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## **Measuring Support to Energy — Version 1.0**

*by the OECD Secretariat<sup>1</sup>*

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*Background paper to the joint report by IEA, OPEC, OECD and World Bank on “Analysis of the Scope of Energy Subsidies and Suggestions for the G-20 Initiative”*

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## ACRONYMS AND ABBREVIATIONS

AC	Code used for policies included in All Commodity Transfers
ACT	All Commodity Transfers
AMS	Aggregate Measurement of Support
CIF	Cost, Insurance and Freight
CSE	Consumer Support Estimate
ERA	Effective Rate of Assistance
ERP	Effective Rate of Protection
EU	European Union
FAO	Food and Agricultural Organisation of the United Nations
FOB	Free on Board
G-20	Group of Twenty
GC	Group Commodity
GCT	Group Commodity Transfers
GDP	Gross Domestic Product
GSSE	General Services Support Estimate
GTAP	Global Trade Analysis Project
IMF	International Monetary Fund
LC	Local Currency
LV	Price Levies
MFN	Most Favoured Nation
MPD	Market Price Differential
MPS	Market Price Support
NAC	Nominal Assistance Coefficient
NGO	Non-government organisation
NPC	Nominal Protection Coefficient
NRA	Nominal Rate of Assistance
NRP	Nominal Rate of Protection
OECD	Organisation for Economic Co-operation and Development
OTC	Other Transfers from Consumers
OT	Code used for policies included in Other Transfers to Producers
OTP	Other Transfers to Producers
PSE	Producer Support Estimate
SCT	Single Commodity Transfers
T	Metric Tonne
TCT	Transfers to Consumers from Taxpayers
TPC	Transfers to Producers from Consumers
TPT	Transfers to Producers from Taxpayers
TRQ	Tariff-Rate-Quota
TSE	Total Support Estimate
US	United States of America
VAT	Value Added Tax
WTO	World Trade Organisation

## **PART I MAIN CONCEPTS**

### **CHAPTER 1. INTRODUCTION**

1. The interest of the G-20 Group in measuring subsidies to energy, and in particular to fossil fuels, is strongly related to the environmental and domestic economic effects of those subsidies. In their statement issued at the conclusion of their 24-25 September 2009 summit in Pittsburgh, Pennsylvania, the G-20 Leaders noted that:

Enhancing our energy efficiency can play an important, positive role in promoting energy security and fighting climate change. Inefficient fossil fuel subsidies encourage wasteful consumption, distort markets, impede investment in clean energy sources and undermine efforts to deal with climate change.

2. Quantifying support, and explaining how the various support elements interact, will be essential for countries to track their progress in implementing the G-20 Leaders' commitment to "rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption". A comprehensive and consistent quantitative method for measuring the subsidies generated by different policies is needed to evaluate the extent of policy reform achieved by countries, both over time and through specific reform efforts. . Nothing speaks louder about intentions of government policy than how its actions direct transfers among taxpayers, government bodies, producers and consumers. Support indicators can establish a common base for policy dialogue by using a consistent and comparable method to evaluate the nature and incidence of policies. In the realm of agricultural and fisheries policy, for example, the development of internationally comparable indicators and wide country coverage has made them useful tools for policy dialogue not only among country groups, but also in inter-governmental forums (most notably the WTO, OECD, IEA, World Bank, IMF and FAO), industry and non-government organisations.

3. Finally, if organized and in a way that takes into account the needs of analysts, estimates of support can be of enormous use to researchers. The data can serve as an input into modelling to assess the effectiveness and efficiency of policies in delivering the outcomes for which they were designed and to understand their effects on production, trade, income, the environment, and so forth. While the indicators cannot by themselves quantify these impacts, the economic information upon which they are based serves as an important building block for further analysis.

#### **1.1. Objective**

4. This background paper is intended to help begin a discussion on methods for identifying, estimating and classifying support to the energy sector. The methods explored in this annex include some that have been applied to other sectors, as well as those that have mainly seen application in the energy sector.

5. The paper outlines a comprehensive and consistent scheme for discussing support to any industry organized by economic activity. This is the basis for the effective rate of assistance (ERA) indicator, as well as for the family of indicators comprised of the producer support estimate (PSE), consumer support estimate (CSE), and total support estimate (TSE). However, it recognizes that that data limitations may require at times the use of subsets of these indicators, or alternative measurement techniques.

## **1.2. Structure**

6. Part I provides an introduction to the basic concepts, as covered in Chapter 1. Chapter 2 introduces the main purpose and principles behind the calculations of the indicators. Chapter 3 explains the criteria used to identify policies included in the calculation of the indicators, how to distinguish policy transfers according to recipient, and, finally, how to classify policies.

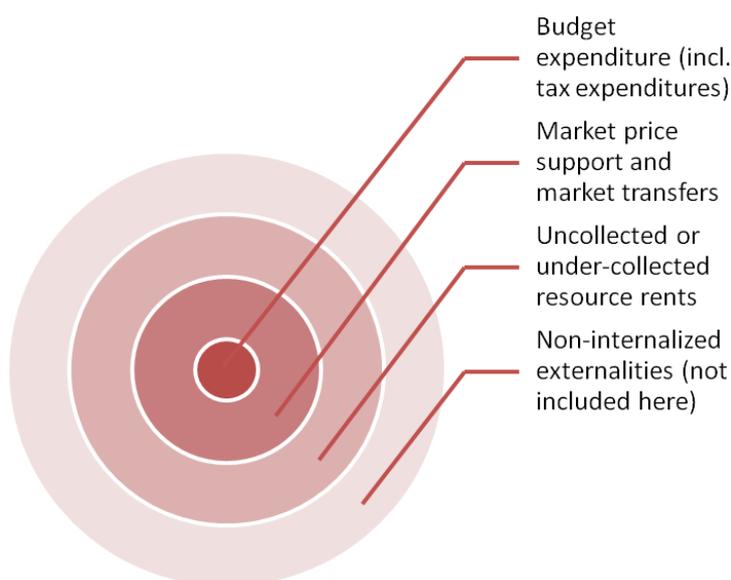
7. Part II details the methodology for calculating the indicators. Chapter 4 explains the method used to calculate transfers derived from policies that affect the market price received by producers of fuels and electricity. Chapter 5 focuses on other transfers, including budgetary payments to producers and support based on revenue foregone, notably tax and credit concessions. Chapters 6 and 7 show how these transfers can be assembled to calculate indicators of support to producers and consumers respectively. Chapter 8 details the calculation of indicators that measure support that is provided to producers or consumers collectively. Chapter 9 explains some of the issues that need to be considered when comparing support indicators across countries or aggregating them to obtain multi-country totals. Chapter 10 concludes Part II by outlining the data and information requirements for calculating the indicators of support.

## CHAPTER 2. OVERVIEW OF SUBSIDY DEFINITIONS AND INDICATORS

### 2.1. Definitions of subsidy

8. Dissimilarities in the concept, and therefore in the formal definition of a subsidy, arise largely from differences in the way the term has come to be used in everyday speech and by professionals working in separate economic and legal disciplines. Originally the term referred to funds granted to a king to supplement or replace customs duties and other taxes collected by royal prerogative (Looney, 1999). It has evolved since then to refer, in some definitions, to any unrequited financial assistance provided by a government. Through time, also, one can observe the gradual accretion of various types of policy-related transfers provided by governments and their agents, along with foregone revenues, to the more common notion of a subsidy as a direct government payment (Figure 1).

**Figure 1. Ever-widening definitions of “subsidy” or “support”**



9. Most of these additional elements are now reflected in the current definition of a subsidy given in the World Trade Organization (WTO) Agreement on Subsidies and Countervailing Measures (SCM Agreement), which was signed at the end of the GATT-sponsored Uruguay Round of multilateral trade negotiations. Although other inter-governmental bodies have developed their own, usually more succinct definitions of a subsidy (or, in the case of the OECD, “support”), the WTO’s definition currently serves as the definition of a subsidy formally agreed by the majority of governments in the world.

10. Article 1 of the WTO’s Agreement on Subsidies and Countervailing Measures defines a subsidy as involving “a financial contribution by a government or any public body within the territory of a Member (referred to in this Agreement as “government”) ... or price support in the sense of Article XVI of GATT 1994” that confers a benefit. Among the financial contributions covered by the definition are: (i) direct transfers of funds (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees); (ii) the foregoing or non-collection of government revenue that would otherwise be

due (e.g. fiscal incentives such as tax credits); and (iii) goods or services (other than general infrastructure) provided by a government in kind, or goods purchased from companies in a way that confers a benefit to that company (e.g., by paying a price that is higher than the market price). The definition also covers situations in which “a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments.”

11. The WTO definition excludes two forms of support: that part of market price support (MPS) — i.e., transfers between consumers and producers created as a result of one or more government interventions — provided through tariff and non-tariff barriers; and subsidies for general infrastructure. The first support element is not included in the ASCM definition for institutional reasons: tariffs and non-tariff barriers are normally addressed at the WTO through different disciplinary mechanisms than subsidies. The second exclusion is consistent with the focus of the WTO on the trade-distorting effect of measures. Subsidies to general infrastructure are presumed to have little specific adverse effects on a country’s trade. (Of course, subsidies for infrastructure may well have an impact on the consumption of energy, and therefore on emissions and other environmental effects.) The ASCM definition does, however, include non-economically justifiable discriminatory pricing of services from government-owned infrastructure as an input subsidy.

12. Only slightly more comprehensive than the WTO in its coverage is the notion of “support” included in the OECD’s subsidy indicator, the producer support estimate (PSE). The PSE incorporates all the types of subsidies covered by the ASCM definition, plus market price support in all its forms. An analogous indicator, the consumer support estimate (CSE) combines transfers affecting consumption.<sup>2</sup>

13. The measures that governments use to provide support vary enormously in terms of their mechanisms and design, reflecting diverse domestic political and economic settings and, increasingly, obligations in the international economic arena. Despite this diversity, policy measures applied in a country within a given period of time can be brought together and expressed in one or several simple numbers — called support indicators — which are comparable across time and between countries.

14. The notion that the “subsidy equivalent” values of transfers generated by different policies can be expressed in common units and combined into one aggregate indicator derives from the economic theory of protection developed in the 1960s to evaluate the effects of tariffs (Corden, 1971). According to this theory, the *producer subsidy equivalent of a policy measure*, whether an import tariff, export subsidy, payment per unit of output or per unit of input, is the direct payment that a government would have to make to producers (normalized to per unit of output) to generate the same impact on production as the policy measure in question. What practitioners eventually realized, however, was that in fact what was being measured were not true subsidy equivalents from the standpoint of the recipient, as the ultimate incidence — what percentage of a given transfer ends up in the pocket of the intended recipient — of different types of subsidies vary enormously. What was being measured, rather, was the gross cost to government or consumers (in cases where prices are artificially elevated). Hence the change in the name to *producer support estimate*.

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<sup>2</sup> The PSE-CSE framework is based on the framework preferred by many economists, the effective rate of assistance (ERA), which is structured so as to produce an estimate of the net government assistance to an industry or product that allows a comparison to be made between the value-added of the assisted sector to the value-added that would be generated by the same, but unassisted sector (at the world or reference price). The ERA takes into account not only support directed at an industry but the amount of support indirectly received, or the tax paid, by the industry through subsidies or taxes applied to supplies of inputs to the industry. A major limitation of the ERA is that it requires accurate data on value added, which can be difficult to obtain.

15. Besides differing in coverage, the way that individual subsidy elements are measured can also differ among practitioners. Desai and Lee (1997), in a guidebook for the Asian Development Bank (ADB), for example, make a distinction between “financial subsidies” and “economic subsidies”. They define a *financial subsidy* as “the difference between cost (financial outlay) and project revenue, where cost includes the actual incremental investment costs of the project plus the incremental operating and maintenance costs, as well as a return on capital equivalent to the cost of borrowing or a target financial return.” And they define an *economic subsidy* as “the difference between input costs and output prices, but with all input costs and output prices reckoned at their equivalent economic prices — i.e., reflecting their true opportunity cost.” The distinction between a financial and an economic basis for subsidy measurement can be illustrated more generally by the distinction between the cost to a government agency of loans it makes at interest rates reflecting its own cost of borrowing. Its net financial cost may be zero, but the economic cost (reflecting the difference between the market interest rate and the government interest rate) may be positive. The authors note that both measurement approaches have their uses and recommend that the ADB estimate both types of subsidies when evaluating projects in which they may invest.

16. The PSE and the various price-gap measurements of consumer subsidies that have been generated by the IEA, World Bank and others generally start from an opportunity-cost perspective. However, due to data limitations, it may not always be possible to know the opportunity cost of an input or an output, so the usual practice is for the financial cost to the government to be used instead.

17. What constitutes an economic approach to defining a subsidy is itself the subject of much debate among economists and those responsible for measuring subsidies. Donohue (2008: 6) writes:

Broadly speaking, subsidies can be seen in one of two ways: subsidies are given by governments or subsidies are given by society. Almost all subsidy definitions available in the literature could be seen as generally conforming to one of these perspectives on subsidies. ... An economic approach might be to define subsidies as “transfers that distort the allocation of economic resources” which would be a society-wide approach to defining subsidies. A more government-oriented approach might be to define subsidies simply as financial payments from governments to firms or consumers. ... The distinction between subsidies derived from government action, versus social subsidies, is profound, and includes many possibilities for refinement.

The etymology of the word “subsidy” clearly points to a definition that has historically been closely linked to the consequences of a government action. The notion of a “social subsidy” — costs paid incurred by society through not only taxes and higher prices, but also or instead through increases in costs not born by economic agents generating those costs — is a more recent idea, usually associated with environmental externalities. The inclusion of (negative) externalities in the definition of “subsidy”, however, changes the term from one linked not only to a government action, but also government *inaction*. That is to say, because externalities are intrinsic to virtually all economic activities, it would imply that somebody driving a diesel truck (and emitting particulate pollution and CO<sub>2</sub>) in a country in a state of anarchy was being “subsidized”. Moreover, since there is a great interest in the environmental effects of subsidies, particularly of fossil-fuel subsidies, including non-internalized externalities in the definition of a subsidy could lead to double-counting. Yet it is a nonsense to speak of externalities as subsidies causing environmental harm, as the environmental harm is already captured in the estimation of the externality.

18. Nonetheless, the basic argument, that when evaluating the impacts of government policies externalities should be considered alongside subsidies, is sound. In order to avoid confusion, however, the terms “subsidy” and “support” as used in this document refer to policy transfers resulting from government action only.

## 2.2. Overview of support indicators: key terms, definitions and distinctions

19. Energy policies may maintain domestic fuel prices below those at the country's border. They may provide direct payments to energy producers, or grant them tax and credit concessions. Support is not only comprised of budgetary payments that appear in government accounts, but also includes support of market prices, as well as other concessions that do not necessarily imply actual budgetary expenditure, such as tax concessions and investment insurance. The common element of all these policies is that they generate transfers to, or among, corporations and individuals that produce or consume energy.

20. The concept of a transfer presumes both a source of the transfer and the existence of a recipient. When analyzing support within a sector, consumers of commodities and taxpayers typically represent the two most important sources of transfers — i.e. the economic groups bearing the cost of sectoral support. However, in the case of energy, producers themselves may be a source of support, at least in the short or medium term. This occurs in situations in which a government restricts exports (thus denying producers opportunities to maximize their revenues), or when it caps domestic prices. However, often the producers involved are state-owned enterprises, which means that, ultimately, it is the government that bears any losses.

21. Critical to understanding the measurement of support based on transfers is the distinction between the notions of “the provision of support” and the “impact of support” (i.e., the impacts of policy transfers). Support estimates measure gross policy transfers only, i.e., the provision of support. They measure, in other words, the level of effort made by governments, as implied by their sectoral policies. The indicators discussed here do not account for the deadweight or other welfare losses associated with that effort within the economic system. Such information can only be derived through general equilibrium and partial equilibrium models.

22. The other important distinction is between initial incidence and final incidence. Support measurements are concerned with the initial (statutory, or formal) incidence of a transfer — to whom the transfer initially flows. However, as with taxes, a proportion of most transfers will leak to other economic agents. For example, only a portion of a policy that provides USD 100 million for an increase in the production of fuel ethanol will end up as extra producer net income, because that extra production will require the purchase of feedstock and other inputs, the prices of which may rise as a result of the induced demand. The actual impact of policies on its recipients will depend on, among other things, the basis upon which support is provided (e.g. per tonne of output, per unit of input, per producer or consumer, etc.), the level of support, and the responsiveness of producers and consumers to changes in the level of support.

23. The support measures themselves, therefore, are not intended to, nor do they in fact, measure the impact of policy efforts on production, incomes, trade or the environment. This limitation is crucial for understanding the proper use and interpretation of support estimates. Chapter 11 contains a detailed discussion of how the indicators should be used and interpreted, and concludes with examples of mistakes in interpretation that should be avoided.

## 2.3. Basic principles of measuring support

24. A number of principles, or general rules, are needed to guide the measurement of support. Those listed below are drawn from the only codification of principles that has been produced to date, as documented in the OECD's *PSE Manual* (OECD, 2009). Principles 1 to 3 determine the scope of policy measures to be considered in estimating support and provide criteria for identifying which policies to focus on within a complex mix of government actions. Principles 4 and 6 help to define the method for measuring support and are important for interpreting the indicators:

1. *Principle 1:* The generation of transfers to producers or consumers is a key criterion for the consideration of a policy in the measurement of support. Policy measures generate explicit or implicit transfers to supported individuals or groups. A sufficient criterion for inclusion of a policy measure in the estimation of support is that producers or consumers, individually or collectively, are the only, or the principal, intended recipients of economic transfers generated by the measure.
  2. *Principle 2:* In accounting for transfers, no consideration should be given to the nature, objectives or economic impacts of a policy measure. This principle complements Principle 1, in that the stated objectives, or perceived economic impacts of a policy measure, are not used as alternative or additional criteria to determine the inclusion or exclusion of a policy measure in the estimation of support.
  3. *Principle 3:* General policy measures available throughout the entire economy — such as general investment tax credits — are not considered in the estimation of support, even if such measures create policy transfers to or from the sector under consideration. Thus, a situation of zero support to the energy sector would occur when there are only general economy-wide policies in place with no policies specifically altering the economic conditions for energy production.
  4. *Principle 4:* Policy transfers can be defined in gross or net terms, i.e. as revenue (gross receipts) or income (revenue less costs) generated by a policy measure. The general practice is to measure transfers generated by policies in gross terms. The phrase gross transfers in the definitions emphasises that no adjustment is made in the indicators for costs incurred by producers in order to receive the support (e.g. costs to meet compliance conditions attached to certain payments), or extra taxes generated as a result of the activity.
  5. *Principle 5:* Policy transfers to individual producers are measured at the point that the product leaves the property of the production stage under investigation. If the objective is to measure support only to primary producers of energy, that would correspond to the mine or well-head. Consequently, the word “consumer” in the definitions and methodology, unless specified otherwise, is to be understood as a first-stage buyer of a fuel or electricity. However, it is important to underscore that most of the consumer subsidies to energy published to date have been measured at the level of the final, not the first, consumer.
  6. *Principle 6:* Policy measures supporting individual producers are classified according to implementation criteria, such as: (i) the basis upon which support is provided (a unit of output or of input, etc.); (ii) whether support is based on current or non-current production or consumption parameters; and (iii) other criteria. These policy characteristics affect producer behaviour, and distinguishing policies according to implementation criteria enables further analysis of policy impacts on production, trade, income, the environment, etc.
25. These are the general principles applied in estimating the indicators of support. Along with the more practical underpinnings of the methodology, they are developed further in the following chapters.

## CHAPTER 3. IDENTIFYING, DISTINGUISHING AND CLASSIFYING POLICIES

26. Before calculating the support indicators for any particular sector or country, it is important to understand fully the range of policy measures used by governments to support economic activities and the forms in which they are implemented.

27. The first section of this chapter defines the generic policy measures included in the measurement of support. The following section differentiates the policies according to which of the three economic groups the transfer is made. The remaining sections detail the various categories and labels that can be attached to policy measures.

### 3.1. Identifying support policies

28. The range of policy measures included in the estimation of government support are determined by the definitions and principles outlined in Chapter 2. In all cases, which government body is responsible for the policy measure giving rise to a transfer should have no impact on the decision of whether to include it or not. Policy measures supporting energy, for example, may fall under the responsibility of many different government ministries, and not just the ministry formally responsible for energy policy, and at different levels of government (central, provincial, prefectural or state). Alternatively, support arising from policies implemented by a ministry responsible for a sector, but unrelated to the activities of the sector being studied (*e.g.* agriculture or national defence), are normally excluded from the sectoral subsidy account.

29. Support provided to producers by governments may be delivered through a wide range of mechanisms: increasing the output price (Market Price Support); providing cash directly (a cheque from the government); reducing the riskiness of investing in fixed capital (*e.g.*, loan guarantee; investment insurance); foregoing a payment that would otherwise be due to the government (*e.g.*, a tax concession) or reimbursing a tax or charge (*e.g.*, as for fuel taxes in some countries); reducing the price of an input (*e.g.*, electricity for mining) or of a value-adding factor (*e.g.*, a wage subsidy); providing a service in kind (*e.g.*, police protection of a pipeline) for free or at a price less than the producer would pay on the open market; investing in knowledge-creating activities (*e.g.*, research and development; education and training of specialists).

30. Within the category of producer support, it may be useful to distinguish those forms of support that create transfers directly to individual producers from those that benefit producers as a whole. In the measurement of support to agriculture, for example, the OECD distinguishes policies that support producers individually (as measured by the PSE) or consumers individually (as measured by the CSE) from other policies that support producers or consumers collectively or indirectly (as measured by the GSSE). In the OECD's GSSE for agriculture, for example, the latter indicator encompasses two types of support measures:

- government expenditures associated with policy measures that are included in the PSE, but which are not received directly by farmers — for example, the cost to the government of storing and disposing of price-supported commodities by the government or an appointed agency; and

- services that benefit primary agriculture but whose initial incidence is not at the level of individual farmers — for example, agricultural education, research, marketing and promotion of agricultural goods, general infrastructural investment relating to drainage, and irrigation, and inspection services beyond the farm gate.

With respect to energy, analogous policies would be expenditures by governments on maintaining stockpiles of petroleum or coal, and expenditure on energy-related education, research, marketing and promotion, investment in general infrastructure relating to the transport of energy (but not predominantly energy), such as roads and railroads; and services related to the verification of the quality standards of transport fuels.

31. Regarding support benefitting consumers, policy measures that provide positive transfers to first consumers of energy include direct payments to final consumers for the purchase of fuels or electricity, and the value of transfers to consumers created through government interventions that artificially depress the domestic price compared with a reference price. In countries wherein the market price for energy is kept higher than the international reference price, it is not unheard of for governments also to provide payments to heavy industries (notably aluminium, cement, iron and steel plants) to offset those higher prices.

### **3.2. Distinguishing among policies according to economic group**

32. Identifying the full range of policies supporting a sector is largely a process of distinguishing between policy measures on the basis of which economic group receives the transfer. Three economic groups are identified, according to whether the policy measure provides transfers to producers individually (PSE), to consumers individually (CSE), or to one or the other collectively as general services (GSSE). Appropriately distinguishing between policies is important for correctly calculating the indicators that measure the level and composition of support. This process can be aided by the following sequence of questions.

33. *Question 1: Does the policy create a transfer to the sector collectively through general services?*

34. To answer in the affirmative, such transfers should not depend on the actions of individual producers or consumers, be received by individual producers or consumers, and not affect directly producer receipts or consumption expenditure. In answering this question, it may be useful to bear in mind the categories for classifying policies within the GSSE (section 3.3.3). If the answer is yes, consider the policy under the GSSE. If no, proceed to the next question.

35. *Question 2: Does the policy measure create a transfer to producers individually based on goods or services produced, on inputs used, or on the fact of being a productive enterprise?*

36. For a policy measure to be included in the PSE, it is necessary that an individual producer takes actions to produce goods or services, to use factors of production, or to be defined as an eligible producing enterprise, in order to receive the transfer. If yes, consider it under the PSE.

37. *Question 3: Does the policy create a transfer to or from consumers of the good or service?*

38. In the case of the CSE, it is necessary for individual consumers to take actions to consume a good or service in order to receive (or provide) a transfer. Examples of policies grouped in the CSE include consumption subsidies in cash or in kind to support consumption levels, and transfers to processors (first consumers) to compensate them for higher domestic prices. Note also that some policies that are grouped in the PSE also appear in the CSE (but with an opposite sign). These relate to the policies that create output price-based transfers. For example, a border tariff creates a price gap between domestic and world prices,

resulting in consumers paying a higher price for that product. This policy measure results in transfers from consumers to producers and from consumers to government revenue (sections 4.2 and 4.3 explain this in greater detail). If yes, consider it under the CSE.

39. The TSE represents the sum of all three components, adjusted for double-counting given that the transfers associated with market-price-support policies appear in both the PSE and the CSE calculations.

### **3.3. Classifying and labelling support policies**

40. The impact of policy measures on variables such as production, consumption, trade, income, employment and the environment depend on, among other factors, the way policy measures are implemented. Therefore, to be helpful for policy analysis, policy measures to be included in the PSE are classified according to implementation criteria. For a given policy measure, the implementation criteria are defined as the conditions under which the associated transfers are provided to producers, or the conditions of eligibility for the payment. However, these conditions are often multiple. Thus, the criteria used to classify payments to producers are defined in a way that facilitates: the analysis of policies in the light of the “operational criteria”. These should include both the transfer mechanism and the statutory incidence of the policy measures (i.e., the transfer basis for each policy). Additional “labels” may be added distinguishing whether the basis is current or non-current, and whether production or consumption is required or not. It is also often useful to distinguish whether constraints are placed on output levels or input use, whether the payment rate is variable or fixed, and whether the policy transfer is specific or not as to the commodities covered or excluded.

41. The key underlying principle is that policy measures should be classified according to the way they are implemented. Policy measures with an environmental focus illustrate the role of implementation criteria in the classification of support policies. Possible payments with an environmental objective include cost-sharing for the installation of pollution-control equipment, or alternatively could be provided per unit of emissions (e.g., to motivate an above-standard level of environmental performance). Although in both cases the payments may have the same environmental objective, the way that they are implemented differs, and the incentives provided to producers in terms of resource use and production decisions may differ. Accordingly, the two cases should not be considered within the same support category.

#### ***3.3.1 Policies that support producers individually (PSE)***

42. The categories and sub-categories listed in Box 1 have been constructed to identify the implementation criteria that are considered to be the most significant from an economic perspective. They identify:

- the transfer basis for support: output (category A), input (category B), receipts or incomes (categories C, D and E), and non-commodity criteria (category F);
- whether the support is based on a current (categories A, B, C, F) or non-current (historical or fixed) basis (categories D and E);
- whether production is required (categories C and D) or not (category E).

**Box 1. Terms and definitions of the PSE categories and sub-categories**

**A. Support based on commodity output:**

**A.1. Market price support (MPS)** — transfers from consumers and taxpayers to producers arising from policy measures that create a gap between domestic market prices and border prices of a specific good or service.

**A.2. Payments based on output** — transfers from taxpayers to producers from policy measures based on current output of a specific good or service.

**B. Payments based on input use: transfers from taxpayers to producers arising from policy measures based on the use of specific inputs:**

**B.1. Variable inputs** — transfers reducing the cost to a producer of a specific variable input or a mix of variable inputs, such as energy, water or chemicals.

**B.2. Fixed capital formation** — transfers reducing the investment cost of buildings, equipment.

**B.3. Services** — transfers reducing the cost of services (e.g., business services, training services) provided to individual producers.

**B.4. Labour** — transfers reducing the cost of employed labour, such as through wage subsidies or reductions in social charges.

**B.5. Land** — transfers reducing the cost of purchased or rented land.

**C. Transfers from taxpayers to producers arising from policy measures based on current receipts or income, with current production of one or more goods or services required.**

**D. Transfers from taxpayers to producers arising from policy measures based on non-current (i.e. historical or fixed) receipts or income, with current production of one or more goods or services required.**

**E. Transfers from taxpayers to producers arising from policy measures based on non-current (i.e. historical or fixed) receipts or income, but production of a good or service is not required.**

**F. Payments based on non-commodity criteria: transfers from taxpayers to producers arising from policy measures based on:**

**F.1. Long-term resource retirement** — transfers for the long-term retirement of factors of production from commodity production. The payments in this subcategory are distinguished from those requiring short-term resource retirement that are based on production criteria.

**F.2. A specific non-commodity output** — transfers for the use of resources to produce specific non-commodity outputs of goods or services that are not required by regulations.

**F.3. Other non-commodity criteria** — transfers provided equally to all producers, such as a flat-rate or lump-sum payment.

**G. Miscellaneous payments: transfers from taxpayers to producers for which there is insufficient information to allocate them to the appropriate categories.**

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1. The abbreviations represent: A – Area; R – Receipts; and I - Income

43. In addition to classification into a category, each policy measure can be assigned several “labels” that provide additional details on policy implementation (Box 2). The six labels contain information on the constraints placed by policies on output and payment levels or input use, further specify the basis of transfer, its commodity specificity and variability of payment rates. The alternatives offered by each label are exhaustive, so that only one of the available options can be attributed to a payment.

#### Box 2. Common PSE labels

**With or without current commodity production limits or limits to payments (w/ L or w/o L):** defines whether or not there is a specific limitation on current production associated with a policy providing transfers to producers. Applied in categories A – F.

**With variable or fixed payment rates (w/ V or w/ F rates):** a payment is defined as subject to a variable rate where the formula determining the level of payment is triggered by a change in price, net revenue or income or a change in production cost. Applied in categories A – E.

**With or without input constraints (w/ C or w/o C):** defines whether or not there are specific requirements concerning production practices related to the programme in terms of the reduction, replacement, or withdrawal in the use of inputs, or if restrictions are imposed on production practices allowed. Applied in categories A – F.

- Payments conditional on compliance with basic requirements that are mandatory (with mandatory);
- Payments requiring specific practices going beyond basic requirements and voluntary (with voluntary).

**Based on receipts or income (R or I):** Applied in categories C – E.

**Based on a single product, a group of products or all products (SC, GC, AC):** defines whether the payment is granted for production of a single product, a group of products or all products. Applied in categories A – D.

44. Distinction between the terms “PSE category” and “PSE label” is a matter of presentation convention. Labels only represent additional dimensions in which the PSE can be broken down and, like the PSE categories, are defined in terms of implementation criteria rather than policy objectives. Labels can be used as an alternative presentation of policy implementation; they also could theoretically be presented as PSE sub-categories or sub-sub-categories. However, not all labels are applicable to all PSE categories (A to F). For example, a label distinguishing payments based on area, receipts or income is by definition redundant for policies in categories A (Support based on commodity output) and B (Payments based on input use). Other labels could be introduced and presented as sub-categories if policy developments warrant the change. In designing the structure of a PSE database, the choice between treating a particular implementation criterion as a sub-category or a label is one of relative importance and pragmatism, rather than a conceptual difference between these two options.

45. The label “with or without current commodity production limits or limits to payments” relates, for example, to a production quota associated with policy measures in category A. The label also applies to policy measures that restrict the payment as such, either by explicitly setting a maximum amount of payment, or by limiting the number of production units that may receive payment. For example, a programme that provides a payment only on the first 60 million litres produced in a given year is labelled as having a payment limit since payments cease beyond that output limit.

46. The label “with or without input constraints” serves to distinguish all PSE transfers (except those in category A.1) that can be provided under the condition that producers respect certain production practices considered as environmentally friendly, or which address other societal concerns. A further

distinction could be made between mandatory and voluntary input constraints. The former would include requirements that relate to a generally applicable regulations, while the latter would go beyond general regulations and are adopted by producers voluntarily.

### ***3.3.2 Policies that support consumers (CSE)***

47. The CSE includes price transfers to or from consumers. The normal case, especially in countries that are net exporters of fossil fuels, is that transfers are made *to* consumers through administered pricing. These transfers may exist alongside other subsidies in cash or in kind (including vouchers) linked to the consumption of a particular energy product. As with production subsidies, limits may apply that restrict the amount of subsidies that an individual or household may receive. This suggests that the labels **With variable or fixed payment rates (w/ V or w/ F)** and **Based on receipts or income (R or I)** may apply.

48. When consumers pay more than the reference price for a fuel, such as because of an import tariff, market transfers can be considered the inverse of transfers associated with market price support for the production of commodities that are consumed domestically; these are called price transfers *from* consumers. These transfers are the same as those included in the PSE under category A.1 Market Price Support, but they are given an opposite sign in the CSE and adjusted to apply to quantities consumed (as opposed to quantities produced in the PSE).

49. Sometimes, when domestic prices are above international prices, budgetary transfers may be provided to first consumers of energy products where these are provided specifically to offset the higher prices resulting from market price support. An example would be payments made to industrial consumers of coal who pay the guaranteed minimum price to producers. Another example might be a price premium for locally produced coal.

### ***3.3.3 Policies that support producers or consumers collectively (GSSE)***

50. Transfers classified under the GSSE relate primarily to payments to eligible private or public services provided to producers or consumers generally. Unlike the PSE and CSE, GSSE transfers do not directly affect producer revenue or expenditure by consumers, although they may affect production or consumption of energy products in the longer term.

51. While implementation criteria are used to distinguish whether the transfer is allocated to the GSSE or another category, the definition of the categories in the GSSE and the allocation of policy measures to these categories largely depends on the nature of the service. Common GSSE categories are listed below.

52. *Research and development.* This category includes payments to institutions for research related to energy-production or transformation technologies and production methods. In most cases, these payments include the financing of public research institutions (mostly through the budget of the ministry of energy), as well as grants financed by public funding provided to private research institutions and universities.

53. *Inspection services.* This category includes payments to finance institutions for the control of fuel quality and safety for consumers. In most cases, these services are financed by public (governmental) organisations, and hence the budgets of these organisations are included in the GSSE. Should these services be provided by private institutions, the GSSE should account only for the amount of public finance granted to these institutions.

54. *Infrastructure.* This category includes public expenditure financing the development of infrastructure that is not for the exclusive use of domestic producers. Special care should be given to distinguish support between specific and non-specific infrastructure. For example, government support for

the construction of dedicated petroleum or natural-gas pipelines should be included in the PSE, as direct investment assistance.

55. *Marketing and promotion.* This category includes forms of government assistance to increase sales of primary energy commodities, such as exhibitions, fairs, promotional campaigns, advertising, and publications.

## **PART II. CALCULATING SUPPORT INDICATORS**

### **CHAPTER 4. ESTIMATING POLICY TRANSFERS: PRICE TRANSFERS**

#### **4.1. Price transfers arising from policy measures**

56. Numerous government policy measures may affect the domestic market price of a good or service, including measures imposed at the border, such as tariffs and export subsidisation, and quotas on imports or exports. In the case of domestic market interventions, such as direct price administration and publicly financed stockholding, they can also involve transfers to or from the government budget, which have implications for taxpayers. Indeed, when consumer prices are subsidized, the gap normally has to be made up by the government in one form or another.

57. All these policy interventions alter the domestic market price of a product compared with its border price. This policy-induced price difference can be denoted as a market price differential (MPD):

$$MPD = DP - BP \quad [4.1]$$

where: *MPD* is the market price differential, *DP* is the domestic market price, and *BP* is the border (or reference) price.

58. The MPD is negative when the net effect of policies is to induce a lower domestic market price, thereby encouraging consumption but discouraging production. It is positive when the policy induces a higher domestic market price, thereby supporting production and, in the absence of other market interventions, discouraging consumption. In the former case, policies place a tax on producers, and price transfers to producers are designated with a negative sign. For a diagrammatical exposition of these effects, see the *PSE Manual* (OECD, 2009).

59. Price transfers are the affected produced or consumed volume multiplied by the *MPD*, adjusted as necessary for quality differences and transport margins (see below). In the OECD's terminology, price transfers to producers are called market price support (MPS) and price transfers to consumers are called market transfers (MT). The same terminology is used here.

#### **4.2. Selecting and adjusting prices**

60. The common approach to calculating an MPD for a commodity is to measure the difference between a domestic market price (when there are policies that are known to distort domestic prices) and a border price that represents the opportunity price (cost) for domestic market participants. The practice of using reference prices based on international prices for traded goods derives from arguments of opportunity cost. For an importing country, the true cost of a product is its import price. For an exporting country, the true value of production at the margin is what its producers could obtain on the international market. Even if the country can produce at a cost that is lower than the international price, according to this logic, domestic production should be valued at the international price rather than at domestic supply costs.

### Box 3. Using a "neutral" baseline counterfactual

Subsidies must be measured against some baseline, some counterfactual situation. Neil Bruce, in a conceptual study that he wrote for the OECD (Bruce, 1990), advised that subsidies should “be measured with respect to a counterfactual environment in which they do not exist, rather than as the deviation of the subsidy from its optimal value.” In fact, many renderings of what that “counterfactual environment in which subsidies do not exist” might look like can be constructed.

When economists take numbers for budgetary grants and loans straight out of budget documents, and arrange them in subsidy accounts, the baseline they are implicitly using to define the subsidy is a very similar world but for one difference: the particular programme providing the subsidy does not exist. Yet the net value of such subsidies to the recipients will be to some extent offset by the increased taxes required to finance them. Adjusting subsidies to account for this effect would be impractical, and the results within the margin of error for the gross (unadjusted) subsidy. But, the theoretical point is worth bearing in mind when analysing the effects of large-scale changes in a country’s pattern of taxing and spending.

Things become more complicated when one applies a price-gap method to measure transfers generated by border protection (i.e. market-price support), or the value to users of under-priced goods or services provided by governments. That is because one of the variables, the reference price, would likely adjust to a new equilibrium in the absence of the policy that gives rise to the price gap being measured. If the government of a country that was a large producer of wheat, for example, were suddenly to announce that henceforth all border protection and export subsidies would disappear, that countries’ exports would drop in the short term and the reference price (usually the price at the border) would presumably rise.<sup>1</sup> The “true” value of the subsidy, to critics of the simple price-gap method to measuring market-price support, should thus be measured against the new equilibrium price, not the reference price prevailing while the price-support policy is in place. A similar argument is often used by beneficiaries of government programs to justify “offsetting” subsidies or tariffs when overseas competitors are blamed for distorting prices in world markets.

This line of reasoning holds considerable appeal, and it cannot be faulted for being “wrong” in any economic sense. But, from a practical standpoint, it raises numerous problems. First, if it is to be followed for the calculation of market price support, then to be consistent it must also be followed in the calculation of direct payments to producers that are tied to a predetermined target price — what in agricultural policy are referred to as “deficiency payments”. That is to say, in that parallel universe in which no deficiency payments are given, production of the affected commodity would have been less, its price higher, and the required deficiency payment would have been smaller. Why stop there? Should we not also take into account the simultaneous effects of all the other subsidies that influence production and consumption levels?

Extending this logic to its inevitable end, one could make an argument for defining the counterfactual for subsidy measurement to be a world in which all subsidies, everywhere, are removed. Measuring subsidies against such a standard could only be done with the help of a computable general equilibrium (CGE) model, and a very detailed one at that. As Bruce (1990) wrote, “Determining the hypothetical output and input prices in the economy in the absence of a government sector constitutes a major computational general equilibrium exercise, and even if this were done, the results would be subject to so much uncertainty that they would be of little interest.” Granted, CGE models have advanced since 1990, but redefining subsidies as welfare effects, without going through the intermediate step of documenting the actual transfers, would sever any link they once had with observable data (such as expenditures published in budget documents) and render them irrelevant for monitoring budgetary impacts and other transfer-related purposes.

1. This outcome would be even more likely were all producing countries to reform their policies altogether and at once.

Source : Steenblik (2003)

61. While the method for estimating a market price differential is, in principle, straightforward, differences of opinion exist among analysts as to what reference price to use. Countries with large endowments of energy resources, in particular, point to the fact that international prices may not represent true opportunity costs, as a large shift in sales from a (previously subsidized) domestic market to the international market would likely depress international prices. Moreover, international prices may be

distorted by a variety of factors and can experience a high degree of volatility from one year to the next. Analysts need to be aware of these limitations when using and interpreting the resulting estimates (Box 3).

62. Although, conceptually, the measurement of price transfers is straightforward, numerous practical issues arise. Generically, these include (Plunkett et al., 1992):

- Ensuring that the products being compared are as alike as possible, or that their prices can be adjusted to account for quality differences.
- When the price comparison involves a weighted average of several price series for a particular product, ensuring that the product(s) chosen for establishing a reference price are representative of the locally produced or consumed product.
- Ensuring that the prices being compared are normalized to the same location, or can be adjusted to take account differences in location, value-added level, and that they reflect the same ancillary services or conditions of sale.

63. For traded goods, where there are no import or export restrictions, the favoured choice of reference price is usually an international price at the border, adjusted for transport and internal distribution costs. For goods that are not traded, the reference price is typically the domestic cost of supply. In the case of energy, the main products that are traded internationally are anthracite, bituminous (hard) coal, crude oil, petroleum products, and liquid biofuels, namely ethanol, biodiesel (and possibly, in the future, synthetic paraffinic kerosene or “bio-jet” fuel). Some cross-border trade in electricity and natural gas occurs, mainly in Europe and North America, but a large number of national markets for these energy carriers are, essentially, isolated. Similarly, though small volumes of peat and lignite briquettes are traded, the bulk of peat and lignite consumed in the world is produced and consumed locally.

### ***Internationally traded commodities***

#### *Selecting a domestic price*

64. When making price comparisons for exported or import-competing products, the standard practice in agriculture has been to measure the domestic price of a product at the point that it leaves the producers’ property. In the case of energy products, the corresponding “factory-gate prices” would be located as follow:

- *Bituminous coal and anthracite:* at the mine-mouth
- *Crude petroleum:* at the well-head
- *Petroleum products:* the refinery gate (the ex-refinery price)

Where producer prices have not been available, analysts have made comparisons on the basis of average wholesale or consumer prices.

65. However, in the field of energy, the domestic prices used for most MPD comparisons of traded products have been either the price between producers and major industrial or power-plant consumers (in the case of coal), which may be a “factory-gate” or a delivered price, or a final consumer price.

*Selecting a border price*

66. A number of border prices and alternative methods for estimating them may be used to calculate MPDs. The choice of a border price for a given commodity in any country is determined by factors such as market structures, specifically the net trade position of the commodity concerned, and data availability. The net trade situation is defined by comparing total domestic consumption and production of the commodity. If the country is a net exporter of the commodity, the most appropriate border price is an *FOB* unit value.<sup>3</sup> The FOB value may be either an annual average of a specific *FOB* quotation price or the annual average unit value of exports of the commodity (*i.e.* total value of exports divided by total quantity). An FOB value may correspond to different levels of tariff aggregations. If so, care needs to be taken to ensure that prices and quantities relate to a common unit for calculating an average unit value. It is preferable to choose the tariff lines for the least transformed products. If trade in these products is small, then more traded tariff lines may be used.

67. If the country is a net importer of the commodity, and if imports are regular and of a reasonable quantity, then the most appropriate border price is a *CIF* value for imports into that country.<sup>4</sup> (When there is no trade because the commodity, tradable in principle, is highly protected, the country is treated as a net importer.) This can be either the annual average CIF unit value for imports of the commodity or products derived from the commodity, or an annual average of a specific CIF quotation price. As in the export case, it is preferable to choose the tariff lines for the least transformed products and, if trade in these products is small, more traded tariff lines are to be used. However, if imports are irregular or insignificant in quantity, other sources for prices need to be investigated. Similarly, if imports vary in quality from one year to the other, or are very different from those produced in the country, the unit value of imports should be avoided.

68. If unit values are difficult to obtain, the level of the import tariff may serve as a proxy. However, caution should be used when import tariffs are high. Often, as in agriculture, tariffs only partially explain higher domestic than reference prices. And in some cases the tariff may be higher than the actual percentage gap between the domestic price and the international price. But in the case of traded fossil fuels, at least coal and petroleum fuels, the import tariff is probably a good (and easily measured) proxy for estimating market price support. The main problem is that because a country's imports may be easily satisfied by countries with which it has a free-trade agreement, the MFN tariff may not be binding, and therefore not actually serving to raise the domestic price above the international reference price.

69. Adjustments to the border price may also have to be made to translate what is essentially a wholesale price (imports or exports in bulk) to the price that the product would fetch at the retail level. Whatever location in the supply chain is chosen as the price point, other adjustments may be required to take into account quality differences between the domestically produced and reference commodity, and in the type of transactions underlying the observed prices. These adjustments are discussed briefly below.

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<sup>3</sup> FOB stands for Free on Board. It is the cost of an export good at the exit point in the exporting country, when it is loaded in the ship or other means of transport in which it will be carried to the importing country. See next footnote for CIF.

<sup>4</sup> *CIF* stands for Cost, Insurance and Freight. It is the landed cost of an import good on the dock or other entry point in the receiving country. It includes the cost of international freight and insurance and usually also the cost of unloading onto the dock. It excludes any charge after the import touches the dock, such as port charges, handling and storage and agents' fees. It also excludes any domestic tariffs and other taxes or fees, duties or subsidies imposed by a country-importer.

*Quality differences*

70. The domestic market and border prices used to estimate the MPD should represent products of similar quality. In the case of fossil fuels, quality relates to such product attributes as impurities (e.g., ash and sulphur), moisture level, and heating value. Some of these product differences are intrinsic, and some will vary according to the degree to which the product has been processed. For example, internationally traded coal generally undergoes more cleaning to remove extraneous matter than does coal used in a power plant next to a mine. Differences in these attributes can cause price differentials independent of government policies. Where quality differences exist, the measured MPD should be adjusted so as to eliminate that element of the price difference arising from quality differences. The way in which the adjustment is carried out largely depends on the type of quality characteristics affecting the price levels, and data availability.

*Differences in contract basis*

71. Among traded energy commodities, major differences exist in the way that they are sold. In the case of petroleum products, large volumes are sold on exchanges or spot markets, and over the course of a year in countries without government interference in price formation end-user prices will closely track movements in spot prices.

72. In the case of coal, however, a large share of the transactions, both within countries and between countries (especially between coal producers and electric power generators), take place either under long-term contracts, with varying degrees of periodic adjustments to reflect changing market prices, or within vertically integrated entities. Generally, these prices are not published. This means that published domestic prices (mainly spot or short-term prices) may diverge considerably from actual average prices actually paid for coal. Similarly, if a large percentage of exports or imports are sold under long-term contracts, average export or import unit values may differ considerably from published domestic prices.

*Non-traded commodities*

73. Most developing countries, and even many developed countries, do not trade electricity or natural gas with other countries. This is also the case for coal in a few countries. When making price comparisons for products that are not traded, the standard practice has been to construct a reference price based on the cost of domestic supply.<sup>5</sup> Such calculations have generally been used only to measure MPDs where transfers to consumers are suspected; nevertheless, the same principles can be applied to measure MPDs for the estimation of market price support to producers.

74. In contrast with traded goods, no adjustments need be made to the “reference” or observed prices to account for quality differences, contract differences, or transport margins. That is, the reference price and the actual price relate to idealized supply and the actual product supplied at the identical location. However, the particular nature of grid-based energy and its commercial arrangements leads to other adjustments that may need to be taken into account, especially when examining subsidies provided to specific end-user groups (e.g., electricity used for irrigation or natural gas for glasshouse heating).

75. Practices regarding the choice of reference price differ; that used by the IEA in its past calculations has been based on the estimated long-run marginal cost (LRMC) of delivering electricity to end users, whereas those of the World Bank and the IMF (Ebinger, 2006) have been based on the average cost of production (ACP), including necessary maintenance and replacement of depreciated capital. ACP is generally a lower benchmark for a pricing policy than LRMC.

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<sup>5</sup> Where substantial electricity can be traded, the border price should be used in calculations of subsidies.

#### ***4.1.1 Price transfers to producers***

76. The Market Price Support (MPS) for a commodity is estimated by adding together transfers to producers from consumers and taxpayers, alternatively found by multiplying the quantity of production by the MPD. MPS is defined as: the annual monetary value of gross transfers from consumers and taxpayers to producers, measured at the producer property, arising from policy measures that support producers by creating a gap between domestic market prices and border prices of the specific commodities.

#### **4.2 Price transfers to or from consumers**

77. Policies that affect prices for specific commodities may give rise to transfers to or from consumers, depending on whether the consumer prices are, respectively, lower or higher than the reference price. In the case of final consumer prices, the cause of the higher prices may be an excise tax on the product, or it may be the result of some combination of border protection (import quotas or tariffs) or administered pricing decision. However, the PSE-CSE framework is based on the assumption that the producer prices and the consumer prices are measured at the same point. In the following discussion of price-measurement methods used currently, it is important to bear in mind that what is being measured is not necessarily the price gap that would be measured if the reference point were the first sale of the commodity in question. It would be only if there were no government interventions between the point of first sale and the final consumer, and price transmission between those levels was perfect.

##### ***4.2.1 Calculating price transfers to consumers based on the price gap method***

78. The IEA analysis of consumption subsidies carried out for the June 2010 report to the G-20 Leaders is based on a price-gap approach. For a given product, the IEA measured the difference between a reference price and the actual retail (end-use) price. For net importing countries, reference prices were based on the import parity price: the price of a product at the nearest international hub adjusted for quality differences plus the cost of freight and insurance to the importing country, plus the cost of internal distribution and marketing and any value-added tax (VAT). For net exporting countries, reference prices were based on the export parity price: the price of a product at the nearest international hub adjusted for quality difference, minus the cost of freight and insurance back to the exporting country, and plus the cost of internal distribution and marketing and any value-added tax. To evaluate the subsidies for fossil-fuel inputs into the power-generation sector, electricity reference prices were based on annual average-cost pricing for each country (weighted by the levels of output of each generating option). These were determined using reference prices for fossil fuels, annual average fuel efficiencies, and transmission and distribution and other costs. To avoid over-estimating subsidy levels in the power-generation sector, electricity reference prices were capped at the levelized cost of a combined-cycle gas turbine (CCGT) plant.

##### ***4.2.2 Alternative methods for calculating consumer subsidies***

79. In many countries, particularly poor countries, estimating consumer subsidies by considering only final sales at official prices fails to count energy that is consumed but not sold, either because of chronic non-payment or under-payment by some users who continue to be served, theft via illegal connections, or meter tampering by registered users. Such losses are most common for electricity, but also for natural gas, and occasionally also coal and petroleum products.

80. These types of losses are captured in the measurement of so-called *hidden costs*, in a method pioneered by Ebinger (2006) and Saavalainen and ten Berge (2006) to take into account excess costs of producing electricity or natural gas that are not covered by sales revenues. The method also accounts for

physical (technical) losses in transmission and distribution in excess of that which would be experienced by a well-run company. However, such technical losses are not properly counted as consumer subsidies.

81. In 2006, the World Bank estimated the hidden costs of providing electricity in Eastern European and Central Asian (ECA) region, where policies often ensure universal access to electric power regardless of cost. Electricity tariffs set at below cost-recovery rates in the ECA region were found to account for 67% of aggregate hidden costs, followed by unaccounted losses at 22%, and poor collections at 11%. High hidden costs were estimated to represent on average 4% of GDP, but some countries were well above 10% of GDP. A similar exercise undertaken for 21 countries in Sub-Saharan Africa confirms that under-pricing accounts for a majority (about 50%) of the aggregate hidden costs, with the rest divided roughly evenly between distribution losses and revenue under-collection. In the worst cases, under-pricing can result in utilities capturing less than half the revenues they need and create an economic burden in excess of 2% of GDP (Briceño-Garmendia et al., 2008).

82. All of these losses reduce revenues relative to costs and have to be covered financially by the gas or electric utilities by some combination of an explicit subsidy paid to the utility and an implicit subsidy in which the utility is left to bear the revenue shortfall (World Bank, 2010 forthcoming). The discussion that follows focuses primarily on electricity.

83. The hidden cost is the difference between the revenue that the utility would receive were it to operate efficiently, with normal losses and with full bill collection, charging cost-recovery tariffs. Using these values the hidden cost calculator equation is expressed as

$$H = Q_e (T_c - T_e) + [ Q_e T_c (\lambda_m - \lambda_n) / (1 - \lambda_m) ] + Q_e T_e (1 - R_{ct}) \quad [4.2]$$

where

$H$  = hidden cost

$Q_e$  = end-user consumption volume

$T_c$  = average cost-recovery price at a technical loss rate of  $\lambda_n$  and full bill collection

$T_e$  = weighted average end-use tariff

$\lambda_m$  = total loss rate

$\lambda_n$  = normative loss rate

$R_{ct}$  = bill collection rate.

84. The three terms of hidden costs are the sum of the under-pricing effect, the unaccounted loss effect, and the collection failure effect. To calculate the hidden cost, data from utility performance for a country are required. Actual end-use tariffs, loss rates, bill collection rates, and energy sent out are usually collected and are updated on a yearly basis. The two factors that are not readily available are the normative losses and the cost-recovery price. The former may be taken from international norms, making allowance for the nature of the system. For example, data published by the World Bank (2009a) indicate that transmission and distribution losses (including theft) in 2006 averaged 6% of output in high-income countries and 12% in middle-income countries. By contrast, South Asia averaged 24% and Latin America and the Caribbean averaged 16%. Ebinger (2006), in the analysis of 20 countries in Eastern Europe and Central Asia (ECA), and Briceño-Garmendia et al. (2008) in an analysis of 21 SSA power utilities suggested that 10% could be taken as normative for power (and 2% for gas) in the absence of other information.

85. The determination of the cost-recovery tariff is based on the costs of supply, assuming normative losses, and includes maintenance and repair costs but not costs of capacity expansion. In this respect it is not the true long-run marginal cost of supply, but rather the short-run average cost. These costs were estimated in the above two World Bank studies by country specialists with knowledge of the individual power systems and access to utility data.”

## CHAPTER 5. ESTIMATING OTHER TRANSFERS

86. This chapter completes the discussion of policy transfers, focusing on transfers that emerge from policies other than those affecting market prices for fuels or electricity. These policies provide support based on: (a) actual budgetary transfers; and (b) revenue foregone by the government and other economic agents.

### 5.1. Budgetary transfers

87. Budgetary transfers are the most “visible” policy transfers. They are observed and do not need to be estimated, unlike the case with the price transfers or support based on revenue foregone. The measurement of direct budgetary transfers is therefore largely an accounting task, which consists of the appropriate use of information on budgetary spending.

88. The first step when accounting for budgetary subsidies is to identify all budgetary expenditures underlying policies which support production or consumption — whether provided to producers or consumers individually or collectively. The principle of complete identification of all publicly financed transfers has several aspects (OECD, 2009):

- All financing through public institutions involved should be captured, paying attention to the fact that implementation and funding of some energy-related measures may be outside the remit of energy ministries. This often concerns government expenditure on education, research, or infrastructural development. Another example is environmental measures, such as expenditure on rehabilitating coal mines, which may be implemented by and financed through the ministries and agencies specifically responsible for environmental issues.
- Ideally, expenditure by all administrative levels of government should be counted. Policy measures are typically financed at multiple levels of government. For example, in a country with a federal government structure, support is likely to be provided the state, province or prefecture level (by convention, referred to as sub-national governments), and even communes or townships, as well as by the central government. Among EU Member states, some EU-wide policies are co-financed across several levels of government, with the EU budget financing part of the costs of a programme, augmented by expenditure from an EU country government’s budget, with the possibility of additional expenditure by a regional or local government entity within that country.
- All public finance instruments should be covered. In some countries, support for energy may be financed from so-called extra-budget funds – instruments which do not formally constitute part of the national budgets. Such funds may be created at the national or regional level and are usually used for implementation of specific programmes.
- When producing estimates for historical periods, data on effectively disbursed — as opposed to planned or budgeted funds – should be used. The principle is to capture actual transfers, where possible. The difference between budgeted and effectively disbursed outlays can be large, for example when emergency assistance is provided over and above the initial budget appropriation, or when a sudden and unintentional fuel-price movement leads to considerable under- or over-

spending compared with the initial allocation. It is important to ensure that all spending items are accounted for consistently in terms of amounts effectively disbursed. However, if the estimations are done on an annual basis, such information may not be available in time for the latest year, in which case data on budgeted expenditures are usually used, which should then be adjusted the following year to reflect actual spending.

89. The terms “budgetary expenditures” and “on-budget costs” are actually not precisely defined, and practices differ among governments, especially in respect of tax expenditures and credit-related support. Almost all governments report direct outlays in their budgets. These can include production bounties and deficiency payments, grants to cover losses incurred by state-owned enterprises, subsidies for intermediate inputs, capital grants, interest subsidies, wage subsidies, expenditure on research and development, and consumer subsidies. Some countries’ budget documents also report tax expenditures alongside normal expenditures, though most report tax expenditures in separate accounts. A few report the subsidy element of loans, loan guarantees, investment insurance, and other interventions in the credit market. Others report the full (face) value of loans in the year that they are paid out, and repayments of the loans as revenue in the year in which these payments are received.

90. Because of the varying practices in the treatment of credit-related support measures in government budgets, the following discussion of “budgetary transfers” is concerned only with government expenditure provided in the form of direct payments and grants.

#### ***Government grants related to assets***

91. Governments often grant money to private corporations in order to help them acquire assets. In the energy sector, an example would be a grant to help fund the construction of a power plant that incorporates certain innovations. The International Accounting Standards Board (IASB, 2009), in its *International Accounting Standard 20*, defines *grants related to assets* as:

... government grants whose primary condition is that an entity qualifying for them should purchase, construct or otherwise acquire long-term assets. Subsidiary conditions may also be attached restricting the type or location of the assets or the periods during which they are to be acquired or held.

92. The simplest form of grant is one that only requires that the long-term assets be acquired. Some governments also provide *reimbursable grants* — a grant that is required to be reimbursed by the beneficiary if the project turns out to be commercially successful. Unlike a conditional loan, a no interest cost is added to the amount that has to be reimbursed. In the case that the grant is reimbursed, it should be treated as an interest-free loan; otherwise, it should be treated like a normal grant related to assets. However, a reimbursable grant related to the acquisition of assets should be recognized and counted as a grant only once: (a) the grant is received; and (b) there is reasonable assurance that the recipient will not satisfy the conditions requiring it to reimburse the grant.

93. Accounting principles dictate that grants related to assets should be treated differently from other forms of grants. The IASB’s IAS-20 recommends that grants related to depreciable assets be recognised in corporate profit-and-loss statements over the periods and in the proportions in which depreciation expense on those assets is recognised. This suggests that, in subsidy accounting, the value of a grant should also be apportioned over a similar number of years, and not allocated in its entirety to the year in which it was granted. IAS-20 also points out that, to be consistent, grants related to non-depreciable assets, such as land, if they also require the fulfilment of certain obligations, should also be recognised in profit or loss over the periods that bear the cost of meeting the obligations. For example, a grant of land may be conditional upon

the erection of a plant or other building on the site; in such cases, it would be appropriate to recognise the grant over the same period as the expected economic life of the building.

### *Adjustments*

#### *Administration costs*

94. The treatment of administration costs — those costs associated with the design, implementation and evaluation of policies — requires some judgement. Generally, the convention when estimating subsidies to either producers or consumers is to ignore general administrative expenditures by ministries, including staff salaries, material, building and other costs. The rationale is that such expenditures are common to any public structure and are not policy transfers as such. Similarly, payments to banks, insurance companies, producer organisations and welfare agencies to cover their costs associated with implementing support policies are usually not counted as support to producers or consumers. It may be worthwhile, nonetheless, to create a separate set of accounts of administrative costs if they are significant.

95. How the salaries and wages of those employed in research, inspection, and other government services should be counted depends on how they are itemized in government budgets. Sometimes the policy expenditures associated with the delivery of the service (which usually comprises mainly the salaries of the advisors, inspection officers, researchers, and so forth) are itemized under separately identified programmes. In other cases, estimating the value of these services by comparison with similar services provided by the private sector may be required.

#### *Avoiding double-counting of support*

96. In working with budgetary expenditures, special care should be taken to avoid double-counting of support. This risk exists when budgetary expenditures underlie support which has already been included elsewhere in the accounting. The clearest example is budgetary expenditures related to domestic price interventions on the supply side. Several such expenditures can be distinguished: (a) intervention purchases; (b) export subsidisation (generally not an option for WTO Member economies); (c) price subsidies (deficiency payments); (d) payments for on-site stockholding; (e) outlays for public stockholding, which include operational costs of public purchasing agencies and depreciation and disposal costs associated with holding public stocks; and (f) compensatory payments to consumers, e.g. subsidies to the industrial or commercial purchasers of fuels to reduce the burden imposed on them by market price support.

97. When the Market Price Differential (MPD) and consequently the price transfers are estimated by comparing domestic and border prices, outlays for intervention purchases (group (a) above) or export subsidies (group (b)), if they are applied, should not be included in the estimation of producer or consumer support. The purpose of these expenditures is to raise the level of domestic prices and this support is already captured through the price gap. Inclusion of groups (a) and (b) in the budgetary part of support in this case would create double-counting with price transfers. When the MPD is estimated based on per tonne deficiency payments (group (c)) or per tonne export subsidies (group (b)) these budgetary items represent direct input into estimation of price transfers, and also should not appear in the budgetary transfers. The groups that should be accounted in the budgetary transfers are: payments for on-site stockholding (group (d)), which should be classified in the PSE. Expenditures on public stockholding (group (e)) should be classified in GSSE. And compensatory payments to consumers (group (f)), should be classified in the CSE as Transfers to Consumers from Taxpayers (TCT).

## 5.2. Support based on revenue foregone

98. Support may be provided in forms that do not imply actual budgetary transfers, but at the cost of revenue foregone by the government or other economic agents. Such support creates implicit transfers to producers or consumers — and, if a complete accounting of support is the aim, should also be identified and quantified. This section presents several types of support based on revenue foregone commonly provided by governments. Approaches to quantifying the associated policy transfers are also discussed. The measurement of transfers based on revenue foregone is largely an empirical task, involving assumptions and judgement about the appropriate reference against which to measure the transfer. A good understanding is needed of both the implementation mechanisms underlying such policies and the broader economic context.

### 5.2.1. Tax expenditures

99. Tax exemptions, exclusions, preferential rates and other design features that differ from the standard tax regime can be categorised as ‘tax expenditures’. They represent deviations from benchmark tax structures that are analogous to public expenditure but delivered through the tax regime. In the case of fossil fuels, tax expenditures in effect reduce the cost of producing or consuming them compared with if the standard tax treatment had applied.

#### Box 4. Common forms of tax expenditure

Tax expenditures come in various forms of special treatment that relate to one of the basic features that characterise the structure of a tax. Common forms include:

- *Allowances*: amounts deducted from the benchmark to arrive at the tax base.
- *Credits*: amounts deducted from tax liability.
- *Exemptions*: items excluded from the tax base.
- *Rate relief*: a reduced rate of tax applied to a class of tax payers or taxable transactions.
- *Tax deferral*: a relief that takes the form of a delay in paying tax.

Each of these forms imply that some tax revenue is foregone and economic incentives are being provided, in much the same way as would happen with a programme involving budgetary expenditure.

Source: OECD (2010).

100. With respect to energy, tax expenditures can be categorised into three broad areas:

- *Tax expenditures relating to energy consumption*: Such tax expenditures are targeted at final consumption, typically by households. They can include reduced rates of excise tax for certain groups of users or types of fuels or electricity, and lower value added tax (VAT) rates on energy consumption.
- *Tax expenditures relating to energy as an input to production*: Such tax expenditures are targeted at fuels or electricity that form an input to final production. They can include exemptions from excise taxes on fuels for businesses (such as agriculture, fishing or mining), and reductions in

rates of energy taxes that are related to the energy intensity of firms' production (e.g. to attenuate the impact that the standard tax rate might have imposed on firms' competitiveness).

- *Tax expenditures relating to the production of energy*: Such tax expenditures are targeted at the actual extraction or production of primary energy (and their transformation into usable inputs to intermediate and final consumption). They are typically provided through the corporate income tax (CIT) system and provide for targeted measures to fossil fuels through accelerated depreciation allowances for capital, investment tax credits, additional deductions for exploration and production, and preferential capital gains treatment for fields.

101. A feature of tax expenditures is that the size of any "tax subsidy" is limited by the standard tax rate. Rates of subsidy are thus likely to be bounded. Of course, the volume of consumption may still mean that the overall size of subsidy is significant. For instance, the UK's reduced rates of VAT on domestic consumption of fuel and power give rise to a tax expenditure equivalent to over 0.2% of GDP.

#### *Measurement and interpretation of tax expenditures*

102. Unlike public expenditure where outlays can be readily measured, tax expenditures are estimates of what revenue would have been collected if the tax regime had been different. They thus require an estimate of the size of the tax break and of the extent to which taxpayers take advantage of it. Since there is often no direct evidence on the latter, the quality of estimates will depend on what data on taxpayers and tax receipts the tax authorities collect; and on whether these data are captured, prepared and made available for statistical and economic analysis. These practical considerations can have a big impact on the availability and quality of tax expenditure accounting.

103. At least as important, though, is the view taken about what constitutes a tax break and how its size should be gauged. The challenge is to identify the standard or benchmark tax regime to be used to establish the nature and extent of any concession. A number of different approaches to deciding on the benchmark regime are possible (and approaches vary between countries). Many countries base their tax expenditure estimates on a conceptual view about what constitutes 'normal' taxation of income and consumption, although they may often modify this for practical reasons (e.g. in relation to the taxation of capital gains). Some countries take a reference law approach and identify only special concessions as tax expenditures, while a few restrict their tax expenditure estimates to those tax reliefs that are clearly analogous to public expenditure.

104. Even in a relatively straightforward case, like VAT, the different approaches could lead to different results. Thus on one basis any tax rate less than the standard rate of VAT would give rise to tax 'expenditures', while others might regard lower rates of VAT as an inherent part of the regime and not giving rise to tax expenditures.

#### *International comparability*

105. Tax expenditure accounting was never designed with international comparability in mind. The main challenge in any analysis of tax expenditures is to identify the reference point or benchmark tax system to be used to establish the nature and extent of any concession. Even where countries have adopted broadly the same methodological approach, the way in which they have implemented it in response to practical issues such as how far a relief should be regarded as a structural part of the tax regime may well differ (e.g. depreciation allowances used in calculating taxable profits). Some of the ways in which methods and scope of tax expenditure accounting may vary are:

- *Scope of Analysis:* Some countries attempt to publish estimates for as many tax expenditures as possible while others look only to calculate the most costly ones (e.g., the top 20 in each tax category).
- *Baseline for measurement:* Tax expenditures are premised on a deviation from the normal or standard practice tax code. Some countries take a stringent view about this baseline and identify a large number of tax expenditures (while recognising that some of them may include what might be regarded as the cost of structural features of the tax regime). Other countries may treat more reliefs as being an inherent structural feature of the tax regime, i.e. part of the baseline, and hence identify many fewer ‘tax expenditures’. For instance, some countries take their standard rate of VAT as the baseline for measuring the revenue forgone from taxation of some goods and services at lower rates, while others regard such lower rates as an intrinsic part of their VAT and would therefore report no tax expenditure.
- *Calculating behavioural effects:* Tax expenditures are generally measured on the assumption that there would be no change in behaviour if the tax relief were removed (the ‘revenue forgone’ method). A ‘revenue gain’ method, by contrast, attempts to calculate the increase in government revenues if the tax expenditure were eliminated, thereby incorporating anticipated behavioural changes. Most countries use the first option to evaluate their tax expenditures. In the context of climate change and greenhouse gas emissions, though, the extent of that behavioural change is in fact of considerable interest. That is how much lower would emissions be if the ‘tax subsidy’ were to be removed?
- *Tax expenditures and the tax rate:* One of the biggest objections to a simple cross-country comparison of tax expenditures is that the amount of the tax expenditure will depend on the tax rate. For instance, if two countries each applied a reduced rate of VAT of 10% to domestic consumption of fuel and power, but the standard VAT rate in one was 20% and in the other it was 25%, the latter would show a higher tax expenditure (in relation to GDP).

#### *Tax expenditure issues particular to fossil fuels*

106. Excise duties on fossil fuels are often quite significant. Duties on road fuels are obvious current examples, but carbon taxes could also become significant in some countries. Most countries, though, have not produced (published) analysis of their tax expenditures associated with excise taxes. This may in part be because of the conceptual difficulties.

107. For instance, if one were to take the highest rate of excise duty on any type of fossil fuel as a benchmark there might prove to be a large number of tax expenditures and the associated revenue cost might be pretty substantial. However, the highest duty rate might well reflect the scale of the externalities associated with the use of that fuel and be due to the use of the duty to attempt to correct for such externalities. (Other reasons for such a high duty rate could include (a) taking advantage of low price elasticities of demand to raise revenues and/ or (b) recouping costs from users, e.g. road construction and maintenance costs, hospital costs arising from traffic accidents). Other uses of fossil fuels may not give rise to the same externalities so a lower rate of excise duty would be appropriate.

108. A further complicating factor is that the scale of the externalities may vary between uses of fossil fuels as many of them may be unrelated to the emission of greenhouse gases (e.g. local air pollution such as emission of carbon particulates). A great deal of knowledge of individual country’s tax (and transport) policies is thus likely to be needed to define what is indeed a tax expenditure. Needless to say the involvement and cooperation of the countries concerned is likely to be necessary if robust estimates are to be produced.

109. Other complications arise where countries have allowed some reductions in a tax on fossil fuel inputs to a production process and the scale of these rebates reflects the degree of exposure of an industry to international competition or the negotiation of an agreement to reduce emissions by some other means (as has occurred with some carbon taxes and the UK's Climate Change Levy). Whether these types of actions should be regarded as giving rise to tax expenditures or not has yet to be substantially debated in the literature.

110. Turning to tax expenditures for fossil fuel production, some complications may arise from the fact that some oil and gas fields (and more rarely coal-fields) can give rise to large amounts of super-normal profits that can be taxed at significantly higher rates than the standard rate of corporate income tax without distorting production decisions. However, there are likely to be other more marginal fields where exploration, development and production could be distorted by high tax rates and governments often therefore find ways of alleviating their impact. While these may be tax breaks compared with the standard regime for fossil fuels production and arguably therefore 'tax expenditures', the overall corporate tax wedge on investment projects may still be as large as that had the normal corporate income tax regime applied. As with excise duties and carbon tax reliefs, this is an area where detailed knowledge of the tax regime would be needed to establish whether there are indeed 'tax expenditures' and, if so, how they should be quantified.

### 5.2.2. Preferential lending

111. Governments often intervene to reduce the cost of borrowing for producers or consumers of energy. When economic agents are able to borrow at favourable terms compared with other businesses, transfers are created, and these need to be accounted for in the estimation of support for producers and consumers. The OECD (2009) lists several examples of preferential lending:

Government action	Comment
A government subsidises interest rates charged to borrowers by providing budgetary compensation to banks in order to enable them to charge interest on loans at a rate below the market rate.	Usually reported in government budgets.
A government imposes special conditions such as fixed or minimum interest rates for credit extended by designated credit institutions.	May be made up by capital infusions (in the case of state-owned institutions) to make up for the loss, or through raising interest rates charged on loans to other borrowers.
A government requires credit institutions to direct certain amounts of credit to a particular sector.	If to achieve the volume of credit extended the interest rate has to be reduced (or other conditions for qualifying for credit are relaxed) then the lender will likely forego revenue.

112. Some governments subsidise interest rates charged to energy-sector borrowers. The lending banks receive budgetary compensation which covers part of the interest rate due on the loans. In these cases, government spending can be used as a measure of the related policy transfers.

113. In other cases, governments rely on mechanisms of credit support that do not generate budgetary spending. Special conditions may apply, such as fixed or minimum interest rates; or credit institutions may be required to direct certain amounts of credit to their energy industries. When such policies are implemented through state-owned lending institutions, the interest lost is a form of budgetary revenue foregone. Sometimes private lenders are also obliged to apply reduced interest rates to energy-related loans

and to allocate certain amounts of their credit for such lending. In this case, provision of preferential credit is based on administrative regulation, and the associated support to the energy-sector borrowers is provided at the cost of revenue foregone by private lenders (who may cross-subsidise these operations through other lending).

114. When governments set interest rates and direct resources for lending administratively, without compensation, the associated support needs to be estimated. The approach used is analogous to measuring a price gap, involving a comparison of the preferential interest rate compared with a reference (opportunity cost) rate.

115. When only the interest rate is reduced, the transfers arising from preferential lending are equal to the interest rate differential multiplied by the average amount of credit outstanding over the course of the year that has been provided in connection with the particular government policy. However, very often preferential loans may adjust other conditions so that they are more generous than what the borrower would have been able to obtain borrowing on the open market. For example, the lender may require less collateral for the loan, or may allow a longer pay-back period than would be normal for the type of loan granted. Accounting for these kinds of preferential conditions ...

116. The approach used is similar to a price-gap measurement, with the preferential interest rate compared with a reference (opportunity cost) rate. The transfers arising from preferential lending (TPL) are equal to the interest rate differential multiplied by the amount of credit, more formally expressed as follows:

$$TPL_Y = \sum_t (i_t^r - i_t^p) \times L_t \quad [4.3]$$

where

$TPL_Y$  – policy transfers from preferential lending accumulated over a year  $Y$

$i_t^r$  – reference interest rate at point of time  $t$  in year  $Y$

$i_t^p$  – the preferential (controlled) interest rate at point of time  $t$  in year  $Y$

$L_t$  – the value of outstanding preferential debt at point of time  $t$  in year  $Y$

117. The value of the outstanding debt ( $L_t$ ) is a stock value corresponding to a specific point in time.  $TPL_Y$  in equation 5.1 is the sum of discrete values of interest foregone estimated for a number of time points in a given year. In order to capture most accurately the annual value of TLP, as many time points as possible should be included, e.g. the monthly data on outstanding credit and interest rates.

118. Information on the value of the outstanding debt may only be available on a quarterly or annual basis. It is possible to interpolate these data to obtain monthly estimates of outstanding debt by applying some assumptions on the evolution of the debt between two known points in time. If data on outstanding debt is not available, information on the amount of new preferential loans may be used. It is possible to estimate the amount of outstanding credit by using these data and information on the standard time structure of these loans.

119. Estimation of transfers associated with preferential lending demands good knowledge of the lending conditions, which may vary by lending programmes and types of beneficiaries and may be subject to frequent changes. It is also important to have adequate information on the values of outstanding debt or allocations of new preferential loans. A choice of appropriate reference interest rate to represent the

opportunity cost for preferential credit requires judgement based on overall knowledge of credit markets in a given country.

### 5.2.3. Debt concessions

120. Producers and large consumers of energy sometimes benefit from debt concessions provided by the government, often as a form of restructuring package. Debt forgiveness related to energy has occurred, for example, in the Polish coal sector, which experienced a severe crisis in the period of transition to a market economy. Debt concession schemes may also involve extensions of repayment periods, reduced interest on overdue debt, and partial write-offs. These concessions create transfers to debtors, which need to be quantified and included in the estimation of support, irrespective of what caused the accumulation of debt and the objectives which led the government to restructure it.

121. The quantification of transfers associated with debt rescheduling, through the extension of the repayment period or reduced interest, is also based on estimating the interest foregone, as applied to preferential lending of the type discussed above.

122. Equation 5.1 can be used, where  $i_p$  is set at zero over the period of debt non-repayment, while for the period of repayment of the restructured debt the rate that is applied for such repayments (usually a preferential rate set below the financial market level) is used. The estimation requires the time series of outstanding overdue credit ( $L_t$ ) and the relevant interest rates in order to calculate the interest rate differential. It is necessary to establish the time structure of overdue debt – the period over which it has accumulated and how its value has been evolving during the period, as well as the schedule adopted for the repayment. In addition, the interest rate set for the repayments ( $i_p$ ) needs to be obtained and an adequate reference interest rate ( $i_r$ ) selected.

123. As concerns the transfers associated with write-offs of capital, penalties or interest, these values are often officially reported and should also be captured in the measured support. However, care should be taken in the attribution of these amounts to particular years. It would be incorrect to allocate a sum written off to the one year when the writing-off is implemented, as this sum represents debt accumulated over a number of years. The debt forgiven should be allocated retrospectively to the period over which it is known (or assumed) to have built up. In the absence of sufficient detail, the written-off debt can be allocated back to previous years based on the time structure of the total overdue debt subject to restructuring, or based on some other appropriate allocation principle.

### 5.2.4. Administered input prices

124. Producers may also be supported through the administration of prices for inputs and services such as energy, water and transportation. For example, a government may impose upper price limits for inputs and services purchased by producers. Some inputs (e.g. electricity for use in coal mining) may be supplied by state monopolies, which sell their goods or services to energy producers at prices below levels set for other consumers. Such policies are similar in nature to the provision of input subsidies. The associated transfer to producers per unit of input purchased is equivalent to the price reduction accorded to them compared with the price paid by a “reference” (alternative) buyer of the same input.<sup>6</sup>

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<sup>6</sup> At the OECD, this approach has been used to estimate implicit support provided through reduced prices for electricity supplied to agricultural producers in Russia (OECD, 2009: 97-98).

### **5.3 Allocation of support to support categories and recipient categories**

125. Once all budgetary and other non-price-related policy transfers are identified, adjusted and allocated to appropriate years, they should be classified according to various categories of support. This task is treated in greater detail in Chapter 6. One specific problem which may be encountered in classifying expenditures is that the budgetary (or other) data reported are too aggregated to be directly allocated to a particular category. For example, data may be presented by broad energy programmes or by implementing agencies — heterogeneous groupings that combine various types of expenditures, perhaps across several forms of energy. In such cases, it is important to make an attempt to obtain disaggregated data. If exact information is not available, then some reasonable approximation is required to allocate the spending items to individual policy measures, and hence to the appropriate support category. The usual practice is to apply percentage shares to distribute the aggregate spending, based on the relative sizes (e.g., output or consumption values) of the industries or commodities covered by the measure. The application of such allocation rules invariably introduces some imprecision into the estimates; however, the errors are likely to be smaller than if the amount was omitted entirely.

## CHAPTER 6. CALCULATING INDICATORS OF SUPPORT

### 6.1. Support to producers

#### 6.1.1. Producer Support Estimate (PSE)

126. To calculate the PSE for a country, the country (aggregate) *MPS* is added to the value of transfers to producers from other policies:

$$PSE_C = MPS_C + \sum BOT = \sum PSE (sub)Category \quad [6.1]$$

where  $PSE_C$  = PSE for country *C*

$MPS_C$  = national (aggregate) *MPS* for country *C*

$\sum BOT$  = Aggregate budgetary and other transfers to producers resulting from policies

$\sum PSE (sub)Category$  = Sum of PSE (sub)categories to which policies are classified from *A* to *G*.

127. To ensure transparency and to assist with the calculation of other indicators, the name of each policy measure and the resulting value of transfer are listed under the PSE categories and sub-categories to which they have been classified according to the process set out in section 3.3.

#### 6.1.2. Percentage PSE (%PSE)

128. The *Percentage PSE (%PSE)* expresses the PSE as a share of gross producer receipts. It is calculated by dividing the PSE by the value of gross producer receipts (*GPR*), and multiplying the result by 100:

$$\%PSE_C = \frac{PSE_C}{GFR_C} \times 100 = \frac{PSE_C}{VP_C + BOT_C} \times 100 \quad [6.2]$$

where *GPR* represents the value of production (*VP*), to which are added budgetary and other transfers (*BOT*).

#### 6.1.3. Producer Nominal Assistance Coefficient (Producer NAC)

129. The *Producer Nominal Assistance Coefficient (producer NAC)* expresses the ratio between the value of gross producer receipts (including support) and gross producer receipts valued at border prices

(measured at edge of the producer's property). The producer *NAC* is calculated by dividing the value of gross producer receipts by the value of production at border prices. Expressed algebraically:

$$\text{producerNAC}_C = \frac{GFR_C}{VP_C - MPS_C} \quad [6.3]$$

The producer *NAC* is mathematically related to the %*PSE*, and can be alternatively derived as:

$$\text{producerNAC}_C = 1 + \frac{\%PSE_C}{(100 - \%PSE_C)} \quad [6.4]$$

### 6.1.3. Producer Nominal Protection Coefficient (Producer NPC)

130. The **Producer Nominal Protection Coefficient (producer NPC)** expresses the ratio between the average price received by producers (including payments for current output), and the border price, measured at the producer's property. Producer NPC values may be calculated at the individual commodity and national (aggregate) levels.

#### 6.1.3.1. Producer NPC for individual commodities

131. The producer NPC for an individual commodity can be derived in two ways. First, domestic and border prices can be compared, where the domestic price is the producer price plus the per unit transfers received from payments based on output:

$$\text{producerNPC}_i = \frac{\left( PP_i + \frac{PO_i}{QP_i} \right)}{RP_i} \quad [6.5]$$

where:  $PP_i$  – producer price of commodity  $i$

$PO_i$  – sum of payments to commodity  $i$  based on output (PSE sub-category A.2)

$QP_i$  – quantity produced of commodity  $i$

$RP_i$  – reference price of commodity  $i$

The numerator in equation 6.5 adds the payments based on output to producer price in order to account for any direct supplements to producer price over and above market price support measures.

#### 6.1.3.2. Producer NPC for a country

132. Once producer NPC values have been calculated for each individual commodity, a national (aggregate) NPC can be derived. As prices and quantities cannot be aggregated for different commodities, the producer NPC for a country is calculated using the value of transfers:

$$\text{producerNPC}_C = \frac{(VP_C + PO_C)}{(VP_C - TPC_C - TPT_C)} \quad [6.6]$$

where:  $VP_C$  – total value of production for country  $C$

$PO_C$  – total sum of transfers in PSE category A.2 for country  $C$

$TPC_C$  – total Transfers to Producers from Consumers for country  $C$

$TPT_C$  – total Transfers to Producers from Taxpayers for country  $C$

133. The producer NPC for individual commodities can also be calculated based on the transfer values method, by substituting the appropriate values for the individual commodity into equation 6.6. When expressed in this form it can be seen that the denominator for the producer NPC, while very close to, is different from the denominator used to calculate the producer NAC (equation 6.4). The denominator for the producer NAC subtracts the total MPS value from the value of production and not just transfers from consumers and taxpayers to producer.

## 6.2. Support to consumers

### 6.2.1. Consumer Support Estimate (CSE)

134. The process of estimating a CSE begins by calculating a consumer single-commodity transfer (SCT) value for each of the individual commodities for which MPS has been calculated.

$$\text{consumer } SCT_i = TCT_i - (TPC_i + OTC_i) \quad [6.7]$$

where  $TCT_i$  = transfers to consumers from taxpayers for commodity  $i$

$TPC_i$  = transfers to producers from consumers of commodity  $i$

$OTC_i$  = other transfers from consumers of commodity  $i$

135.  $TCT$  are budgetary payments to consumers (including tax concessions), to reduce the effective price they have to pay for energy — e.g., to compensate them for the higher prices they pay for energy products resulting from policies that support producer prices, to favour a particular industry, or to address energy poverty. The  $TCT$  is obtained from the information on budgetary or tax expenditures. The sum of the other two components in equation 6.7 corresponds to price transfers from consumers ( $PTC$ ), which include transfers both to domestic producers and (if some of the demand is met through imports subject to an import tariff) to the government.

136. The information and analysis used to calculate market price support (MPS) is used as the basis for carrying out these calculations — i.e. the same values for MPD, production, and consumption are used. The  $TPC$  value is the mirror image of MPS for the same commodity. However, instead of being added as a value transferred as support to producers, it is subtracted as a value transferred away from consumers. If consumption is greater than production, then consumers also pay the MPD on the remaining volume of consumption, supplied from imports ( $OTC$ ).

137. Once consumer SCT values have been calculated for individual commodities, a national (aggregate) CSE value can be calculated by a similar method:

$$CSE = TCT_C - (TPC_C + OTC_C) \quad [6.8]$$

138. The national (aggregate) value of transfers to consumers from taxpayers is found by adding together the value of  $TCT$  for all the individual commodities for which MPS has been calculated with any additional  $TCT$  that are provided to consumers of non-MPS commodities, that is:

$$TCT_C = \sum_{i \in AMC} TCT_i \quad [6.9]$$

139.

### 6.2.2. Percentage CSE (%CSE) and Consumer Nominal Assistance Coefficient (Consumer NAC)

140. The %CSE for a country is calculated by dividing the CSE by the value of consumption expenditure, *i.e.* value of consumption less transfers to consumers from taxpayers ( $TCT$ ), and multiplying the result by 100. Value of consumption is adjusted for  $TCT$  because it effectively reduces consumer expenditure. This is expressed as:

$$\%CSE = \frac{CSE}{VC_C - TCT_C} \times 100 \quad [6.10]$$

where  $VC_C =$  value of consumption of the sector in country C

141. The consumer NAC is calculated by dividing the value of consumption by the value of consumption at border prices. Expressed algebraically:

$$consumerNAC = \frac{VC_C}{VC_C + CSE} \quad [6.11]$$

142. The consumer NAC is mathematically related to the %CSE, and can be alternatively derived as:

$$consumerNAC = 1 - \frac{\%CSE}{(100 - \%CSE)} \quad [6.12]$$

### 6.2.3. Consumer Nominal Protection Coefficient (Consumer NPC)

143. As for the producer NPC, the consumer NPC indicator is first calculated at the individual commodity level. The results are then used to derive a national (aggregate) consumer NPC.

144. The consumer NPC for an individual commodity is derived by comparing domestic and border prices, where the domestic price is the consumer price. *Note that the consumer price is normally equal to producer price, which follows from the definition of consumer as a first-stage buyer of the commodity.*

$$consumerNPC_i = \frac{\left( CP_i + \frac{CP_i}{QC_i} \right)}{RP_i} \quad [6.13]$$

Where	$CP_i$	=	consumer price of commodity $i$
	$CP_i$	=	sum of payments to consumers relating to their consumption of commodity $i$
	$QC_i$	=	quantity consumed of commodity $i$
	$RP_i$	=	reference price of commodity $i$

145. As prices and quantities cannot be aggregated over a variety of different commodities, the consumer NPC for a country is calculated based on the value of transfers:

$$consumerNPC = \frac{VC_C}{(VC_C - TPC_C - OTC_C)} \quad [6.14]$$

where	$VC_C$	=	total value of production for country $C$
	$TPC_C$	=	total Transfers to Producers from Consumers for country $C$
	$OTC_C$	=	total Other Transfers from Consumers for country $C$

146. Note that the national (aggregate) consumer NPC can be lower or higher than the producer NPC — depending on the relative size of the payments based on output received by producers, and payments based on use received by consumers.

### 6.3. General Services Support and Total Support Estimate (TSE)

#### 6.3.1 General Services Support Estimate (GSSE)

147. The GSSE measures the value of transfers provided through policies that support producers or consumers collectively rather than as individuals. The GSSE can be estimated as:

$$GSSE = \sum GSSE_{category} \quad [6.15]$$

Where  $GSSE$  = General Services Support Estimate for country  $C$

$GSSE_{category}$  = total value of transfers to GSSE category in country  $C$

#### 6.3.2 Total Support Estimate (TSE)

148. Two methods exist to calculate the TSE for a country, and both can be used to help to ensure that all indicators of support are correctly calculated. The first method sums up the transfers distinguished by recipient (*i.e.*, transfers *to producers*, *PSE*), transfers *to general services* (*GSSE*), and transfers *to consumers* from taxpayers (*i.e.* consumer subsidies, *TCT*):

$$TSE = TSE + GSSE + TCT \quad [6.16]$$

149. The second method sums up the transfers distinguished by source — *i.e.* transfers **from consumers** ( $TPC + OTC$ ) and transfers **from taxpayers** ( $(PSE - TPC) + GSSE + TCT - OTC$ ) — as shown in equation 6.16 (algebraically it can be reduced to equation 6.15):

$$TSE = (TPC + OTC) + ((PSE - TPC) + GSSE + TCT) - OTC \quad [6.17]$$

150. It should be noted that both methods for calculating the TSE involve the assumption that the total value of transfers from consumers to others ( $OTC$ ) is received as budget revenue (e.g., as import duties).

### 6.3.3 Percentage GSSE (%GSSE) and the percentage TSE (%TSE)

151. Two relative indicators of support are derived from absolute values of  $GSSE$  and  $TSE$ . The %GSSE indicates the importance of support to general services within total support. It is calculated as the percentage share of the  $TSE$ :

$$\%GSSE = \frac{GSSE}{TSE} \times 100 \quad [6.18]$$

152. The %TSE indicates the level of total support to a sector relative to a country's gross domestic product ( $GDP$ ). The %TSE is found as a percent share of the value of  $GDP$ :

$$\%TSE = \frac{TSE}{GDP} \times 100 \quad [6.19]$$

## 6.4. Calculating indicators of support for groups of countries or for the world

### 6.4.1. Conversion into a common currency

153. To obtain total support indicators for a group of countries, or for the world, the value of transfers and production in national currencies must be converted into a common currency. The choice of the common currency has an important impact on the results in terms of how the absolute indicators: (a) compare between countries, and (b) change from year to year. For this reason, it is advisable to convert all support indicators in both US dollars and another common currency, such as the euro. However, the relative indicators among countries in a given year will not be changed by the choice of a common currency.

### 6.4.1. Aggregation to regional or global totals

154. Once the values of transfers and production have been converted into a common currency, or currencies, aggregation into global totals can be carried out.

## CHAPTER 7. DATA AND INFORMATION REQUIREMENTS FOR CALCULATING THE INDICATORS

155. This chapter lists the data and information requirements for calculating indicators of support, drawing on the methodology detailed in the previous chapters of Part II. Its purpose is to assist those involved in calculating indicators in gathering the necessary information which may be needed from a wide range of sources.

156. The indicators are calculated on an annual basis. The time scale (i.e. the number of years) over which the indicators are calculated will, accordingly, increase the quantity of information required.

### 7.1. Requirements for calculating price transfers

157. Information required on the domestic market:

- Value and volume of production information for individual commodities and (if of interest) total energy at the producer level.
- Producer prices, clearly indicating the unit that it is based on. For consistency within the transfer calculation, either the value of production is found by multiplying quantity by price, or alternatively the value is divided by quantity to derive a producer price.
- Consumption data are also required. This can be obtained directly, or as a result of adding the volume of production and imports and subtracting imports, ensuring that the same product weight basis is used.

158. Sources that can be used to obtain information related to marketing margins include:

- Estimations published by national authorities. However, such data are relatively rare, since the information is often commercially sensitive.
- Estimations obtained on a regular but often *ad hoc* basis from national authorities, industry organisations or major private companies.
- Estimating the marketing margin as the difference between the producer price and an average wholesale price in the country considered. However, this type of estimation leads to very variable margins, and it may be appropriate to use a moving average margin for several years. This option is less preferable than the previous two.
- Using marketing margins available in other countries if no domestic information is available.

159. Trade data include:

- Values and volumes for both exports (FOB) and imports (CIF) of energy commodities and products.

- Tariff schedule for the country – to understand the profile of tariffs imposed on imports.
- Export subsidy budgetary information (if applicable).
- Exchange rates – information on official exchange rates, on an annual basis, and, if relevant, on a monthly basis so that any seasonal calculations can be made.

## **7.2 Requirements for calculating budgetary and other transfers**

160. Data on budgetary transfers related to the implementation of energy policies are typically based on official budgetary information on the execution of national budgets and reports by relevant agencies. The majority of this information is publicly available on the internet sites of the ministries of finance, energy and central banks of the countries concerned. Administrative databases which provide detailed information on current expenditures by programmes also exist within the ministries, often on a monthly basis. These help to adequate allocation of payments to calendar years. However, this information is not usually publicly available.

161. Care should be exercised when budgetary information is compiled from several sources. Some sub-national expenditures may be reported both independently and as part of the expenditures made at higher administrative levels. Another case warranting caution in order to avoid double-counting is where data on the budgetary outlays are compiled through combination of sources reporting the public spending by agencies and by specific programmes or activities. It is generally preferable to use a single source of budgetary information; however, this does not often provide sufficient detail on the budgetary spending, thus making it necessary to use several sources. It is therefore important to understand the composition of the budgetary data reported in various sources used.

162. Estimation of support based on revenue foregone demands recourse to official documents describing the relevant mechanisms. For example, to estimate transfers related to preferential lending, official documents (regulations) are required describing the conditions of lending, including time terms of loans, repayment schedules and interest rates applied. In the case of debt rescheduling, all relevant government decisions outlining the conditions and schedules for repayments should be used. Information on preferential interest rates is usually available from the relevant Ministry and banks involved in preferential lending. Information on market (reference) interest rates is usually published by the central banks. Ministries and agencies dealing with macro-economic issues typically provide various price and financial data.

163. Support based on revenue foregone presents a particular difficulty in terms of achieving consistency across countries (e.g. as is the case of tax concessions) because these transfers are not always measured or reported.

## GLOSSARY

***Conditional loan:*** An official loan that is to be reimbursed only if the project financed with the loan turns out to be commercially successful. If the project fails, the loan is not reimbursed — i.e., it becomes a grant. Conditional loans usually carry an interest and appear as a credit liability in the borrowing company's balance sheet.

***Forgivable loan:*** A loan which the lender undertakes to waive repayment of under certain prescribed conditions. A conditional loan is a specific example of a forgivable loan.

***Interest-rate subsidy:*** A subsidy to the interest cost of a loan borrowed from a private loan institution. Interest-rate subsidies are typically offered to certain specific sectors, for certain types of investments and uses, or certain sizes of companies.

***Reimbursable grant:*** A government grant, in general for R&D and innovation in a new product, that is to be reimbursed by the beneficiary if the project turns out to be commercially successful. In general, there is no additional interest cost included in these reimbursements.

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