Dear Mr Lucius and Mr Sterlin Balenciaga

**EIB consultation: review of energy sector lending policy**

National Grid welcomes the opportunity to comment on the European Investment Bank’s review of its energy sector lending policy. National Grid plays a vital role at the centre of the energy industry connecting millions of people safely, reliably and efficiently to the energy they use. National Grid owns and operates the high voltage electricity transmission system in England and Wales and as National Electricity Transmission System Operator (SO) operates the Scottish high voltage transmission system. National Grid also owns and operates the gas transmission system throughout Great Britain and through the low pressure gas distribution business, distributes gas in the heart of England to approximately eleven million offices, schools and homes. In addition, National Grid owns and operates significant electricity and gas assets in the US, operating in the states of New England and New York.

In the UK, National Grid’s primary duties under the Electricity and Gas Acts are to develop and maintain efficient networks and also to facilitate competition in the generation and supply of electricity and the supply of gas. Activities include the residual balancing in close to real time of the electricity and gas markets. Through its subsidiaries, National Grid also owns and maintains around 18 million domestic and commercial meters, a Liquefied Natural Gas (LNG) importation terminal at the Isle of Grain, and has shared ownership and operation of the electricity interconnectors between England and France (IFA) and England and the Netherlands (BritNed). In addition, the wholly owned subsidiary, National Grid Carbon Limited, has advanced the transportation and storage elements of the Carbon Capture and Storage (CCS) supply chain.

We have responded to a number of the questions asked from a UK perspective, though some fall outside our mandate as Transmission owner and operator.

**What impact do you consider the current economic crisis will have on the energy sector (demand, policies, supply)?**

Because of the difficulties in forecasting the effect of future economic conditions we now produce three scenarios describing the future of the energy sector;

- **Slow Progression**, in which developments in renewable and low carbon energy are slow, and the renewable energy target for 2020 is not reached.
- **Gone Green** in which the 2020 renewable target and the 2020 and 2030 carbon reduction targets are reached.
- **Accelerated Growth**, which has more low carbon generation, greater efficiency and greater electrification.
Although we have three scenarios it is important to realise that Gone Green is not intended to represent a central case. Our views of the future are described in our publication UK Future Energy Scenarios, (UKFES) available on the National Grid website. Future economic conditions in the three scenarios are described as follows in section 3.3 of UKFES:

In Slow Progression economic growth remains weak due to economic headwinds from Europe and depressed consumer demand; in Gone Green the economy recovers to traditional levels of growth with a partial rebalancing of the economy towards manufacturing, while in Accelerated Growth the economy booms, driven by a rebalancing towards a green economy which sees the UK become a world leader in many green technologies. In line with economic growth, fuel prices are stagnant in Slow Progression, with moderate increases in Gone Green and the highest price increases in Accelerated Growth.

It is worth pointing out that our views of energy demand have been revised since the recession. For example, in 2008 the forecast total UK gas demand for 2017 published in our Ten Year Statement was 1,185 GWh. In the 2012 UKFES the gas demand for 2017 ranges from 1,082 GWh in Slow Progression to 765 GWh in Accelerated Growth, lower than the 2008 forecast in all cases.

**What level of investment in RE do you expect in the short and medium term?**

Our views on renewable energy are described in the UKFES. Appendix 2 of that document gives a summary, from which an extract is shown here.

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<tr>
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<th>Slow Progression</th>
<th>Gone Green</th>
<th>Accelerated Growth</th>
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<td>2020</td>
<td>2030</td>
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**Do you agree that there is significant scope for investment in renewable heating and cooling?**

UK heating and cooling accounts for 47% of UK Green House Gas levels in 2010. Heating and cooling includes industrial, commercial and residential properties and in relative terms, renewable heating and cooling remains a minor contributor to energy demand. From our internal work and through sponsored studies it is evident that a least cost approach to achieving climate change targets requires a major shift towards electric driven renewable heating appliances (air / ground heat pumps), with contributions made from Hydrogen, district heating and gas (biogas / natural gas).
In particular, our studies have indicated that low carbon electricity coupled with high efficient electrical heat pumps could play a vital role in reducing greenhouse gas emissions across the majority of commercial and residential buildings (anticipated to between 34-40m buildings by 2050). Where appropriate it is most economic to combine heat pumps with existing gas infrastructure to form "hybrid" gas appliance / electric heat pump solutions. Hybrids provide a base load renewable heat with an economic level of seasonal and daily balancing from gas. The existing gas infrastructure would also serve as a method of securing energy services under extremes or peak conditions.

We also note that where an electrical heat pump may not be provided due to upstream network or low carbon generation deficiencies, a gas heat pump may prove to be appropriate in reducing fuel consumption and providing a renewable contribution. Such technologies remain immature and further investment may be necessary to develop the products for commercialisation.

Our studies show an important role for district heating within urban commercial and industrial developments near to low carbon heat production sources i.e. CHP with CCS or nuclear - thermal power plant. The options that CCS open up include pre-combustion carbon stripping of natural gas to form Hydrogen (with carbon dioxide to CCS) that can be utilised to displace oil and some gas from higher temperature processes.

Our work in this area is described in the report ‘Pathways for Decarbonising Heat – National Grid / Redpoint – Baringa’

What are the barriers to investments in this sector and how might these be overcome?

There are a number of barriers that we have identified to the uptake of renewable heating appliances through a co-sponsored study for the residential market (link below) and we see some of these barriers being relevant to commercial and industrial markets.

The UK has a well established gas appliance market with sales annually circa 1.2-1.5m boilers. Following customer surveys and a review of technology developments it is evident that customers are largely drawn to replacement heating products upon the failure or anticipated break down of existing appliances within existing properties. Under such circumstances customers inform us that they require a heating system that can be replaced or repaired in short timescales, provides near instant hot water, requires little space within the home, can make use of existing heat delivery systems (central heating), is low cost for installation and ongoing operating costs remain low (relative to other fuels). Where gas appliances are an available option (82% of UK homes), gas tends to set this benchmark. Alternative options may prove comparable in many regards yet tend to fall behind the existing gas service with regard to supply chain development, customer awareness / risk of something different, installation costs, ongoing running costs, spatial demands, and behavioural change dependencies. Undoubtedly some of these barriers can be over come with wider deployment but a level of incentive and customer safe guards may be required until installation and running costs reduce, performances improve and customer awareness increases.

The new build sector, prior to residency and subject to building regulations, may prove an appropriate area to develop renewable heating supply chains and build customer awareness. Likewise the RHI, designed by the UK Government to promote the adoption of circa 380,000 heat pumps by 2020 alongside biomass and solar thermal, is largely targeting electrical, oil or coal heated communities where heating costs are higher.

What do you think are the main barriers to energy efficiency investments? What might be done to overcome these?

The UK Green Deal indicates that the up-front cost for energy efficiency and perceived payback remains a major barrier. The UK Green Deal and ECO supplement are designed to remove such up front barriers and encourage energy efficiency. A balance between incentives and regulations may serve to promote higher uptake rates. For instance, the UK adopted legislation to enforce market convergence towards higher efficiency condensing boilers that has almost certainly made a significant contribution to annual gas demand reductions since 2005. Appliance efficiency standards are a method of promoting continuous performance improvements. A combination of up front capital cost
mitigation and regulations could be used to promote one off energy efficiency (insulation) developments. Under such conditions we envisage “intervention points” such as house sales or extension works desired by customers as being appropriate times to promote further efficiency improvements, providing the overall costs remain economic.

Is the traditional model for electricity transmission and distribution changing? What implications does this have for future investments in electricity networks?

Today, the balancing of generation and demand is predominantly achieved through flexing thermal generation such as gas fired power stations. The demand side of the balancing equation has been quite historical in its nature and has therefore been easy to forecast. The unpredictability has been driven by the generation.

As we move forward with the roll out of microgeneration such as solar PV, smart meters (time of use tariffs) and demand taking more control of its own behaviour it moves from a relatively passive to an active state. As such this means the traditional tools used for forecasting demand will no longer be applicable due to the increased unpredictability. This change will impact both transmission and distribution systems, with the former being used to designing and operating traditionally passive systems that now become more active. The future design and operation of transmission and distribution therefore needs to become more integrated than it has needed to in the past, ensuring that there are optimised investment drivers and incentives across the whole energy system/networks.

What is the future role of smart grids, offshore grids and energy storage solutions?

The whole energy systems/networks will undergo a significant step change in what needs they may be able to meet over the upcoming decades with the decarbonisation of energy. There will be challenges from the connection of larger generation units to new points of demand such as heat pumps and electric vehicles. This brings variation on both sides of the balancing equation and the traditional investment techniques may no longer always be the optimum solution. As such a suite of investment/operational tools will be needed to manage both the transition to and enduring decarbonised energy sector. Smart grids, offshore grids a energy storage solutions are a vital part of that.

What role will coal and lignite fired generation have in the EU power system in the medium term, with or without CCS, and how is this consistent with the EU’s Climate Action goals and its security of supply objectives?

We are only in a position to comment on coal generation in the UK; we have no lignite fired generation.

The Large Combustion Plant directive (LCPD) will lead to the closure of around 8 GW of coal capacity by 2016 in all our scenarios as described in the UK Future Energy Scenarios document (UKFES). Under the Industrial Emissions Directive (IED) there will be between 9 GW and 11 GW of coal capacity closing in 2023. The remaining capacity either opts into the IED and fits environmental upgrades, converts to a CCS plant or takes the transitional route with limited running hours and gradual closures from 2023. In 2020 the capacity of coal fired generation without CCS in our three scenarios ranges between 18 GW and 20 GW while by 2030 the total falls to between 4 GW and 6 GW.

In Slow Progression CCS is not commercially viable in the period to 2030; as such no new coal plants are built. In Gone Green a pilot large scale CCS project connects in 2025 with commercial deployment following; around 4 GW of coal plant is fitted with CCS by 2030. In Accelerated Growth a pilot large scale CCS project connects in 2020 with commercial deployment following leading to around 8 GW of coal plant fitted with CCS by 2030.

What will be the role of local coal supplies as input for highly efficient CHPs?

The majority (70%) of fuel used in CHP plant in the UK is natural gas. Coal makes up only 3% of the total (figures from Digest of UK Energy Statistics 2012). In none of our scenarios do we foresee any significant increase in the use of coal in CHP.
What is the scope for the development of shale gas resources in the EU?

Whilst there are opportunities to develop shale resources across Europe there are many barriers to overcome. These are country specific. In the UK our view is that the development of shale is subject to considerable uncertainty and could range from little or no impact to a potential ‘game changer’.

Do you expect the share of natural gas in EU primary energy consumption to grow further?

Future EU gas demand is subject to considerable uncertainty as is EU primary energy. The greatest influence in determining the share of natural gas is national and European government policy with respect to attaining renewable and carbon targets and the future role of nuclear generation and the future operation of coal fired plant. Under most scenarios, the market share for gas is expected to decline due to lower domestic demand and increased renewables for power generation.

What would be the best approach to increase security of gas supply and reduce import dependency?

With limited indigenous gas reserves and an expectation of lower EU gas production, import dependency can only be reduced if the market share for gas declines or if unconventional gas such as shale or biogas is produced at far greater levels than current production.

There are many factors that enhance security of gas supply; these include diversity of gas supplies (both imports and indigenous supplies), increased transmission capacity / interconnections, increased gas storage, fully functioning gas markets, increased interaction between gas and alternative fuels for power generation and greater access to demand side response.

Given the large uncertainty on future gas demand, what is the risk that investment in natural gas infrastructure may be stranded?

With the possibility of lower gas demand there is an obvious risk that future investment in natural gas may not be utilised. However any reduction in gas demand is anticipated to be at a relatively slow rate and gas as medium to produce heat is expected to play a pivotal role for a considerable time commensurate with the longest timescales for environmental targets.

What role do you expect nuclear power to play in the European energy market? As nuclear power stations are ageing, should their life be extended (where possible) or should they be replaced with other generation sources?

We are only in a position to comment on the role of nuclear power in the UK.

Nuclear power plays an important role in all three of our scenarios, with new capacity expected in each one. Extension of plant life is also anticipated in every scenario, ranging from an average of ten years in Slow Progression to 5 years in Accelerated Growth. Our views have been lent credence by a recent announcement by EDF Energy that the closure of two power stations has been put back from 2016 to 2023. The continued existence of nuclear power stations will be important in reaching the target in the Renewable Energy Directive that requires the UK to achieve 15% of its energy consumption from renewable sources by 2020.

Yours sincerely

[By e-mail]

Paul Whittaker
Director, UK Regulation