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## **THE ECONOMICS OF AN ITALIAN WIND PLANT IN THE FRAMEWORK OF THE EU DIRECTIVE 2001/77/EC FOR THE PROMOTION OF ELECTRICITY PRODUCED FROM RENEWABLE ENERGY SOURCES**

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### **Overview**

The Italian Renewable Energy Sources (RES) policy is an important element part of CO<sub>2</sub> emission reduction policies, co-ordinated by the Ministry of Economic Development (formerly Ministry of Industry).

Recently (1999-2001) there was a shift in the main policy instrument to support RES from the so-called CIP-6 regime, based on a pre-determined tariff paid by the system operator to qualified producers of RES-generated electricity, to a Green Certificate (GC) system with binding targets. The obligation to buy Green Certificates is imposed on electricity suppliers (producers and importers) and the GCs are exchangeable and tradable on the market. This paper aims to forecast the possible revenue of RES-generated electricity sold to the grid in Italy in the next 10 years by plants falling under the GC scheme. The success of this policy instrument is also evaluated in the frame of the EU directive (directive 2001/77/ec of the European Parliament and of the Council of 27 September 2001) for the promotion of electricity produced from renewable energy sources in the internal electricity market with the indicative target of 25% of gross electricity consumption.

### **Methods**

According to the present Italian legislation, the procedure that has been followed in the present study in order to forecast the possible revenue of RES-generated electricity sold to the grid in Italy in the next 10 years by plants falling under the GC scheme is the following:

- 1) The total revenue is the sum of the price paid by the grid to the producer for the electricity fed into the grid plus the revenue deriving from the sale of the GCs; the two contributions are forecast separately
- 2) In order to evaluate the demand for GC, we have started from the prediction of the demand for electricity in Italy in the next 10 years, based on a detailed calculation from a bottom-up econometric model
- 3) The rules to determine the required volume of GCs imply the evaluation of the electricity already produced from RES; of the electricity produced from not-RES plants with annual production lower than 100 GWh (exempt from the obligation of GC) and of the exemption of the first 100 GWh per year produced by each of the other plants; the combined heat and power (CHP) plants, which are also exempt, and the fraction of electricity imports that is certified to derive from RES production. Once all these contributions have been subtracted from the gross electricity production, the remaining part is subject to the percentage of GC fixed by the government, on which only reasonable hypotheses can be made after 2006
- 4) The supply of GC is also evaluated, in its two components: plants operating under the CIP-6 regime and other RES plants. This prediction is somewhat affected by the future district heating plants (new or retrofit), which a recent norm has assimilated to RES plants. Reasonable assumptions have had to be made in this context. The scenario of GC supply takes into account the extension of time for which GC are issued for each plant (8 or 12 years)
- 5) The demand and supply of GCs are then compared up to 2015 to determine the behaviour of the market. Two scenarios are evaluated, in order to take in account some uncertainties in the normative framework. Those uncertainties concerns the new Italian Government choices about the way to comply with the targets of the European Directive and in particular about the obligation that possible GCs exceeding demand would be bought by the grid (GRTN) at a price to be fixed, but presumably remunerative.
- 6) The price paid by the grid to the RES (non-CIP-6) producer is equal to the average market price of electricity. This price is set by the thermo-electric component of the power-generating park. This will in term depend on the composition of the park (expected to change substantially with time) and on the price of fuels (mainly natural gas and, for a lesser part, coal). Predictions are then made (based on a variety of sources and economic models) on the future prices of fuels, the investment costs in the power sector, and the market price of electricity, based on the experience so far of the operation of the electricity market. The result will give the first component of the revenue for RES plants.
- 7) The market value of GCs will then be evaluated. In the reference scenario, until about 2012, as we shall see, this value will be dominated by the price of the GCs generated by the CIP-6 plants put on the market by GRTN at a regulated price. The CIP-6 RES-based plants generate GCs which are not issued to the plant operator (since this is already repaid by the special CIP-6 tariffs) but by the public, represented by GRTN. The price at which GRTN sells its GC on the market is given by the difference between the costs incurred by GRTN in purchasing electricity from renewable energy CIP-6 plants (whether or not they generate GC) and the revenue obtained from the sale of this electricity on the market (both free and regulated). Since the CIP-6 regime was quite generous, the resulting price is rather high and it represents a benchmark, as well as a cap, for the GC market.
- 8) The two components calculated, sale of electricity and sale of Green Certificates, allow to estimate the revenues from a RES plant in Italy up to 2015

### **Results**

A comparison between the reference scenario and the worst case shows that the a revenue per kWh of a new RES power plant in Italy (IAFR certified) can move from about 140 €/MWh to about 190 €/MWh. This difference depends on how the Government will further develop the energy and environmental policies already in place, within the framework of the EU choices. The more realistic value for such revenue can be set around 180 €/MWh on the average. That's because Italy is still far away from the EU RES targets and a strong incentive is still necessary in order to stimulate the construction of new RES capacity.

In any case, the average long run marginal cost for wind power plants in good wind conditions can be estimated around 100 €/MWh, so that the GC mechanism is anyway a strong incentive for such technology. In this situation, the gross margin of an investment in a new IAFR wind power plant can go from 40 to 90 €/MWh.

### **Conclusions**

Although subject to a number of uncertainties, the scenarios presented in this paper are positive enough to guarantee a strong incentive for a wind plant on the base of the evaluation of the revenues of a RES power plant installed in Italy in the near future.

A possible revision of the rules governing the systems of Green Certificates so as to make them more compatible among different countries and allowing a European-wide market of GC (which is a distinct possibility) might even make the Italian system more favourable, in the sense of extending the useful lifetime of RES plants in generating GCs (in other countries, the RES obligation is calculated over the entire lifetime of RES plants, and not only over a limited period).

All these considerations lead to think that future Italian governments will maintain a legislative environment favourable to both new and existing RES plants, and that the assumptions in the present studies are well founded and, if anything, on the conservative side.