WHEN AN EFFECTIVE EU ENERGY POLICY?

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1. GENERAL COMMENTS

Energy in general and electricity in particular are always more essential to economic development and to prosperity, health and security of citizens:

GDP is strictly related to energy (consumption / cost / quality of supply)

The EC green paper is based on 3 pillars:

1. **competitive environment** (affordable energy costs)
2. reliable, **secure** and high quality energy **supply** (for industry, transports and heat/light for domestic clients)
3. **environmental sustainability**

The **energy sector** is a “special one” and it is characterized by very long cycle times.

In the electricity sector the global time from R.D&D (Research, Development and Demonstration), to engineering, construction and operation of “a family” of products, it is of various decades:

- for HVDC substations > 30 years
- for new NPP’s ~ 100 years

In the oil/gas/coal arena the same long times are involved for wells and mines and relevant

infrastructures for transportation.

These inherent long-time characteristics must be considered carefully in the development of energy scenarios and policies and in R&D programs/fundings.

In this scenario how is it possible to combine the liberalization of the energy sector with an energy policy?

The investors in a liberalized market are governed by financial environment that is becoming even more a speculation market with always shorter return time for investments.

In this view, the investments in the energy sector are mainly directed by private investors to the less capital intensive and shorter IRR activities which are usually not in favour of the environment or of long term security of supply.

One of the fundamental tasks of EC and of national governments should be therefore that to find the detailed rules (and “the devil lies in the details”) for a liberalized market which could allow also a coherent energy policy; a liberalized market, in any case, is not a “Far West”.

The time to secure consent and permissions to build energy infrastructures is becoming longer and longer and it is for almost all the applications by far longer than final detailed engineering and construction times.

In many cases it is exceeding a decade and it is therefore:

- impossible to implement in an effective way the possible signals coming from the market;
- impossible to define the financial closing for the projects availing good financial conditions;
- impossible to take engagements and define contracts with suppliers which are never sure of their backlog / possible engagements.

This is becoming a strategic issue and some coordinated answers/actions should be taken by EC and by the country governments. Democracy is nice but we need an “efficient democracy” to avoid chaos and future localisms.

2. VULNERABILITY

How is EU placed in the energy market?

It is and it could be always more vulnerable.

Vulnerability, according to a WEC WG, is a concept more important and complete than dependence; it is the non capacity of a nation (or group of nations) to set up an energy policy which allows in the medium/long term to have a balanced optimization of the three fundamental conditions well stated in the EC "green paper" (competitiveness, security of supply, environmental sustainability).

From the energy point of view, one could have a complete dependence but could be not vulnerable through long term agreements diversified by regions and by types of resources.

On the other hand, one could be completely independent from external energy supplies but if it is got thru the utilization of very expensive energy sources (e.g. not yet economic renewables) it is very vulnerable and subject to possible economic collapses due to the competition from other areas availing cheaper energy.

Considering what above, it is quite clear that possible scenarios where mainly/only Europe is pursuing a very expensive environmental sustainability (and therefore with a global low impact on emissions of around 10%) should be taken into account to verify the co-existence of the three EC pillars (among the others high cost of energy sources will kill all the energy intensive industries with relevant impact on employment, economy, etc.).

If we consider EU 29 (EU 25 + Bulgaria, Romania, Norway and Switzerland), the final energy demand is around ~ 1200 MTOE.

By the type of fuel the final demand is now around:

- 43% liquid fuels
- 22% gas
- 20% electricity (with an increasing penetration rate)
- 5% solid fuels
- 5% others

With respect to the 3300 TWh of electricity production form the global 775 GW of power plants, they are:

~ 51.5% from fossil fuels (mainly coal and gas)
~ 30% from nuclear
~ 15% from hydro
~ 3.5% from other renewables

The global mix for electricity production is not so bad if we look at “global vulnerability” (apart from gas), but less than 10% of electricity is traded between the different countries and therefore there is not a real European electrical market due to lack of transmission capacity and there are a lot of “local vulnerabilities”.

3. TRANSMISSION

I would like to remember that in a liberalized market transmission is much more important than in a centralized market where a central planning/operation of generation and transmission was /is done. A real European electrical market will exist only if a large transmission/interconnection capacity exist giving at each instant the possibility to convey to the loads the energy coming from the cheapest plants.

Stronger interconnections will reduce also local reserve capacity margins.

- Transmission accounts for less than 10% of final kWh cost.
- Investments in transmission are the best investment for security of supply of energy and for a real competitive and cheap market.
- Technology (cables, HVDC, FACTS) exists to overcome critical problems of oppositions and of operation of large interconnected system.

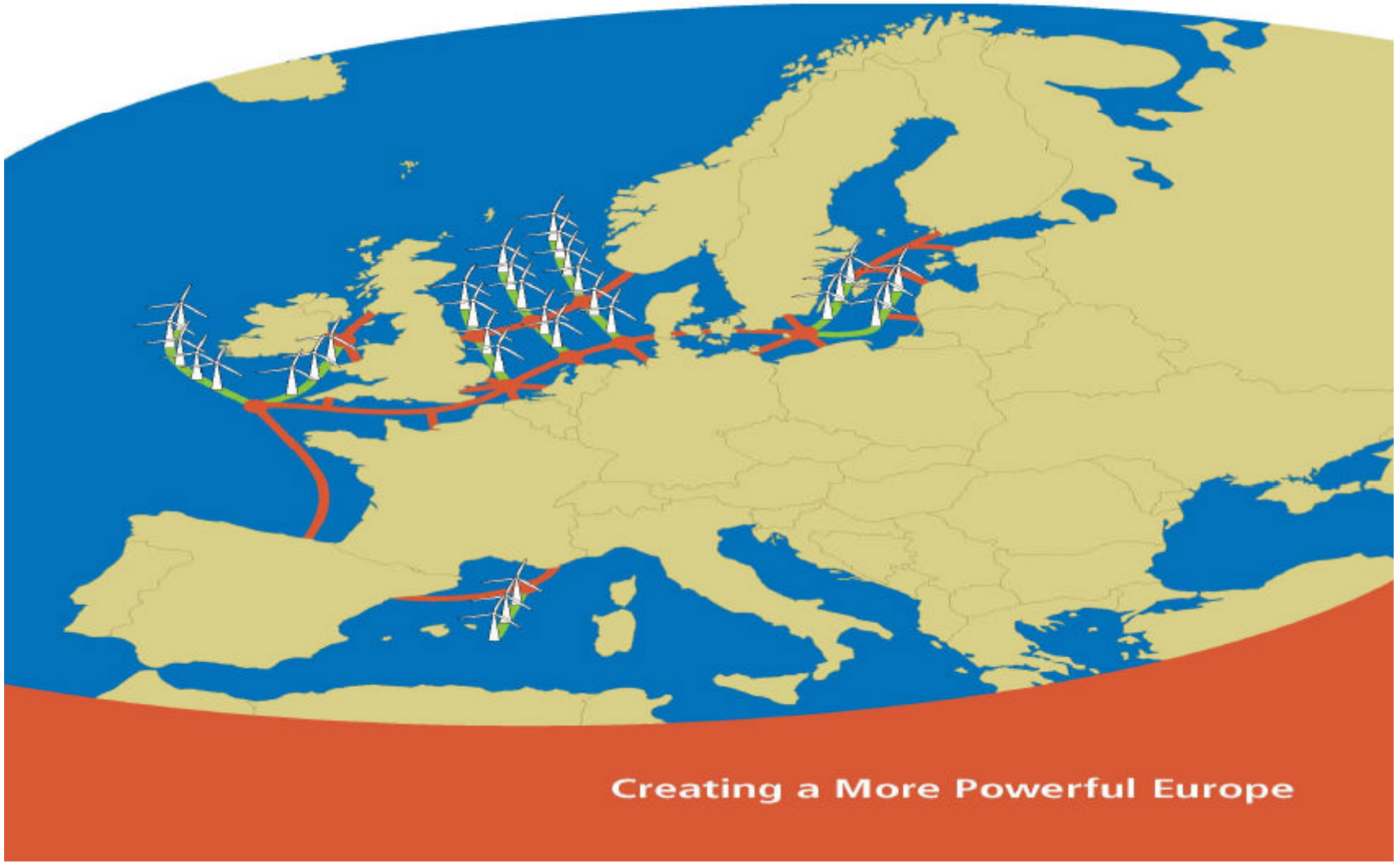
With reference to the overcome of the unpredictable electricity supply from wind generators and on the other hand to increase interconnection capacity between countries, the “European offshore supergrid proposal” is bringing together the latest technologies of wind generation and electricity transmission.

10,000 MW of wind generators interconnected, are making more reliable and predictable the energy supply and providing off-shore supergrid interconnections between regional networks (UK, Germany and Netherlands in first phase with possible future expansion to France, Spain and Mediterranean sea). It is a clear example of technologies and energy sources.

Airtricity

European Offshore Supergrid® Proposal

Vision and Executive Summary



4. THE NUCLEAR OPTION

Considering the dramatic increase of energy consumption driven by some countries (China, India) and by a portion of world population of around 1.7 billion people which doesn't avail now commercial energy sources, there is the expectation of future high and volatile oil, gas and coal prices; in their view EC cannot avoid to consider seriously the nuclear option to minimize its vulnerability (dependence / cost of electricity/impact on the environment).

I would like to recall some of the preliminary results of WEC WG I am chairing on “future role of nuclear in Europe”.

For EU, now 90% of reactors are more than 15 years old and were planned for a 35-40 years life.

The life extension/upgrading of the existing NPP's with their very cheap energy cost (around 20 €/MWh) and zero CO2 emission is a must and many countries are considering that; a retirement according to initial scheduling/subsequent laws would be a great problem for some countries and for EU in general.

For possible new NPP's, the technology exists now and it is called "generation 3"; large reactors (1000 MW and above which are the cheapest one) are offered by the world main suppliers and are not causing "unit size" problems in the "strong" EU system.

Different financial approaches are strongly affecting the kWh costs attributable to the overnight construction cost (OVN) and relevant interest costs during construction. For instance, if one considers, for a single unit order:

- same cost per kW installed (e.g.1800 €/kW as for EPR in Finland);
- same utilization hours (e.g.8000 per year);
- same amortization period (e.g. 60 years)

The result is:

- ✓ for **FINLAND:** with a 5% real discount rate, the portion of kWh cost due to investment is **14 €/MWh;**

- ✓ for **large and experienced global utilities** it is **25€/MWh;**

- ✓ for **Central and Southern Europe IPP's**, with after taxes IRR of 13% for equity (50%) and 7% cost for debt (50%) the above value becomes around **40 €/MWh** in case of Italian taxes. With higher value connected also to the involved risk, the 40€/MWh could go up.

The **total production cost** of a new nuclear power plant, including decommissioning and final waste allowances, could range (excluding special case local taxes):

- for a **single unit order**:
  - from **25-32.5** €/MWh with Finland approach
  - to **51-58.5** €/MWh for IRR values considered by IPP's
- for a **multiple unit order**, as considered by some large utilities, the value is **36 to 43.5** €/MWh

The Finnish approach has availed the definition of a final waste disposal site and special agreements between producers and consumers (long time take-or-pay contracts) with reduction of risks and discount rates.

With **emission trading at 20 €/ton of CO2**, the following "advantages" have to be considered for NPP's with respect to:

- Gas CCGT plant: 6-8 €/MWh
- Coal plant: 15-18 €/MWh

- For comparison purposes, **the present kWh price offered by an IPP in Italy with a CCGT plant** and with a gas cost close to 0.3 €/m3 is around **70 €/MWh**, not considering the CO2 emission charge of ~ 7 €/MWh; 80% of the 70 € are gas cost!

- For a NPP, uranium is only a portion of fuel cost which accounts for some 10% of total kWh!

Key issues for nuclear development in liberalized markets are:

1. **public acceptance**;

2. **standardization and series effects** on cost and security + producers/consumers long term agreements;

3. **institutional framework** to limit risks for site allocations and final waste disposal;

With reference to public acceptance, is the present approach “each country is responsible for taking care of its own waste” the best one for a real integrated EU energy and nuclear policy development? I do not believe that; some few repositories for high level waste would be sufficient and would facilitate the development of possible new nuclear programs in countries, where the solution of “final waste” could be of strong help for starting possible nuclear renaissance. Clearly this implies well defined prices for the services rendered from a specific country to the other ones.

EU-25 IS THE POLITICAL ENTITY WITH:

- the largest number (149)/global installed capacity (131 GW) of nuclear units;
- the largest share of electricity (30%) produced by nuclear plants (930 TWh);
- the most important and leading R&D Centers and industries covering all the activities connected to NPP's, from fuel enrichment to turn key NPP's and to decommissioning and final waste disposal.

R&D efforts/funds should be directed not only to very long term projects (e.g. fusion).

EU must keep the leadership also in Generation IV reactors which will be in commercial operation around 2030.

5. THE ELECTRICITY MARKET

The **electricity market** is characterized now and in the next future by the non technical/economical capacity of storage and therefore production must follow the load:

- the "demand" diagram is varying daily, weekly and with seasons. It is therefore necessary to have an adequate mix of base-load plants, mid merit and peak ones;
- from the production side, some technologies are possible/ economic only as base-load (e.g. nuclear), someone as peak (single cycle gas);
- some renewables (wind, PV) have no possibility of commitment of a firm capacity. They cannot work without the "back up" of conventional generation and of a strong T&D system (with clear additional costs to the ones usually provided for them).

A realistic approach is needed, considering the long times for an actual and economic development of CCS (carbon capture and sequestration) and of possible distributed generation.

6. ENERGY EFFICIENCY

Energy/efficiency is the cheapest and most clean energy source.
Apart from buildings and transport systems, the electricity sector can provide substantial contribution both increasing efficiency in production and final consumption.

More than 50% of electricity consumption in EU 25 is in industrial plants and 70% of this 50% is consumed by electrical motors. Substitution of inefficient motors and/or application of inverters can provide substantial savings as analysed in EC by many years.

In Italy less than 2% of motors sold are of class "efficiency 1" and only around 5% of inverter applications are exploited; I have computed possible savings of 20 TWh per year and 10 Mt CO2 per year. There has been practically no effect of voluntary approach and there is the necessity of obligations/incentives.

The life cycle cost of an electrical motor in 10 years of life (and motors have a longer life) is: 2% initial investment cost and more than 95% electrical energy costs (which are increasing).

For a real success of an energy efficiency policy, a life cycle approach should become a normal approach:

- *information*
- *communication*
- *.... but also effective laws*

7. CONCLUSIONS AND FINAL REMARKS

- An EU energy policy could exist only in case of a political will/integration and will affect an industrial policy.

- It is essential to define detailed rules for a possible coexistence of liberalization and privatization processes with long term objectives.

- Future scenarios where mainly Europe is pursuing expensive environmental sustainability should be considered together with possible different EU configurations.

- To have a real integrated electricity market, strong investments in interconnections/ transmission should be pursued and new technologies can be applied.

- The nuclear option must be considered seriously by EC to minimize its vulnerability.

- Energy efficiency in all the sectors must be pursued even with “obligations” in case voluntary agreements are ineffective.

- Public opposition and the very long times of consent/authorization must be tackled with appropriate common strategies and communication.

- As WEC is stating since many years, all the energy options must be considered and no one energy source should be worshipped or demonized.
  Not a confrontation of “ideologies”, but discussions based on “actual facts/costs/environmental evaluations”.

Thank you for your attention