Presentation

# Feed-In Tariffs' and Eco-Taxes' Contributions to Innovation Experiences from Germany


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# 1 Background

It's a great pleasure to have the opportunity to contribute to this important event. In fact, it seems particularly timely to exchange upon the potential of research and development to contribute to climate protection. The call for innovative, technology-based strategies to combat climate change has recently been echoed in the outcomes of the G-8 Summit in Gleneagles and the establishment of the U.S.-Germany Working Group on Energy, Development, and Climate Change and the Asia-Pacific Partnership on Clean Development.

This high level of international activity is likely to stimulate rethinking and reassessment in national and regional programs. Against this background, exchange upon key factors, such as the time frame, financing issues, the role of the public and private sectors or the commercialization of innovative products and services promises to be beneficial in the process of redesigning different R&D programs.

# 2 Public vs. Private sector

As seen today there is a general consensus that both the public and private sectors have an important role to play in Research and Development. Usually, public spending focuses on basic research and long-term R&D, while the private sector is more responsible for activities with a shorter time frame, such as the improvement of existing technologies.

Wernher von Braun - one of the leading figures in the development of rocket technology and the father of the US space program – once said: "Basic research is what I am doing when I don't know what I'm doing." This is not to say that basic research is not needed. Nor is it to claim that basic research lacks focus and direction. It is obvious that efforts to build up the hydrogen-economy do have specific targets. However, the quote well expresses the

relative uncertainty of basic R&D, both in terms of outcomes and in terms of the time frame.

In my presentation I would therefore like to focus on what governments' roles can be in promoting existing technologies in a foreseeable period of time. In particular, I would like to draw on the German experiences in deploying and mainstreaming low-carbon technologies. In both sectors – energy production and the diffusion of energy efficient technologies - the role of the government was crucial. I would therefore like to use my time to briefly discuss two German policy instruments and their impacts on the deployment and advancement of low carbon technologies.

# 3 Renewable Energy Sources Act (EEG)

Let me begin with the Renewable Energy Sources Act. The background for this legislation was the particular German situation. In Germany more than one third of installed electricity production capacity will have to be replaced by 2020. In other words, within the next 15 years, Germany has to install about 40.000 MW of new electricity production capacity. Given the average lifetime of power-plants, investment decisions in the next years will shape Germany's energy future. Consequently, Germany has to pay particular attention to the deployment of existing technologies.

Since 2000 the Renewable Energy Sources Act has provided a "feed-in guarantee" for Renewables. Electricity from renewable sources has to be bought by grid operators at a guaranteed price for the next 20 years. As the feed-in tariff decreases annually, there are strong incentives to build up renewable energy plants sooner rather than later.

The result of the new legislation is a strong increase in RE. Between 2000 and 2004 the electricity generation from wind energy increased by a factor of five and employed photovoltaic, although starting from a very low base, increased tenfold. Thus, RE sources today generate more than 11% of Germany's electricity. This increase in production came along with technological innovation, in

particular through learning by doing and economies of scale. For instance, the height increase in windmills' towers (from about 50 to 130 meters) and the extension of rotor blades (from about 20 to 70 meters) was accompanied by new materials, enhanced generators as well as innovative software to control the mills at higher wind speeds. As a result, modern windmills produce as much electricity in a day as they did a decade ago in an entire year (windmills now produce up to 5 Megawatts and the industry targets 8 MW windmills). Similar observations can be made in the costs. In the last 12 years, the costs of electricity from photovoltaic went down by more than 50%.

The next big issue in wind energy is of course offshore wind farms, which are currently being planned off the German, Danish, Swedish, Irish and British coastlines. Such wind farms are expected to contribute much more electricity than conventional windmills on land, and also provide that electricity at more steady rate. However, going offshore introduces a whole new set of challenges for turbines, such as how to resist adverse conditions like high humidity and sea spray.

In conclusion, RE-Technology had been developed to a large extent before public intervention took place. However, the market only took off after the German Renewable Energy Sources Act came into force, achieving significant cost reductions and spurring innovation. As a result, Germany is not only a leading exporter of RE-Technology, but of the policy instrument itself. Similar legislation has been adopted by more than 15 other states, including European countries such as Austria, Sweden and Spain, but also significant emerging markets, notably Brazil and, as of this year, China.

# 4 Germany's experiences with the Eco-tax

Let me now turn to the German ecological tax reform, which was introduced in 1999. It central aims are to improve energy efficiency throughout the economy and to trim down the non-wage labor costs. In this way, the eco-tax is expected to create a double

dividend: all income generated through taxes on energy consumption is used to lower the non-wage labor costs, which are relatively high in Germany, thereby reducing energy consumption and stimulating employment. It also means that the tax reform was designed to be revenue-neutral from the tax payers' perspective, as all tax revenues were re-directed into the pension scheme. In regard to R&D, several issues seem notable:

1. First, financial incentives. Rendering energy consumption generally more costly, the eco-tax provided incentives not only to particular products or market segments, but to all economic actors to develop and use more energy efficient technologies.
2. Second, long term investment security. The predictable increase in the energy price over a longer period of time, as well as a time horizon for special regulation of up to 20 years, provided producers with the necessary security to invest in R&D and prompted consumers to invest in more energy efficient products and services.
3. Last but not least, the eco-taxes provided a strong signal to the markets. Although the largest part of the soaring energy prices in the last years came from the oil and gas markets, the debate about the tax-reform and the annual increases in the tax raised awareness of the necessity for a more rational use of energy. Energy efficiency became a much stronger factor within purchasing and investment decisions. This signal was also clearly transmitted to the internal R&D efforts within the private sector.

As a result, energy efficient products and services, such as energy contracting, energy saving bulbs, LED technology, energy efficient housing and natural gas driven vehicles increased their market share significantly over the last years. This came along with a reduction in the price and an enhancement in technology, efficiency and - not to be neglected - design. Thanks to these advancements, many of these products – such as insulating window glassing or energy-saving light bulbs – have left the niche of innovative emerging technologies and have since become standard products traded in supermarkets and widely applied in households

and industry. At the same time, there are a number of companies – often SMEs, but also bigger corporations – that have successfully adapted to the new challenges and service the demand for energy-efficient, intelligent energy solutions.

If you are interested in the details of these effects, Ecologic just published a study on the Eco-Taxes' effects on innovation and market penetration. It is downloadable at our website, but is unfortunately only in German.[1]

Through macroeconomic modeling, it has been estimated that without the eco-Tax, the other contributions to the pension scheme would be 1.7 percentage points higher than they are today (at 19.3%). In this way, the eco-tax has prevented the loss of up to 250,000 jobs. At the same time, reduced emissions of 20 million tons of $CO_2$ can be accredited to the eco-tax, making it one of the most important – and most successful – tools for German climate policy

# 5 Conclusion

To wrap up: it is clear that both the private and public sectors play distinctive and important roles in the area of research and development. However, while there is a blurred line between when there is need for private versus public funding, governments are unique in their ability to design incentives and regulatory conditions for the commercialization of technologies. The German experiences confirm that by creating the right market conditions and by providing long term investment incentives governments can strongly contribute to the deployment of existing innovative products. Moreover, the commercialization process spurred R&D to increase efficiencies and to offer larger varieties of technologies. As well, the learning by doing effect should not be underestimated.

Indeed, past technology transitions have mainly consisted of an evolution and recombination of existing technologies, rather than

[1] http://www.ecologic.de/modules.php?name=News&file=article&sid=1156

the invention of a new technology alone. Several scientists point to the fact that we already possess the fundamental scientific, technical and industrial know-how to solve the carbon problem for the next half-century.

Governments should not exclusively focus on the needed basic research and long term visions, but also on the deployment and advancement of low carbon technologies and energy efficient products in the present. Actually, innovation does not only comprise new and revolutionary technologies, such as fuel cells or clean coal, but also small and practicable solutions to achieve higher energy efficiency without a loss in comfort.

Thank you very much for your attention. I am looking forward to your questions and our discussion.