



E3G

Politically Robust Package of Power Market Reform

E3G Briefing Note

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About E3G

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E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change.

E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere.

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Context

Reform of the GB power market presents an opportunity to build vibrant new markets in the full range of low carbon resources necessary to achieve virtual decarbonisation of the sector by around 2030. These new markets should aim to promote innovation in new technologies and ensure that competition is harnessed to deliver maximum benefits for consumers. This involves opening up the market to new sources of finance and new entrants with business models focussed on delivering the necessary low carbon products and services.

The ‘Gold Standard’ market reform project¹ has identified the shortcomings of current market arrangements in decarbonising the power sector, key outcomes that market reform must deliver and a set of design specifications for market reform capable of delivering those outcomes. Of paramount importance is the requirement for clarity in high level policy objectives along with a credible delivery vehicle to ensure the necessary outcomes are achieved. This is essential to promote a clear understanding of public value and provide confidence in the enduring nature of the new market arrangements. It is also critically important that there exists a credible transition path that avoids any hiatus in ongoing investments by ensuring that the market remains attractive to existing participants whilst creating the environment to attract additional players going forward.

The key problem that the new market arrangements will need to address relates to the fact that wholesale market prices are based on short run marginal costs and will therefore largely be driven by changes in fossil fuel prices for the foreseeable future. The majority of low-carbon generation has no exposure to fossil fuel price volatility in its cost structure and, therefore, future earnings do not benefit from the internal hedge enjoyed by fossil-fuelled plant. Moreover, in the longer term, low marginal-cost generation will increasingly set the marginal

¹ See “GB Power Market Reform: High Level Policy Choices” (October 2010). The ‘Gold Standard’ project is being undertaken by E3G and funded by the European Climate Foundation. It involves contributions and input from the following group of independent experts: Meg Gottstein, Richard Cowart and Michael Hogan, the Regulatory Assistance Project, Matt Philips from the European Climate Foundation, Rob Gross from the Centre for Energy Policy and Technology, Claire Thornhill from the Climate Change Committee Secretariat, Rachel Cary from the Green Alliance, Philip Baker, UKERC, Catherine Mitchell and Bridget Woodman from Exeter University, Stephen Thomas from Greenwich University and Ben Caldecott from Climate Change Capital

price. All investments — but particularly heavily capital-intensive, low-carbon resources like renewables and nuclear — will increasingly be unable to earn a revenue stream sufficient to repay investment costs.

Fossil-fuel price volatility (in either direction) sends a 'mixed message' to investors that serves to undermine power sector decarbonisation in current markets. Very high future natural gas prices reduce the effect of carbon price as a disincentive to the construction of and/or continued operation of high-carbon plant. Very low gas prices will tend to undermine the effect of carbon prices as a spur to low-carbon investment². Therefore, to decarbonise the power sector in the requisite time-scale required to meet carbon reduction targets, new market arrangements will need to ensure that investment decisions are robust against either scenario.

There are a number of additional important shortcomings in the current market arrangements:

- *Innovation policy*: The low carbon power system of the future will involve a number of technologies that are currently immature. Significant investment will be required in these technologies well before they are cost competitive and the absence of coherent long term deployment strategies will increase the risks associated with investment in R&D and the development of the necessary supply chain capacity
- *Long-term demand reduction*: The market has failed to develop a significant 'customer pull' for investments to improve energy efficiency and, under the current arrangements, deployment is largely driven by an administered obligation on suppliers in the domestic sector. These investments are not, therefore, made on an equivalent basis to generation investment and it is inevitable that a suboptimal mix of investment will emerge. Moreover, business models of energy suppliers have not evolved such the energy reduction products are viewed as core to future profit growth and they remain largely viewed an ancillary regulatory compliance activity that creates an additional cost to energy supply.

² For example, the DECC and HMT "Energy Market Assessment" (March 2010) shows the significant price volatility in gas prices between 2000 and 2010 (Chart 3.B) and highlights the impact of future low gas prices and concludes: "The cost of gas is a much more significant driver of the electricity price than the cost of carbon, for example DECC analysis suggests that in 2020 a 50 per cent increase in the cost of carbon allowances would be offset by just a 15 per cent reduction in the cost of gas."

- *System stability:* There is a range of potential future providers of system stability services (e.g. generation, demand response, storage) and it is likely that some combination of all of these will be required. However, they each have distinct cost characteristics and are at various stages of technological development. The current arrangements require that investors take a long term view of both short run prices and future system operator contracting strategy. The huge uncertainties involved make these extremely high risk investments for established technologies, let alone for those that are immature and require further development. It is therefore likely that the current arrangements will lead to a dependence on existing fossil generation plant remaining on the system to provide these services.
- *Networks investments:* Significant network developments involve long lead times and expenditure needs to be justified by the Regulator against a highly uncertain future system need. In the absence of a clear strategic vision for the future system, it is therefore likely that the transmission infrastructure will tend to impose a constraint on the ability of low carbon generation to export power to the system as network upgrades lag the rate of new generation build. Moreover, the failure to fully integrate demand side investments in the appraisal of network developments is likely to result in an over-reliance in developing new network capacity.
- *International integration:* The costs of reducing carbon emissions and maintaining system stability across Europe are likely to be much reduced with an effective single European energy market in which low carbon and system stability resources are shared between member states. Moreover, the UK has the potential to benefit significantly from the ability to export renewable energy given the extent of the indigenous resources. However, the current market arrangements are based on the principle that national demand will be matched by national supply and any exchange with neighbouring countries will be limited. This will increase the costs of decarbonising the national electricity system in addition to foregoing export opportunities.

A range of policies, institutions and regulatory mechanisms will be required to create and sustain new market arrangements that are capable of addressing these shortcomings. This paper contains an E3G proposed package of reforms

which has been designed to deliver the required outcomes identified by the Gold Standard project. Apart from illustrating the components of an overall package capable of meeting the design objectives, this package has also been constructed with an eye to ensuring that market reform is politically robust and, therefore, deliverable.

This package assumes that a carbon pricing mechanism continues and is designed to leverage the benefits of a carbon price, while at the same time ‘future-proofing’ the market so it can successfully decarbonise, irrespective of future fossil fuel price variability. Carbon pricing will continue to ensure that fossil-fuelled generation becomes increasingly efficient and is dispatched in an optimal manner as long as it remains on the system. In addition, carbon pricing will continue to play a key role in stimulating the participation of the demand-side and other low-carbon resources in delivering system stability. Moreover, carbon pricing will continue to ensure that retail suppliers are exposed to the full cost of fossil-fuelled generation when choosing among resource options to meet their customers’ energy service needs.

E3G’s proposed package of policies, institutions and regulatory mechanisms are outlined below.

Policy

There are three proposed elements for the high level policy: carbon emissions, technology and innovation and system security and stability.

- Power sector carbon emissions:
 - Define power sector carbon intensity which must be delivered by 2030 – probably using values proposed by the Committee for Climate Change. This creates the fundamental basis on which new markets can develop and provides clear long term sales opportunities for low carbon resources.
 - Introduce a sequenced EPS which ensures all unabated coal fired generation is retired from the system by 2025 and unabated gas plant by 2030³. This is important to ensure that decarbonisation targets are delivered at least cost in the context of a free bi-lateral contracting market structure, even when fossil fuel prices persist at relatively low levels.
- Technology/innovation
 - Deliver existing 2020 renewable targets through maximising short term potential of all renewable resources
 - Set minimum levels of renewables growth between 2020 and 2030 – probably distinguishing between technologies to ensure continued innovation in higher cost technologies
 - Set minimum levels of CCS deployment between 2020 and 2030
 - Set maximum levels for new nuclear build between 2020 and 2030. This is important in ensuring a controlled nuclear build programme in the situation where market arrangements favour the construction of new nuclear plant (see below).
- System security and stability
 - Require that sufficient flexible capacity (from all sources and with particular focus on the demand side) is under contract to deliver a pre-specified level of response and a security standard for five years ahead starting in 2016. This enables new long term market

³ It is anticipated that CCGTs could opt to operate at low load factors (say <10%) and provide system stability services thereby avoiding the need to fit CCS technology.

opportunities to be created for the full range of system stability services that will be necessary to maintain security of supply in a low carbon future. In addition, this mechanism provides assurance that security of supply will be maintained throughout the low carbon transformation without incurring the welfare penalty of paying a capacity payment to all existing capacity.

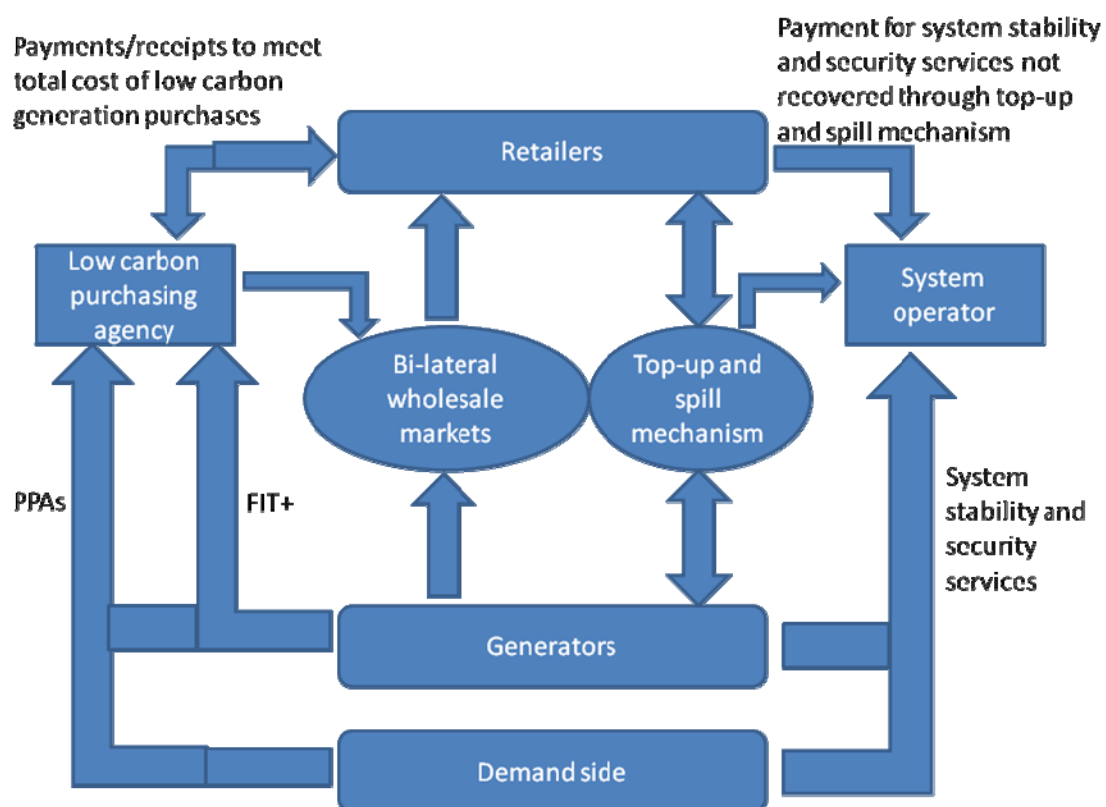
- Instruct the regulator to ensure that the incentive mechanism associated with the delivery of this obligation includes the requirement to introduce new sources of system stability⁴ other than generation. This is essential to drive innovation on the demand side of the market and, possibly, in new technologies such as power storage.

⁴ We use the term “system stability services” in this paper to refer to the additional capacity requirements to ensure overall system security/reliability.

Market Arrangements

The high level policy can be delivered through the same model for trading arrangements that is currently in place and which is based on bi-lateral trading between generators and suppliers. However, this model needs to be enhanced to drive efficient investment in low carbon resources and to develop new markets in system stability and security services.

The proposed new market model is illustrated in the following diagram:



Generators either sell power directly to retailers or to a low carbon purchasing agency. This agency purchases either using enhanced feed-in-tariff contracts or through competitive power purchase agreement tenders (see section on low carbon purchasing agency procurement strategy for more complete explanation). The low carbon purchasing agency then re-sells the power it has

purchased into the wholesale markets under pre-defined auction rules designed to promote liquidity. Any difference between the value recovered from these auctions and the total cost of purchases is recovered through a charge placed on suppliers. The low carbon purchasing agency is also able to purchase end-use energy efficiency measures through the competitive power purchase agreement process from investors in the demand side of the market.

The existing balancing mechanism is reformed to create a top-up and spill mechanism in which generators and retailers pay or receive money for uncontracted sales or purchases. The payment mechanism is designed to incentivise accurate notification of expected generation or consumption at gate closure but does not create an excessive financial risk.

The System Operator runs competitive tenders for pre-defined system security and stability services which are open to generators, customers and other providers. A proportion of the costs of these contracts is recovered through the top-up and spill mechanisms whilst the remainder is recovered through a charge on retail suppliers.

Institutions

The following institutional changes are required:

- Establish a Low Carbon Purchasing Agency obligated to deliver carbon intensity, technology and innovation targets
 - The procurement strategy for this Agency must be defined in advance (see below)
- Introduce new obligations on the System Operator to deliver the security and stability obligations
 - The regulator will be required to introduce appropriate incentive regulation to ensure that the SO discharges these responsibilities at minimum cost. This will involve the development of new arrangements for top-up and spill⁵ which provide sufficient incentives for accurate physical notifications to the SO without creating a material financial risk for market participants.
- The statutory objectives for Ofgem need to be revised to ensure that its actions are designed to enable the Low Carbon Purchasing Agency and the System Operator to meet their obligations at least cost. This is particularly relevant for the regulation of networks, including supporting those investments in smart grid technologies that will deliver a more responsive demand-side and end-use efficiency improvements to the market. It is also important that this remit covers the provision of low carbon and system stability resources from outside the UK, thereby providing the Regulator with the remit to actively promote the single market agenda within the EU.
 - This requires that the UK takes a leadership role in the development of the 3rd Package framework rules and network codes being developed on the EU-level, especially in the development of the 10-year network plans and transmission cost recovery proposals being considered in those forums for building a more interconnected Europe power market.

⁵ Top-up and spill refers to energy produced or consumed which is not covered by a forward contract.

Low Carbon Purchasing Agency Procurement Strategy

As described above, the new market arrangements will include a strategic, targeted procurement process for low-carbon resources, administered by a Low-Carbon Purchasing Agency. The procurement strategy for this agency must be defined in advance to create the credible long term sales opportunity for low carbon resources that is necessary to allow the market to efficiently respond and invest in the relevant technologies and supply chain capability.

The key proposed elements are:

- A 'FIT+' scheme that is introduced as soon as practicable (2013?) to:
 - Ensure 2020 renewables targets are met at least cost. Existing renewables operating under the RO, including those reaching financial close prior to 2013, will be novated onto FIT contracts such that they receive a tariff equal to the highest of the expected future value arising from the RO and the first phase of FIT tariffs⁶. This is essential to avoid an hiatus and introduce incentives for renewables developers to accelerate projects to enable them to capture maximum value.
 - Drive innovation in pre-specified technologies (say, offshore wind, marine, early stage CCS demonstrations) throughout the 2020-2030 decade. These technologies will be eligible for a FIT+ contract and this acknowledges the ongoing need to drive innovation in new technologies and can be targeted on those technologies which have the potential to deliver least cost long term emissions reductions and, where appropriate, support industrial development and growth.

⁶ It is unlikely that these will be the same since a FIT regime presents the opportunity to more closely track costs than the RO regime. Developers of existing projects will therefore have the ability to choose the highest of these two tariffs.

- In addition to a fixed payment for low carbon generation⁷, the FIT+ regime will also involve:
 - Long term arrangements and costs of system access. This will include compensation terms during periods when the generator is ‘constrained-off’ the system, thereby providing financial security for the investor without introducing unmanageable risks for system stability.
 - Top-up and spill payments and charges to introduce incentives/penalties for within day delivery. These arrangements will replace the existing cash-out penalty for renewable generators until the new top-up and spill mechanism is introduced in 2016. It will create sufficient incentive for accurate physical notification without introducing significant financial risks.
- The Low Carbon Purchasing Agency will run a competitive procurement processes to fill the gap between the output purchased through FITs and that required to deliver the overall carbon targets. Importantly, investments to deliver long term demand reductions should be considered on equal terms to generation solutions. The procurement process will be in two stages. This is necessary given the range of technologies and the radically different cost structures involved.
 - Stage 1: Bids for annualised lifetime costs for generation/demand reduction for a single year in 10 years time. It is expected that nuclear power would be competitive in an auction with this simple decision metric.
 - Stage 2: Successful bidders are then taken forward to a competitive procurement process to develop long term contracts that have the following elements:
 - Energy price
 - Capacity price
 - Terms and costs of system access
 - Incentives/penalties for delivery within day against day ahead notification
 - Prices for balancing services

⁷ Payment arrangements for technologies with significant variable costs, such as CCS and biomass, might involve a fixed premium against a fuel price index rather than a fixed price in order to deliver the necessary revenue stabilisation.

- Output procured by the Low Carbon Agency must be re-sold to the wholesale market under prescribed auction rules. This is important to ensure that there are liquid forward markets that allow stand-alone supply businesses to hedge sales on an incremental basis and avoid the need for them to devote significant effort to managing wholesale price risk. A suggested set of sales rules are:
 - Auctions of power purchases: 50% two years ahead, 20% year ahead, 20% month ahead and 10% day ahead
 - Shortfalls or surpluses in purchasing costs are shared across suppliers through an ex-post charge which the Low Carbon Agency is obligated to minimise. This will incentivise sales at the average cost of low carbon resources such that, over time, the wholesale price of power will move away from the marginal cost of fossil fired generation towards this value.
 - It is expected that the Low Carbon Agency would be required to publish forecasts of shortfall and surplus costs to aid hedging by suppliers

Procurement of system security and stability services

The existing arrangements for procuring balancing services remain in place until 2016. There is no evidence that there will be system security or stability issues over this timeframe and there is, therefore, no need to introduce new market arrangements during this period. By the end of 2013, the system operator and regulator need to have fully developed a system security and stability purchasing strategy through competitive tenders for a range of system stability services. This strategy will include:

- A definition of the range and extent of the services required to maintain system stability/reliability with an increasing proportion of intermittent resources in the resource mix.
- The nature of the tender process
- A clear description as to how this will give rise to an overall level of capacity consistent with the prescribed security standard

Potential providers of stability services would submit bids which include the variable and fixed (capacity) costs of providing the service. These tenders are open to all providers including both new and existing power generation and demand-side resources (demand response, energy efficiency and distributed generation). Winning bidders for system stability services will be paid their bid price. Providers of low carbon resources, purchased by the Low Carbon Purchasing Agency, and providers of stability services, purchased by the System Operator, will be providing a certain level of capacity to the system. In the event that this is insufficient to deliver the necessary security standard, the System Operator will also run competitive tenders to deliver the necessary additional capacity.

A new top-up and spill mechanism will need to be developed to replace the existing cashout mechanism once the new contract based arrangements for

security and stability services are introduced. The objective will be to ensure that sufficient incentives exist for market participants to deliver in line with physical notification to the system operator whilst avoiding excessive financial risk. Therefore:

- A proportion of the overall system stability and security costs will be recovered through imbalance charges on market participants. The precise level of this charge will be a key area for consideration during the development of the new top-up and spill regime.
- The remainder is shared across suppliers as a fixed charge
 - This charge is defined ex-ante (say one year ahead) to assist supplier hedging
 - Variations from these costs are covered by the System Operator as part of the incentive mechanism to minimise costs

Political advantages

The package of reform outlined in the previous sections has a series of political advantages that should aid implementation. These are listed below:

- It is fully consistent with all the pledges contained in the coalition agreement that relate to electricity markets. This package is complementary to a carbon pricing regime, including one in which a price floor has been introduced. Indeed, the system allows carbon price signals to continue to deliver the same benefits to the system as exist now.
- There is a strong focus on stimulating the development of new competitive markets in low carbon products and services that will be essential in driving economic growth going forward. In particular, the policy framework (emissions targets, EPS and innovation strategy) establishes clear long term market opportunities that will attract investors and developers.
- In the short term, the majority of trading continues as now with the key impact on the market involving the transfer from RO to FiTs. This urgency reflects the imperative to maintain momentum towards delivery of 2020 renewables targets. There is the opportunity to use the Green Investment Bank to ensure that investments continue to flow in the short term thereby minimising any potential investment hiatus.
- The system retains a bi-lateral contracting model which:
 - Avoids any 'cliff-edge' between existing trading and the new market arrangements – long term contracts struck now between market participants remain relevant into the longer term
 - Is robust to the longer term and can operate with a largely decarbonised system with the price increasingly reflecting the average cost of low carbon generation (which, presumably, is the reserve price that the Low Carbon Purchasing Agency would place on sales in the auctions). Competitive low carbon resources would therefore be able to freely enter the market at that stage provided

that their costs are lower than the average costs purchased by the Low Carbon Purchasing Agency. The market framework will therefore remain robust well beyond 2030, by which time, the role of the Low Carbon Purchasing Agency will be diminishing.

- The auction process is designed to tackle the difficult problem of delivering new nuclear power plant without an explicit subsidy whilst allowing specific contractual arrangements to be introduced which address the particular issues relevant to such investments
- No existing generation plant receives a windfall arising from the introduction of new broad-ranging instruments which are targeted on increasing market price
- The packages of proposals should dramatically improve the operation of the competitive supply market. In particular, a focus on facilitating easy forward hedging and the reduction in imbalance penalty increases the attractiveness for new entrants. This comes at a time when smart metering is opening up the opportunities for new entrants to dramatically reduce costs to serve and improve standards of customer service in addition to offering a range of new products and services.
- There is a reasonable window (5 years) to introduce the new security and stability regime and, in particular, replace the existing cashout regime which is now widely discredited as being unfit for purpose.
- Competitive tenders to provide flexible capacity will provide assurance that security of supply will be maintained beyond 2016 when margins begin to tighten but avoid delivering unnecessary windfall capacity payments in advance of this date or to those assets covered by long term contracts.
- The purchasing activities of both the Low Carbon Purchasing Agency and the System Operator would stimulate the development of entirely new markets that exploit the potential of the demand side of the market to minimise the costs of the low carbon transition.