of environmental policies. In this context, it is important to examine what other market failures one is trying to solve, as well as how well additional policies address them. If one's goal is simply to achieve a given market share for renewables, then tradable portfolio standards should be the most cost effective means of doing that. However, such policies tend to benefit the most commercially available technology. The effectiveness of feed-in-tariffs was noted, which primarily stems from the certainty they provide for investment in renewable energy.

Fischer concluded with the following points:

- Overlapping policies require overlapping problems to justify them
- Policies should be evaluated in terms of the whole context in which they operate
- Fixed-price policies are more transparent, as well as additive, in the sense that their value will not change when another policy is added. This gives one a better idea of the effects an additional policy will have.
- If the main objective is to reduce greenhouse gas emissions, then establishing a price on carbon emissions is the single most effective way to do so.

3. Delegation interventions

The Chairman noted that while it was not strictly the competition authority's job to think about the consistency of instruments, it is interesting to keep in mind the effects multiple policies might have on efficiency generally. He asked the UK delegation about a report by the Office of Fair Trading (OFT) on the possible competitive effects of product standards, as well as the role of mandatory competition impact assessments that must accompany new, mandatory standards introduced in the UK.

A delegate from the UK said the report, which was released a couple of years ago, evaluates the possible competition effects of product standards. It identifies the pro-competitive effects of product standards, including their ability to correct market failures. That is particularly true where concerns exist

about up-front costs of new products or, alternatively, where firms are unable to signal their product's green credentials. Competition is enhanced when these market failures are addressed through the use of product standards. The report also identifies five ways product standards may generate competition concerns:

- By giving rise to asymmetric cost impacts on firms – These can arise in several ways, including by having a differential impact on firms' production costs, by raising the minimum efficient scale for the industry, and by increasing barriers to entry. Several factors may mitigate these concerns, including the time taken to adopt the standard and the possibility that an open standard could achieve the same objective.
- By enabling policy makers to pick winners – Some suggestions to alleviate this concern include ensuring that product standards are flexible, that they encourage a range of technological changes rather than rewarding a single technology, as well as strategic timing of the implementation of product standards.
- By encouraging co-ordination as an alternative to formal regulation – Voluntary agreements are often encouraged by policy makers as an alternative to regulation but they can facilitate either intentional or unintentional harm to competition in the market. The report identifies a number of design features that minimise such risks.
- By giving rise to asymmetric product impacts – There is a risk that energy labels and other standards can promote competition along one dimension at the expense of others. While this effect is thought to be unlikely to occur in practice, the risk could be mitigated by ensuring that labels are accepted by all firms, clearly specify that they relate only to environmental performance and quantify the environmental impact, and that ratings are set against absolute standards.
- By facilitating exclusionary behaviour – Here, "exclusionary behaviour" refers to the situation where firms engage in excess investment to enhance the environmental performance of a particular product in order to have it adopted as a minimum standard for the industry. The report discusses the need for policy makers to evaluate the ability of incumbent firms to benefit from this activity.

The delegate proceeded to discuss the role of the OFT. The OFT has a general mandate to give advice to ministers and their departments regarding changes or proposed changes in the law, regulation, or policy. Furthermore, for about 10 years now, impact assessments have been required for proposed changes in policy or legislation. Through this process, policy makers are required to identify the effect of the proposal, as well as the justification for adopting it. Under this broad assessment, a competition assessment is also conducted. The competition assessment is conducted by the sponsoring department, though, not by the OFT.

Nevertheless, the OFT periodically publishes guidance for the sponsoring departments about how to conduct the assessments. Specifically, the guidance asks policy makers to identify the market that may be affected by the proposed change and then to ask four questions:

- Does the proposal directly limit suppliers?
- Does it indirectly limit suppliers?
- Does it reduce the ability to compete?
- Does it reduce the incentive to compete?

An affirmative answer to any of these questions requires that a full competition assessment be done. The OFT has found that their involvement has resulted in significant changes in the initial policy approach, which has then had a materially less adverse effect on competition.

The Chairman then gave the floor to Knut Johansen, representing the bloc of five Nordic delegations that submitted a joint contribution.

Johansen began by highlighting the OECD's environment outlook to 2030, which was published 2 years ago. It recommended that for environmental policies to be cost-effective, there should be a strong emphasis on market-based approaches. The reality, however, is that many countries still subsidise fossil fuels. Much work is needed to remove these subsidies. This will require a lot of thinking to evaluate the distributional effects, as well as industrial effects.

Johansen also emphasised the importance of advocacy for market-based instruments and appropriate competition policies in the context of a green growth strategy. Promoting correct pricing of environmental goods is important for cost-effective environmental policy and for providing the proper incentives for innovation. He also mentioned that green competition advocacy involves promoting the application of market-based instruments in as many sectors and to as many pollution sources as appropriate, and in a non-discriminatory fashion.

Next, the Chairman asked the Australian delegation to comment on their submission, noting that it mentioned some cases where limitations prevent market-based instruments from being adopted and, additionally, that there may be ways to improve non-market-based instruments with supplementary market-based ones.

A delegate from Australia confirmed that there are certain circumstances where non-market-based instruments may be preferable. These circumstances include situations where private activities may be difficult to monitor and situations where effects are highly localised. The delegate offered a few examples, including regulating the dumping of hazardous materials by individuals and fertilizers that can damage river systems and ecosystems. Australia's contribution discusses how non-market-based instruments are integrated with different elements of competition policy in order to result in a comprehensive policy approach that improves outcomes. One example is the competitive tendering process, where the public sector provides funding to achieve a given environmental objective and contracts with one or more private parties. A competitive selection process is used to minimise the costs of achieving the environmental objectives.

The Chairman then asked Bulgaria to discuss the difficulties it has experienced when requiring all industrial facilities to have installations to limit their industry-specific pollutants. He also asked Bulgaria to discuss the Debt for Environment Swap Agreement with Switzerland. In particular, why Switzerland and what are the benefits of this agreement?

A delegate from Bulgaria stated that the problems related to environmental protection have changed throughout the years, as the country has moved from a centralised economy to a market-based one. Most of the large polluting installations in Bulgaria did not have purification systems to manage pollution. However, this changed in recent years and the country's main problem now is enforcing the necessary technological modernization of these installations. This raises a concern about competition, as the companies themselves are primarily responsible for financing these installations.

Regarding the Chairman's comment for further discussion of Bulgaria's Debt for Environment Swap Agreement with Switzerland, the delegate noted that the agreement, which entered into force in 1996,

annuls about 20% of Bulgaria's debt to Switzerland provided an equivalent amount of funds are invested in environmental protection projects.

The discussion then moved to fees and rebates. The Chairman observed that Chinese Taipei has a broad range of experience with different forms of refunds. He asked the delegation to discuss how refunds work, whether they are consistent with international trade agreements, and the possible problems that may arise when rebates have international trade implications.

A delegate from Chinese Taipei mentioned a range of fee and rebate measures, including export refunds, facility refunds, insurance refunds, and exemption ratio measures, that are used to reduce remediation fees. Enterprises that are required to pay an emissions fee can, alternatively, apply for tariff exemptions for air pollution prevention and control equipment. Remediation fees paid by a facility may be rebated for new investments in equipment or project expenses that contribute to pollution prevention. This refund is up to 20% of the remediation fees paid in the previous year. The delegate also explained how insurance rebates are determined and the process by which exemption ratios are determined. The delegate did not believe that the refunds, which do not comprise an export subsidy, should raise any international trade or competitiveness issues.

The Chair then asked Switzerland to comment on the mechanisms and flexibility for CO2 levies, as well as how it handles the possibility that exporting firms may be disadvantaged relative to firms that produce in countries without comparable levies. In particular, does it raise international trade issues or is it an issue of emissions leakage?

A delegate from Switzerland noted that flexibility in compliance in the Swiss system refers to the ability of energy intensive companies to be exempted from the CO_2 levy. Exemption requires that a firm commit to an emissions reduction target. Once a target has been established, they are granted an equivalent amount of tradable emissions rights for participation in the emissions trading scheme. The Swiss competition authority would prefer a comprehensive system (e.g. either a uniform CO_2 tax or an ETS encompassing all emitters), but such a system is not politically feasibly given concerns over international competitiveness.

The policy has been successful so far. However, due to the low levels of trading in emissions permits, it is difficult to assess exactly what the marginal abatement costs are. Work is currently being conducted to improve the system for the period after 2012 and to achieve greater emissions reductions. The delegate added that it would be more efficient overall if the Swiss emissions trading system merged with the EU ETS. Switzerland will get into negotiations with the EU on the linking of their emissions trading schemes as from 2013.

Regarding export refunds, the delegate stated that Switzerland taxes volatile organic compounds (VOCs) and that exported products are exempted from this requirement. The refunds themselves are for the VOCs contained in the product. Such a policy does not have adverse competition impacts. However, exports refunds are not based on VOC emissions due to a firm’s production process itself. As a result, VOC-intensive producers may be potentially disadvantaged. The delegate discounted these competition concerns due to the fact that most of those firms are exempted from the tax for taking measures to reduce stationary source emissions below stipulated limits.

The Chair then highlighted three sections of the EU delegation's submission. First, it states that subsidies are unavoidable, or are at least the best way to solve problems, in some circumstances. The Chairman asked the EU to discuss these situations. Second, under current rules subsidies are controlled by the European Commission (EC). He asked the EU to discuss the evidence for the idea that without cross-country rules governing the application of subsidies, subsidies would be used in a strategic manner to

promote domestic industries at the expense of those outside of the country. Lastly, he asked the EU to describe its position in cases where subsidies do not have adverse competition effects.

A delegate from the EU said that the EU does not consider subsidies to be replacements for other market-based environmental policy instruments or regulation; rather, in some circumstances they are instruments that complement other approaches. One example involves subsidies for assisting companies that want to achieve a certain level of environmental performance beyond what existing regulation requires. Other situations include using subsidies to aid in the implementation of environmental standards prior to the date of enactment, as well as compensating firms that are adversely affected by distortions created when an ETS is in effect in certain locations and not others.

The purpose of setting cross-country regulations on the use of subsidies, the delegate continued, is to prevent countries from using state aid to give their firms a first mover advantage. The potential adverse effects of such actions include distorting dynamic incentives, as well as crowding out investment in a particular technology in other member states. Underlying the latter possibility is a concern that such policies could result in an "artificial concentration of this technology in some member states." The delegate offered solar technology in Europe as an example.

Finally, the delegate noted that under EU law essentially anything that gives a "selective advantage" to certain companies is presumed to lead to some competitive distortion. As a result, most analyses will then consider whether this competitive distortion is compensated for by a particular positive goal, such as having an incentive effect (i.e. whether particular environmental investments would have occurred without aid).

The Chairman then turned to the Czech Republic, asking for an explanation of why the country's support for renewable energy was discontinued, as well as the country's views on the duration of the support before it was originally implemented.

A delegate from the Czech Republic explained that there is a system of targets for reducing CO_2 emissions and for promoting renewable energy sources. The support for renewable energy production came in the form of a two-fold subsidy. On one hand, producers of this energy were not required to pay taxes for their production. On the other hand, they were subsidised via the establishment of fixed energy prices for these sources. The programme was quite successful at attracting solar energy providers, and then the price of solar energy technology fell. Yet because energy prices were still fixed, it became extremely profitable to invest in solar energy. The result was large growth in the number of solar panel parks throughout the country. The policy of fixed prices for these sources became problematic as solar parks started replacing agricultural land, as well as affecting energy prices generally. The government decided to restore the situation to what it was prior to the implementation of a fixed price regime for renewable energy sources.

The Chair noted a similar focus on in Spain's contribution. In particular, their competition authority specifically examines subsidies, which are below thresholds established by the EC. He asked the delegation to discuss subsidies for solar energy in more detail.

A delegate from Spain noted that local subsidies primarily affect the automotive industry. In particular, subsidies are given to consumers for buying vehicles that are deemed better equipped for environmental protection. The subsidies stem from a combination of central and regional government funds. Two important conditions are attached to the subsidies, namely that the recipients must be residents of the region that grants the subsidy, and the vehicle must be purchased from a facility in the region that grants the subsidy. The latter condition raises concerns about effects on competition.

The delegated noted two things about the potential for effects on competition from these automotive subsidies. First, the conditions do not comply with the better regulation guidelines published by either the National Competition Commission or the OECD. These guidelines indicate conditions under which regulations may be introduced that result in distortions to competition. Second, these conditions not only introduce potential distortions at the regional level, but in the national market for automobiles, as well. The subsidies can be used to promote regional protectionism, which the EU regulation of subsidies tries to avoid.

The National Competition Commission has three recommendations relevant to these subsidies:

- The goals to be reached with public aid under consideration, as well as the specific measures adopted to attain them, must be clearly and precisely defined, paying special attention to the adequacy of such measures to the purpose at hand.
- Efforts to reach several objectives with the same aid scheme are likely to result both in less efficient results and in the introduction of a significant distortion in competition conditions in the markets involved.
- Public aid schemes should avoid, in particular, the introduction of discrimination or preferential treatment among suppliers of a subsidised product based on the geographical location. Such discrimination contributes to creating or reinforcing especially serious obstacles to competition, which under certain conditions may be spread across the whole national market.

Regarding support for renewable energy, the delegate noted that the discussion in Spain's contribution was in response to earlier concerns about overinvestment in solar electricity generation. Such concerns may be well grounded.

The Chairman then asked the US delegation two questions. First, what is the status of subsidies for environmental performance in the US? Second, does the US believe that voluntary markets could ultimately substitute for government intervention? This latter question was motivated by the fact that the US lacks a federal programme to reduce greenhouse gas emissions but does have a range of voluntary state-level programmes (e.g., for renewable energy certificates).

Regarding the first question, a delegate from the US highlighted a broad range of examples of the use of subsidies in the US. These included instruments to promote emissions efficiency and renewable technologies, such as rebates, tax credits, energy savings obligations, renewable electricity standards, and renewable energy technology financing programmes. Some states participate in a regional cap-and-trade programme, and some of the revenues are used to fund energy efficiency or renewable energy instruments.

Regarding voluntary markets, the delegate said that such markets for renewable energy in the US are "beyond compliance markets", in that they serve to satisfy consumer preferences, which are often above and beyond what policy requirements stipulate. These markets do exist in some jurisdictions that lack existing policies and, additionally, have benefited in locations that do have renewable electricity standards. These voluntary markets are not, however, designed to serve as a substitute for emissions reduction programmes, including mandatory cap-and-trade systems. The FTC oversees the validity of commercial claims, which include environmental claims made in these voluntary markets.

The Chairman then shifted the discussion to the subject of the role of competition authorities in the issues raised thus far, especially their role in the design of regulatory solutions. He asked Chile to discuss its experience with allocating water rights.

A delegate from Chile noted that each of the interventions discussed in its contribution involved a merger analysis. In one case, the competition authorities were involved to evaluate the prospect of

allocating more water rights to a particular dominant firm. In another case, a competition tribunal was responsible for evaluating a joint venture that dealt with water rights. Another case involved an approval for new acquisition of water rights.

Moving from enforcement towards the role of competition authorities in the advocacy for market-based policies, the Chairman returned to the Nordic delegation. In their joint report, the Nordic competition authorities strongly advocate market-based policies. The Chair asked the delegation to comment on how successful their efforts have been, as well as on the extent to which competition authorities have played a role in designing market-based environment policies.

A delegate from the bloc of five Nordic delegations replied that the aim of their report was to explore the relationship between environmental competition policy and how competition authorities can contribute in achieving the goals of green growth. Competition and environmental policy both serve to enhance social welfare. Competition should be sought in conjunction with environmental objectives (especially emissions pricing), as effective price signalling of externalities is important to ensure that appropriate incentives are in place for abatement and innovation. Given a well-designed environmental policy, healthy competition should be enforced. One of the challenges for competition authorities is to ensure that green legislation will not adversely affect competition, and that pro-competition legislation is implemented instead. The OECD's competition assessment "toolkit" of is of valuable assistance in the design of environmental policy.

The Chairman then highlighted a comment in Korea's submission, regarding the view that the design of emissions trading programmes should take the input of competition authorities into account. He also noted that in Korea, the head of the competition agency has a role in the cabinet. Specifically, he asked Korea to comment on whether the KFTC is able to intervene in the design of environmental policy. For example, what role, if any, would the agency have in shaping the design of subsidies? He also asked the delegation to comment on why it believes competition authorities should have influence on the design of emissions trading programmes.

A delegate from Korea explained that the KFTC can participate in the process of designing environmental subsidies, or any other system for environmental protection, through a competition assessment. When a new law is proposed or an existing law is revised, the KFTC is consulted and is able to raise an issue of anti-competitiveness arising from the proposed changes. An example is the pilot programme developed in Korea for an emissions trading programme. While the KFTC was not consulted in this instance, should the pilot become an official programme, the KFTC can play an advocacy role in its ultimate design through a competition assessment and prior statutory consultation.

The Chairman then observed that the US FTC plays an active role in providing opinions about competition analysis to federal agencies that work on environmental matters. He asked the US to comment on the agency's recommendation to the Federal Energy Regulatory Commission (FERC) regarding the integration of variable energy sources in the US electric power grid. He also asked the US to comment on the likelihood that the FTC opinion will be followed.

A delegate from the US clarified that the FTC recommendation, if adopted, would enhance the ability of the variable energy sources to compete. Regarding the chances that the recommendation will be adopted, the delegate noted that in the past FERC has been appreciative of the agency's input. In many cases, FERC has taken actions that are consistent with the FTC's recommendations.

The Chairman then asked that Sweden to comment on the future challenges competition authorities might face in the areas discussed thus far.

A delegate from Sweden asserted that green policies are here to stay and will have an ever-widening impact. He also mentioned the need to look into the sectors discussed today and to be prepared to face the arguments and acquire the needed expertise to deal with the efficiency arguments that are inevitably going to come up. Furthermore, it is important that competition authorities become involved in proper casework involving green policies. This is the area where competition authorities have real value added and, additionally, where advocacy work can be conducted. Competition authorities should also work to help create instruments that will enable others to do competition reviews of new policies. Finally, pro-active communication policies, as well as periodic publication of impact assessments, would be desirable.

The Chairman then gave the floor to BIAC.

A delegate from BIAC noted the complexity of the relevant issues in green growth initiatives. BIAC's view is that supporting green growth requires support for innovation and entrepreneurship. This stems from the reality that policies designed to promote green growth ultimately require companies to switch to more efficient and lower-emitting technologies. Regarding the choice of environmental policy instruments, BIAC prefers market-based approaches. However, in some circumstances, including setting pollution limits for specific installations or point sources, command-and-control can be useful. CAC policies may also be more effective in cases concerning the preservation of biodiversity, endangered species, or special habitats. The preference for market-based instruments has to do with the following considerations:

- Information deficits on the part of the regulating agency
- Lack of flexibility of regulatory approaches to changes that arise over the life of the regulation
- Greater need for enforcement under regulatory approaches
- Risk of regulatory capture under CAC approaches

A delegate from France noted that France's green growth policies have developed from a framework created in 2007 called the Grenelle Environment Project. This project comprises various instruments including the obvious traditional ones that inform regulations and norms, but also a certain number of information tools, voluntary commitments, and above all economic instruments. These latter instruments inscribe environmental policies within a market economy context, as the OECD has already done through its green growth framework.

The delegate gave two examples of economic instruments implemented by France to incite environmentally appropriate economic behaviour, namely in terms of price signals that have been put in place to divert demand toward products and sectors that perform well from an environmental standpoint (see Appendix III). The first example is a subsidy for households in the form of a 'tax credit for sustainable development'. It can be applied to construction projects carried out in households that may lead to a tax reduction if the work involves installing equipment that uses renewable energy or renovations that increase the thermal efficiency of the household. The credit can go up to 50% of the cost, but it has a ceiling of 16.000 euros. This tax credit has enjoyed considerable success, as approximately 7% of French households have taken advantage of it since its creation. France is trying to control fiscal spending by progressively rendering the conditions under which households can benefit from this credit more difficult. This entails favouring spending on appliances that perform extremely well environmentally. The tax credit has had a significant impact in redirecting consumer behaviour and demand; it has also stimulated supply in energy efficiency sectors. Indeed, the more severe the criteria, the more supply is stimulated in the most environmentally advanced technologies.

The second example is a general tax on polluting activities. It encompasses 8 types of activities and has been revised to include household waste. The goal was to promote recycling over waste disposal or incineration. The tax has ensured that recycling can compete with waste disposal and incineration. Many

other encouraging measures have been put into place, from fiscal mechanisms to special prices that incite households and businesses to make environmentally friendly choices.

A delegate from Portugal stated that it appears, based on the discussion thus far, that energy prices will continue to increase. He asked what competition authorities should do in such circumstances. The delegate then suggested that competition authorities should refrain from jumping to conclusions in order to please politicians and consumers when there is no evidence of wrongdoing. The delegate emphasised the early stage of the process of green growth and asked whether others felt that competition authorities were intervening too early in the process. Should competition authorities and regulators step back and allow the market to develop without too much interference? In this context, the issue is setting prices correctly and how best to do that.

4. Expert comments

Prof. Amundsen observed that the stewardship programme discussed by the Australian delegation highlighted just how far one can utilise market mechanisms to achieve environmental objectives. He also noted the importance of future thinking about how market power exercised in one market can affect another, connected market (e.g., markets for renewable certificates and electricity).

In response to the delegate from Portugal, Dr. Morgenstern commented that the main question concerns what we know about the damages that are being imposed on human health and the environment. Developing monetary measures of these damages can ultimately guide the long-term development of policies designed to reduce emissions. He also noted that about half the emissions are excluded from the EU ETS. Morgenstern drew from the earlier comments of Dr. Fischer by noting there is a potential for different policies to compete with each other. Policy makers should be cognizant of this reality and clear as to when benefits from additional policies are being double counted.

The Chairman concluded by highlighting some of the important points made during the roundtable. He perceived a preference for market-based environmental policies but, in some circumstances, the delegates recognised a role for traditional CAC approaches. The important questions then concern the ultimate design of policies and the dynamic, as well as static, effects they have. Additionally, the direct, indirect, and competition effects are extremely important. Competition authorities could bring their experience with competitive markets to the table to help ensure that market-based policies adopted in the future are based on competitive market foundations. The various ways that competition authorities could become involved include advocacy and enforcement. In response to Portugal's comment, he emphasised that competition authorities should exercise caution in all areas, not just environmentally related ones. However, that does not mean that they should be disinterested in the development of policies to support green growth.

COMPTE RENDU DE LA DISCUSSION

Par le Secrétariat

1. Introduction

M. Frédéric Jenny, Président du Comité de la concurrence, note que cette table ronde a lieu alors que l'OCDE développe un cadre d'analyse de la croissance verte. Le résultat de ces discussions devrait nourrir une stratégie de l'OCDE dans ce domaine. Il ensuite invite le Professeur Eirik Amundsen à présenter une introduction aux principes économiques de la réglementation et de la croissance verte (voir l'appendice I – disponible en anglais seulement). M. Amundsen commence par définir la croissance verte comme étant une croissance soumise à des contraintes économiques et énumère un certain nombre des facteurs qui la caractérisent :

- faibles émissions de gaz à effet de serre ou autres types de rejets
- faible perte de biodiversité
- saine gestion de l'aménité
- utilisation efficace des ressources naturelles par d'autres moyens

M. Amundsen précise que l'on désigne aussi la croissance verte par le terme de croissance durable. Il expose les différents points de vue concernant le lien entre la croissance et les efforts visant à internaliser les externalités négatives, se disant convaincu que la croissance est possible si l'on s'efforce d'internaliser toute une série d'externalités négatives. Bon nombre de personnes considèrent, quant à elles, qu'en se fixant pour objectif une croissance verte, on génère de la croissance (par exemple par le biais du développement de nouveaux secteurs d'activité). En internalisant les externalités négatives, on fait évoluer, au final, les prix relatifs tout en favorisant la croissance verte (par exemple en augmentant les économies d'énergie, en améliorant l'efficacité énergétique et en renforçant la R-D).

M. Amundsen se demande ensuite si, une fois les externalités négatives correctement internalisées, c'est-à-dire une fois les prix fixés efficacement, d'autres arguments plaident en faveur d'un subventionnement du développement de l'énergie renouvelable. Il en énumère quelques uns :

- Les inventions et les innovations sont des biens publics. De ce fait, les énergies renouvelables ne seront pas suffisamment développées si elles sont laissées au seul marché privé.

- L'apprentissage par la pratique provoque un effet d'entraînement.

- La sécurité de l'approvisionnement en énergie est un bien public (ou un mal public en cas d'insécurité énergétique).

Il relève ensuite que l'augmentation des prix de l'énergie à elle seule ne suffit pas toujours à stimuler les économies d'énergie. Par exemple, une personne qui a réalisé des travaux d'isolation de son habitat peut parfois réaliser des gains importants, mais bien des gens n'ont pas conscience de ces gains. Cela

confirme qu'il est indispensable d'informer les ménages et qu'il ne faut pas se contenter de distribuer des subventions en faveur des économies d'énergie.

M. Amundsen se demande en outre pour quelle raison il faudrait cibler les économies d'énergie en tant que telles. Selon lui, l'énergie est un facteur de production à l'instar du travail, du capital et d'autres biens intermédiaires. Du point de vue de la collectivité, la production d'énergie doit donc avoir lieu au coût le plus faible pour elle. Si l'on détermine correctement le prix des sources d'énergie problématiques (comme les combustibles fossiles) tout en encourageant par ailleurs la production des sources d'énergie bon marché, le prix de l'énergie se chargera sans doute de rationner le volume de combustibles fossiles consommés.

M. Amundsen en vient ensuite aux objectifs et aux instruments de la protection de l'environnement et de la croissance verte. Il souligne que bon nombre de pays ont fixé des objectifs en termes de réduction des émissions, de parts des énergies renouvelables et d'efficacité énergétique. Selon une approche élémentaire, la réalisation de ces trois objectifs nécessite la mise en œuvre de trois instruments distincts. M. Amundsen relève qu'un grand nombre de réflexions ont cependant eu pour objet d'étudier l'efficacité d'une multiplicité d'instruments dans ce contexte. Il fait remarquer que le recours à de multiples instruments peut se révéler inefficace. Dans le doute néanmoins, la meilleure solution pourrait être de combiner plusieurs instruments.

M. Amundsen fait en outre état de certaines difficultés à venir selon lui. Il est surtout indispensable d'aligner les secteurs soumis à des quotas et ceux qui ne le sont pas (à savoir les secteurs prenant part au système communautaire d'échange de quotas d'émission de gaz à effet de serre (SCEQE) et ceux soumis à d'autres formes de politique environnementale). Il importe donc de se demander comment aligner ces secteurs et en particulier, le prix des droits d'émission de CO_2 dans le cadre du SCEQE et les taxes sur les émissions de CO_2 au sein de l'UE. L'harmonisation de ces deux dispositifs permettrait de favoriser la réduction des émissions, là où chacun d'entre eux est le moins coûteux. De surcroît, il faudrait mettre au point des mécanismes visant à développer les gains liés aux échanges dans le domaine des énergies renouvelables résultant des différences de coûts de production d'un pays de l'UE à l'autre.

En ce qui concerne la promotion de la croissance verte, M. Amundsen adresse les quelques mises en garde suivantes :

- On fait communément valoir que le fait de « stimuler le secteur de l'énergie renouvelable » crée de nouveaux emplois, mais cela n'est pas obligatoirement le cas.
- On proclame souvent que les pays soutenant le secteur de l'énergie renouvelable bénéficieront des avantages liés au statut de précurseur. Or, si cet argument est en partie fondé, il ne se vérifie pas pour tous les pays.
- Le fait de promouvoir une technologie en particulier peut être coûteux pour la collectivité.
- Le développement d'une nouvelle industrie verte dans les pays développés peut se traduire par une forme de ré-industrialisation de ces pays.

2. Politique environnementale fondée sur le marché

2.1 Fiscalité et subventions en faveur de la performance environnementale

Le président invite M. Richard Morgenstern à commencer par un exposé sur la fiscalité et les subventions. M. Morgenstern précise que sa présentation portera principalement sur les moyens qui peuvent être utilisés dans le cadre de politiques environnementales. Il tient pour acquis que les objectifs environnementaux sont l'aboutissement toute une série d'aspects à prendre en compte, comme le droit, la

science, la politique et, à l'occasion, l'analyse coûts/avantages. Les moyens utilisés pour mettre en œuvre des politiques environnementales sont importants car ils déterminent le coût global et la probabilité d'atteindre un objectif environnemental donné. M. Morgenstern constate que les politiques environnementales fondées sur le marché sont davantage susceptibles d'atteindre un objectif précis et que, les politiques fondées sur la contrainte ayant un caractère prescriptif, peuvent s'avérer moins efficaces. Généralement, de telles politiques ne favorisent pas l'innovation, domaine dans lequel les politiques fondées sur le marché incitent au contraire les entreprises à investir. Il souligne la popularité croissante de ces dernières.

En venant aux droits d'émissions et aux taxes sur les émissions, M. Morgenstern rappelle que le principe du pollueur-payeur a été adopté il y a plus de 40 ans par l'OCDE en tant que principe directeur. La version initiale tenait compte des « coûts intégraux », mais a été révisée en 1991 pour s'étendre aux coûts sociaux au sens large.

Lors de l'élaboration des taxes, droits, redevances ou prélèvements liés aux émissions, il convient de prendre en compte un certain nombre d'aspects. Ces considérations ont trait à l'assiette fiscale, au taux d'imposition, à la question de savoir qui doit payer, à la question de savoir comment utiliser les recettes, aux implications de la structure du marché et aux effets sur l'innovation. M. Morgenstern livre quelques observations sur tous ces aspects :

- L'assiette fiscale : Il existe de nombreuses manières de déterminer l'assiette fiscale, certaines étant meilleures que d'autres. L'assiette fiscale doit être « définie avec précision » en fonction des dommages effectifs à l'environnement.
- Le taux de l'imposition : Arthur Pigou a fait valoir que, dans un marché parfaitement concurrentiel, le taux d'imposition doit être égal aux dommages marginaux. Cela étant, le monde est plus complexe que cela.
- Qui paie les taxes : En général, l'élargissement de l'assiette fiscale est la meilleure solution, mais il faut trouver un équilibre entre les avantages relatifs qui en découleraient et le surcroît de coûts administratifs qui résulterait de la mise en place d'une assiette globale. Dans le contexte de la réduction des émissions de CO_2, il convient par ailleurs d'accorder une attention particulière aux problèmes de concurrence que suscite l'inclusion de secteurs supplémentaires.
- Les recettes : Il existe de nombreuses manières d'utiliser les recettes. On peut ainsi s'en servir pour alléger l'imposition des entreprises, pour aider les familles à faible revenu, pour diminuer d'autres impôts ou pour subventionner les technologies propres. On peut citer en exemple les allègements accordés en fonction de la production, prévus dans diverses propositions de loi aux États-Unis en vue d'apaiser les inquiétudes relatives à la concurrence et aux fuites d'émissions.
- Structure du marché : Il s'agit d'un aspect important. Certaines modalités de mise en œuvre des politiques environnementales peuvent s'avérer efficaces pour certaines structures de marché et non pour d'autres. Ainsi, l'instauration d'une taxe égale aux dommages marginaux dans un marché concurrentiel peut être efficace. En revanche, dans d'autres configurations du marché, en présence d'un monopole ou d'une concurrence monopolistique par exemple, cette solution peut ne plus l'être.

Abordant la question des taxes sur les émissions par rapport au système de plafonnement et d'échange, M. Morgenstern souligne qu'un système fondé sur les quantités émises, autrement dit un système de plafonnement et d'échange, présente un intérêt si la courbe des dommages marginaux est pentue. En revanche, lorsque la courbe des dommages marginaux est aplatie, les dispositifs fondés sur les prix (autrement dit les taxes sur les émissions) offrent des avantages. Il est également possible de mettre en place un « mécanisme hybride » conjuguant les spécificités de chaque approche. Un tel dispositif serait mis

en œuvre en recourant à une « soupape de sécurité » ou bien encore à un « encadrement des prix ». M. Morgenstern relève par ailleurs que s'il est difficile de définir une fiscalité optimale, c'est qu'il est difficile de recueillir des informations précises sur les dommages occasionnés.

M. Morgenstern met en évidence un certain nombre de rôles joués par les subventions, notamment en tant que « mécanismes permettant de réduire les émissions, d'adopter des technologies produisant de faibles émissions comme les énergies renouvelables et d'exercer des activités de R-D respectueuses de l'environnement. » Les subventions peuvent être mises en œuvre de différentes manières, notamment sous forme de paiements directs, de crédits d'impôt, de financements préférentiels, de dispositifs d'amortissement accéléré et d'incitations à la R-D.

Comparant l'intérêt des subventions par rapport à la fiscalité, M. Morgenstern explique que la fiscalité est le meilleur moyen d'internaliser les externalités négatives et les subventions le meilleur moyen d'internaliser les externalités positives. Les subventions en tant que telles peuvent être financées par un certain nombre de sources, notamment les recettes publiques générales. Il met cependant en garde sur contre l'effet contreproductif que peut avoir, pour financer ces subventions, l'introduction de nouvelles taxes engendrant des distorsions.

2.2 Normes de performance négociables et superposition des différentes politiques environnementales

Une autre conférencière invitée, Mme Carolyn Fischer (voir l'appendice II - disponible en anglais seulement), souligne qu'un certain nombre de motivations sous-tendent la croissance verte. Outre la protection de l'environnement, ces motivations comprennent la sécurité énergétique, l'innovation, les emplois verts, la promotion de secteurs d'activité naissants et la politique industrielle. Il existe de nombreux exemples de superposition des différentes politiques publiques dans le contexte de la protection de l'environnement et il convient d'évaluer ces politiques en conséquence. Dans les pays de l'OCDE, on peut citer à titre d'exemples toute une série de mesures : les taxes sur les émissions, les exonérations fiscales pour la production d'énergies renouvelables, les normes d'émissions, les normes de performance négociables, les certificats verts négociables, les prix d'achat incitatifs, les subventions à la production, les subventions à l'investissement et les subventions à la R-D. Mme Fischer établit une distinction entre les politiques de prix fixes (comme les taxes sur les émissions) et les politiques de prix endogènes (comme le système de plafonnement et d'échange).

Poursuivant la discussion sur la fiscalité et les subventions, Mme Fischer souligne que les normes de performance négociables constituent une autre option de la politique environnementale. Les normes de performance non négociables peuvent être envisagées dans le cas des quotas d'énergies renouvelables, imposant qu'un certain pourcentage du bouquet énergétique des entreprises provienne de sources d'énergie renouvelable. On peut considérer que ces normes représentent une combinaison de la fiscalité et des subventions. Les normes de performance négociables sont moins courantes que les quotas d'énergies renouvelables. Ce sont pourtant des normes fondées sur l'intensité. Aux États-Unis, elles ont été appliquées pour réduire le taux de plomb de l'essence et sont de plus en plus utilisées pour les besoins des normes applicables aux économies de carburant. Les entreprises allant au-delà des normes prescrites peuvent vendre leurs crédits à celles qui sont moins efficaces.

À propos de la superposition des différentes politiques environnementales, Mme Fischer précise qu'au contraire des politiques de prix fixes (comme les taxes sur les émissions), dans un système de crédits négociables, les prix réagissent à d'autres politiques publiques en vigueur. Elle explique par ailleurs que lorsqu'une politique de plafonnement et d'échange contraignante est en place, toute autre politique mise en œuvre n'aura aucun effet sur les émissions. Par conséquent, quand un tel dispositif est en place, la réduction des émissions ne peut justifier l'introduction de politiques supplémentaires. Les politiques visant

à subventionner la production d'énergies renouvelables permettront d'atteindre plus facilement le plafond et feront donc baisser le prix des droits d'émissions. Dans le cas des quotas d'énergies renouvelables, les politiques supplémentaires favorisant les énergies renouvelables feront baisser le coût des crédits d'émission et réduiront le coût de production fondé sur la consommation de combustibles fossiles, qui dès lors augmentera (de même que les émissions).

Mme Fischer revient sur un point abordé par M. Amundsen, à savoir le fait qu'une fois fixés les prix pour les émissions, d'autres motivations doivent sous-tendre la poursuite de la mise en œuvre des politiques publiques. Dans ce contexte, il importe de se demander quelles autres défaillances du marché l'on tente de résoudre et dans quelle mesure les politiques supplémentaires adoptées y parviennent. Si l'objectif recherché est simplement de donner une certaine part de marché aux énergies renouvelables, alors les normes de performance négociables devraient être le moyen le plus économique d'y parvenir. Cela étant, ces politiques profitent généralement à la technologie la plus accessible commercialement. Mme Fischer souligne l'efficacité des prix d'achat incitatifs. Cette efficacité provient principalement de la certitude que procurent ces tarifs à ceux qui souhaitent investir dans les énergies renouvelables.

Mme Fischer conclut son intervention par les remarques suivantes :

- la superposition des politiques ne se justifie qu'en cas de superposition des problèmes
- les politiques publiques doivent être évaluées à l'aune du contexte global dans lequel elles sont mises en œuvre
- les politiques de prix fixes sont plus transparentes, et s'additionnent les unes les autres, car les prix ne changent pas quand une autre politique est ajoutée. Elles permettent donc d'avoir une meilleure idée des effets qu'aura l'adoption d'une politique supplémentaire.
- si l'objectif principal est de réduire les émissions de gaz à effet de serre, alors la fixation d'un prix pour les émissions carbone est la seule manière efficace d'y parvenir.

3. Interventions des délégations

Le Président fait remarquer que, si les autorités de la concurrence n'ont pas vraiment pour mission de réfléchir à la cohérence des instruments, elles ont tout intérêt à tenir compte, de manière générale, de l'éventuel impact que peut avoir, en termes d'efficacité, l'application de plusieurs politiques. Il interroge la délégation du Royaume-Uni à propos d'un rapport réalisé par l'Office of Fair Trading (OFT) concernant les effets possibles sur la concurrence de normes relatives aux produits, ainsi que sur le rôle des évaluations obligatoires de l'impact sur la concurrence qui doivent accompagner les nouvelles normes obligatoires introduites au Royaume-Uni.

Un délégué du Royaume-Uni confirme que le rapport, publié il y a quelques années, évalue les effets possibles sur la concurrence de normes relatives aux produits. Il décrit les effets favorables de ce type de normes en termes de concurrence, notamment leur capacité à corriger les défaillances du marché. C'est d'autant plus vrai quand des craintes existent concernant les mises de fonds initiales pour de nouveaux produits ou bien quand des entreprises ne sont pas en mesure de signaler leur engagement écologique en ce qui concerne leurs produits. La concurrence est favorisée quand l'utilisation de normes relatives aux produits permet de remédier aux défaillances du marché. Le rapport répertorie également cinq phénomènes que peuvent déclencher des normes relatives aux produits et qui sont susceptibles de susciter des inquiétudes sur le plan de la concurrence :

- Une asymétrie des coûts pour les entreprises – Elle peut survenir de plusieurs manières, notamment en raison d'un impact différent sur les coûts de production des entreprises, car l'échelle minimale d'efficience du secteur est située plus haut et les obstacles à l'entrée sont

renforcés. Plusieurs facteurs peuvent atténuer ces préoccupations, notamment le temps que prend l'adoption de la norme et la possibilité que le même objectif soit atteint par une norme ouverte.

- Une sélection des gagnants par les responsables de l'action publique – Pour atténuer cette crainte, on peut, entre autres, s'assurer que les normes relatives aux produits soient souples, qu'elles encouragent une série de changements technologiques au lieu de privilégier une seule technologie, et que la mise en œuvre des normes relatives aux produits ait lieu au moment opportun.
- Une coordination plutôt qu'une réglementation officielle – Les responsables de l'action publique privilégient souvent des accords facultatifs au lieu d'une réglementation, mais ces accords entre les intervenants sur le marché risquent de favoriser les effets préjudiciables, intentionnels ou non, sur la concurrence. Le rapport fait état d'un certain nombre de caractéristiques à prendre en compte lors de leur conception pour minimiser de tels risques.
- Une asymétrie de l'impact sur les produits – Le risque existe que les labels énergétiques et d'autres normes favorisent la concurrence concernant un seul aspect au détriment des autres. Bien qu'une telle évolution passe pour peu probable dans la pratique, ce risque pourrait être atténué en s'assurant que les labels sont acceptés par toutes les entreprises, en précisant clairement qu'ils ne concernent que la performance environnementale et en quantifiant l'impact environnemental, et en veillant à ce que les notes soient accordées en fonction de normes absolues.
- L'encouragement d'un comportement d'exclusion – On entendra en l'occurrence par « comportement d'exclusion » la situation où des entreprises se livrent à des investissements excessifs pour améliorer les performances environnementales d'un produit particulier afin qu'il soit adopté en tant que norme minimale pour le secteur. Le rapport examine la nécessité pour les responsables de l'action publique d'évaluer la capacité des entreprises en place à tirer parti de cette activité.

Le délégué traite ensuite du rôle de l'OFT. La mission générale de l'OFT est de conseiller les ministres et leurs ministères concernant les changements ou propositions de changement de la législation, la réglementation ou l'action publique. En outre, depuis environ 10 ans à présent, des études d'impact sont requises sur les propositions de changement des politiques publiques ou de la législation. A travers ce processus, les responsables de l'action publique sont tenus de déterminer l'impact de telle ou telle proposition et de justifier la nécessité de son adoption. Dans le cadre de cette vaste évaluation est aussi menée une étude sur la concurrence. Cette étude est cependant réalisée par le ministère de tutelle, et non par l'OFT.

Cela étant, l'OFT publie régulièrement des instructions à l'intention des ministères de tutelle sur la procédure à suivre pour mener ces études. En particulier, selon ces instructions, les responsables de l'action publique doivent repérer le marché qui risque d'être concerné par la proposition de changement, puis se poser quatre questions :

- La proposition impose-t-elle directement des limites aux fournisseurs ?
- Impose-t-elle indirectement des limites aux fournisseurs ?
- Réduit-t-elle la compétitivité ?
- Réduit-t-elle l'incitation à être compétitif ?

Une réponse affirmative à l'une quelconque de ces questions exige que soit menée une étude complète sur la concurrence. L'OFT est parvenu à la conclusion que leur participation a sensiblement modifié l'approche initialement adoptée pour la conception de politiques publiques, ce qui a eu des effets nettement moins négatifs sur la concurrence.

Le Président donne la parole à Knut Johansen, représentant le bloc des cinq délégations nordiques qui a soumis une contribution groupée.

M. Johansen commence par mettre en avant les perspectives de l'environnement de l'OCDE à l'horizon 2030, publiées il y a 2 ans. Il souligne que, pour que des politiques environnementales soient rentables, il faut nettement privilégier les approches fondées sur le marché. En réalité, cependant, beaucoup de pays continuent de subventionner des combustibles fossiles. Des efforts considérables sont nécessaires pour supprimer ces subventions. Il faudra beaucoup réfléchir pour évaluer les effets de répartition, ainsi que les effets industriels.

M. Johansen ajoute qu'il est important de promouvoir des instruments fondés sur le marché et des politiques adéquates de la concurrence dans le cadre d'une stratégie de croissance verte. Il faut encourager une tarification correcte des biens environnementaux pour qu'une politique environnementale soit efficiente et que des incitations satisfaisantes soient fournies en faveur l'innovation. Il affirme en outre que pour promouvoir une concurrence respectueuse de l'environnement, il convient entre autres d'encourager le recours à des instruments fondés sur le marché dans autant de secteurs, et pour le plus de sources de pollution, que cela s'avère nécessaire, et selon un mode non discriminatoire.

Le Président demande ensuite à la délégation australienne de commenter sa contribution, soulignant qu'elle a cité certains cas où des restrictions empêchent l'adoption d'instruments fondés sur le marché et qu'elle a en outre fait remarquer qu'il est possible d'améliorer les instruments qui ne sont pas fondés sur le marché en utilisant des instruments supplémentaires qui, eux, sont fondés sur le marché.

Un délégué de l'Australie confirme que, dans certaines circonstances, des instruments qui ne sont pas fondés sur le marché peuvent être préférables. Ces circonstances sont notamment les situations où il peut être difficile de contrôler certaines activités privées et les situations où les effets sont très localisés. Le délégué cite plusieurs exemples, dont la réglementation concernant la mise au rebut de produits dangereux par des personnes physiques ou d'engrais qui peuvent endommager les réseaux hydrographiques et les écosystèmes. La contribution de l'Australie examine l'intégration d'instruments non fondés sur le marché dans différentes composantes de la politique de la concurrence afin d'aboutir à une approche complète dans la conception des politiques publiques qui améliore les résultats. Un exemple à cet égard est la procédure d'appel d'offres concurrentiel, dans le cadre de laquelle le secteur public apporte un financement pour parvenir à un objectif environnemental donné et fait appel à un ou plusieurs sous-traitants privés. Un processus de sélection concurrentiel est appliqué pour minimiser les coûts à engager en vue d'atteindre les objectifs environnementaux.

Le Président demande ensuite à la Bulgarie d'exposer les difficultés qu'elle a rencontrées lorsqu'elle a exigé de tous les sites industriels qu'ils limitent les substances polluantes provenant spécifiquement de leur secteur. Il invite également la Bulgarie à donner plus d'informations sur l'accord passé avec la Suisse à propos d'un mécanisme d'échange dette contre nature. Et en particulier, à expliquer pourquoi précisément avec la Suisse et quels sont les avantages de ce mécanisme ?

Un délégué de la Bulgarie souligne que les problèmes liés à la protection de l'environnement ont évolué au fil des années, le pays étant passé d'une économie centralisée à une économie de marché. La plupart des grandes usines polluantes en Bulgarie n'avaient pas de circuits d'épuration pour gérer la pollution. La situation a changé ces dernières années et le principal problème du pays est désormais de procéder à la modernisation technologique nécessaire de ces sites. Cela suscite des inquiétudes en termes de compétitivité, car le financement des installations revient principalement aux entreprises elles-mêmes.

A propos des précisions demandées par le Président à propos de l'accord passé entre la Bulgarie et la Suisse sur un mécanisme d'échange dette contre nature, le délégué fait remarquer que l'accord, qui est

entré en vigueur en 1996, annule environ 20 % de la dette de la Bulgarie vis-à-vis de la Suisse, sous réserve qu'un montant équivalant soit investi dans des projets visant à protéger l'environnement.

La discussion porte ensuite sur les droits et les remises. Le Président a observé que Taipei chinois avait une grande expérience de différentes formes de remboursements. Il a demandé à la délégation d'exposer le fonctionnement du système de remboursements, de préciser s'ils sont conformes aux accords commerciaux internationaux et les éventuels problèmes qui peuvent se poser quand les remboursements ont des conséquences commerciales internationales.

Un délégué du Taipei chinois a cité divers mécanismes de droits et d'allègements, y compris les restitutions à l'exportation, les remboursements de lignes de crédit, les remises d'assurance et les exonérations, qui permettent de réduire les taxes sur les activités polluantes. Les entreprises qui sont tenues de payer une taxe sur leurs émissions peuvent par ailleurs demander une exonération si elles sont dotées d'équipements anti-émissions. Les taxes sur les activités polluantes versées par un site peuvent être réduites en cas de nouveaux investissements dans des équipements ou de dépenses prévues dans le cadre de projets contribuant à la prévention de la pollution. Ce remboursement peut atteindre 20 % des taxes sur les activités polluantes payées l'année précédente. Le délégué explique en outre comment sont calculées les remises d'assurance et comment sont déterminés les taux d'exonération. Selon le délégué, ces remboursements, qui ne prévoient pas de subventions des exportations, ne devraient pas soulever de problèmes, que ce soit sur le plan du commerce international ou sur le plan de la concurrence.

Le Président demande ensuite à la Suisse de donner des précisions concernant son système de taxes sur les émissions de CO_2 et la souplesse accordée à cet égard, ainsi que l'approche adoptée lorsque des sociétés exportatrices risquent d'être désavantagées par rapport aux entreprises produisant dans des pays où ce type de taxes n'est pas appliqué. Plus particulièrement, ce point soulève-t-il des problèmes sur le plan des échanges internationaux ou un problème de fuite des émissions ?

Un délégué de la Suisse souligne que la souplesse accordée pour se conformer au système suisse renvoie à la possibilité qu'ont les entreprises à forte consommation d'énergie d'être exonérées de la taxe sur les émissions de CO_2. Une exonération exige d'une entreprise qu'elle s'engage à respecter un objectif de réduction de ses émissions. Une fois cet objectif fixé, un montant équivalent de droits d'émissions négociables lui est accordé pour participer au système d'échange de quotas d'émissions. Les autorités suisses de la concurrence préfèreraient un système complet (par exemple soit une taxe uniforme sur les émissions de CO_2, soit un système d'échange de quotas d'émissions englobant tous les émetteurs), mais un tel système n'est pas réalisable sur le plan politique compte tenu des craintes sur le plan de la concurrence internationale.

Jusqu'à présent, cette politique a réussi. Étant donné les faibles volumes d'échange de permis d'émissions, cependant, il est difficile d'évaluer le coût marginal de la réduction des émissions. Des travaux sont en cours pour améliorer le système au-delà de l'horizon 2012 et pour parvenir à des réductions plus importantes d'émissions. Le délégué ajoute qu'il serait globalement plus efficace que le système suisse d'échange de quotas d'émissions fusionne avec le système communautaire d'échange de quotas d'émissions. La Suisse commencera à négocier avec l'UE pour le raccordement de leurs systèmes d'échange de quotas d'émissions à partir de 2013.

En ce qui concerne les restitutions à l'exportation, le délégué signale que la Suisse taxe les composés organiques volatiles (COV) et que les produits exportés ne sont pas soumis à cette obligation. Les restitutions concernent les COV contenus dans les produits. Une telle politique n'a pas d'impact négatif sur la concurrence. Cependant, les restitutions à l'exportation ne tiennent pas compte des émissions de COV inhérentes au processus de production d'une entreprise. Les producteurs qui génèrent une grande quantité de COV peuvent donc être désavantagés. Le délégué écarte ces craintes en matière de concurrence en

expliquant que la plupart de ces entreprises sont exonérées de la taxe car elles ont pris des mesures pour ramener les émissions de sources stationnaires en deçà des limites stipulées.

Le Président attire ensuite l'attention sur trois points dans la contribution de la délégation de l'UE. Le premier est qu'on lit dans la contribution que des subventions sont inévitables ou, du moins, le meilleur moyen de résoudre les problèmes, dans certaines circonstances. Le Président demande à l'UE de préciser ces circonstances. Le deuxième point est qu'en vertu de la réglementation actuelle, les subventions sont contrôlées par la Commission européenne (CE). Le Président demande à l'UE de développer les arguments confortant l'idée que, sans une règlementation transnationale régissant l'application des subventions, les subventions serviraient d'instrument stratégique pour promouvoir les industries nationales au détriment des industries à l'extérieur des frontières. Enfin, il demande à l'UE de décrire sa position au cas où des subventions n'auraient pas d'effets négatifs sur la concurrence.

Un délégué de l'UE déclare que l'UE ne considère pas que les subventions remplacent d'autres réglementations ou instruments fondés sur le marché dans le domaine de la politique environnementale ; elle estime plutôt que, dans certaines circonstances, elles constituent des instruments qui complètent d'autres approches. En constitue un exemple les subventions pour aider les entreprises souhaitant parvenir à atteindre un niveau de performance environnementale au-delà de ce qu'exige la réglementation. Parmi les autres circonstances figure le recours à des subventions pour aider à la mise en œuvre de normes environnementales avant la date de leur entrée en vigueur, ainsi que l'indemnisation d'entreprises qui subissent les effets négatifs de distorsions dues à l'existence d'un système d'échange de quotas d'émissions dans certains endroits et pas dans d'autres.

L'instauration d'une réglementation transnationale sur le recours aux subventions, poursuit le délégué, permet d'éviter que les pays utilisent les aides publiques pour donner à leurs entreprises l'avantage du premier entrant. Les effets négatifs potentiels de telles initiatives sont notamment les distorsions des incitations dynamiques, ainsi que l'éviction des investissements consacrés à une technologie particulière dans d'autres États membres. Cette dernière éventualité fait craindre que de telles politiques n'entraînent une « concentration artificielle de la technologie en question dans certains États membres ». Le délégué donne comme exemple la technologie solaire en Europe.

Enfin, le délégué note qu'en vertu de la législation de l'UE, presque tout ce qui peut conférer un « avantage sélectif » à certaines entreprises passe pour conduire à une distorsion de la concurrence. Par conséquent, la plupart des analyses examinent si cette distorsion de la concurrence est compensée par un but positif particulier, comme celui d'avoir un effet incitatif (autrement dit, si des investissements environnementaux spécifiques auraient eu lieu sans aide).

Le Président se tourne ensuite vers la République tchèque, lui demandant d'expliquer pourquoi le pays a interrompu son soutien à l'énergie renouvelable et de donner le point de vue qu'avait le pays sur le temps que devait durer ce soutien avant sa mise en œuvre initiale.

Un délégué de la République tchèque explique qu'un système d'objectifs est en place pour réduire les émissions de CO_2 et promouvoir les sources d'énergie renouvelable. Le soutien en faveur de la production d'énergie renouvelable a pris la forme d'une double subvention. D'une part, les producteurs de ce type d'énergie n'étaient pas tenus de payer des taxes sur leur production. D'autre part, ils étaient subventionnés par une tarification fixe de ces sources d'énergie. Le programme a raisonnablement réussi à attirer des fournisseurs d'énergie solaire et le prix de la technologie solaire a baissé. Cependant, comme les prix de l'énergie sont restés fixes, il est devenu extrêmement rentable d'investir dans l'énergie solaire. Aussi les centrales solaires se sont-elles multipliées à travers tout le pays. La politique de prix fixes pour cette source d'énergie a commencé à poser un problème car les centrales solaires ont peu à peu remplacé des terres agricoles et exercé une influence croissante sur les prix de l'énergie dans leur ensemble. Les pouvoirs

publics ont décidé de revenir à la situation antérieure à la mise en œuvre d'un régime de prix fixes pour les sources d'énergie renouvelable.

Le Président constate qu'un problème semblable est soulevé dans la contribution de l'Espagne. Plus particulièrement, les autorités espagnoles de la concurrence se penchent sur la question des subventions, qui sont inférieures aux seuils établis par la CE. Il demande la délégation de donner plus de précisions sur les subventions allouées à l'énergie solaire.

Un délégué de l'Espagne explique que les subventions locales concernent essentiellement le secteur automobile. Des subventions sont notamment accordées aux particuliers pour l'achat de véhicules jugés mieux équipés pour la protection de l'environnement. Les subventions proviennent de fonds publics tant nationaux que régionaux. L'octroi de subventions est soumis à deux conditions essentielles : les bénéficiaires doivent résider dans la région qui accorde la subvention et le véhicule doit être acheté auprès d'une entité située dans la région qui accorde la subvention. Cette dernière condition soulève des inquiétudes quant aux effets sur la concurrence.

Le délégué souligne deux points à propos des effets que pourraient avoir ces subventions automobiles sur la concurrence. Premièrement, les conditions ne sont pas conformes aux lignes directrices en vue d'améliorer la réglementation publiées soit par la Commission nationale de la concurrence, soit par l'OCDE. Ces lignes directrices précisent les conditions dans lesquelles peut être mise en œuvre une réglementation qui entraîne des distorsions de la concurrence. Deuxièmement, ce n'est pas seulement à l'échelon régional, mais sur le marché national de l'automobile que ces conditions introduisent d'éventuelles distorsions. Les subventions peuvent servir à promouvoir un protectionnisme régional que la réglementation de l'UE cherche à éviter.

La Commission nationale de la concurrence a formulé trois recommandations concernant ces subventions :

- Les objectifs à atteindre au moyen de l'aide publique qui sont examinés, ainsi que les mesures spécifiques adoptées pour les atteindre, doivent être définis clairement et précisément, en accordant une attention particulière à l'adéquation de telles mesures avec le but recherché.

- Les efforts réalisés pour atteindre plusieurs objectifs dans le cadre du même système d'aide risquent non seulement d'aboutir à des résultats moins efficaces, mais aussi de provoquer une importante distorsion des conditions de concurrence sur les marchés concernés.

- Les mécanismes d'aide publique devraient en particulier éviter de générer une discrimination ou un traitement préférentiel entre les fournisseurs d'un produit subventionné en fonction de l'emplacement géographique. Une telle discrimination contribue à ériger ou à renforcer des obstacles majeurs pour la concurrence qui, dans certaines circonstances, peuvent s'étendre à l'ensemble du marché national.

En ce qui concerne le soutien à l'énergie renouvelable, le délégué indique que les aspects traités dans la contribution de l'Espagne sont en réponse à des craintes exprimées précédemment d'un surinvestissement dans la production d'énergie solaire. Ces craintes pourraient être fondées.

Le Président pose ensuite deux questions à la délégation des États-Unis. Premièrement, qu'en est-il des subventions accordées pour la performance environnementale aux États-Unis ? Deuxièmement, les autorités américaines pensent-elles que les marchés s'appuyant sur un engagement facultatif pourront à terme se substituer à l'intervention des pouvoir publics ? Cette dernière question est motivée par le fait que les États-Unis n'ont pas de programme fédéral destiné à réduire les émissions de gaz à effet de serre mais

ont au niveau des États un ensemble de programmes facultatifs (par exemple, concernant les certificats d'énergie renouvelable).

Concernant la première question, un délégué des États-Unis donne un large échantillon d'exemples de l'utilisation de subventions aux États-Unis. Parmi eux figurent les instruments visant à promouvoir l'efficacité énergétique en matière d'émissions et les technologies renouvelables, comme les remises, les allègements fiscaux, les obligations en matière d'économie d'énergie, les normes relatives à l'électricité renouvelable, ainsi que les programmes de financement de technologies liées à l'énergie renouvelable. Certains États participent à un programme régional de plafonnement et d'échange, dont une partie des revenus sert à financer des instruments en faveur de l'efficacité énergétique ou de l'énergie renouvelable.

Concernant les marchés reposant sur un engagement facultatif, le délégué a précisé qu'aux États-Unis, dans le domaine de l'énergie renouvelable, ils vont « plus loin que les marchés se conformant aux réglementations », dans la mesure où ils cherchent à satisfaire les préférences des consommateurs, qui ont des exigences souvent bien plus rigoureuses que celles dictées par les initiatives publiques. De tels marchés existent dans certaines juridictions qui n'ont pas de politiques en place et, de plus, ils ont prospéré dans des lieux où il existe des normes d'électricité renouvelable. Les marchés reposant sur un engagement facultatif ne sont cependant pas conçus pour se substituer à des programmes de réduction des émissions, y compris des mécanismes obligatoires de plafonnement et d'échange. La Fair Trade Commission (FTC) contrôle la validité des réclamations commerciales, et notamment des réclamations environnementales formulées dans ces marchés reposant sur un engagement facultatif.

Le Président fait ensuite porter la discussion sur le rôle des autorités de la concurrence concernant les problèmes soulevés jusqu'à présent, notamment leur rôle dans la conception des solutions réglementaires. Il demande au Chili d'évoquer son expérience de l'attribution de droits relatifs à l'eau.

Un délégué du Chili précise que chacune des interventions dans sa contribution concerne l'analyse d'une fusion. Dans un cas, les autorités de la concurrence ont cherché à évaluer la perspective d'attribuer davantage de droits relatifs à l'eau à une entreprise dominante spécifique. Dans un autre cas, un tribunal de la concurrence a examiné une co-entreprise s'occupant de droits relatifs à l'eau. Un autre cas encore traite de l'approbation d'une nouvelle acquisition de droits relatifs à l'eau.

Passant de la question de la mise en œuvre au rôle des autorités de la concurrence dans la promotion de politiques fondées sur le marché, le Président se tourne vers la délégation nordique. Dans leur rapport commun, les autorités nordiques de la concurrence développent une solide argumentation en faveur de politiques fondées sur le marché. Le Président demande à la délégation de préciser dans quelle mesure leurs efforts ont été couronnés de succès et quel rôle les autorités de la concurrence ont joué dans la conception de politiques environnementales fondées sur le marché.

Un délégué du bloc des cinq délégations nordiques répond que l'objectif de leur rapport est d'explorer la relation entre politique environnementale et politique de la concurrence et la contribution possible des autorités de la concurrence pour atteindre les objectifs de croissance verte. La politique de la concurrence et la politique environnementale servent l'une comme l'autre à améliorer le bien-être collectif. Il faut encourager une concurrence qui respecte les objectifs environnementaux (en particulier au moyen d'une tarification des émissions), car il importe que le prix effectif reflète les coûts externes afin de s'assurer que des incitations appropriées soient en place pour réduire la pollution et favoriser l'innovation. Une politique environnementale bien conçue permet une saine concurrence. Un des défis pour les autorités de la concurrence consiste à s'assurer que la législation verte n'ait pas de répercussions négatives sur la concurrence et qu'au lieu de cela une législation favorable à la concurrence soit appliquée. La « boîte à outils » de l'OCDE pour l'évaluation de la concurrence est d'une aide précieuse pour concevoir une politique environnementale.

Le Président évoque ensuite un point de vue exprimé dans la contribution de la Corée, selon lequel la conception de programme d'échange de quotas d'émissions doit prendre en compte les éléments d'informations fournis par les autorités de la concurrence. Il note qu'en Corée, le dirigeant de l'autorité de la concurrence exerce des fonctions au sein du gouvernement. Plus spécifiquement, il demande à la Corée de donner des précisions sur la capacité de l'autorité coréenne de la concurrence à intervenir dans la conception de la politique environnementale. Par exemple, quel rôle joue, le cas échéant, l'autorité de la concurrence dans la conception des subventions ? Il demande également à la délégation d'expliquer pourquoi elle pense que les autorités de la concurrence devraient influencer la conception des programmes d'échange de quotas d'émissions.

Un délégué de la Corée explique que l'autorité coréenne de la concurrence peut participer au processus de conception des subventions environnementales, ou à tout autre mécanisme de protection de l'environnement, au moyen d'une évaluation de l'impact sur la concurrence. Quand une nouvelle loi est proposée ou une loi existante révisée, l'autorité coréenne de la concurrence est consultée et peut signaler tout problème que posent pour la concurrence les changements envisagés. Un exemple est le programme pilote mis au point en Corée pour l'échange de quotas d'émissions. Si, en l'occurrence, l'autorité coréenne de la concurrence n'est pas consultée, elle peut intervenir, au cas où le programme pilote devient officiel, pour défendre des aspects particuliers lors de sa conception définitive au moyen d'une évaluation d'impact sur la concurrence et d'une consultation réglementaire préalable.

Le Président fait ensuite remarquer que la FTC aux États-Unis joue un rôle actif en donnant son avis dans le domaine de l'analyse de la concurrence aux organismes fédéraux qui travaillent sur des questions environnementales. Il demande aux États-Unis de commenter la recommandation formulée par cette instance à la *Federal Energy Regulatory Commission* (FERC) concernant l'intégration de diverses sources d'énergie dans le réseau électrique aux États-Unis. Il demande aussi aux États-Unis de donner son opinion sur la probabilité que l'avis de la FTC soit suivi.

Un délégué des États-Unis précise que la recommandation de la FTC, si elle est adoptée, permettra aux autres sources d'énergie d'être compétitives plus facilement. Concernant la possibilité que la recommandation soit adoptée, le délégué indique que, par le passé, la FERC a apprécié la contribution de cet organisme public. Dans bien des cas, la FERC a pris des mesures conformément aux recommandations de la FTC.

Le Président demande ensuite à la Suède d'exposer les défis auxquels les autorités de la concurrence peuvent être confrontées dans les domaines traités jusque là.

Un délégué de la Suède déclare que les politiques vertes sont à présent bien établies et qu'elles auront une portée de plus en plus étendue. Il mentionne également la nécessité d'examiner plus en détail les domaines abordés ce jour et de se préparer à affronter la controverse et à acquérir les compétences nécessaires pour être en mesure de répondre aux arguments d'efficacité qui seront inévitablement évoqués. En outre, il est indispensable que les autorités de la concurrence commencent à intervenir réellement dans les dossiers écologiques. Dans ce domaine, les autorités de la concurrence apportent une réelle valeur ajoutée et peuvent défendre des aspects spécifiques. Elles devraient aussi contribuer à concevoir des instruments qui permettront à d'autres d'évaluer l'impact des nouvelles politiques sur la concurrence. Enfin, il serait souhaitable d'adopter des politiques dynamiques de communication et de publier régulièrement les évaluations d'impact.

Le Président accorde ensuite la parole au Comité consultatif économique et industriel (BIAC).

Un délégué du BIAC souligne que les problèmes qui se posent dans le cadre des initiatives de croissance verte sont complexes. Le BIAC est d'avis que, pour encourager la croissance verte, il faut

soutenir l'innovation et l'esprit d'entreprise. Cela vient du fait que les politiques conçues pour promouvoir la croissance verte exigent à terme des entreprises qu'elles passent à des technologies plus efficaces qui génèrent moins d'émissions. Quant au choix des instruments dans le cadre des politiques environnementales, le BIAC préfère les approches fondées sur le marché. Cependant, dans certaines circonstances, y compris la définition de limites en termes de pollution pour des installations spécifiques ou des sources ponctuelles, une approche fondée sur la contrainte peut être utile. Les politiques fondées sur la contrainte peuvent être aussi plus efficaces dans les cas où il s'agit de préserver la biodiversité, les espèces menacées ou des habitats spéciaux. La préférence pour des instruments fondés sur le marché est due aux considérations suivantes :

- déficits d'information de la part de l'instance de réglementation
- manque de souplesse des approches réglementaires vis-à-vis des changements qui surviennent pendant la durée de la réglementation
- nécessité plus grande d'une répression en cas d'approches réglementaires
- risque de capture réglementaire en cas d'approches fondées sur la contrainte

Un délégué de la France souligne que, dans le cadre de son action en faveur d'une croissance verte, la France a mis au point en 2007 un dispositif appelé le Grenelle de l'environnement. Ce projet s'appuie sur différents instruments : d'une part des instruments classiques et prévisibles de réglementation et de normalisation, et d'autre part un certain nombre d'instruments d'informations, d'engagements volontaires et surtout d'instruments économiques. Ces derniers instruments inscrivent les politiques environnementales dans un contexte d'économie de marché, comme l'OCDE l'a déjà fait à travers son dispositif de croissance verte.

Le délégué donne deux exemples d'instruments économiques mis en œuvre par la France pour encourager un comportement économique approprié sur le plan environnemental, une indication ayant été fournie par les prix pour orienter la demande vers des produits et des secteurs qui affichent de bonnes performances environnementales (voir l'appendice III - disponible en anglais seulement). Le premier exemple est une subvention dont peuvent bénéficier les particuliers sous la forme d'un « crédit d'impôt pour le développement durable ». Elle s'applique à des projets de construction des particuliers, une réduction d'impôt étant accordée si les travaux prévoient l'installation d'équipements utilisant de l'énergie renouvelable ou des rénovations augmentant l'efficacité thermique du foyer. Le crédit peut atteindre 50 % du coût, mais il est plafonné à 16 000 EUR. Ce crédit d'impôt a rencontré un succès considérable, car environ 7 % des ménages français en ont profité depuis sa création. La France tente de contrôler les dépenses budgétaires en durcissant progressivement les conditions exigées des ménages pour qu'ils obtiennent ce crédit. Cela passe par une préférence accordée aux appareils qui enregistrent d'excellentes performances environnementales. Le crédit d'impôt a eu un impact important en réorientant le comportement et la demande des consommateurs ; il a aussi stimulé l'offre dans les secteurs liés à l'efficacité énergétique. D'ailleurs, plus les critères sont stricts, plus cela stimule l'offre parmi les technologies les plus avancées sur le plan environnemental.

Le second exemple est une taxe générale sur les activités polluantes. Elle couvre 8 catégories d'activités et elle a été révisée pour inclure les déchets ménagers. L'objectif était d'encourager le recyclage par rapport à la mise en décharge ou à l'incinération des déchets. La taxe a permis d'assurer que le recyclage puisse devenir compétitif par rapport à la mise en décharge et à l'incinération des déchets. Bon nombre d'autres mesures d'encouragement ont été mises en place, qu'il s'agisse de mécanismes fiscaux ou encore de prix spéciaux qui incitent les ménages et les entreprises à faire des choix respectueux de l'environnement.

Un délégué du Portugal déclare qu'il semble qu'au vu des discussions menées jusque là, les prix de l'énergie vont continuer d'augmenter. Il demande ce que doivent faire les autorités de la concurrence en pareilles circonstances. Le délégué suggère ensuite que les autorités de la concurrence évitent de tirer trop vite des conclusions pour satisfaire la sphère politique et les consommateurs alors qu'il n'y a aucune preuve d'agissements répréhensibles. Le délégué souligne que le processus de croissance verte en est à ses balbutiements et demande si d'autres ont l'impression que les autorités de la concurrence interviennent trop tôt dans le processus. Les autorités de la concurrence et les organismes de réglementation doivent-ils faire marche arrière et permettre au marché de se développer sans trop intervenir ? Dans ce contexte, le problème est de définir correctement les prix et de savoir comme le faire au mieux.

4. Commentaires des spécialistes

M. Amundsen constate que le *stewardship programme* [programme de pilotage] présenté par la délégation australienne met en évidence dans quelle mesure les mécanismes de marché peuvent servir à atteindre des objectifs environnementaux. Il souligne en outre l'importance des futures idées sur l'impact que peut avoir l'exercice du pouvoir de marché sur un autre marché lié (par exemple, les marchés de l'électricité et des certificats attestant de l'origine renouvelable de l'électricité).

En réponse au délégué du Portugal, M. Morgenstern fait remarquer que la question essentielle a trait à ce que nous savons des effets préjudiciables pour la santé publique et l'environnement. La mise au point d'indicateurs monétaires reflétant ces effets préjudiciables peut en définitive permettre d'orienter l'élaboration à long terme de politiques conçues pour réduire les émissions. Il souligne également qu'environ la moitié des émissions sont exclues du système communautaire d'échange de quotas d'émissions. M. Morgenstern rappelle les commentaires précédents de M. Fischer en indiquant qu'il est possible que différentes politiques se fassent concurrence. Les responsables de l'action publique doivent être conscients de cette réalité et faire clairement savoir quand les avantages de politiques supplémentaires sont pris en compte deux fois.

Le Président conclut en mettant en avant les points importants qui sont ressortis de la table ronde. Il perçoit une préférence pour les politiques environnementales fondées sur le marché même si les délégués ont reconnu que, dans certaines circonstances, les approches classiques fondées sur la contrainte ont un rôle à jouer. Les questions essentielles ont ensuite porté sur la conception à terme des politiques publiques, ainsi que sur les effets dynamiques, et statiques, qu'elles produisent. En outre, les effets directs, indirects et en termes de concurrence sont extrêmement importants. Les autorités de la concurrence pourraient apporter leur expérience des marchés concurrentiels pour aider à faire en sorte que les politiques fondées sur le marché qui sont adoptées à l'avenir s'appuient sur les bases de marchés concurrentiels. Les autorités de la concurrence peuvent intervenir de plusieurs manières, notamment en défendant des aspects particuliers et sur le plan de la mise en œuvre. En réponse aux commentaires du Portugal, il souligne que les autorités de la concurrence doivent se montrer prudentes dans tous les domaines, et pas seulement ceux en rapport avec l'environnement. Cependant, cela ne signifie pas qu'elles doivent se désintéresser de l'élaboration de politiques publiques en vue de soutenir la croissance verte.

APPENDIX I

Presentation by Mr. Eirik Amundsen

Regulation and Green Growth: Economic Principles

by
Professor Eirik S. Amundsen
University of Bergen/ University of Copenhagen

Discussion on Pro-Active Policies for Green Growth and the Market Economy,
The OECD Competition Committee meeting
Paris, 27 October, 2010

Contents

- The notion of “Green Growth”
- Basic economic questions on subsidization
- Formulation of proper targets
- Instruments and compatibility
- Words of caution

Green growth

- ***Green growth:*** Economic growth under environmental constraints such as
  - Low emission of green house gases (GHG)
  - Low specific or ambient pollution (noise, acid rain, etc.)
  - Minimum waste disposal
  - Minimum loss of biodiversity
  - Sound amenity management (i.e. taking account of irreversibilities and option values)
  - Otherwise efficient use of natural resources.
- In short this may also be termed “**Sustainable Growth**”
- Many see the pursuit of sustainable growth itself as a means of promoting growth i.e. creating new green industries, businesses and jobs.
- Activities related to climate change seem particularly important in this respect i.e. development and deployment of technologies of
  - Renewable energy
  - Energy saving/ increased energy efficiency

Consequences of internalizing environmental external effects

- Many of the above mentioned constraints are so-called negative external effects.
- Such effects may be internalized by the use of taxes (Pigouvian), permit systems and command and control mechanisms.
- If such negative effects are priced correctly (e.g. a correct price of CO2 emission), the resulting change of relative market prices (e.g. more expensive fossil energy) will induce:
  - Relatively more renewable energy (substitution)
  - More energy saving (on average energy is becoming more expensive)
  - More R&D on new technologies of renewable energy and efficiency augmenting technologies (induced technological change)

A basic question on subsidies on renewable energy

With correctly used instruments for internalizing the negative external effects from GHG emission are there any valid economic arguments for subsidizing development of renewables?

- Inventions and innovations are public goods (non excludability implies that efforts of inventing new renewables are not sufficient if left to the private agents, in spite of patent systems). This calls for general subsidies.
- Learning by doing has spill-over effects (non excludability implies that efforts of developing renewables are not sufficient if left to the private agents). This calls for subsidies for a period until all spill over-effects from learning by doing have been realized.
- Security of supply

A basic question on subsidies on renewable energy (cont.)

- But these arguments may be valid for any technology development (e.g. IT research), not only renewables.
- The question is whether the social return from subsidization is larger for energy research than for other research and therefore should be subsidized more heavily than other kinds of research.

A basic question on subsidies for energy savings/ increased energy efficiency

- Why is not increasing prices of energy sufficient for stimulating a reduction of energy consumption and a more efficient use of energy?
  - Invention of technologies that increase energy efficiency is a public good and calls for general subsidies
  - Spill-over effects from learning by doing using new efficiency increasing technologies is a public good and calls for time limited subsidies.
  - Lack of information on gains of insulation etc. is often mentioned as a cause of slow energy saving. To the extent this is the case society's resources should be spent to increase information.

Why targets on energy saving?

- Energy is a production factor just like other production factors (labour, capital services, raw materials and intermediaries). In this respect it is not quite obvious why one should reduce the use of this particular factor.
- From the point of view of society, energy generation should take place at the lowest possible cost to society (e.g. from deregulating the electricity market)
- This is a rationale for more efficient energy markets (just as more efficient labour markets, capital markets, financial markets are good for society). This will result in lower energy prices and consequently not lead to energy saving.
- Environmental problems as well as problems of security of supply relating to energy use should be taken care of by internalizing these effects in the costs of using the various energy sources and not by requiring a general reduction of energy use.

Number of targets and instruments

- Many countries have targets on i) emission reduction of GHG, ii) shares of renewable energy and iii) energy saving/efficiency (e.g. EU)
- Accepting there are three targets one simple view would be that we need three different instruments to attain the targets. (Think of a system of independent linear equations that should be determined.)
- But if the important target is to reduce the emission of GHG, then applying three instruments to attain all three targets may imply inefficiency with excessive costs of attaining the target (”too many constraints”)
- Hence, as noted harsher GHG-policy alone increases the costs of fossil energy and implies efficient
  - Increase of the share of renewables
  - Reduction of energy consumption
- Recognize, however, that in the face of uncertainty, it may well be optimal to combine instruments even if there is only one target (e.g. a quota system with a price ceiling and a price floor.) (Cf. Roberts and Spence, 1976).

Choice of instruments to achieve the targets

- Environmental problems are typically due to market failure (e.g. externalities and public goods)
- However, instead of abandoning the use of market forces, these may be applied in a smart way e.g. ”creating markets for the externalities”.
- Market instruments (other than taxes/subsidies)
  - Target on GHG emission: Emission permits
  - Target on share of renewables: Green certificates
  - Target on energy saving: White certificates

Challenges

- Necessary to align the quota and the non quota sector in order to equalize the marginal abatement cost of GHG emission
- A need for systems that can equalize the marginal costs of generating renewable energy between countries and thus realize gains of trade. (e.g. within EU and USA)
- Necessary to separate who is paying from who is doing.

Words of caution on promoting ”Green Growth”

- “Stimulating the renewable energy sector will create new jobs”: Not necessarily. Labor will be taken from other sectors of the economy.
- “Stimulating the renewable energy sector will give the country a first mover advantage in trade of renewables”: Not necessarily so if many countries plan to do this. (All countries can not have a first mover advantage, cf EU)
- ”Pick the winner strategies”: Promoting a specific technology may be costly to society i.e. the market should decide not politicians.
- The development of a new green industry in developed countries may amount to a re-industrialization of developed countries contrary to long term trend

APPENDIX II

Presentation by Mr. Carolyn Fischer

Market-Based Environmental Policies: Overlapping Issues

Carolyn Fischer

October 27, 2010

OECD Roundtable

RESOURCES FOR THE FUTURE

Overlapping Motivations

- Energy security
- Environmental preservation
- Innovation
- Green jobs
- Infant industries and industrial policy

RESOURCES FOR THE FUTURE

Overlapping Policies

Everything but the kitchen sink?

Country	Emissions cap-and-trade system	Carbon tax	Non-renewable generation tax	Emissions performance standard	RPS/ TGCs	Feed-in tariffs	RES-E production subsidies	Investment/ R&D incentives
Canada		✓[1]	✓		✓	✓	✓	✓
Denmark	✓	✓	✓			✓		✓
Germany	✓					✓		✓
Japan	✓				✓			✓
Netherlands	✓		✓		✓	✓[2]		✓
New Zealand	✓							✓
Norway	✓	✓	✓			✓		✓
Spain	✓					✓		✓
UK	✓		✓		✓	✓[3]		✓
U.S. Federal	proposed			proposed	proposed		✓	✓
U.S. States	✓			✓	✓	✓	✓	✓

RESOURCES FOR THE FUTURE

Useful Distinctions
from an Economic Perspective

- Fixed-price measures
  - Carbon
  - Fossil fuel taxes
  - Renewable subsidies
- Endogenous-price measures
  - Cap-and-trade
  - Portfolio standards
  - Performance standards
  - *Credit value adjusts to other market influences*

RESOURCES FOR THE FUTURE

Tradable Standards

- In effect, they combine a tax and subsidy
  - Renewable portfolio standard = tax on generation + subsidy to renewable energy
  - Tradable performance standard = emissions price + subsidy to production (in the value of the per-unit allocation)
- Lesser effects on costs and production than a tax
  - Efficiency issues
- Prices adjust in the presence of other policies

RESOURCES FOR THE FUTURE

Combining Renewable Policies with a Cap-and-Trade System

- *With a binding cap, zero incremental emissions reductions are realized from supplementary policies.*
- RES-E subsidies cause allowance prices to fall
  - Tends to benefit dirtier emitters!
    - i.e., coal-fired save more than natural gas-fired
  - Less fossil energy generation overall
    - Displaced by RES-E and lower prices
  - None of the overlapping policies can simultaneously disadvantage both kinds of fossil generation

RESOURCES FOR THE FUTURE

Combining Policies with Tradable Standards

- *A binding renewable portfolio standard links the fates of fossil and non-fossil energy*
- Supplementary policies that subsidize renewables make credits cheaper
  - Benefits fossil energy suppliers
  - Expands overall consumption
    - and emissions! (unless there's also a cap)
- Additional charges on fossil energy reduce demand for renewable credits

RESOURCES FOR THE FUTURE

Rationales for Overlapping Policies

How many tools do we need?

- Economic principle: Need as many tools as problems
  - If GHGs only problem, an emissions price is the only tool needed; anything else raises costs
  - If RES-E share is only goal, then RPS by definition should be efficient
- Other market failures:
  - R&D, learning-by-doing spillovers
  - Network effects
  - Barriers and information problems
  - Credit access constraints
  - Market power
  - Energy security…

RESOURCES FOR THE FUTURE

Renewable Energy Policies as Innovation Policies

- Different sources have different needs
  - Different innovation stages, net emissions characteristics, capital cost structures, etc.
- Simple RPSs and production subsidies do not distinguish among sources
  - Benefit currently commercial options;
  - Less effective at promoting next-generation technology
  - Empirical studies find FiTs more cost-effective (OECD 2010)
  - Could have differentiated mandates
- Need to balance RD&D push with market pull policies

RESOURCES FOR THE FUTURE

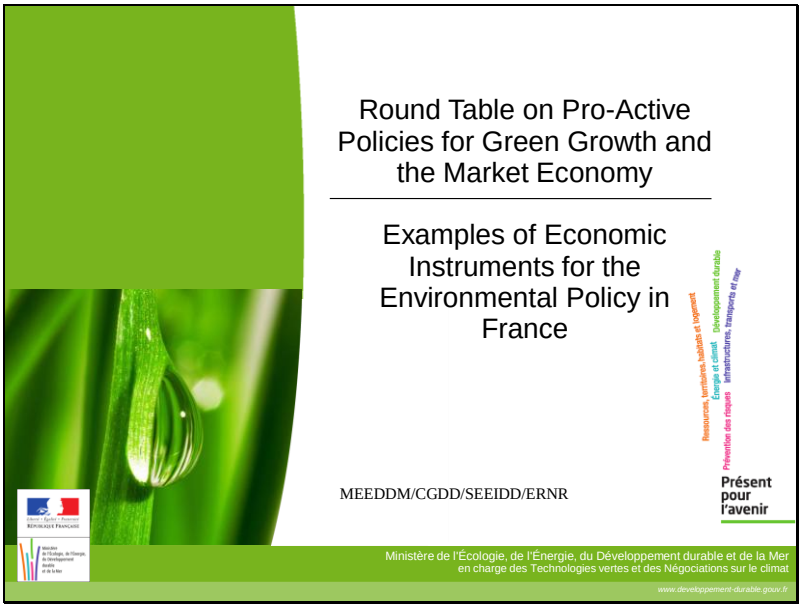
Concluding Thoughts

- Overlapping policies require overlapping problems to justify them
- Policies should be evaluated in whole context
- Fixed-price policies are more transparent: Additive
- Must recognize tradeoffs between not picking winners and appropriately targeting innovation needs
  - To what extent do market failures vary by technologies?
- Carbon price still the single most effective policy for GHG reduction, even with spillovers

RESOURCES FOR THE FUTURE

APPENDIX III

Presentation by France

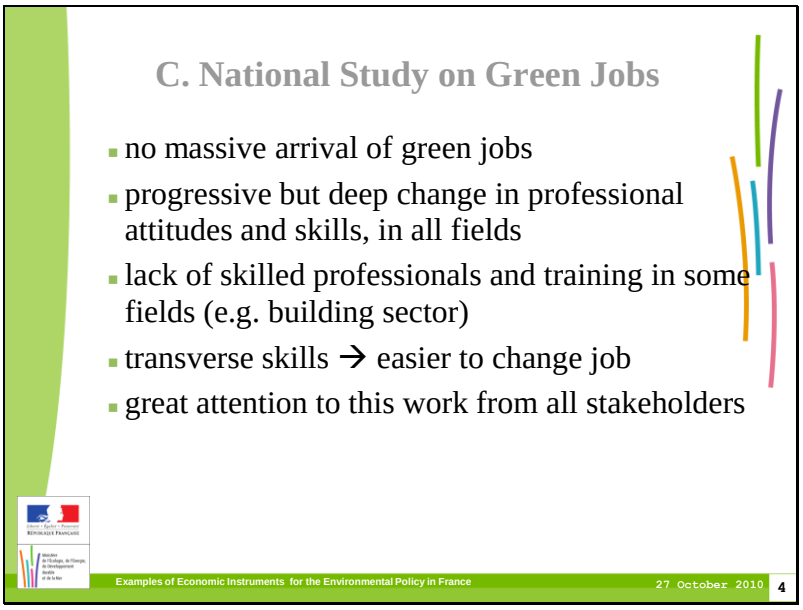


A. Tax Credit for Sustainable Development

- credit on income tax
- rate : 15 to 50% of the cost of works
- limited to €16,000 over 5 years for a childless couple
- €2.7 billion fiscal expenditure in 2009
- 61% for renewable energies – 39% for improving efficiency
- turnover generated : €8 billion
- jobs saved or created ≈ 20,000

B. General Tax on Polluting Activities

- application of the Polluter Pays Principle (PPP)
- 8 categories of activities
- €480 million collected in 2009 of which €270 million related to household waste
- objective: promote waste recycling rather than landfill or incineration
- cost per tonne in 2009:
  - Recycling: €70
  - Landfill: €70
  - Incineration: €87


C. National Study on Green Jobs
no massive arrival of green jobs
progressive but deep change in professional attitudes and skills, in all fields
lack of skilled professionals and training in some fields (e.g. building sector)
transverse skills → easier to change job
great attention to this work from all stakeholders
Examples of Economic Instruments for the Environmental Policy in France
27 October 2010
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