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## **EFFICIENCY AND EFFECTIVENESS OF PROMOTION SYSTEMS FOR ELECTRICITY GENERATION FROM RENEWABLE ENERGY SOURCES – AN UPDATE ON LESSONS LEARNED FROM EU COUNTRIES**

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### **OVERVIEW/INTRODUCTION**

Currently, a wide range of strategies is implemented in different countries to increase the share of electricity from renewable energy sources (RES-E). One of the most controversially discussions is whether trading-based (e.g. the recently announced Guarantee-of-Origin (GoO) trade) or technology-specific instruments (like feed-in tariffs (FIT)) lead to preferable solutions for society. An important issue in this context is that both systems are actually market-based and both systems are introduced by policy makers and, hence, create an artificial market. Finally, in both systems the final electricity customers (or the tax payers) will have to cover the support costs. The core objective of this paper is to discuss the perspectives for future promotion schemes to ensure an efficient and effective further increase of RES-E. Special focus is put in this context on the Spanish dual system which could – due to its market-oriented component – serve as a transition instrument towards a more market-compatible promotion tool.

### **2. METHOD OF APPROACH**

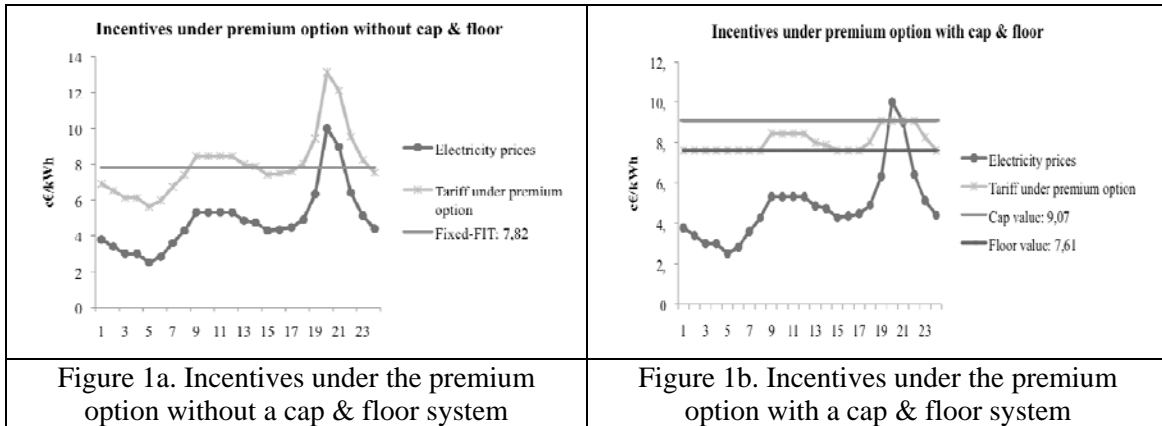
The analysis applied in this work is based on a formal framework analysing the costs and the economic performance of the programmes from the following points-of-view:

- identifying investment costs (and fuel costs if there are any) as well as producers' surplus from the generation point-of-view;
- investigating the over-all additional extra costs for the electricity consumers/tax payers → society's point-of-view.

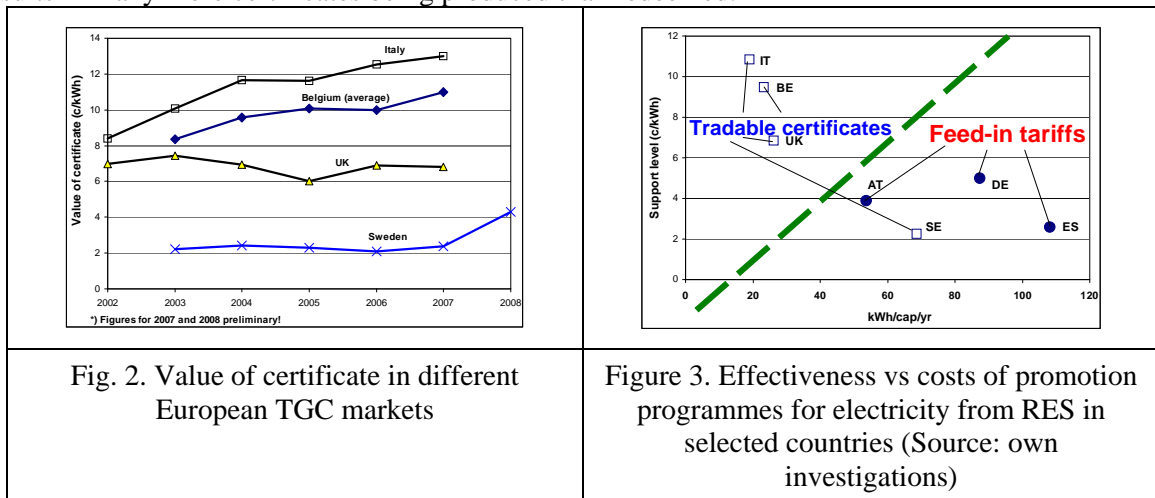
### **3. RESULTS**

In the following the major lessons-learned in recent years are summarized for the major support systems. One of the most interesting instruments – which currently regulates RES-E support in Spain – is a dual system consisting of a FIT and alternatively a premium system with a cap and floor component for plants opting for a market option.

Figure 3 illustrates the effects of the cap and floor system on the incentives level under the premium option by simulating the revenues for wind energy on the 28th of January 2009 in the case that no cap and floor system had been implemented and in the opposite case. Comparing the upper and the lower part of the figure, it has to be highlighted that during peaks hours there is a loss of revenues when the cap and floor system is implemented, but during the base load hours the effect is just opposite, obtaining higher revenues since the floor value is higher than the expected revenues (market prices plus premium).



The major lessons learned from specific countries with quota-based tradable GoO systems are: In the UK, the major problem – aside from high certificate prices – is that so far the quota has never been fulfilled. In 2004, only 2.2 % of electricity was generated from “new” RES while the quota was 3.3 %. One main reason for this failure is the low penalty and respectively the fact that this penalty is recycled to the RES-E generators. Moreover, because banking is not allowed, RES-E generators fear that the certificate price will drop the closer they come to the quota. There is a similar situation in Italy. Certificate prices here are high (see Fig. 6) and quota fulfilment is moderate (about 80 % of the quota of 2.2 % was fulfilled in 2005). One major reason for the high certificate price is the low validity of the certificates of eight years. Non-fulfilment of the quota can be explained by the low penalty level. In Sweden, certificate prices are very low – see Fig. 2 – but the quantities of new RES-E installed are also very low. One reason is that some old capacity is also allowed in the Swedish quota system. This results in many more certificates being produced than redeemed.



Finally the relation between quantities deployed and the level of support is analysed for some trading and some FIT systems in recent years. It is often argued that the reason for higher capacities installed is a higher support level. Paradoxically, countries with highest support levels – Belgium and Italy for example – are among those with the lowest specific deployment (Figure 3). On the other hand, high FITs especially in Germany and Spain are often named as the main driver for investments especially in wind energy. However, the support level in these countries is not particularly high compared with other countries analysed here. Regarding the comparison of the different support schemes, the investigated FIT systems are effective at a relatively low producer profit. A well-designed (dynamic) FIT system provides a certain deployment of RES-E in the shortest time and at lowest costs for society. Summing up the major results of this analysis are:

The success stories of growth in RES-E in EU member states in recent years has been triggered by FIT-based systems implemented in a technology-specific manner at modest costs for European citizens. The Spanish dual systems proved – in a dynamic development which finally includes floor and cap values – that there are opportunities to move from pure subsidy-based systems towards market-oriented promotion schemes.

At present, quota-based trading systems show a low effectiveness although comparably high profit margins are possible. Firstly, a major problem are the producer profits possible especially for the cheapest options in the market. This leads to correspondingly high additional costs for customers. Secondly, market mechanisms seem to fail in TGC-systems, but, why should competition work in a TGC market if it does not function in the conventional European electricity market? The large incumbent utilities favor trading systems since this scheme gives them the chance to hedge risks and therefore prefer higher profitability.

#### **4. CONCLUSIONS**

The most important conclusions of this analysis are: (i) A well-designed (dynamic) Feed-in tariff system provides a certain deployment of electricity generated from Renewable Energy Sources (RES-E) fastest and at lowest costs for society; (ii) A dual system with a market-oriented component can serve as a transition instrument towards a more market-compatible promotion tool; (iii) Promotion strategies with low policy risk lead to lower profit requirements by investors and, hence, cause lower costs for society.