

Lecture 5

Policies to support renewable energy sources

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Outline of the lecture

- Need for support of renewable energy?
- Comparison of the different support mechanisms for renewable energy
 - Price-based
 - Quantity-based
- Data on European and Italian markets

Need for support for renewable energy

- Electricity production based on fossil fuels generates environmental damages \Rightarrow external costs
- Renewable energy technologies are still not mature
- Reliability issues of renewable energy sources
- Job creation at the local level
- Renewable energy sources (e.g. wind, solar) require initial support mechanisms to compete with large hydro and thermal plants
- They also require policy support to reduce investors' uncertainty

Types of support schemes for renewable energy

- Price based approaches
 - Obligation of electric utilities to purchase electricity generated by renewable energy sources at a predetermined price \Rightarrow feed-in tariff
 - Premium on spot market electricity price for electricity generated by renewable energy sources \Rightarrow feed-in premium
- Tradable green certificates (quantity-based approach):
 - Electric utilities are required to generate a certain quota of electricity with renewable energy sources
 - If they do not produce enough electricity with renewable energy sources they can buy it from other companies that produced in surplus
- Many countries also complement these instruments with other fiscal measures (grants, tax credit, etc)

Feed-in tariff

- Renewable energy producers are paid a set rate for their electricity over a long term period
- The tariff is usually differentiated by technology and size of the installation
- Given the tariff, markets determine the total installed capacity and the total generation
- Feed-in tariff schemes were very effective in most countries in boosting the diffusion of renewable energy sources (e.g. Germany, Italy, Spain)
- Fixed prices provide stable investment climate
- Long term stability leads to innovation

Feed-in tariff

- The subsidy generated windfall profits for producers of renewable energy
- They were not probably cost efficient (public funds used for the subsidy are collected with distortionary taxation)
- Generate rent-seeking behaviours
- May induce technological lock-in
- Interaction with other policy instruments \Rightarrow ETS
 - Generation of electricity with renewable energy 'releases' permits within the ETS for other generators of CO₂ emissions
 - If the feed-in tariff is unilaterally set by one single country (e.g. Germany) that would reduce the price of CO₂ allowances also in other countries \Rightarrow lower compliance costs in other countries subsidized by German taxpayers...

Renewable energy quota obligations

- The government mandates a minimum share of capacity or generation to be based on renewable energy sources
- This obligation is usually combined with tradable green certificates
 - The market decides the price of green certificates
 - These schemes are very useful to support low-cost (i.e. mature) technologies
- With tradable certificates cost efficiency is attained
- Volatility and uncertainty about the value/price of certificates have a negative impact on investments
- Large windfall profits for incumbent utilities with a big installed capacity in renewable energy sources

Support schemes and innovation

- Feed-in tariffs are particularly effective for the diffusion of technologies that are not mature
- Policy-induced acceleration in the diffusion facilitate the movement along the learning curve
- Extensive evidence in the economic literature about the strong and positive impact of feed-in tariffs on innovation in renewable energy technologies (patents)
- Even more powerful if coupled with liberalization of the electricity market
 - Incumbent firms have little incentive to innovate in these technologies as that would erode their profits arising from traditional technologies
 - Easing entry of new players may help boosting innovation (by entrant)

Figure: Total primary production for EU28 (TJ, Eurostat)

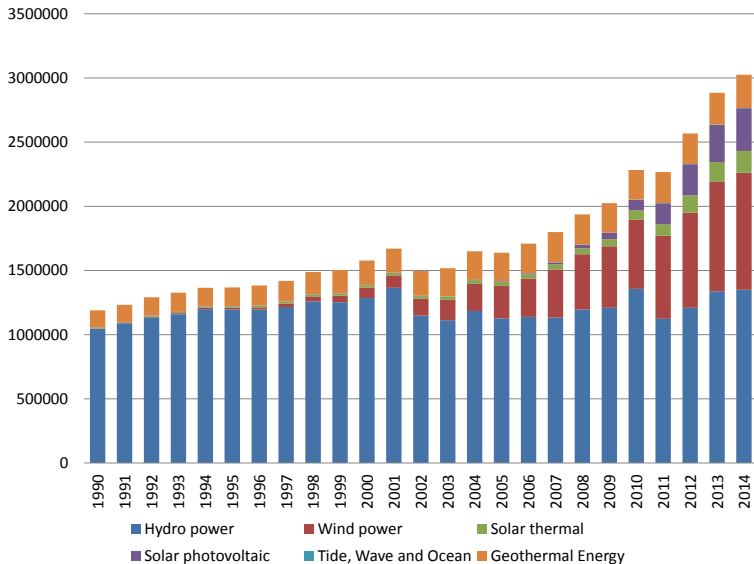


Figure: Total primary production of renewables excluding hydro (TJ, Eurostat)

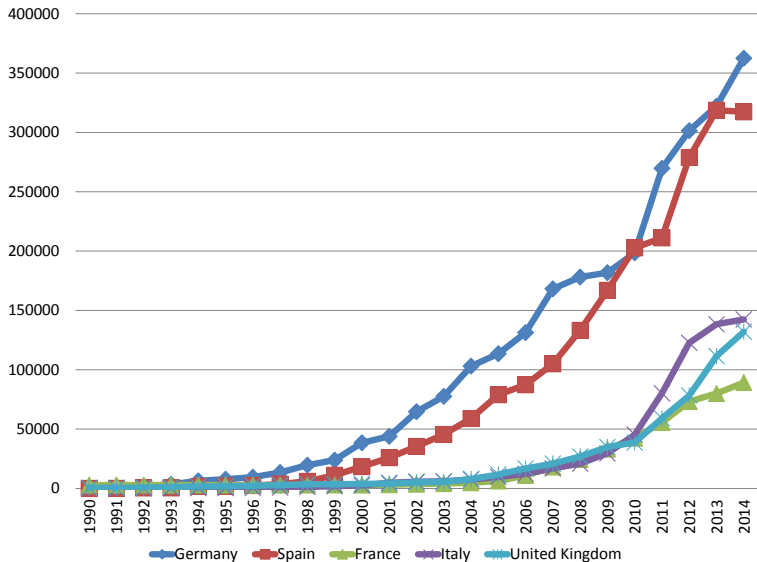


Figure: Total primary production of hydro (TJ, Eurostat)

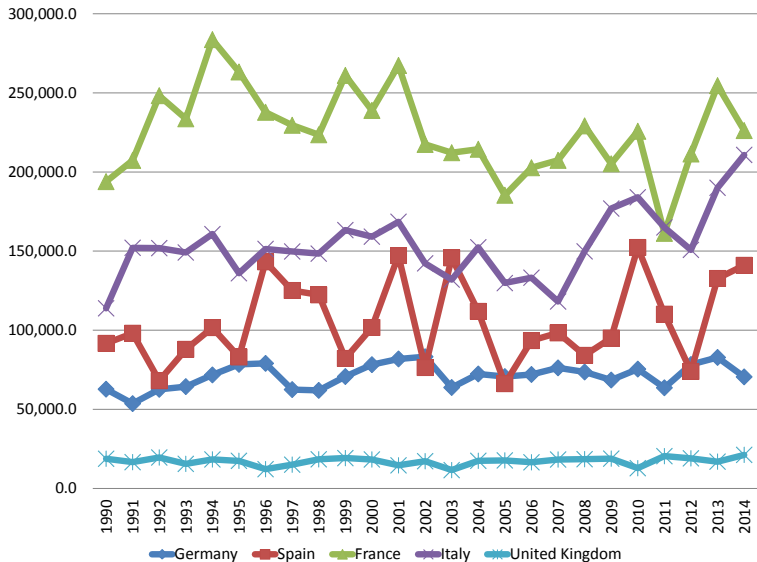


Figure: Total primary production of wind (TJ, Eurostat)

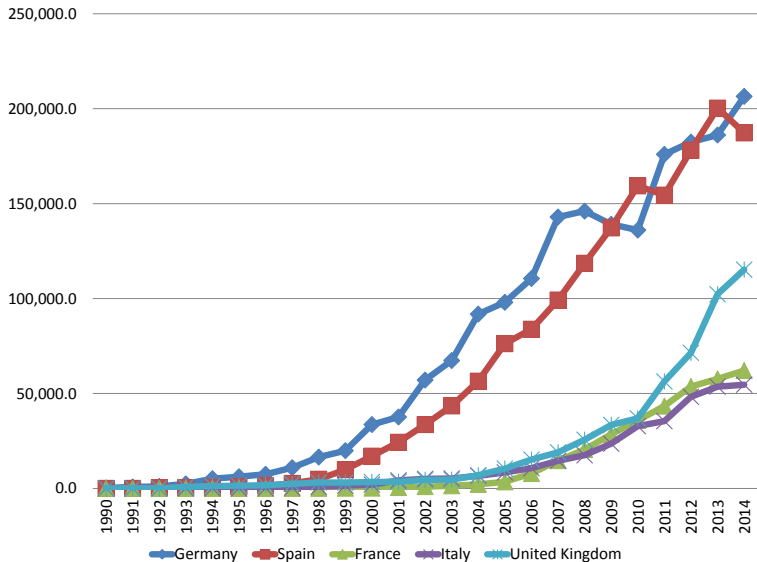


Figure: Total primary production of solar thermal (TJ, Eurostat)

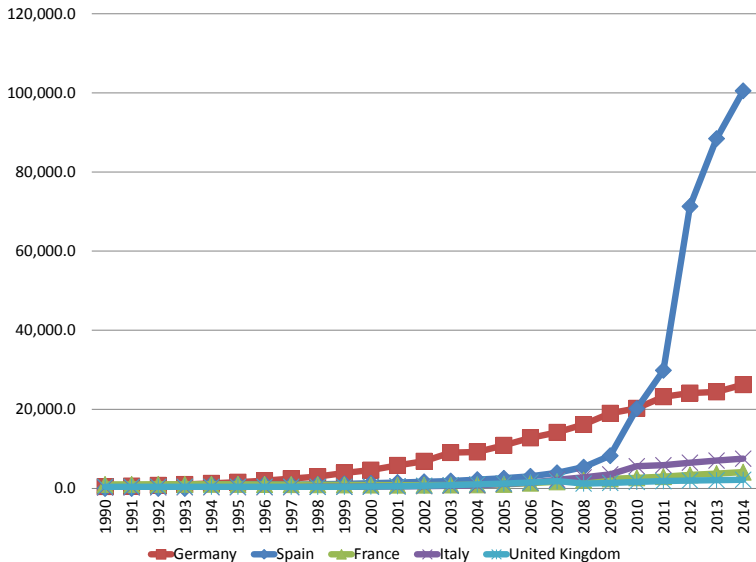


Figure: Total primary production of solar photovoltaic (TJ, Eurostat)

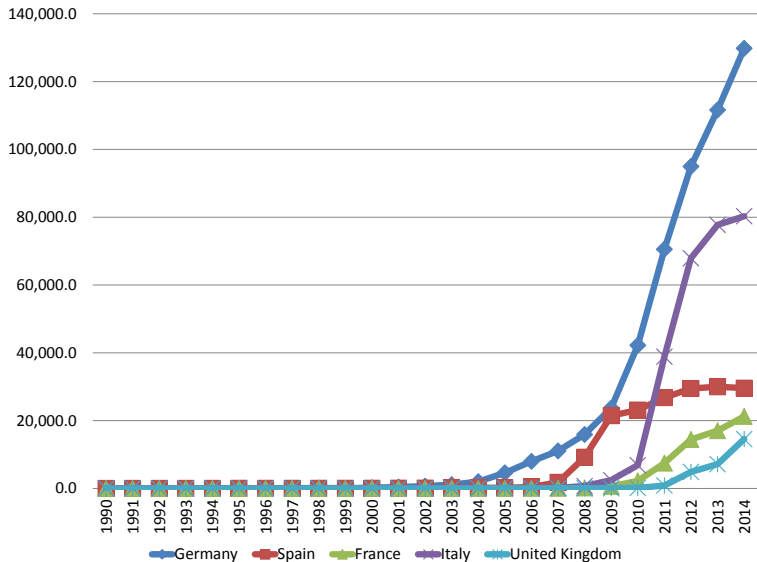
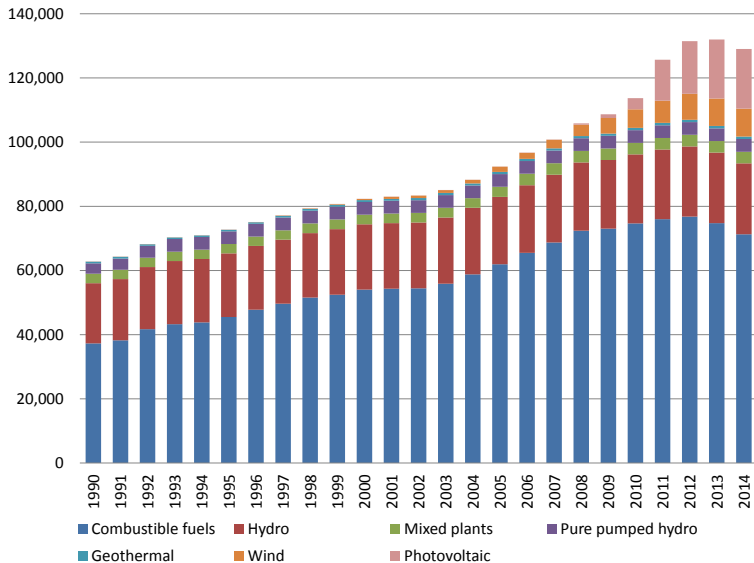


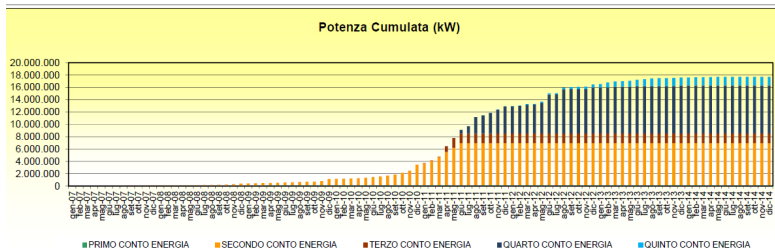
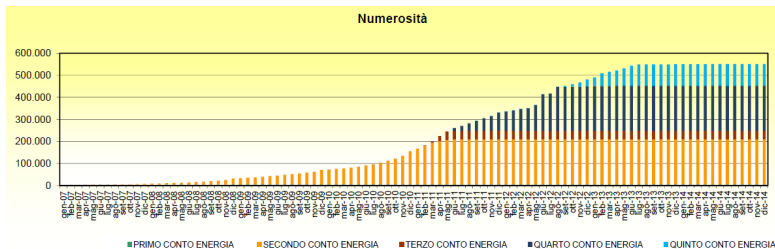
Figure: Italy - Installed capacity for electricity generation (MW, Eurostat)



Italian 'Conto Energia'

- Introduced in 2005 following the EU Directive on renewable energy (2001/77/CE)
- Feed-in tariff for solar photovoltaic
 - Primo Conto Energia (July 2005)
 - Up to 85MWp of new installed capacity per year
 - Feed-in tariff of about 0.5 euro per kWh for 20 years
 - 5% reduction in the feed-in tariff for each year
 - Secondo Conto Energia (February 2007) \Rightarrow mostly changes in the bureaucratic procedures
 - Terzo Conto Energia (August 2010) \Rightarrow differentiation of tariff for different installations (and reduction of the tariff)
 - Quarto Conto Energia (May 2011) \Rightarrow further reduction in tariffs
 - Quinto Conto Energia (July 2012) \Rightarrow ceiling set to 6.7 billion euro/year
- In July 2013 the 'Quinto Conto Energia' was ended and substituted with a 50% tax credit for the installation of solar photovoltaic

Installed capacity under 'Conto energia'



Green certificates (Certificati verdi)

- Introduced in 1999 (Decreto Bersani), kick-off in 2004
- Electric utilities have to produce at least 2% (in 2004, +0.35% every year) of their electricity with renewable sources
- If an utility cannot attain that target, it has to purchase 'certificates' from other producers to reach the target (certificati verdi)
- There is a market for these certificates
- Differently from the feed-in tariff, there exists uncertainty about the price of certificates
- Useful for more mature technologies (e.g. wind)

Green certificates

