sandbag

New Electricity Market Design

Further information: Response to the European Commission Consultation **October 2015**

In this complementary submission to Sandbag's response to the Public Consultation of the European Commission on a new Energy Market Design, we offer a comprehensive overview of our vision for the 2021-2030 period. In particular, we propose an electricity supplier decarbonisation obligation backed by tradable certificates to act as the chief instrument guaranteeing that power generation, Europe's most carbon-polluting economic sector, continues to reliably cut its emissions.

About Sandbag

Sandbag is a UK-based not-for-profit think tank conducting research and campaigning for environmentally effective climate policies.

Our research focus includes the phase-out of old coal in Europe; deep decarbonisation of industry through technologies including Carbon Capture Utilisation & Storage; reform of the EU Emissions Trading Scheme; and increasing ambition in the EU 2020 and 2030 climate & energy packages.

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We also explain that scarcity pricing must become significantly more sophisticated if keeping Europe's lights on is to take place in a climate-friendly way. Finally, we highlight the threat that overly simplistic capacity markets pose to the European Union's (EU) long-term mitigation goals because they will likely result in the lock-in of incumbent generation capacity, in particular high-carbon coal.

A. Context of Electricity Decarbonisation

Electricity decarbonisation must not focus only on 'renewables', an outdated term which refers to a group of technologies with very different characteristics. Well-designed market rules should aspire to properly incentivise all low-carbon options and demand-side responses.

Whilst a higher Emissions Trading Scheme (ETS) carbon price could achieve all these things by including industrial sectors in the ETS, the pace of ambition is necessarily limited and massive allowance over-supply currently renders the policy all but irrelevant for the next 10 years.

An overhaul of the electricity market design is therefore be a priority. Doing so promises cheaper and faster decarbonisation of the electricity sector compared to continued reliance on renewables targets and an ETS price.

One model is to introduce "an electricity supplier decarbonisation obligation", where every supplier has a requirement to meet a target carbon intensity for the products it supplies. It would be comparable to introducing fuel efficiency standards to cars. However, it would work best if tradable, enabling decarbonisation of the electricity system at lowest cost.

B. How to cost effectively decarbonise Europe's electricity generation

Europe's fight against climate change will completely seize up during the coming decade due to seemingly irreconcilable tensions among key Member States (MSs) over which national energy policy priorities should set the tone for Union-level policy on electricity generation. Deadlock among MSs over technology preferences has produced objectives for 2030 on renewable energy and energy efficiency that are legally non-binding and therefore potentially unenforceable. Meanwhile, structural oversupply and overly cautious cap-setting are set to keep the carbon price in the EU ETS prices low for a long time to come. Therefore, in practical terms, there is no robust EU policy that would ensure cuts over the foreseeable future in the greenhouse gas emissions of electricity generation, the European economy's largest carbon-polluting sector.

The evidence that decarbonisation of the European electricity sector needs to be maintained and accelerated is clear:

- Figure 1 shows that coal generation alone caused 17% of all EU's GHG emissions in 2014.
- Figure 2 shows that over the last 10 years, CO_2 from coal generation has not fallen faster than the broader economy. This is at odds with policy-makers who often see the electricity sector as the easiest and quickest contribution to reducing emissions in the broader economy.
- Figure 3 shows that renewables are simply not replacing coal generation, as yet. Gas generation collapsed from 2010 to 2014, but lignite was completely unchanged, and hard coal fell only marginally. That renewables is not offsetting coal generation undermines much of the rationale of building renewables in the first instance.

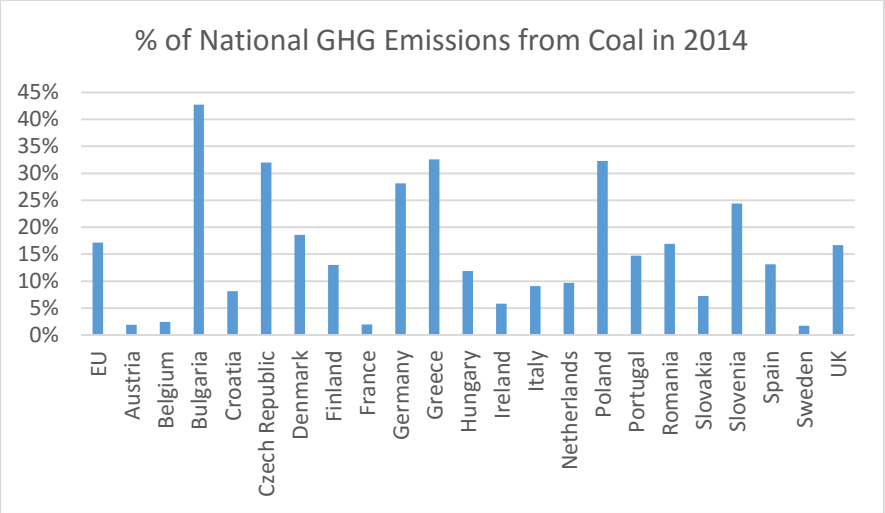

Figure 1 Sandbag analysis of EEA data and EUETL data

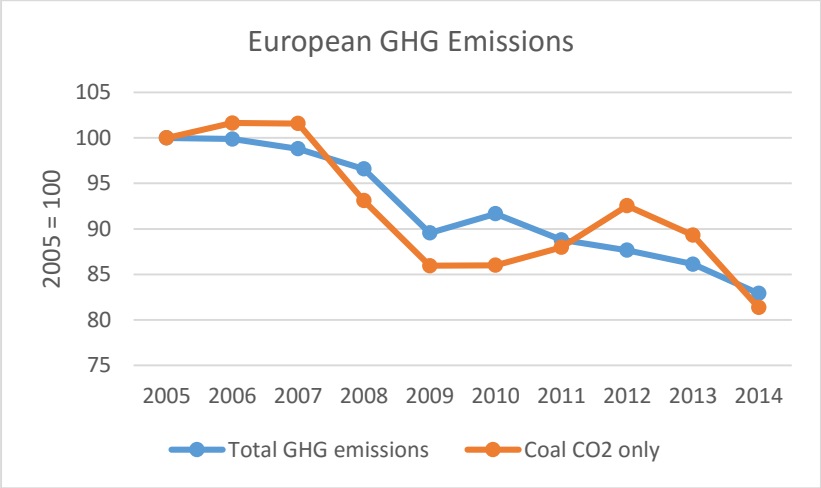

Figure 2 Source: Sandbag analysis; total GHG data from EEA, Coal data from EUETL

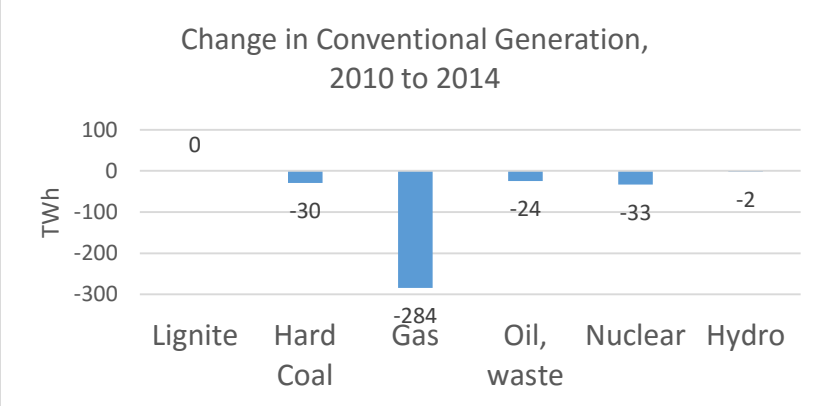

Figure 3 Sandbag analysis from Eurostat data

Decarbonising electricity fast is a priority since it opens up avenues for decarbonising other sectors including transport and heat.

An overarching goal to decarbonise power generation should not be overshadowed by a fight over how to achieve it. Europe must instead develop an instrument that rewards all decarbonisation options. In accordance with the Lisbon Treaty, it must permit MSs to continue giving support to electricity from renewables – but it must also bring the effects of weak attempts to limit dirtier forms of generation into sharp relief. Furthermore, it must also recognise how existing forms of clean generation, such as hydro and nuclear, contribute to electricity decarbonisation. Finally, it must reward attempts to reach out for other abatement options – both low-hanging fruit, such as switching from a dirtier to a cleaner fossil fuel, and some potentially promising high-hanging ones, such as fitting existing power plants with Carbon Capture and Storage (CCS) equipment.

The new Energy Market Design can make a constructive contribution if the focus of the discussion shifts away from national technology favourites, and focuses instead on setting market rules that create an investment incentive for lower-carbon forms of generation. It must also ensure that future market rules avoid locking in high emissions via capacity measures that, if not designed carefully, can distort competition and reward incumbents.

Introducing a new instrument

We propose an "***electricity supplier decarbonisation obligation***" to act as a mechanism to decarbonise Europe's electricity system and to attract low-carbon investment. It is intended to set a standard for the **maximum carbon intensity of electricity** that electricity suppliers can sell to their customers. **At a European level, this would mean reducing the carbon intensity from today's 350gCO_2/kWh, until the electricity sector is completely decarbonised by 2040.**

The intention of this policy is to create a performance standard, in the same way that fuel efficiency standards are set for car manufacturers. However, unlike car fuel efficiency targets, it would function by means of a fully traded **market mechanism**, so that the overall carbon intensity of European electricity generation can diminish at the least cost. The market would function by means of **carbon intensity certificates** that would trade at a price. This price would act as a "**top-up**" onto the electricity price for low carbon generation, with the largest premium for renewable generation.

The instrument would impose a **carbon intensity target trajectory on every electricity supplier**. Every electricity supplier in each MS would have the same carbon intensity to aim for. Sandbag recommends setting the carbon intensity target at the MS-level because it would likely be politically difficult to impose an ambitious target at the European-level. This is because it is unlikely that the MSs would unanimously to agree to a uniform level across countries, as this would be a large wealth transfer from countries with a significant share of dirty generation to countries with cleaner energy mixes. Therefore, differential effort allocation among all MSs is

likely to be politically unavoidable in order to achieve a consensus about introducing this mechanism. Whilst compliance would be handed down to individual suppliers the target would not be set at the supplier-level, since this could potentially lead to grandfathering clauses favouring suppliers with a dirty energy mix. This in turn would slow down the decarbonisation of European electricity generation.

As in the EUETS, suppliers would be under obligation to comply with the total carbon intensity. However, each electricity supplier would be free to purchase carbon intensity certificates from an open market. The target would fall every year, until the power sector is eventually 100% decarbonised.

Building on already existing institutions: Reporting carbon intensity

The additional administrative burden of such a system should be minimal if policymakers built on pre-existing institutions providing a regulatory infrastructure for the tracking of electricity. At present suppliers throughout the EU face a duty, introduced under Directive 2003/54/EC and then re-stated in Directive 2009/72/EC, to disclose data about the fuel mix used to generate the electricity they sell to their consumers. These are calculated already and aggregated to a national level (see

Figure *4*. However, the regulatory stringency for the reporting framework is only backed by EU-level legislation through Guarantees of Origin for renewable energy. This was introduced under Directive 2009/28/EC, and for high-efficiency cogeneration, under Directive 2004/2/EC and reinforced under Directive 2012/27/EU. In contrast, all other energy sources are subject to a regulatory patchwork, with the robustness of oversight varying from MS to MS.

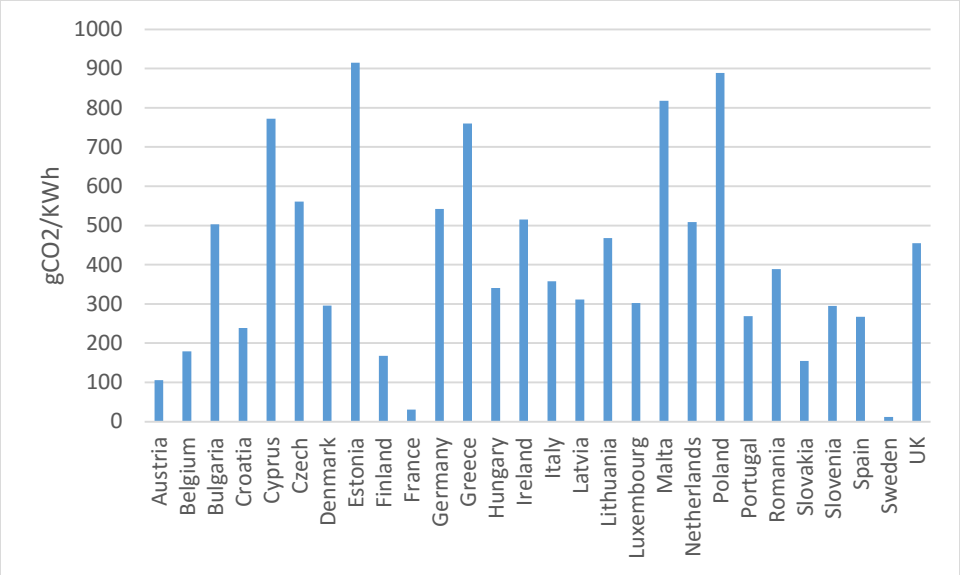

Figure 4: Carbon intensity of electricity generation by country (2014).

Source: Reliable-Disclosure.org.[1]

The EU must adopt a common reporting framework for carbon intensity. The European Energy Certificate System developed by the Association of Issuing Bodies, a network made up of energy certificate administrators from across the EU, presents a unified alternative to the current fragmented landscape that has developed in a bottom-up fashion. This system is already implemented for all energy sources and with thorough regulatory oversight in a number of MSs. However, the system is currently largely voluntary, as some MS still completely opt out of issuing certificates for energy types for which they do not face EU-level obligations. If the EU built on this framework, or developed some top-down equivalent thereof, policymakers, regulators and consumers would have a consistent way of tracking the carbon content of each MWh of electricity traded in Europe, from generation to consumption. This EU-level framework could then function as the foundation upon which the electricity supplier decarbonisation obligation could function.

Accounting for further policy implications

This price would create a pseudo 'cost of carbon' for the electricity sector. It would also create a different carbon price to the 'industry versus electricity' price found under the ETS. However, such inconsistencies in carbon price already exist: renewable generation already receives substantial subsidies over-and-above the current carbon price while industrial ETS participants are insulated from carbon costs with high proportions of free allowances and additional compensation payments being made to many.

[1] See figure 5, http://www.reliable-disclosure.org/upload/161-RE-DISS_2014_Residual_Mix_Results_2015-05-15_corrected2.pdf

A futures traded market would be created, whereby a renewables generator can forward sell the certificates in advance, locking in a future “top-up” price. This would help the bankability of a project and reduce its capital costs. Banking and borrowing rules between years would need to be established to ensure prices do not dramatically detach from one year to the next.

Establishing an open and tradeable green certificate market in this way would also create a compliance mechanism for the EU to meet its ‘legally binding’ EU wide renewables target in a competitive and least-cost way.

C: Scarcity pricing and capacity market payments

The differentiated effect of scarcity pricing

Sandbag believes that scarcity pricing is sufficient to ensure security of supply from existing conventional capacity, and capacity mechanisms are not needed to stimulate investment in these sources of supply. However, scarcity pricing is likely not sufficient for demand response and storage and other market design features may need to be created.

The market is however not currently delivering scarcity pricing because of falling demand and over-supply. *Figure 4* demonstrates that the yearly number of hours featuring price spikes has collapsed since 2008 in a number of European MSs. The fact that so many peaking plants have shut already in Europe in the last few years is because of genuine oversupply, but also because scarcity pricing doesn't exist. **Pricing signals in Europe today are currently blunt, so market design changes must be made to sharpen wholesale pricing signals**.

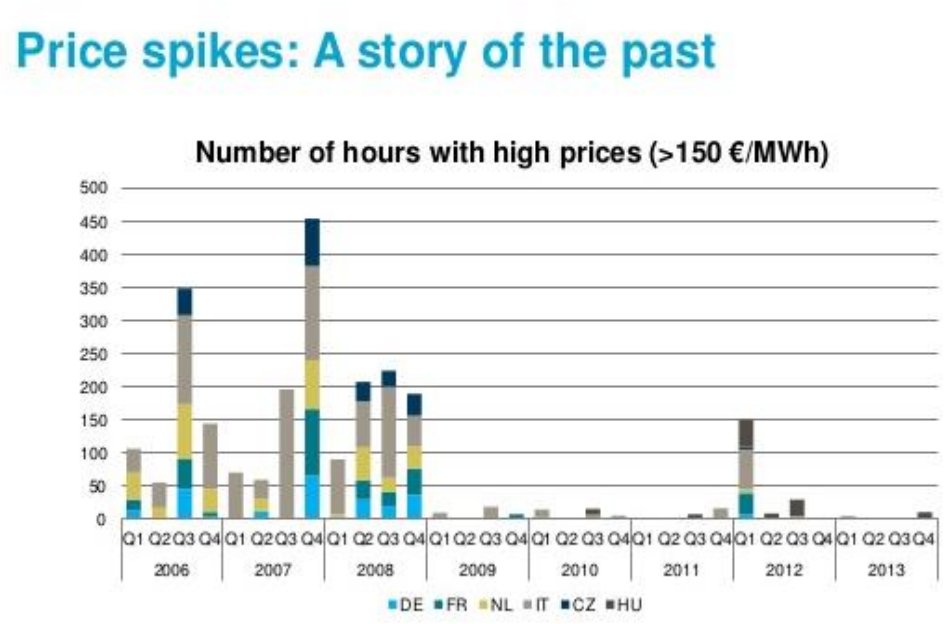

Figure 4: Numbers of hours with high prices (> EUR 150/MWh). Source: 2014 slide from Statkraft.[2]

The question is; will scarcity pricing alone keep the lights on? Economic theory would dictate yes. If the hourly prices were known over the next 10 years, then a peaking power plant could decide whether it is economic to stay open or not and, in total, the market delivers a least-cost solution.

The problem is that, by definition in the case of scarcity pricing, revenues are extraordinarily unpredictable from one year to the next. This is apparent if one uses *Figure 4* as a proxy for revenues. For example, if in the forecast for next winter the demand/supply balance were

[2] http://www.slideshare.net/statkraft/fornybarkonferansen-ulf-eriksen

tight, then a gas peaking plant would decide to invest to stay open. However, only the **actual** events next winter will determine whether this investment is profitable. It is possible that during any given winter the gas peaking plant may actually receive no revenues whatsoever. Therefore, because of this extraordinary unpredictability, investments will be vastly discounted.

This unpredictability of revenues matters much more for demand-response and storage than for existing peaking gas plants. To keep an *existing* peaking gas plant open for this winter requires very little investment and scarcity pricing should reward this well. This is because peaking plants are typically owned by utilities, whose scale allows them to offset the chances of an unprofitable winter by the prospect of other, profitable winters. **Therefore, we believe that capacity markets are not needed for conventional generation, and that scarcity pricing, even as blunt as it is today, is sufficient.**

In contrast, the situation for *new* capacity – whether it be new demand response, new storage or new fossil generation – is quite different. Not only are investment needs for new capacity larger, but it is also often smaller companies that undertake them. An unprofitable winter would be catastrophic for these market participants. **Therefore, we believe that scarcity pricing is not necessarily sufficient for demand-side response and storage, thus requiring additional market design features to support this type of investment**.

The consultation on Electricity Market Design suggests that "scarcity pricing" could be used in place of capacity mechanisms and we support this conclusion. **Commonly taken shortcuts in the design of capacity markets will continue to have a negative impact on European climate policy, since they would most likely lead to the lock-in of incumbent generation, and to the slow-down of the decarbonisation of the electricity system.**

Overall problems with capacity markets

The European Commission's guidance[3] on state aid for capacity markets says all forms of capacity must be able to participate, including "demand-side management, interconnectors and storage". Yet operators' requirements for demand-response are very different from those of a large coal power plant. Demand-response must be much more sensitive to credit issues, the firmness of deliverability, notices to respond, etc. Requirements for interconnectors and capacity payments are very different again; they must not give perverse incentives to export electricity. As to battery storage, it can only deliver a certain volume of electricity over a limited timescale, and also requires importing electricity to top it up; therefore its requirements are again very different from other capacity types.

In order to simplify implementation, these subtleties are often lost. There is an unfortunate tendency to implement the capacity market to favour the largest incumbent players, which at the time consist of gas and coal power plants. Capacity markets therefore end up paying fossil

[3] See from page 38 http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628%2801%29&from=EN

generation money that it otherwise would not have received. **Because capacity markets are skewed in their favour, incumbent dirty generators such as coal - instead of being undercut - are actually further supported.** This has negative implications for climate policy, which is why the New Energy Market Design must avoid inadvertently blocking out cleaner new innovative capacity.

The UK capacity markets experience

These problems are demonstrated in the UK capacity market design. In the case of the UK capacity mechanism, the 2018 auction cleared at £19/KW, meaning 9GW of coal generation will be paid £173m in capacity payments in 2018. *Figure 5* shows this[4]. This equates to €26m/MW of capacity, which would cover the majority of fixed costs for a coal power station. This means that the capacity market is actively encouraging coal plants to stay open longer than they would otherwise be.

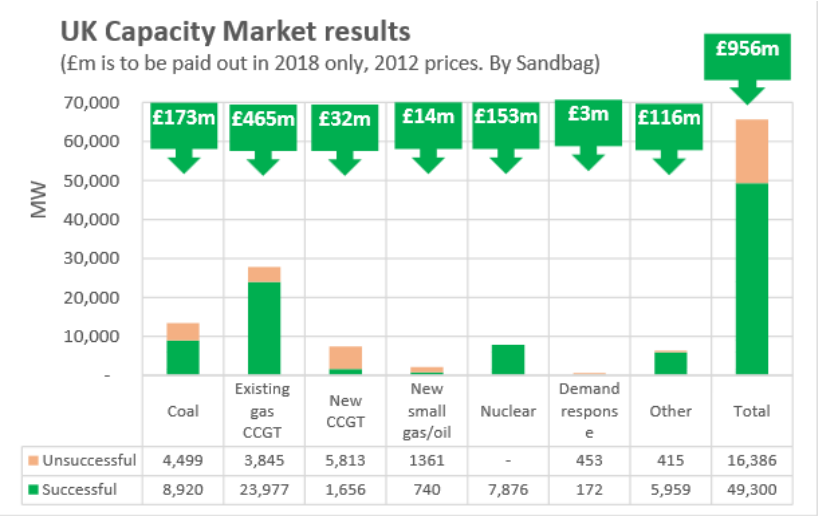

Figure 5: UK's Capacity Market results for 2018 auctions.

Interconnectors were not eligible to participate in the first auction in 2014. Demand response received very few bids because the market design was not fit-for-purpose. Indeed, the design of the UK capacity market is now challenged in European courts by Tempus Energy, who seeks to put demand response on a level-footing.

Another design feature of the UK auction which creates incumbent lock-in is the length of capacity contracts. First, the UK designed a 3-year contract for refurbishing power plants which coal power plants can use to justify investment into life-extending investments. 3-year contracts were awarded to 3.5GW "refurbishing" coal plant in the 2018 auction, leading to the lock-in of incumbent coal capacity.

[4] See Sandbag's briefing on the UK capacity market results: https://sandbag.org.uk/site_media/pdfs/reports/Capacity_Mech_19-Dec-14.pdf

Second, the UK designed a 15-year contract for new capacity. However, this clears in the same auction at the same price as 1-year contracts, despite featuring a completely different duration. In the recent auction, new capacity was undercut by incumbent coal capacity, and, out of 11GW of new capacity bidding, only 2.6GW was awarded contracts. If this new capacity cleared at a higher price for a 15-year contract, it would help lower prices in the next 14 auctions, resulting in an overall net system benefit. Therefore, auctioning new capacity alongside existing capacity doesn't create an optimal design.

Finally, there may be perverse effects and distortions that should not be allowed to continue. The UK capacity market has attracted a large build programme of diesel generators, which are below the threshold to enter the ETS and therefore do not pay a carbon price or are required to meet air quality standards required of larger plant. Also, the decision not to allow capacity that receives a renewable incentive to bid in to the market is perverse. Firm renewables capacity, such as biomass and energy from waste, cannot be rewarded for capacity provision, despite providing a clear potential benefit to the market.

The UK experience suggests that divergent requirements make it reasonable – and preferential – to apply a market design measures specifically to stimulate demand-side response and storage, but not to conventional generation, especially incumbent coal generation and that much stricter rules at an EU level should be applied to avoid market distortions arising.

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