



**GE Response to European Commission Consultation Paper:  
Generation Adequacy, Capacity Mechanisms and the Internal Market in Electricity  
07 February 2013**

## **Summary**

General Electric (GE) is pleased to provide its high-level views on the issues raised by the European Commission on generation adequacy and capacity mechanisms. We view the consultation as a welcome step in recognising the link between supply and demand and the growing role that flexible generation and demand side management will play in the future.

In our response we have outlined that a **distinction should be made between generation adequacy and flexibility** as we do not perceive there to be a problem with the former. However all providers of flexible services to the energy markets (flexible generation, demand response and energy storage) face significant market uncertainties and a lack of investment signals. At the same time, we support the view that if capacity mechanisms are not well designed or are introduced improperly they risk being counterproductive.

GE has conducted several large-scale renewable generation integration studies in North America, Western Europe, China, India, and Brazil. These studies identify **success factors that may be required to integrate renewable technologies while maintaining system reliability**, reducing the cost of electricity and meeting environmental targets.

Key findings and recommendations from these studies suggest a holistic approach is needed to ensure flexible services are incentivised:

- Improve strategies for grid operation to address grid reliability
- Increase coordination between member state domestic markets
- Drive deployment of grid-friendly renewables and flexible resources
- Modify power market design to encourage operation and investment of the full range of flexible resources (flexible generation, demand response and storage)
- More integrated power generation and system planning strategies

## **About GE in Europe**

For more than 100 years GE has been investing in growing its presence across Europe. Today each of our global businesses has a strong presence in the region and we have grown our European employee base from 3,000 people in 1990 to more than 100,000 people today. Europe hosts the headquarters of a number of GE's global businesses.

GE is one of the world's leading suppliers of power generation and energy delivery technologies. GE Power & Water, GE Energy Management and GE Oil & Gas - work together to provide integrated product and service solutions in all areas of the energy industry including coal, oil, natural gas and nuclear energy; renewable resources such as water, wind, solar and biogas; and other alternative fuels.

Europe is also an important centre of innovation, research and development for the company with our Global Research Centre located in Munich, Germany. In Europe we have more than 36,000 employees working in research and development, engineering and manufacturing. In total GE invests more than €4billion per year on R&D globally.

GE is a member of the *Energy Partnership*, a unique alliance of companies from the energy sector that seeks to promote greater political and public understanding of the merits of a capability-based energy market and systems approach, focused upon the integration of renewables and gas.

## **Consultation Response**

### **Section 1 Investing in the internal market and towards a more coordinated approach**

#### ***(1) Do you consider that the current market prices prevent investments in needed generation capacity?***

A well-functioning internal energy market is important to GE and we support properly functioning energy markets in Europe across wholesale, balancing and ancillary services, to reflect the economic value of power at every stage of the supply chain and steer investments to where they are most efficient. However investors in flexible generation as well as non-generation sources (such as demand side, storage and efficiency) face insufficient market signals which act as a barrier to long-term investment in these technologies.

Natural gas offers the best generation balancing resource as it is easy to store and can respond swiftly to load and demand changes. Increasing the deployment of intermittent wind and baseload nuclear capacity will require a significant volume of flexible generation that delivers responsive fast-starts and low emissions. It also offers the potential for reducing the carbon emissions with increased efficiency and typically around half the emissions of coal power generation.

#### ***(2) Do you consider that support (e.g. direct financial support, priority dispatch or special network fees) for specific energy sources (renewables, coal, nuclear) undermines investments needed to ensure generation adequacy? If yes, how and to what extent?***

GE supports measures that promote a system-wide approach to the EU energy market. Energy policy discussions have tended to be based on a technology vs. technology approach that has often created unintended consequences for the wider energy market.

In many cases specific policies and interventions in the market have often lacked co-ordination or coherence and exacerbated already difficult market conditions such as the cheaper price of coal versus gas which is not consistent with the EU's longer term goal of moving to a low-carbon

economy. Industry figures show that, owing to uncertainty, few power plant projects generally progress beyond planning stages and there are significant economic advantages to burning coal over gas in the current environment. This tends to be exacerbated by local factors present in individual member states.

This has not only undermined new generation investment but the operation of existing installed capacity which already offers significant flexible and efficiency characteristics to the market. This has become a significant trend in many EU markets notably in Spain but also in other countries such as the UK and Italy which have witnessed a range of between 2-10GW come off the system.

**(3) Do you consider that work on the establishment of cross-border day ahead, intraday and balancing markets will contribute to ensuring security of supply? Within what timeframe do you see this happening?**

A larger balancing area enables system commitment and dispatch over a more diverse area and collection of power generation, demand-side resources and load. With control area coordination and/or consolidation, variability of renewable resources (wind and solar) and load is reduced while increasing access to more, flexible generating plants and demand-side resources.

Analysis in the Western Electricity Coordinating Council (WECC) that was part of the National Renewable Energy Laboratory's "Western Wind and Solar Integration Study"<sup>2</sup> (WWSIS) has shown that limited coordination between the balancing areas can add over \$600million per year to the system operating costs, and that this cost increases as more renewables are added to the system.

Lack of coordination may increase the need for flexible generation in each of the balancing areas. In Europe, it is particularly important to ensure intra-day cross-border trading functions properly, as the variability of wind and solar will need to be managed within a few hours before actual delivery. In many countries cross-border trading is limited to day-ahead markets. Well-functioning intra-day cross-border trading will increase options for utilities and generators to cost-effectively balance portfolios by taking advantage of benefits from interconnected traded power markets, although in some markets there is insufficient interconnection capability.

#### **Section 4 Mechanisms to address generation adequacy and flexibility concerns**

##### **(12) Do you consider that capacity mechanisms should be introduced only if and when steps to improve market functioning are clearly insufficient?**

There must be clarity on what problem the final capacity mechanism is intended to solve.

The majority of industry participants agree there is a need for reform to the wider wholesale electricity market and cross-border balancing. The introduction of a capacity mechanism can only be considered as a part of these wider steps and increased co-ordination between domestic markets. Considering the urgency for investments, we consider that capacity mechanisms should be introduced only when steps to improve market functioning are clearly insufficient or are not delivering expected outcomes.

There are a number of Member States (for example UK, Ireland, France and Spain) that have already taken steps to develop a capacity market. This is due in large part to the efforts they are making to meet their energy goals and the perceived need to ensure that low carbon investment does not undermine security of supply.

The European Commission needs to ensure:

- wider internal market measures are taken to ensure generation adequacy. As the European Commission concluded in the recent internal energy market communication, this should include properly functioning markets and better balancing of domestic national markets. However there is concern that these measures are insufficient on their own and not being taken fast enough to meet security of supply concerns and ensure there are adequate returns for making these investments available to the market.
- there must also be clarity on what problem the final capacity mechanism is intended to solve. A potential capacity payment scheme should ensure that the most effective flexible generation and demand solutions comes on line in order to support the EU energy goals - security of supply, climate change and affordability - as opposed to simply rewarding existing capacity. This would not only reduce the carbon footprint by giving priority to best available low emissions technology but also leverage other options such as energy efficiency and demand response.

***(13) Under what circumstances would you consider market functioning to be insufficient?***

***a. to ensure that new flexible resources are delivered?***

***b. to ensure sufficient capacity is available to meet demand on the system at times of highest system stress?***

Current market interventions do not set clear long term volume targets in any of the key markets. For the electricity market to be attractive to the full range of investors including generation, demand-side and storage, it is necessary to ensure there is a clear and credible long term sales volume opportunity against which potential investments can be assessed.

This requires a market that recognises the lead time to develop and construct new flexible plant and the specific characteristics to incentivise other measures such as demand response, self-generation and energy storage.

A potential capacity payment scheme will need to address flexible resource requirements to better deal with grid operation uncertainty resulting from increasing deployment of variable renewable energy. As such the system will require a reliable (real-time) power system operation and signals for investments in generation, transmission and demand side options to ensure power system reliability in the future as well as reducing the carbon footprint by giving priority to best available low emissions technology.

In principle the reference market should be 'within day' and as close to real time as possible. Within day markets will maximise the amount of capacity able to participate and are becoming more critical to support the growing penetration of wind on the system. Power markets are predominantly day-ahead with variability of renewable energy to be managed within a few hours before delivery. Intra-day balancing markets are in most countries still not mature and auctions for system services tend to not provide sufficient investment signal.

Whilst incentivizing flexible peaking plant, capacity mechanisms could provide an important opportunity to get a clear and credible long term price signal into the market price so that consumers or providers of other capacity (storage, decentralised generation) can enjoy the same value if providing capacity at appropriate times. There may be implementation issues relating to the ability of demand-side response measures to be part of a strategic reserve as this requires something dispatched infrequently and it would be counter-productive to have either a storage facility or interconnector capacity with restrictions on its utilisation.

**(14) In relation to strategic reserves:**

***a. Do you consider that the introduction of a strategic reserve can support the transition from a fossil fuel based electricity system or during a nuclear phase out?***

***b. What risks, if any, to effective competition and the functioning of the internal market do you consider being associated with the introduction of strategic reserves?***

A strategic reserve market is generally not compatible with wider efforts to bring new flexible services to the energy market and drive demand response and storage. This is because a strategic reserve will only encourage certain types of reserve capacity (depending on where it is introduced) and tends to be procured on a day-ahead timescale that does not meet the need of intra-day or real time changes in demand and supply.

Alternative approaches benefit from linking gas strategy reserves with gas-based generation (combined cycles and cogeneration) and thereby guarantee greater short or mid-term flexibility in the market.

**(15) In relation to capacity markets and/or payments:**

**a. Which models of capacity market and /or payments do you consider to be most and least distortionary and most compatible with the effective competition and the functioning of the internal market, and why?**

**b. Which models of capacity market and /or payments do you consider to be most compatible with ensuring flexibility in a low carbon electricity system?**

**c. Are there any models of capacity mechanism the introduction of which would be irreversible, or reversible only with great difficulty?**

GE believes that efforts to assess the role of capacity markets should consider the market as a whole and ensure the most efficient and low carbon emitting capacity is deployed to meet the needs at both a day-ahead and real time basis.

The process should:

- promote a competitive and transparent market that allows all parties that can contribute to security to do so (flexible generation, demand side response, storage)
- differentiate or band technologies e.g. 1MW coal is not the same as 1MW aero peaking.
- provide the TSO with services required.
- provide certainty to allow providers of capacity to invest

Many existing wholesale markets are predominantly day-ahead and “energy-only”, with variability of renewable energy to be managed within a few hours before delivery. The final proposed design of the capacity mechanism could therefore be more transparent to all investors in the market and competition

should remain the most efficient and cost effective solution to incentivizing investment in plant to meet both extreme peak demand and hour-to-hour variation in intermittent generation output.

One alternative to capacity markets is actually to tender for electricity and **specify capability and the flexible characteristics needed**. This would allow suppliers to find ways of combining renewables with for example gas-fired generation and wider demand response solution.

For example, this could be achieved via a hurdle or minimum performance standard for any party to bid into the Capacity Market. This would be administered via a tiered approach; the “rate” of capacity payment made could be a function of “grid support attributes per MW” as listed below:

- **Ramp rates:** potential for a generating station, when connected to the grid, to increase or decrease its output in MW as a function of time (e.g. MW/minute). Higher ramp rates provide greater support to the TSO.
- **Start times:** amount of time it takes for a generating station to reach full load from a request to start from the TSO. Quoted start times are based upon the time since the last plant operation. As a result, three separate “start times” are typically referenced i.e. Hot Start (<8hours), Warm Start: (>8hours<72hours) and cold start (>72hours). The faster the start the greater the support to the TSO.
- **Minimum Stable Generation:** The percentage to which a generating plant can reduce output from its nominal capacity, while still complying with emissions standards and grid codes. The lower the minimum stable generation the greater the flexibility of the plant and thus greater the support to the TSO.
- **Efficiency:** It is important to consider the thermal efficiency of the generation station when evaluating capacity mechanism and the associated impact on carbon emissions.

**(16) Which models of capacity mechanisms do you consider to have the least impact on costs for final consumers?**

It will be important to ensure a transparent and competitive market that can provide the most efficient and cost effective solutions to incentivising investment. This should encompass new services required to meet both extreme peak demand and hour-to-hour variation in intermittent generation output and deliver real benefits to consumers.

**(17) To what extent do you consider capacity mechanisms could build on balancing market regimes to encourage flexibility in all its forms?**

Balancing market integration offers system efficiencies by enabling system commitment and dispatch over a more diverse area and collection of power generation, demand-side resources and load. By allowing TSOs to more efficiently procure balancing services in adjacent areas well-functioning intra-day cross-border trading will increase options for utilities and generators to reap operational efficiencies by more cost-effectively balancing portfolios.

Another advantage is that international linkages result in more balancing options on the market and increased plant loading efficiency and the associated environmental benefits. This is important as some EU Member States do not meet the minimum recommended interconnection capacity (i.e. Iberia, UK). Deployment of capacity mechanisms can take this into account whereby lower levels of interconnection potentially require a greater need to consider capacity mechanisms.

**(18) Should the Commission set out to provide the blueprint for an EU-wide capacity mechanism?**

GE supports a well-functioning internal energy market that steers investments to where they are most efficient. If policies such as capacity mechanisms are not well designed or are introduced without proper co-ordination at EU level, this risks undermining the efforts to complete the Internal Energy Market.

If capacity mechanisms do not treat demand reduction fairly, they can lock in generation-based solutions rather than energy efficiency or demand response solutions, may not attract sufficiently flexible generation capacity or distort the EU-wide price signal. This would run counter to EU decarbonisation and resource efficiency objectives.

**(19) Do you consider that the European Commission should develop detailed criteria to assess the compatibility of capacity mechanisms with the internal energy market?**

For the electricity market to be attractive to the full range of investors, it is necessary to ensure that there is a clear and credible long term sales volume opportunity against which potential investments can be assessed. To that end there must be clarity and coherence over where market interventions are justified and what problem the final capacity mechanism is intended to solve.

A capacity mechanism also requires an assessment of the appropriate level of capacity and an incentive to deliver this desired level of capacity. Although setting the level should not be confused with achieving the outcome which should be left to the market.

It should be underpinned by clear investment signals either set by a central body or by a market mechanism. Ultimately grid operators are in GE's view best able to assess capacity requirements to deal with increasing grid operation uncertainty.