



## **Innovation and Climate Change**

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### **Getting the prices right**

We are sailing with an unadjusted economic compass, leading us off-track. We are heading North-East on subsidized coal instead of South-West on renewable energy. The economic compass is misleading us mainly because prices are not adjusted for the economic externalities of using fossil fuels. Getting the prices right, -- so that polluters pay for the negative environmental impacts they impose on society --, will in itself provide the most powerful and constant incentives to develop and diffuse new low-carbon-emission technologies. OECD countries still subsidize fossil energy industries. Removing subsidies for fossil energy would be a good first step. Getting the prices right is a first essential step in providing the right framework to incentivize innovation to address the climate challenge.

Getting the prices right is important, but it is not enough.

### **Need for a strong IPR regime**

The innovations that are needed to move us in the direction of low carbon economies are also hampered by another market failure – the “public good” character of innovations. If you are a smart and innovative guy inventing new technologies and (intelligently) organizing production and marketing and I just sit and wait to free-ride on your ideas at no cost, that would not give you the right incentives to continue to invest your time, money and effort. We need protection of intellectual property rights so that innovators are duly rewarded for their investments. Legal systems to protect IPRs are necessary, but there is some concern that the current IPR system also hampers or slows the rate of diffusion of new technologies in particular to developing countries. So we need a system that both provides incentives for innovators to develop new technologies (i.e. a reasonable return on their investment) but also ensures a rapid diffusion on new climate-friendly technologies. Some have suggested a global technology fund that can buy patents on clean technologies, e.g. from OECD countries and provide them to emerging economies and low income countries in exchange for emission reduction commitments.

### **Need for a stable long-term policy framework**

A third challenge that makes progress towards a low carbon economy slow and difficult is the slow capital turn over in energy, building, and transport infrastructure. For the private sector to take the right decisions on large capital investment, governments need

to provide a stable, long term policy framework. For the recent OECD Environmental Outlook to 2030, we simulated several policy scenarios for GHG emissions reductions over the long term. The most ambitious of these, the “450 ppm scenario” that would achieve stabilization of atmospheric GHG concentration at this “safe” level, is a “smart” scenario because it minimizes premature scrapping of existing equipment or infrastructure due to unforeseen and sudden price changes. In this context it is very important that the expected massive investments in energy , building and transport systems in the major emerging economies do not “lock in” high emission pathways for decades to come.

### **Public support for R&D**

These enormous investments also provide an excellent opportunity to move towards more sustainable energy systems. The OECD normally warns against “picking winners” and I won’t do that either because governments and bureaucrats are not the best judges of viability of technologies. But at the same time we know that much of the energy investments will be in coal based systems. And it might be wise to put some extra coordinated international research into carbon capture and storage technologies to make these technologies ready for the market sooner than what otherwise might be the case. Some consolidated further development of easily deployable nuclear energy technologies might also be worth considering. This does not exclude further support for basic research in renewable technologies. IEA data show that government support to energy research and development has been falling since the 1990s, and the amounts targeting energy efficiency and renewable are still relatively small shares of the total (about USD 1 billion to each), which is quite surprising given the rising awareness about climate change. It might be time to turn that trend.

### **Technology diffusion and financing**

Development of new technologies and more generally innovation is important to move to smarter and more sustainable economies. Deployment of innovations and technologies are equally important. The public channels to finance technology deployment include official development assistance, export credits, and international mechanisms such as the Global Environmental Facility, –and I already mentioned the idea of an international IPR fund. Otherwise the bulk of this technology transfer has to come via private investments. An international cap and trade system covering the largest emitters would provide incentives for such private investments in low carbon technology internationally, as those with tight emission caps look for opportunities to buy emission reduction rights where such opportunities are cheaper. In the absence of or as a complement to quota trading, one way of transferring technologies is the Clean Development Mechanism, where developed countries pay the additional costs of emission reduction projects in developing (Non-Annex 1) countries.

### **Efficiency gains and scale-effect, need for a systemic change**

Developing and deploying new technologies are necessary steps to move towards a low carbon economy, but so far the rate of change has not been high enough to effectively decouple environmental pressure from economic growth. Efficiency gains are often eaten

up by scale effects. Each new car that is put in motion is more energy efficient than the predecessor, but at the same time the transport volume is increasing at double speed. Buildings are to some extent getting more energy efficient – and more could be done by more stringent building codes, but at the same time the building sector is expanding very rapidly. This points to the possible conclusion that: yes getting the prices right, introducing more stringent standards and government support to basic research is all fine – but we badly need some systemic change that reduces the pressure on the environment. The carbon capture and storage technologies could count as one such major systemic change. We might need more.

### **Green jobs, smooth transition to a “low-carbon” society**

A few words on green jobs and the labor market. On the move towards a low carbon economy there need to be structural changes in the in the economy. Some sectors will decline others will expand. This gives a good opportunity to create new jobs, but it will also lead to some transitional costs. In this context it is important that labor markets are functioning well and that there are good systems in place for re-training of people who are on the move to new employment. The analyses the OECD and others have done indicate that in general revenue-neutral environmental policies have little effect on overall employment. The main purpose of environmental policies is to improve the environment. It is of course important to analyse the employment impacts of environmental policies, but it might lead to inefficiencies to try to solve unemployment problems with environmental policies. Unemployment problems should be addressed by macroeconomic policies and by improving the functioning of labor markets in general.