BELLONA EUROPA brief

COULD CAPACITY MARKETS DERAIL EU CLIMATE PROGRESS?

The European energy supply is changing, with renewables supplying more of the energy needs of business and consumers. However, much of the renewable energy being deployed is intermittent sources of electricity, only providing to the grid when resources such as wind, solar or wave are available.
Liberalisation of the electricity market has brought with it the 'merit order' – determining who supplies power to the grid and when. In simple terms this means that the electricity production plants with lowest cost production are chosen first to sell electricity to consumers, with more expensive plants coming on line as consumers need more electricity. Renewable sources are first in line in the merit order, as renewable energy will be dispatched to the grid whenever the wind blows or the sun shines. Due to, amongst other things, a lack of electricity storage capacity, fossil power is required to remain in backup and step in when renewables cannot generate.
This interaction is leading to market failures and potentially system failures. Operators claim that competition from renewables has begun to severely reduce the commercial viability of some fossil generation capacity. Fossil power plants providing this back-up capacity faces two options: Being mothballed due to insufficient revenues, or receiving a subsidy in the form of capacity payments simply to be kept alive and available to prevent blackouts. However, capacity payments are a poor treatment for the current failings of the electricity market – such measures put both Europe's climate and single market objectives at risk.

Present trends in the European electricity market

At present the electricity supply systems of Europe are going through the most radical period of change seen since the birth of the sector in the beginning of the last century. These changes are affecting both the market structure and more importantly the very stock electricity generation plants. Both the liberalisation of the electricity market in Europe and the introduction of renewables are having profound effects on the operation and future function of the system.

The increasing deployment of renewables has had some interesting effects on the operation of the merit order system. Renewable energy plants such as a wind turbine or a solar cell once built don't require any fuel, they will simply generate and sell electricity to the grid when the wind blows or the sun shines. This is important as it means that whenever possible renewable energy will sell power to the grid, and be first in line on the merit order. On the flip side however, when the wind and sun are not sufficient, traditional fossil power facilities are required to step back in to meet electricity demand.

This interaction between renewables providing cheap electricity much of the time on the one hand, and underutilised fossil fuel plants that mainly operate when renewables are absent on the other hand, is leading to market failures and potentially to system failures. As renewable capacity has grown, it produces increasingly large amounts of electricity to a market once dominated by fossil plants. This in turn results in a reduction of income for larger and complex facilities such as gas and coal power plants. If such plants' operating hours become too few or inconsistent, a plant will become loss-making, and eventually closed or mothballed, removing capacity from the system.

This situation also affects the investability of new fossil fired capacity. It becomes increasingly difficult to make a return on a large capital expenditure as expected income from electricity sales is dropping. To phrase it differently, would you build a power plant if it had small and declining prospects of recuperating its investment cost through electricity sales?

Keith Whiriskey - July 2014

The rise of the capacity mechanism

The poor commercial performance of fossil generation plants is a potential positive development as it removes CO_2 sources from the system. However, in the absence of electricity storage technologies it would lead to unreliable electricity supply as too little capacity would be available when renewables cannot sufficiently generate. This could lead to power outages, price spikes, and economic damage – a list of events that no consumer or industry would enjoy.

This issue of electricity supply security has gained prominence with energy planners in Europe. Many energy regulators and politicians throughout Europe have begun to rapidly put in place mechanisms to guarantee energy supply security. These generally involve some form of capacity payment, which is a payment to a power plant for just being available on the system. Such payments do make the investment in little used power plants more attractive, and thus help ensure sufficient capacity is on the grid. Yet in practice, consumers will be paying to owners of idle fossil fuel power plants in an increasingly inefficient subsidised system.

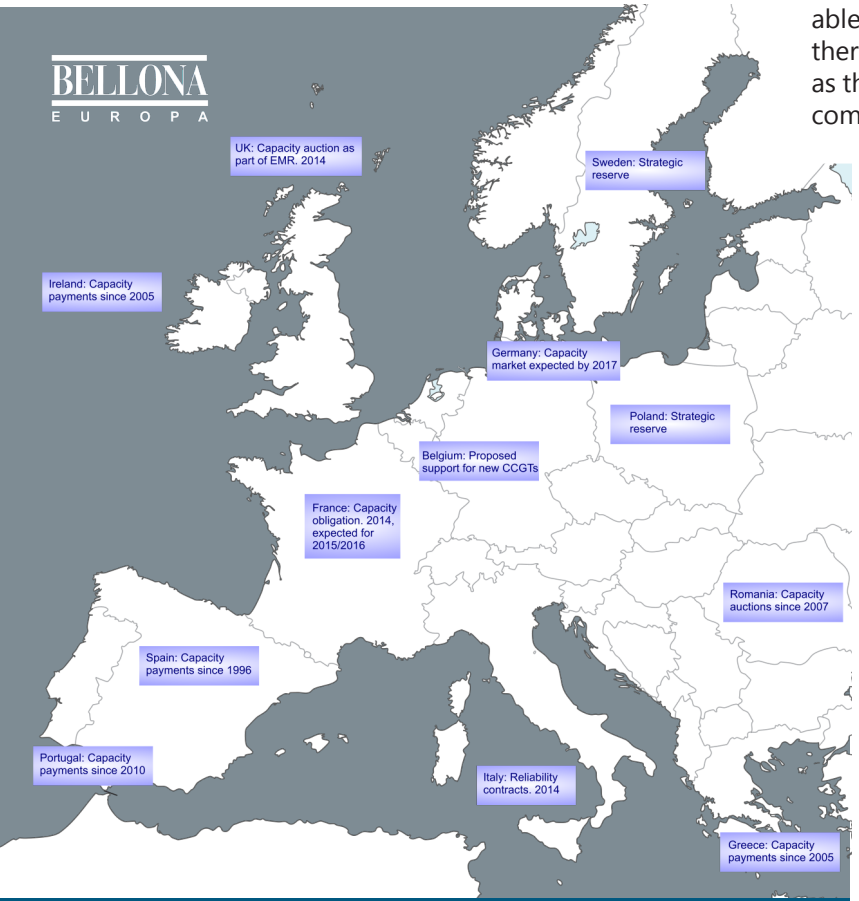

Figure 1 the increasing use of various forms of capacity payments in European electricity markets

Finland, Norway, Poland and Sweden currently operate strategic reserves, whereas Greece, Ireland, Italy, Portugal and Spain practice capacity payments. All mechanisms are targeted or differentiated to some extent. None are open to cross border participation, although the power exchange between e.g. Ireland and the UK is based on prices including capacity charges. France and the UK have decided to implement capacity mechanisms and discussions are on-going in Germany and Belgium (Figure 1).

A bailout to mismanaged utilities

Many large European utilities will require capacity markets to be put in place to guarantee their future survival. These large utilities have not been the drivers of the "energy transition" and are by and large still dominated by traditional thermal generation. By 2012, big German utilities had only been responsible for 5% of domestic renewable deployment (Figure 2). This failure of some of Europe's largest generators to invest sufficiently in renewable generation has left them exposed to changing market conditions and unable to profit from renewable deployment schemes. This in turn has resulted in ever declining profitability of existing fossil generation capacity while simultaneously making investments in new thermal facility increasingly difficult. Dramatic falls in share price of two of Germany's largest generators, RWE and e.on, reflect the declining fortunes and outlook for the traditional utility business model.

Such mismanaged utilities are eager to receive capacity mechanisms. These mechanisms create additional income streams desperately needed to keep such business profitable into the future. Additionally, capacity payments further increase market distortions by reducing competition as the cost of generation matters less while simultaneously companies are encouraged to rent-seeking behaviour.

Energy policy should prioritise the deployment of technologies that are both low carbon and that will effectively be used. These include flexible low carbon generation technologies such as Carbon Dioxide Capture and Storage (CCS) and a diverse range of electricity storage technologies to compliment renewable deployment.

Damage to the EU internal market

The spread of different capacity market schemes in EU Member States is leading to a fragmentation of European energy markets as the addition of national generation back-up reduces the need for interconnectors and energy market integration. The result will be an increase of the cost of electricity for tax payers or consumers, whose electricity bills will have to support construction, maintenance, manning and margins of seldom used and polluting fossil power plants. In addition, reduced incentives to develop interconnectors may result in a lower rate of renewables deployment as the risk supply interruptions are greater in isolated networks.

Locked-in/locked-out

The knee-jerk reaction of government to implement capacity payments is inefficient and a costly way to provide electricity supply security in a renewable age. Clearly having large expensive assets idle over longer time periods is neither efficient materially nor capitally.

Existing and planned schemes throughout EU Member States are primarily intended to provide revenue to underutilised fossil generation plants. These payments will encourage the lock-in of CO_2 intensive fossil generation capacity into a system that needs to rapidly decarbonise. This CO_2 intensive generation will dominate as the provider of reserve capacity for intermittent renewables. In turn this CO_2 intensive generation will result in a lock-out of developing energy storage technologies as their market niche is taken by subsidised and polluting fossil plant.

Large-scale electricity storage to accompany renewable generation will benefit both consumers and the decarbonisation effort. Such technologies can store low-cost renewable energy when the system experiences oversupply, then releasing this electricity to the grid when it is more needed, such as at night in the case of solar or when the output of wind falls below demand. In this way large-scale electricity storage can reduce the need for underutilised fossil power plants to guarantee electricity supply security. Policy instruments to encourage the development and deployment of electricity storage are the most desirable option for both consumers and the environment.

System scale storage deployment could be supported through the same capacity mechanisms now being implemented throughout Europe. The capacity market as part of the electricity market reform in the UK will be available to energy storage technologies. However, under that scheme existing and planned fossil generation have a clear advantage due to the mature nature of the technology over developing storage technologies. As a minimum given the need to provide electricity supply security, the design of any capacity mechanism should disadvantage fossil generation in favour of energy storage solutions.

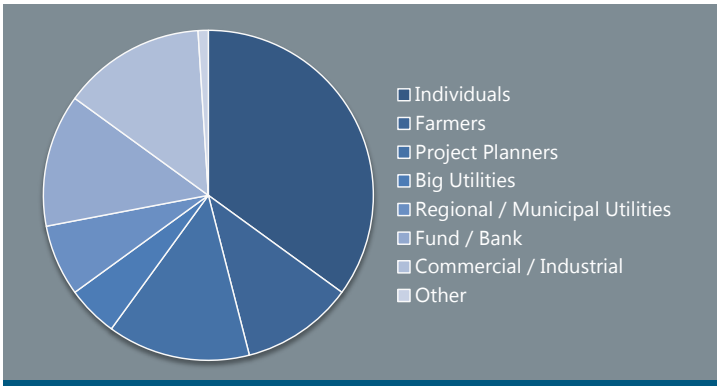

Figure 2 Ownership of renewable installed capacity in Germany, 2012 (unendlich-viel-energie.de)

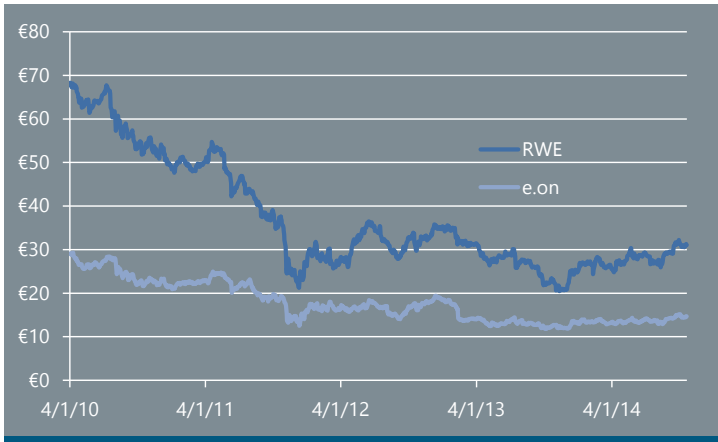

Figure 3 Share price of RWE and E.ON two of Germanies largest power generators (2010 - 2014)

- Capacity payments may lock-in underutilised fossil capacity, in turn locking out or delaying electricity storage capacity.
- Reduced electricity storage deployment will in turn limit renewable deployment.
- If capacity payments policies are to be used, they must preference electricity storage above polluting fossil generation capacity

Bellona Europa
Rue d'Egmont 15
1000 Brussels
Belgium

europe@bellona.org
+32 (0)2 648 31 22

www.bellona.org
@Bellona_EU
facebook.com/bellona.international