Department of Energy & Climate Change,
4th Floor, Area 4E
3 Whitehall Place,
London, SW1A 2AW

Sent by e-mail to: gasgeneration@decc.gsi.gov.uk

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Dear

RE: Call for evidence on the role of gas in the electricity market

Gazprom Marketing and Trading Limited ("GM&T") welcomes the opportunity to take part in the call for evidence on the role of gas in the electricity market. GM&T is a UK registered wholly-owned subsidiary of the Gazprom Group ("Gazprom") active in the marketing and trading of energy commodities worldwide including power, gas, oil, LNG and carbon allowances. In the UK, GM&T is active in the gas and power markets both on the wholesale and the retail segment and maintains an active interest in developing gas-fired generation facilities.

Below please find our comments on the questions addressed in the consultation document:

a) What are the main strengths and weaknesses of gas generation in helping deliver a secure, affordable route to decarbonisation through to 2020 and then by 2050?

GAZPROM MARKETING & TRADING LIMITED, REGENT'S PLACE, 20 TRITON STREET, LONDON, NW1 3BF, UK
T: +44 (0)20 7756 0303 **E:** RegulatoryAffairs@gazprom-mt.com **www.gazprom-mt.com**

GM&T supports the transition to a low-carbon economy in line with the UK's legally binding environmental targets, but this has to be achieved in a cost-effective, affordable and sustainable manner.

A consequence of the proposed climate change targets and electricity market reform will be to create a rigid power system unable to respond to peaks in demand and sudden supply interruptions from weather-dependent Renewable Energy Sources ("RES"). The risk from a security of supply point of view will be even greater in case the envisaged level of investment in new nuclear and CCS capacity does not materialise due to technical, economic or other considerations.

A study undertaken by Redpoint Energy[1] in support of the Electricity Market Reform programme suggests that a total of 11.2GW of nuclear new build will be required to meet demand during the decade after 2019, when the first new nuclear plant is expected to come on-line. This equates to about 1.0 GW per year on average. Similarly, as per Redpoint Energy's modeling results, CCS new build accounts for 5.5GW, from 2025 to 2030, or about 1.0GW per annum on average. Both these scenarios appear to be very optimistic given the fact that new nuclear reactors currently under construction in other European countries are facing continuous technical and economic challenges (e.g. the Flamanville project) and that CCS, although a promising technological development, is completely untested on a large commercial scale and requires significant investments (see for instance the recent experience with the UK's first CCS competition).

Gas is therefore indispensable as a reliable and secure electricity source, one that will enable the transition to decarbonisation. In particular, gas fired generation would be the best tool to ensure the UK's security of supply as it:

1. Provides flexibility to the power system:
   CCGTs are the most suitable technology capable of responding to sudden load and demand changes. This is due to their capability of quickly increasing or decreasing output and to reach full load from fully stopped in around 40 minutes. Their characteristics are also ideal for maintaining system security when the output from wind, solar and wave technologies is insufficient to meet and follow demand.

   A recent study undertaken by Eurelectric provides a comparative analysis of different generation technologies in terms of operational flexibility.

[1] Redpoint Energy, Electricity Market Reform – Analysis of Policy Options, v1.0, December 2010, p. 54

The generation technologies analysed are: i) nuclear power plants or "NPP"; ii) hard coal fired power plants or "HC"; iii) lignite fired power plants or "Lign"; iv) combined gas fired power plants or "CCG") and (v) pumped storage or "PS".

The metrics against which the analysis was performed are:

- *Start up time "cold"*:

  Estimate of the lead time required to start the production of electricity when the plant is idle. This metric is particularly important given the unpredictability of forecasting renewables load and the economic inefficiency of running back up capacity at minimum stable load

- *Start up time "warm":*

  Estimate of the lead time required to start the production of electricity when the plant is running at minimum stable load.

- *Load gradient "upward" and "downward"*

  Estimate of the plant capability of increasing or decreasing production as a percentage of current load. This metric is particularly important given the unpredictability of forecasting renewables load volatility

- *Minimum shutdown time*

  Time required for the plant to be operational. This is the biggest drawback of pumped storage generation technology

- *Minimal possible load*

  Minimum generation needed to keep the plant on a "warm" condition

The table below clearly shows that gas-fired CCGTs are the most flexible among fossil fuel technologies, despite the values reported being quite conservative (EURELECTRIC 2011, "Flexible Generation: Backing up renewables", pg. 19).

	NPP	HC	LIGN	CCG	PS
Start-up Time "cold"	~ 40H	~ 6H	~ 10H	< 2H	~ 0,1H
Start-up Time "warm"	~ 40H	~ 3H	~ 6H	< 1,5H	~ 0,1H
Load Gradient ↗ "nominal Output"	~ 5%/M	~ 2%/M	~ 2%/M	~ 4%/M	> 40%/M
Load Gradient ↘ "nominal Output"	~ 5%/M	~ 2%/M	~ 2%/M	~ 4%/M	> 40%/M
Minimal Shutdown Time	←		NO	→	~ 10H
Minimal possible Load	50%	40%	40%	<50%	~ 15%

Source: EURELECTRIC/VGB enquiry

Figure 1 – Flexibility analysis of different generation technologies (EURELECTRIC, 2011)

2. Insures customers against policy failures:
   Any delay in the timetable for the transition to a low-carbon economy, particularly in the deployment of new nuclear plants, due to operational or financial constraints would cause a material security of supply risk for British consumers. By incentivizing gas fired generation, the UK Government would in effect procure an insurance policy for its citizens against the cost of black outs. As the Value of Loss Load could be as high as 10,000 GBP/MWh (as pointed out in Redpoint study[2] commissioned by DECC), the economic case for investing in CCGTs is even stronger.

3. Minimises system costs:
   CCGTs have the lowest levelised capital cost of all generation technologies (see figures below provided by EURELECTRIC, 2011, pg. 34). This means that gas fired generation is the cheapest option for the procurement of backup reserve to intermittent renewables.

[2] Redpoint Energy, Electricity Market Reform – Analysis of Policy Options, v1.0, December 2010, p. 54

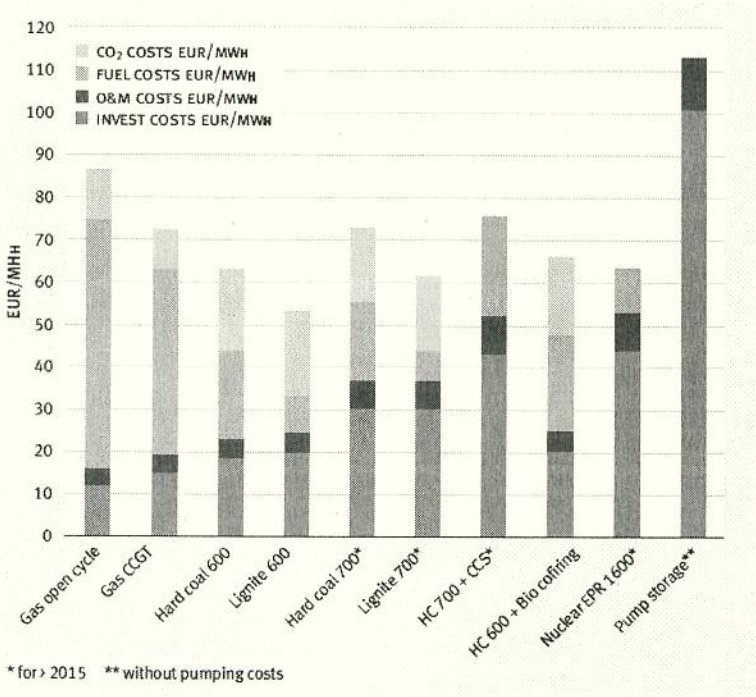

Figure 2 – Levelised cost of electricity generation (EURELECTRIC, 2011)

Conversely, it is very difficult to find any obvious weakness of using gas as an electricity source.

For instance, in recent years the media often raised concerns regarding the limited amount of gas supplies. The recent years have disproven these concerns. According to the "BP Statistical Review of World Energy 2012", worldwide proved gas reserves increased from 131.2 tcm in 1991 to 208.4 tcm in 2011. This is equivalent to 64 years of reserves at current consumption rates, which is well beyond the 2050 target. Finally, gas production is spread all over the world and it is easily accessible through pipelines and LNG.

In addition to this, gas producers are investing a considerable amount of money to improve the security of supply of their customers both inside and outside Europe. For instance, Gazprom will complete North Stream Line 2 pipeline by the end of the year and the Bergermeer storage project by 2015. Furthermore, South Stream's FID is expected by the end of the year. The above mentioned investments will greatly increase the security of supply of Gazprom's customers in Europe.

In the future, UK's security of supply will be dependent on baseload low-carbon technologies, mainly nuclear power stations, coming online on time and on budget. As noted above, neither can be taken for granted given the recent experience. This situation leaves the current and future governments with a considerable risk which would be difficult to justify to consumers. Enabling investments in gas fired generation is the most secure and efficient "no regret" policy that the Government could implement.

b) What role can gas fired generation play in the future and what level of gas generation capacity is desirable?

Gas fired generation will play a very important role for the future of the GB electricity system. In particular, this type of technology will provide:

- Flexibility to the system
- Essential ancillary services to National Grid
- Mid-merit order and peaking capacity during the transition period and baseload if the nuclear and CCS power plants projects are delayed
- Low investment capital cost and fast speed of construction
- Proven, readily available, low risk technology with manageable environmental impact

In terms of the desirable level of gas fired generation, this will much depend on three factors:

- The level of security of supply that the Government intends to provide to end consumers:

  Renewable load factors and production variability imply that a substantial amount of conventional back up capacity needs to be installed. Theoretically, if the Government wants to ensure end customers a statistically low Load of Loss Probability (LoLP), then the desirable amount of capacity should be at least equivalent to the installed renewable capacity multiplied by the forecasted renewables' load factors (this assumes a perfect correlation between production from all renewable power plants in the UK),

- The pace at which renewables, nuclear and CCS will be rolled out:

  Enough gas generation capacity should be set aside against delivery failure of renewables, nuclear and CCS projects. The exact amount would depend on the probability of delivery risks occurring,

- The minimum amount of firm gas demand that would attract gas shippers to the UK market:

  In order to ensure that sufficient generation capacity is available, any Government's strategy would have to look into the gas generation value chain in its entirety.

  In particular, security of supply can only be ensured if the fuel is readily available for generation when required meaning that gas suppliers should be compensated for the reserve capacity and flexibility that they provide. This can only occur if the transportation infrastructure is in place and if the shippers believe that demand is attractive and stable enough to make the upstream investment worthwhile. Only enduring solutions that include firm demand commitments will truly guarantee security of supply for end customers.

c) What are the key factors driving the economics of investing in new gas-fired power generation and how are these factors likely to change?

There are several factors which substantially impact the economics of investing in new gas fired power generation. The most important ones are included in the table below:

Factor
Power demand during the asset's life
The **share of renewables** in the energy mix and its projected growth
The **carbon markets** behavior
The relative spread between the **spark and dark spreads**
The **share of nuclear** in the energy mix and the future policies affecting this form of generation

The relevant policies and regulations that provide for a **support / subsidy** to specific forms of generation technologies and the perception of the stability of these policies over the investment life-cycle
The absolute level of **commodity prices**
The **volatility of commodity prices**
The **gas price seasonality**
Capital costs
The **liquidity** of forward markets

Given the prevailing policy uncertainties regarding the future of the UK energy market; it would be premature to make a judgment on the possible changes affecting the above mentioned factors. One point to take into consideration, though, is that the financial crisis has not significantly impacted the capital costs of CCGTs. In particular, the cost of gas generation turbines has been stable over time and will probably increase once the sales pipeline of H series turbines is further developed. This increases the difficulties faced by investors in recovering the entire value of the investment from a reduced amount of running hours.

d) What barriers do investors face in building new gas generation plants in the UK? What are the key regulatory uncertainties that may prevent debt and equity investors making a final investment decision in gas generation and supply infrastructure?

The table reported below summarizes the main barriers faced by investors when undertaking a project for the development of a gas fired power plant.

Barriers	Explanatory note
Policy uncertainties	This is by far the biggest barrier that investors are currently facing. Investments in electricity generation require a long

	payback period. A stable legislative and regulatory framework is therefore a necessity. The recent experience has demonstrated that stability is not always achieved and policies are often changed in due course. For instance the EMR, although at its early implementation stages, has already being challenged by a diverse range of stakeholders. This situation creates uncertainties for investors about the future of the UK's energy reform which in turn either deters them from investing or increases their required returns.
Regulatory uncertainties	Please see answer to question e).
Lack of liquid forward markets	The forward markets are not developed and liquid enough to allow investors to hedge their risks.
Sustainable supply of fuel	The procurement of gas is a very important element in the investment decision process. The current energy policies are sidelining gas from the energy mix. On the other hand, only by committing to a minimum firm demand, the Government can provide certainties to investors that a functioning gas market will be in place once the investment comes to fruition.

Of the barriers mentioned above, the one relating to policy uncertainties is the most relevant one. It is worth noting that the 15 GW UK consent 'Pipeline' for CCGT projects includes many developments whose permit will expire before construction can be committed. Also most of the planned power projects are based on gas turbines that are rapidly being superseded by higher-flex, higher-efficiency ones and therefore would require re-permitting before construction could begin.

The usable consented pipeline will therefore diminish quickly if investment uncertainties are not removed soon, and the project pipeline may, by obsolescence or expiry, be reduced to zero in the next 2 to 3 years.

Therefore, it is fundamental that the Government takes actions to remove the policy uncertainties in the very immediate future.

e) Are there any other policy issues that need to be addressed beyond the Government's proposals for the capacity mechanism and the EPS?

The table below presents a list of policy and regulatory issues that the Government should address or at least take into consideration, should it wish to promote investments in new gas fired generation:

Owner	Policy / Regulatory Area	Issue
DECC	Security of supply	• Full visibility is required on the additional measures that DECC is evaluating in order to ensure the GB security of supply both for gas and electricity (e.g. building more storage capacity, long term contracts, etc.).
DECC	EMR implementation	• The policy details of the EMR are still being defined. Clarity on this policy area would provide a boost to the investors' confidence. In particular, the level of feed-in tariffs for nuclear power stations should be announced to the market as soon as possible.

DECC / Treasury / EU Commission	Carbon policy	• No visibility of future carbon policies in the EU (e.g. set aside, etc.)
EU Commission	Energy policies	• Market coupling and interconnection investments affect the profitability of gas fired generation. It would be important to have greater certainties about the implementation timeline for market coupling in the UK and the relative infrastructure projects required to support it. • The design of the proposed capacity mechanisms within Europe should be harmonized. This would ensure that generators within the Union compete fairly against each other. Indeed, the UK risks of losing investments should the Government's policies be less attractive than the ones implemented elsewhere.
EU Commission	Financial markets policies	• Financial regulations (e.g. REMIT, EMIR, MiFID, etc.) influence the ability of utilities to fully participate in the market and create additional costs for small players.

OFGEM	Electricity transmission tariffs	• Future of ICRP and transmission charging in general (e.g. timeline, costs, credit guarantees needed to book transmission capacity).
OFGEM	Gas transmission tariffs	• Future of transmission charges for gas in the UK. In particular, the average infrastructure cost per unit of gas transported will increase should the Government not ensure a minimum firm demand for gas. This would translate in higher variable generation costs for gas fired generators.
OFGEM	Balancing market	• The balancing market reform will affect the value of intraday flexibility and ancillary services. It is vital that balancing prices appropriately reflect scarcity. • Renewables should bear the full cost of the imbalances for which they are directly responsible

f) Given a continuing role for gas and the potential for increased volatility in gas demand, to what extent is gas supply and related infrastructure a barrier to investment in gas fired generation? What impact will unconventional gas have on the case for investing in gas generation and the supporting infrastructure?

The potential increase in gas demand volatility is a very important issue that should be addressed by the Government especially since it has repercussions on the asset developers' risk.

In order to ensure that the plant is operating when needed, the investor can either:

- Buy the gas spot. By contracting on a spot basis, the investor ensures that its volumetric exposure is minimised as the gas will only be purchased when needed. On the other hand, there is a substantial price risk as electricity and gas prices tend to correlate. This in return could imply that the future spark spreads might not be as attractive as they should in order to remunerate investments.
- Buy the gas on a long term basis. In this way the plant operator ensures a stable price for its gas supplies. On the other hand, the volume exposure increases as the total contracted volume might not be used given the reduced load factors.

Any Government scheme that aims at supporting investments in gas fired generation should take into account this dichotomy and the fact that security of supply might be best served through long term arrangements.

I hope you find these comments useful. If you have any queries please do not hesitate to contact Alex Barnes on 020 7756 0301 or at RegulatoryAffairs@gazprom-mt.com.

Yours sincerely,

Gazprom Marketing & Trading Limited.

Unsigned as sent by e-mail.

GAZPROM MARKETING & TRADING LIMITED, REGENT'S PLACE, 20 TRITON STREET, LONDON, NW1 3BF, UK
T: +44 (0)20 7756 0303 **E:** RegulatoryAffairs@gazprom-mt.com **www.gazprom-mt.com**