Daniele AGOSTINI*

THE CHALLENGES IN RENEWABLE ENERGY REGULATION**

Abstract: Renewable energy sources policies have been playing an increasingly important role in recent years in light of their benefit in terms of security of supply, fight against climate change, environmental protection and perspectives on job creation. The exploitation of local resources such as wind, solar light and biomass allows a decreased dependence from both individual energy sources as well as energy imports. The carbon neutral nature of renewable energy plays a key role in reducing global pollution not only in terms of CO_2 emissions, but also in terms of NO_x and SO_x. Similarly a number of benefits arise in terms of enhancement of air quality on a local and regional level. Last but not least, the significant research, development and deployment effort required is associated with substantial employment opportunities.

For the above reasons, Governments have been aggressively promoting renewable energy sources with financial and regulatory instruments. This commitment led to a 70%[1] global increase of installed RES capacity from 1990 to 2008 resulting in significant CO_2 emissions reduction. An exponential growth has been observed in recent years in the industrialized world and a similarly robust increase is expected to continue in some countries and to start up in others. In the EU, a target of 20% of RES generation on final consumptions has been set for 2020. Considering the existence of this mandatory target, combined with the presence of a consolidated system of incentives in several countries, we can expect a continuation of the growing trend of the share of electricity production coming from renewable sources.

The above public policies need to be framed in the very peculiar context of the energy sector and more specifically the production of renewable energy. The equilibrium of electricity systems is characterised by a careful management of variations in both demand and supply. Flexibility of generation plants may vary across technology for both RES and non RES sources. The level of intermittency of renewable energy sources may vary not only across sources but also across geographies. As a result impacts of RES production on electricity systems are very different depending on its penetration, the role of intermittent sources, grid

* Daniele Agostini, Head of Renewable Energy Regulation and Energy Efficiency, Enel Group

** Full paper is given in terms of PowerPoint presentation.

[1] Source: Enerdata

characteristics and degree of integration of regional markets. The increasing penetration of intermittent renewable energy may put severe strain electrical system's ability to respond to variations. The increased RES generation has had an impact on grid system and the growth foreseen for the next years will necessarily require additional network development.

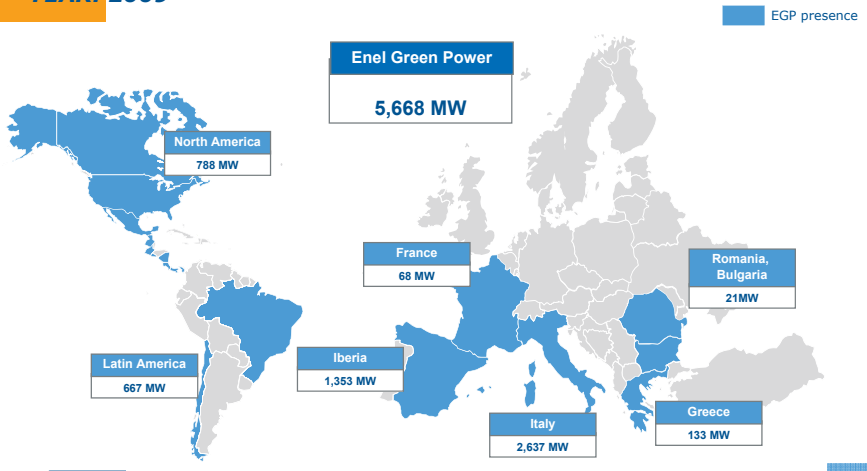
Rapid public policy development and the complexity of the energy sector context have created a number of regulatory challenges. Recent experience in mature electricity markets is making it increasingly clear that in order to minimise impacts of RES on electricity systems, it will be necessary to manage the mix of regulatory policies in terms of production portfolio, level of regional integration, infrastructure requirements and promotion schemes. Production portfolio targets must take into consideration the balance between intermittent and not intermittent sources as well as supply chain dynamics. Regional integration conditions must ensure a basic level of interconnection, sufficient market liquidity and source diversification. Infrastructure management must provide appropriate levels of connection and access with the increasing support of advanced technology capabilities provided by the deployment of smart grids. Finally, promotion schemes must ensure sufficient remuneration to guarantee financial sustainability and overcome non-economic barriers. In such respect the recent European Directive offers opportunities in terms of financing as well as effective tools for accelerating permitting processes and introducing greater transparency in accessing the grid.

Agenda

- Context
- The three regulatory challenges:
  1. Incentive program
  2. Permitting process
  3. Connection and access
- Conclusions

2

Leading the way in new renewable energy
YEAR: 2009*

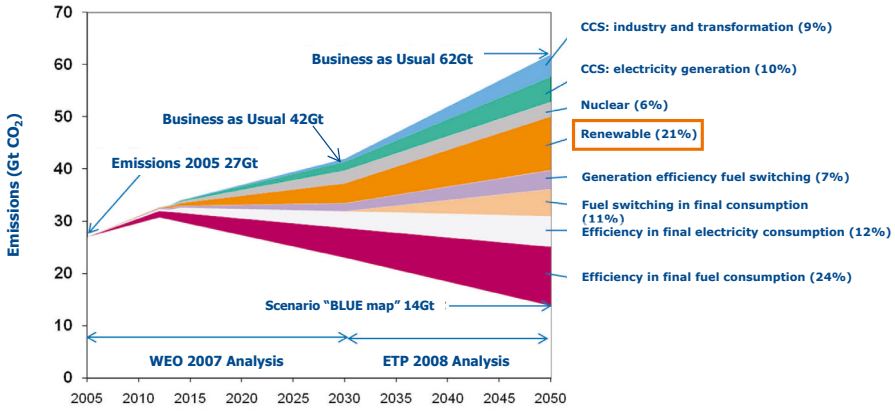


20,735 TWh total EGP Energy Production 2009

* Proforma data does not include large hydro and includes only Enel Green Power (incorporating also Eufer and ECvR), Enel Group worldwide installed capacity for Renewable Energy Sources is 33 GW including pump storage of approx. 10 GW

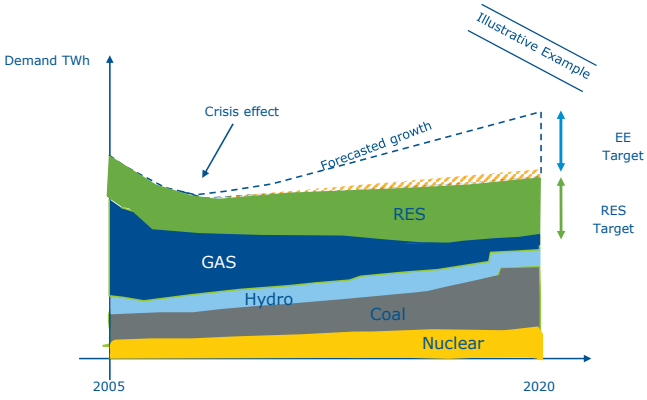
3

CO2 as a driver of RES Policy



CO2 is one of the key drivers of RES Policy

The security of supply driver



Security of supply considerations are also dominant

Global renewable energy growth

Technology	Global installed capacity 2008 (GW)	Global installed capacity 2009 (GW)	Variation in capacity 2008-09 (GW)	Variation in capacity %	Expected growth CAGR 2009-2020	Investments 2009 (€ mld)	EGP Presence
Hydro	~950	~980	+30	3%	2%	~ 65	✓
Wind	~121	~159	+38	31%	16%	~ 50	✓
Biomass	~52	~54	+2	4%	22%	~ 35	✓
Solar	~15	~23	+8	56%	32%	~ 25	✓
Geothermal	~10	~11	n.r.	n.r.	9%	n.r.	✓
TOTAL	**~1.148 GW**	**~1.227 GW**	**+79 GW**	**7,4%**	**8,5%**	**~ € 175 Bln**	

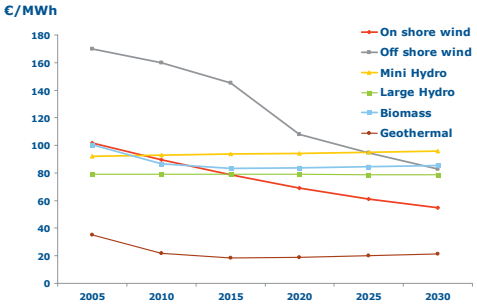
Strong growth is expected in biomass and solar

Source: Enel estimates based on WEO 2009/GWEC 2008 (2008); Reference scenario WEO 2009 (2020 min); market research/McKinsey (2020 max); "REN 21 Renewables Global Status" Report 2009-2010.

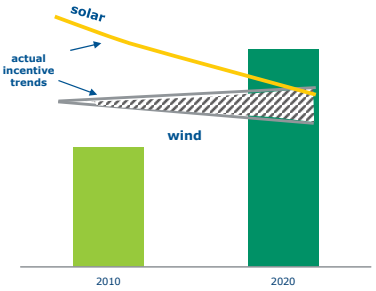
Agenda

- Context
- The three regulatory challenges:
  1. Incentive program
  2. Permitting process
  3. Connection and access
- Conclusions

How much will it cost



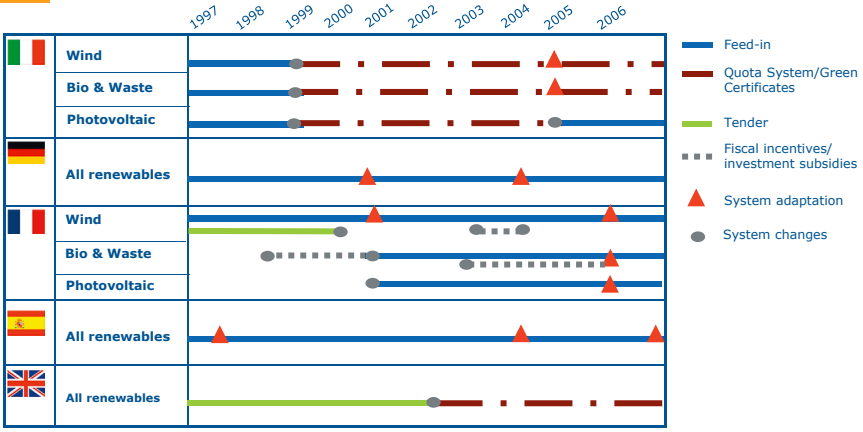
Technological unit cost



EU RES production (TWh) v.s. incentive trends

Reduction in technological costs may be offset by increasing resource scarcity

How will it be paid



Different policy tools will evolve and complement each other

Source: European Commission COM (2008) 19

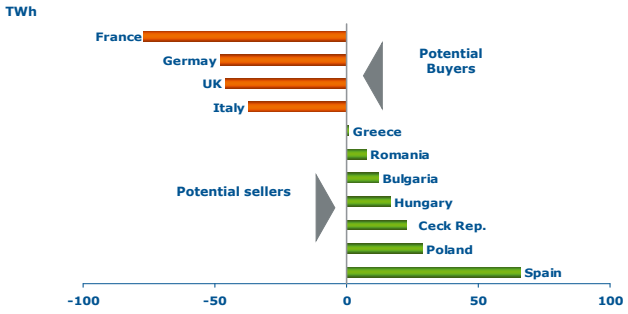
Where will the funds come from

Funding sources may depend on choice of policy tools:

- General public finance (R&D funding, fiscal breaks, capital subsidies)
- Electricity whole sale prices and tariffs (feed-in, green certificates
- CO2 auctions (R&D funding, capital subsidies)
- EU trading of green certificates
- Joint projects (capital subsidies)

Finding the right combination will be the real challenge

EU trading potential in 2020



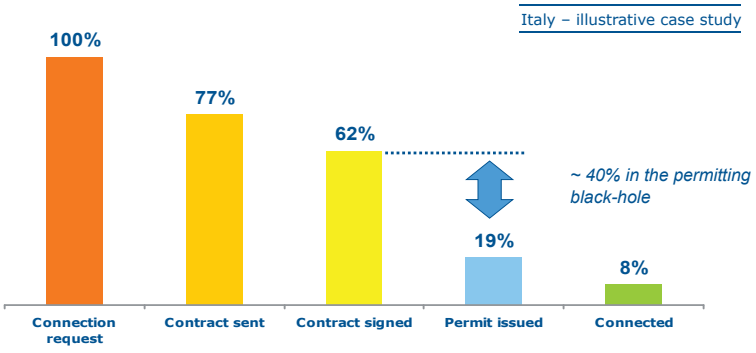
The EU Commission believes there is a significant trading potential

Source: Primes MS, Forecast Documents

Agenda

- Context
- The three regulatory challenges:
  1. Incentive program
  2. Permitting process
  3. Connection and access
- Conclusions

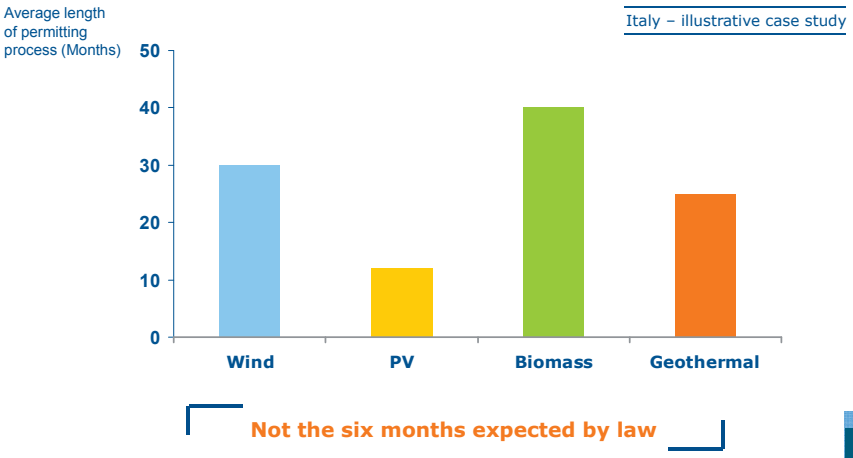
The role of the permitting black-hole



Not everybody appears to makes it ...

Note: elaborated on sample Spring 2010 Enel data, based on capacity requests

Life in the permitting black-hole

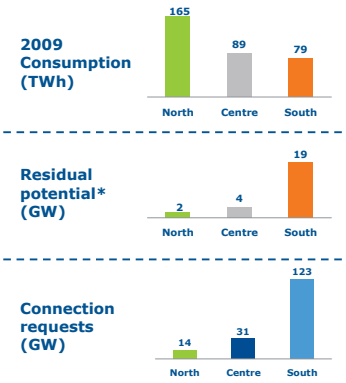


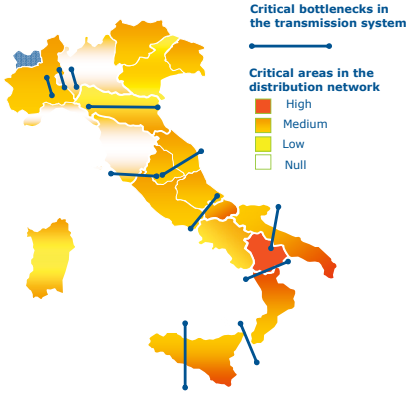
Source: I-Com survey data

Agenda

- Context
- The three regulatory challenges:
  1. Incentive program
  2. Permitting process
  3. Connection and access
- Conclusions

The challenge of the grid upgrade

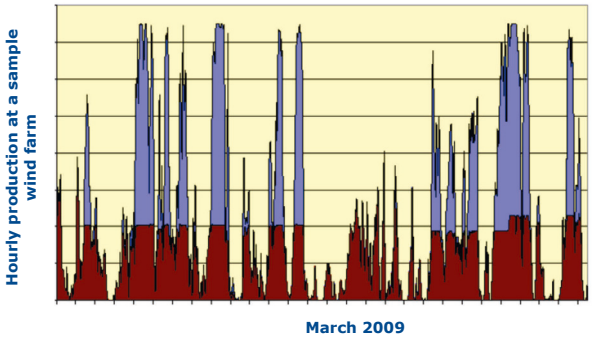




The different development time scales between production plants and grid upgrades are critical

Fonte: REF, Terna, Enel Distribuzione 2010 Spring data

The dispatching challenge



Restrained production

Actual production

… 50% of total production may occur during within only 20% of annual operation time …

Smart grids may help better dispatching of wind and solar power characterised by high level of intermittency

Conclusions

- Renewable Energies will play a critical role in the energy sector
- Uncertainties do exist regarding incentive programs:
  a) actual costs (increasing or decreasing)
  b) combination of instruments (feed-in, quota systems, tenders or fiscal breaks)
  c) funding source (public finance, electricity prices, CO2 auctions, trading)
- The challenge of the permitting process should not be underestimated
- It is critical that RES penetration is supported through upgrades in the transmission and distribution systems (capacity increases and smart grid technology)