Energy Policy 37 (2009) 2143–2146

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Viewpoint

EU renewable energy support policy: Faith or facts?

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ARTICLE INFO

Article history:
Received 29 October 2008
Accepted 19 February 2009
Available online 31 March 2009

Keywords:
EU Policy
Tradable green certificates
Evidence

ABSTRACT

The recent EU Commission proposal for promoting the supply of power from renewable energy sources was originally based on a pan-European, harmonised tradable green certificate (TGC) scheme. We suggest, on the basis of a multi-disciplinary analysis, that a pan-EU TGC system is not the way forward for Europe. It is vital that the Commission (and the majority of Member States) avoids implementation of such policy designs put forward by a coalition of vested interests. They should instead look at, and act upon, the available evidence from those countries that have experimented with TGCs (e.g. Flanders, UK and Sweden) and design policies that stand a better chance of meeting the criteria of effectiveness, efficiency and equity. In particular, the policies must enable EU to meet the immense innovation/industrialisation challenge by inducing the development of a capital goods industry that can, eventually, diffuse a broad range of technologies that use renewable energy sources. Only then we can acquire an ability to implement an industrial revolution in the energy system in a way that broadly meets the criteria of effectiveness and dynamic efficiency.

1. Introduction

The recent European Union (EU) Commission proposal for promoting the supply of power from renewable energy sources was originally based on a pan-European, harmonised tradable green certificate (TGC) scheme. This was redrafted at the last moment to allow member states to opt out of the proposed framework. However, there are now grave doubts that such an opt out would hold up before the European Court. Until the issue is decided, legal insecurity would reign for years and discourage investment. If the ability to opt out is annulled, feed-in tariff (FIT) systems are likely to collapse as electricity companies from TGC countries could buy up certificates (guarantees of origin) from low-cost generation, such as on-shore wind in FIT countries, thus fulfilling their corporate (and national) targets while leaving FIT countries to achieve theirs with more expensive sources and technologies.

This harmonised TGC proposal – modified to a hybrid system – follows others made over the last 10 years by influential actors both within the EU Commission and outside (such as EURELECTRIC—an association of utilities in the EU) who have repeatedly argued the need for a harmonised EU policy in support of electricity from renewable energy sources (RES-E). In this viewpoint, we argue that a pan—EU TGC system threatens the EU's ability to meet the challenge of climate change and the competitiveness of the RES-E industry in the EU. Facts are given from three countries which have implemented various forms of TGC.

2. The scale and challenges of the renewables directive

Achieving the EU goals on climate stability means that an almost carbon-free EU power system must be in place by 2050 (IPCC, 2007). If historical growth rates of power consumption are maintained, this would mean adding a supply capacity of about 6300 TWh by 2050. Whilst improvements in energy efficiency are of vital importance to reduce that figure, renewables have a central role to play in the formation of a carbon-free power sector (CEC, 2008a). In 2005, the renewable power supply of Europe was 500 TWh but hydropower accounted for the lion's share of that (341 TWh). While increasing renewable power supply to fulfil the target of 20% energy supply from renewables by 2020 is a

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doi:10.1016/j.enpol.2009.02.043

challenge, decarbonising the whole sector by 2050 implies an industrial revolution.

The size of the transformation makes it obvious that a cluster of RES-E technologies need to be fostered. Building a rudimentary industrial supply capacity for a single new technology often, however, takes a couple of decades. Additional decades are required to (a) improve its performance/cost ratio and (b) generate a manufacturing capacity that allows it to have a significant impact on the power market. Because of the time constraint (2050), a wide range of RES-E technologies must be fostered urgently and in parallel, not sequentially.

Rebuilding industrial structures that can develop and diffuse a cluster of new RES-E technologies on a very large scale within four decades constitutes the central 'innovation/industrialisation challenge' for EU policy. This viewpoint argues that this challenge is closely linked to three conventional criteria for assessing policy instruments: effectiveness, efficiency and equity.

We take effectiveness to mean that the full transformation of the EU power sector is realised by 2050. This presupposes that the full resource base of the EU and of neighbouring regions, such as North Africa and Norway, is utilised in a sustainable way. Deployment in the short run can, of course, be rapid with already developed technologies and this is likely to require trade in RES-E (e.g. export of bio-power from Norway). An entirely different dynamic is required if the EU is to stand a chance of meeting the innovation/industrialisation challenge. Strong incubation efforts are necessary for a broad range of technologies to be ready in due time. Putting a variety of technologies "on the shelf" (Sandén and Azar, 2005) goes far beyond funding R&D and applying general instruments such as emission trading. Additionally, it involves forming markets and building up new constituencies (Kemp et al., 1998).

Efficiency, or cost-effectiveness, is central to the argument for market-based instruments. This argument generally involves focusing on selecting the currently most cost-efficient technologies. Minimising costs over a period of four decades means that we need to focus on what policy instruments can be expected to generate the lowest cost solution over the whole period, taking technological progress into account (dynamic efficiency). This rests, to a large extent, on the innovative capabilities in the capital goods industry and, hence, on the ability of the EU to meet the innovation/industrialisation challenge.

Finally, equity is a crucial factor in creating social legitimacy for policies supporting an industrial revolution. Excess profits do not help us meet the innovation/industrialisation challenge and must be avoided.

3. The facts of applying TGC: three case studies

The main features of TGC systems are (1) that RES-E producers receive tradable certificates corresponding to the amount of 'green' electricity they supply to the grid, (2) that some type of obligated actor (electricity suppliers, consumers or producers) are legally required to buy a certain amount of certificates over a certain period of time (coupled to electricity sales, consumption or production, respectively).[1]

Sweden, the UK and Flanders have all experimented with different forms of TGCs. The lessons so far from these experiments are (1) that they tend to favour incumbent companies (e.g. large utilities), (2) that most investments concern relatively mature technologies and that there is little or no domestic demand that can stimulate the industrialisation of less mature technologies and (3) that TGCs tend to induce high levels of excess profits which, given the first two lessons, primarily benefit incumbent actors and relatively mature RES-E technologies.

3.1. Sweden

The Swedish TGC was initiated in 2003 and is currently to last until 2030. The current aim is to add 17 TWh output of 'green' power by 2016, roughly corresponding to a legally binding 11% quota (share of total electricity consumption/sales). So far, RES-E production has increased by 6.8 TWh (2003–2007) that is slightly less than the planned. Most of this has come in the form of an increased production in already existing biomass-combined heat and power (CHP) plants, and the interest in investing in new plants has largely been restricted to on-shore wind turbines and biomass CHP. The main actors are the paper and pulp industry, municipal district heating companies and the large electricity utilities.

The prime feature of the Swedish case is the excessive profits that the system generates. First, existing plants were included at the start of the system in order to obtain a liquid market. These were both fully commercial plants (in the paper and pulp industry) and plants that had received demonstration subsidies. These plants will benefit from an additional income stream for about a decade (to 2012–2014) in spite of zero or low additional costs. Second, another source of excess profits will come into place when more costly technologies than land-based wind power and biomass CHP are implemented in order to fill a rising quota, driving up the price of the certificates. A (conservative) estimate of the two sources of excess profits (for already existing plants and plants built until 2013) suggests that up to half of the payment to power producers will be excess profits to biomass CHP and land-based wind power.

3.2. The UK

The renewables obligation (RO) was initiated in 2002. The current obligation amounts to 15% of electricity supply in 2020. So far, the RO system has under-achieved in relation to its quantitative target, which is not surprising given the low buy-out price: in 2007, 4.9% (15.9 TWh) was supplied which should be compared with the target of 7.9% (or 25.6 TWh). Wind power is the dominant RES-E technology and the main investors/producers are the major utilities, the ex-monopoly companies (Stenzel and Frensel, 2008).

Similar to the Swedish TGC system, the RO has been costly for the consumer, according to an analysis by the European Commission (CEC, 2008b). UK government and regulatory agency data bears this out. For example, data published by the Non-Fossil Purchasing Agency (2008) suggests that the average price per MWh of wind power in 2006 was around £93.5/MWh, while the Department of Trade and Industry and Ofgem (the energy regulator), estimated the production cost at around £55/MWh (DTI, 2006). This implies that the profits amount to over 40% of the turnover.

3.3. Flanders

The Flanders TGC system was initiated in 2002 with a quota of 0.8% of power sales and aiming at 6% by 2010. An analysis of the period 2002–2007 shows that the RES-E production has increased to more than 2 TWh in 2007 (4.9% of electricity sales). Most of the RES-E was delivered from bio-waste flows exploited by incumbent power companies or waste processing companies. The

[1] Sometimes, a buy-out price or penalty limits the cost for the obligated actors or excerts an incentive for them to comply.

technologies ranged from co-incineration in inefficient old coal-fired plants to newly set-up biomass combustion using non-sustainable bio-fuels (e.g. palm oil).

Again, the prime feature of the system is the excess profits that it generates. Between 2002 and 2007, the Flemish RES-E output cost consumers M€ 838. If the rules of the German FIT had been applied, this would have been reduced to M€ 301. The level of excess profits, thus, amounted to 64% of the turnover; in other words, the German FIT is 2.8 times cheaper than the Flemish TGC. The main part of the excess profits (approx. 87%) went to biomass and waste combustion and the rest to wind power. The TGC system is, thus, throwing money at investors, rewarding them with huge excess profits. These have been associated with some investment in mature technologies, but little money has been spent on real RES-E innovations.

3.4. Consequences of a pan-EU TGC system

In sum, TGC systems generate large excess profits, which primarily benefit established actors and mature RES-E technologies. Our concern is that these undesirable features would be even more prominent in a pan-EU TGC system and that they would have dangerous consequences for EU industry and society at large.

First, on the EU level there are vast cost differences between locations as well as between technologies. Since the certificate price is determined by the marginal cost of the most expensive technology currently included in the trading system, a pan-EU system with a uniform price for the RES-E kWh would generate enormous excess profits over the next four decades. Such profits would not be a reward for entrepreneurship and innovation (which is appropriate in a market economy) but would be captured by incumbents investing in the most mature technologies. Excess profits violate the equity criterion and hurt the legitimacy of renewables as well as the competitiveness of EU industry.

Second, a pan-EU TGC system would not drive innovation and industrialisation of the broad range of RES-E technologies that necessarily have to constitute the bulk of the EU power system in 2050. The 2008 EU report (CEC, 2008b) shows that the TGC case study countries above experience low deployment even for mature technologies. At a country level, we can choose to minimise short-term cost and neglect the innovation challenge (as in the three TGC countries above) but if TGCs are applied at the EU level, there will be no market space for learning and capacity building for new and current costly technologies. The EU solar cell industry would probably collapse and other RES-E industries would not emerge. Abstaining from developing new industries means that EU would not develop the capacity to manufacture the capital goods required to combat climate change (apart from those which are already industrialised, such as wind turbines and biomass combustion). This has three implications.

- The EU would opt out from a huge market for RES-E equipment, beyond the already industrialised technologies, and therefore, choose not to exploit vast opportunities for industrialisation and employment.
- Whereas, today's mature technologies can go some way towards decarbonising the power sector, they are not sufficient. A pan-EU TGC system would then rest on the questionable assumptions that the innovation/industrialisation challenge will be met by other countries, say Japan, India and China, and that the EU is prepared to take the risk of relying on imports of capital goods from these countries to meet the climate challenge. Arguably, without an innovative EU capital goods industry, we would jeopardise the 'effectiveness' criterion and, in particular, the dynamic efficiency criterion.
- Without a domestic industry, the appropriate skills may not be available in Europe to implement these technologies in a cost-efficient way. We would expect relevant skills to develop as a result of the growth of domestic industries. If Europe were to lose its current innovation and industrialisation edge, it may also find itself dealing with a greater skills shortage, again jeopardising the dynamic efficiency criterion.

For all these reasons, we strongly advise against policy at the EU level which focuses on minimising short-term costs and ignores the innovation/industrialisation challenge. The risk of fostering the wrong technologies (the neoclassical worry) is far less serious than the risk of failing to meet the innovation/industrialisation challenge. In the EU, it is therefore imperative that some countries continue to use frameworks that give stable and long-term incentives (FIT) to investors to explore new technological opportunities and build new capital goods industries. The rest of the EU (and other countries) may then rely on these countries for acquiring the new technologies in such volumes and at such cost levels that we, collectively, can decarbonise the power sector by 2050. These frameworks are, thus, of strategic importance to the EU's ability to combat climate change. A pan-EU TGC system is, therefore, an extremely dangerous proposition.

It is also a naïve proposition in that it neglects the complex institutional reality in the energy sector. When such a policy instrument is applied across countries, it requires major institutional adjustments in order to avoid distortions and achieve cost-effectiveness. We consider four areas of such adjustment in which facts conflict with faith.

The first is to reach a high degree of similarity in the design of the member states' TGC systems. Distortions may result from differences in the composition of eligible portfolios of technologies, the acceptance or exclusion of existing plants, applying diverging TGC coefficients for the various technologies, unequal roles played by price caps (incentive, penalty or safety valve for limiting costs), different duration of governmental commitments, and so on.

A second is the abolition of other RES-E support, such as investment subsidies, environmental bonus, tax credits and local/regional community support.

A third is the integration of conventional electricity markets, because green certificates and conventional electricity are linked products. We must expect that significant differentiation of conventional electricity prices will remain between various regional electricity markets (Nordic, British, Continental, Iberic and Italian markets) because of interconnection restrictions and large differences in the conventional generation technologies installed. The lack of electricity price convergence between regional markets would undermine the long-term theoretical efficiency conditions of the development of RES-E projects in EU. Indeed, in a pan-EU TGC system, much costlier RES-E projects would be developed in countries with high electricity price than in those with lower prices.

A fourth is to ignore that the social benefits attached to the green component of electricity production may differ across nations. Electricity consumers would pay for the development of RES-E projects, and their social benefits, in other countries via the TGC trade. However, industrial policies in support of RES-E, such as innovation pull mechanisms, energy diversification, air pollution abatement and local development impacts provide significant positive externalities that reflect national political goals.

Hence, a pan-EU TGC system is a simplistic economics textbook proposition, the implementation of which would bring even more perverse outcomes than the trials in Sweden, UK and Flanders show.

3.5. The coalition behind the pan-European TGC dream

How can we then explain the recurrent emphasis on such a regulatory framework by core actors in the EU? The coalition behind the pan-European TGC dream is composed of actors found both within and outside of the European Commission. Inspired by neo-liberal ideology, they advocate 'market-based instruments'. The design of these are guided by neoclassical economic theory, with its preference for textbook analyses which are far away from the real world of complexity and uncertainty. This world view is strongly established in DG[2] Enterprise and Industry, DG Competition and – as a result of environmental economics inspired by the same theory – in DG Environment. Other key advocates of TGC are the big power producers (and their associations, such as EURELECTRIC and EFET[3]). In addition, these actors are assisted by friendly regulators, both in the Commission and at national levels, which maintain a symbiotic relationship to the conventional power sector.

These actors have a range of reasons for advocating TGCs beyond their faith in neoclassical economics. Commission officials like flexibility in target achievement and a framework for importing renewable energy from outside the EU, for example, Norway or North Africa. The Commission acquires new powers over energy issues when RES-E support can be reframed as falling within the competition and internal market remit. The latter is easier with TGCs than with other instruments.

However, the strongest interest in a pan-EU TGC system undoubtedly comes from the power producers themselves. As our case studies show, incumbent utilities can capture excess profits within such a system without taking the risks associated with implementing relatively immature technologies. Additionally, as in the UK, they may be placed in charge of renewables development and this provides them with the market control and the political power to deploy renewables at their chosen pace.

Also, some friendly regulators in the Commission and at national level encourage European power companies to grow into international champions. A possible way to do so is by implementing a pan-EU TGC system that generates excess profits.[4]

4. Conclusions

We suggest, on the basis of a multi-disciplinary analysis, that a pan-EU TGC system is not the way forward for Europe. It is vital that the Commission (and the majority of Member States) avoids implementation of such policy designs put forward by a coalition of vested interests. They should look at, and act upon, the available evidence (including Commission, 2005, 2008b) and design policies that stand a better chance of meeting the criteria of effectiveness, efficiency and equity. In particular, the policies must enable EU to meet the innovation/industrialisation challenge. Only then we can develop the ability to implement an industrial revolution in the energy system in a way that broadly meets the criteria of effectiveness and dynamic efficiency. We cannot expect the EU power oligopolies to lead this revolution. In addition to an ambitious and imaginative Energy Efficiency policy, a Renewables policy must, therefore, deliberately be designed to open up, and secure attractive investment conditions, for new entrants and entrepreneurs in the whole value chain for a broad range of technologies. In a market economy, the prospect of rents is a necessary and appropriate incentive for encouraging entrepreneurship. However, rents should be channelled to risk taking innovators/entrepreneurs and should not be confused with the excess profits captured by incumbents free riding on badly designed regulations. Only in this way, will Europe have a chance of meeting the challenge of climate change and of ensuring an economically healthy industrialisation of new technologies.

Rejecting a pan-EU TGC system does not, of course, imply rejecting physical trade. As noted above, meeting the climate challenge necessarily involves exploiting the full renewable energy resource base of the EU and neighbouring countries. This can hardly be achieved without the opportunity for physical trade of renewable power, something that, for example, may induce an exploitation of the huge potential for Norwegian off-shore wind power. A trading system must, however, be designed in a way that it does not (a) lead to economic inefficiencies at the EU level and (b) endanger the ability of the EU to build up a broad RES-E capital goods industry. The challenge for policy is, therefore, to design framework(s) that allow for a full use of the resource base, acknowledge the institutional diversity in the EU and, most importantly, make it possible for us to address the innovation/industrialisation challenge.[5]

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[2] Directorates General (DGs) are the major subunits of the European Commission.

[3] European Federation of Energy Traders.

[4] These profits could possibly be seen as a way to compensate the utilities when they have to switch from free allowance of carbon permits in the ETS to auctioning of these.

[5] The new instruments recently proposed in the Energy Council by Germany, Poland and the UK – similar to those of the Turmes Report to the European Parliament (Turmes, 2008) – may help to meet this challenge.