National Infrastructure Commission – Interim Report

REA Response to Energy Infrastructure Questions 13 to 19

The UK has an established and mature gas grid, which provides a reliable supply of gas for heating. However, the continued burning of natural gas for heating is not sustainable as the UK progresses towards a low carbon energy system. This brings into question the future role of the gas grid.

13) What will the critical decision factors be for determining the future of the gas grid? What should the process for deciding its future role be and when do decisions need to be made?

It is clear that the decarbonisation of the heat sector will require a wide range of technologies, with no one solution to suit all heat requirements. Increased electrification of heating and the use of biomass heat, combined with increasing energy efficiency standards, will help both reduce gas demand and achieve decarbonisation. However, projections indicate that there will still be a significant gas demand in the future that will need to be met through continuing utilisation of the gas grid. This is especially true in situations where it may not be practical to move to alternative low carbon technologies or in commercial and industrial situations requiring high heat loads. National Grids Future Energy Scenarios 2017 estimate a Gas demand of 398 TWh by 2050 within its 'greenest' two-degree scenario[i]. As such, policy development concerning the future of the gas grid has to be focused on ensuring its decarbonisation, developing domestic renewable gas sources that produce Biomethane or BioSNG to be injected into existing gas infrastructure.

The further development of both the Anaerobic Digestion and Energy from Waste sectors will be crucial for achieving a future decarbonised gas grid. The AD sector has already seen substantial growth with over 540 plants now operational, 82 of which are involved in injecting Biomethane into the gas grid [ii]. Frustratingly, the policy environment has recently been a major barrier to further development of the sector. Firstly the 5MW per quarter deployment cap under the FiT regime has greatly restricted developer's ability to advance projects; while similarly, the ongoing delays to the promised resetting of the biogas and biomethane tariffs within the Renewable Heat Incentive continues to block the sectors immediate advance.

In comparison, the BioSNG market is comparatively nascent with demonstration plants proving the potential for Advanced Conversion Technologies (ACTs), such as gasification of waste or biomass, to deliver BioSNG. However, currently, the support for the sector is mainly provided through the Contracts for Difference scheme, which supports power production from the combustion of syngas rather than for BioSNG injection to grid. A stable policy environment is needed in this sector for commercial-scale projects to be realised.

Recent modelling by Cadent Gas on feedstock, arising from both waste and non-waste sources suggests total estimated bioenergy potential of 149 TWh by 2050 for a medium scenario, ranging from 94 to 250 TWh under the low and high scenarios[iii]. With the right Government policies and objectives, the Gas Grid could be substantially decarbonised in the future, helping to further meet emission targets within the heat sector, as well as legally binding carbon budgets.

6 Spring House, Graphite Square
Vauxhall Walk, London SE11 5EE
Tel: 020 7925 3570
http://www.r-e-a.net/

As such, in terms of the key policy developments required to ensure the future decarbonisation of the gas grid this includes:

- Legislation for the announced reforms to the Renewable Heat incentive to be laid and to come into force as soon as possible, so that further gas to grid AD and ACT projects can continue to be deployed utilising the biogas and biomethane tariffs.
- Government to provide clarity on future mechanisms for the deployment of AD and ACT projects beyond 2020 when the RHI budget is due to finish.
- Government to make clear what it would like to see delivered from Advanced Conversion Technologies (ACTs) and develop support mechanisms, such as tax breaks or demonstration funding, to ensure its commercialisation.
- Develop greater systems for the collection and analysis of industry data on the amount of waste and residues arising both now and in the future. This will help the development of policy decisions about the potential for the amount of renewable gas that can be produced in the UK.
- Legislate to bring in a timetable for mandatory food waste collections to be introduced across all local authorities.
- The future of the Gas Grid will also be an essential component of the Bioeconomy and Waste and Resource strategies now being developed by BEIS and DEFRA respectively. These must clearly set out how the government intends to utilise the available waste resource in order to decarbonise the gas grid and how they will deliver an increased AD and ACT capacity that shall be required. Following these the publication of these strategies there needs to be a coherent policy's across Government Departments so that waste resource is directed where it is most needed to achieve our decarbonisation goals.

Green Gas Certification Scheme

Government should also make the most of, and support, the further development of the Green Gas Certification Scheme (GGCS), operated by Renewable Energy Assurance Limited (REAL). Founded in 2011, GGCS is a not-for-profit, industry-led, initiative that tracks Biomethane through the supply chain to provide certainty for those that buy it. The key participants are green gas producers who register the gas they have injected into the grid, while suppliers and other traders register the gas sale contracts they have agreed. This provides both assurances in the market allowing consumers to be sure of the origin of the gas, as well as provide an additional premium revenue stream to renewable gas producers through the sale of Green Gas Guarantee of Origin certificates, helping to further develop the renewable gas market. In 2017 the GGCS surpassed 1TWh of certificates having been sold, enough to power 83,000 UK homes for a year and demonstrates the growing demand for access to renewable gas through the grid.[iv]

The use of a market-based certification scheme is also beneficial for engaging a number of sectors in the use of renewable gas. For example, the GGCS's work to date has demonstrated that there is a strong appetite for organisations to source renewable gas as part of their carbon reduction strategies, or part of complying with local low and zero carbon planning requirements. The government's strategy for supporting the growth of green gas in the grid does not allow for such opportunities, and it is only through a certification based system, working on a mass balance principle, that such routes can be explored. Similarly, the GGCS has facilitated long-term contracts for the supply of renewable gas between businesses and AD plants. This is supporting plans for area-wide zero carbon developments

through the provision of biomethane to Combined Heat and Power (CHP) district heating schemes, and has been working with the transport sector to facilitate the use of renewable gas in the emerging gas bus and gas HGV sectors.

It is has been widely recognised that delivery of biomethane, on a mass balance basis through the gas grid, is the most efficient way for green gas to be conveyed to consumers. However, the government is only now recognising such opportunities, as can be seen in the most recently issued RTFO guidance, which allows for use of gas pipelines for distribution of biomethane [RTFO Guidance Part One Process Guidance - April 2017]. Going forward it is important that government recognise that the full potential for renewable gas can only be fully realised by using the UK's national gas grid, and through matching producers to end consumers through a mass balance system.

The UK has a relatively old and energy inefficient building stock, which results in higher energy consumption. Upgrading the energy efficiency of buildings will enable consumers to save money in the short and long-term as the UK switches to low carbon heat infrastructure. Building refurbishment could be integrated with other enhancements, such as installing solar panels or alternative forms of heating.

14) What should be the ambition and timeline for greater energy efficiency in buildings? What combination of funding, incentives and regulation will be most effective for delivering this ambition?

We support the focus on improving the energy efficiency of UK housing stock, as has been stated through the Governments Clean Growth Strategy. However, more needs to be done to flesh out the Governments plans to explain how they intend to get all fuel poor homes to EPC Band C by 2030 and what proposals they wish to bring forward in regards to reforming the original Green Deal framework in order to make a 'pay as you save' scheme more attractive.

The REA has frequently called for a comprehensive approach to energy efficiency which recognises the importance of combining improved efficiency standards and the delivery of onsite renewable power and heat technologies. The Merton Rule, implemented at the local authority level, remains a possible key policy driver against which better energy efficiency and on-site renewables can be delivered. The Merton Rule, named after the council that first introduced the policy, sets a requirement that developers must produce a certain percentage of a buildings energy requirement from onsite renewables. This was originally set at 10%, but has been amended by subsequent implementing authorities. Furthermore, the policy also implements a hierarchy for considering energy usage within developments, firstly examining how energy usage can be reduced, then improving energy efficiency and finally considering the needs for onsite generation. This is done by insisting that developments within the Local Authority comply with energy efficiency standards that exceed the energy requirements of existing building regulations.

The ability for councils to instigate the Merton Rule has been enshrined in legislation through the Planning and Energy Act 2008, and remains an important instrument that Local Authorities should be encouraged to adopt as part of their low carbon plans. A recent survey conducted by APSE Energy and the REA demonstrates that a lack of central government focus on energy efficiency, in particular, the scrapping of the Zero Carbon Homes initiative, has meant LA's have become less inclined to set their own standards through powers provided by the Merton rule. This should be reversed and Local Authorities provided due support in developing detailed energy efficiency plans utilising the Planning and Energy Act 2008.[v]

The Commission should also be aware of the work currently being put forward by the Independent Government Review 'Each Home Counts' that makes clear recommendations for how the energy efficiency sector can be further improved and ensure that rigorous quality standards are maintained.[vi]

Keeping the cost of low carbon energy down is one of the most important inputs into a successful industrial strategy for the UK. Well-designed market mechanisms should ideally be open, competitive and technology neutral.

15) How could existing mechanisms to ensure low carbon electricity is delivered at the lowest cost be improved through:

- ***Being technology neutral as far as possible***
- ***Avoiding the costs of being locked in to excessively long contracts***
- ***Treating smaller and larger generators equally***
- ***Participants paying the costs they impose on the system***
- ***Bringing forward the highest value smart grid solutions?***

It is important that existing mechanisms for renewable and clean tech technologies continue to be maintained in line with the existing plans, which currently sees them funded up to 2020. The industry has developed projects and business plans in line with these established schemes, and further changes could negatively impact the ability of such projects to effectively deploy. However, clarity is needed in term of how mechanism may operate after 2020 and how they could be refined to meet the bullet-pointed aims listed by the Commission in this question.

In reference to the commission's aims of bringing forward the best value generation, we wish to highlight the findings of a report recently commissioned by The REA in conjunction with Eaton, and conducted by Bloomberg New Energy Finance (BNEF). It looks at the 'tipping points' for renewable energy deployment in a world without any changes in policy (and carbon prices of c.$39/tonne), based purely on cost projections for generation technologies. Launched in Bonn at COP23, the study uses a series of modelling assumptions for the UK market to calculate how the country's generation mix will look based on the future cost of power technologies. In terms of renewables, due to modelling constraints, the study only includes wind (onshore and offshore) and solar generation but also recognises the clear need for all forms of renewable generation. The finding of this report is helpful in understanding future costs projections for renewables and how future mechanisms can be designed to ensure a cost-effective diverse generation mix. Below we summaries some relevant findings related to this question, however the executive summary and full report is available here: https://uk.eaton.com/content/content-beacon/RE-study/GB/home.html?wtredirect=www.eaton.com/tippingpoints

Renewables as lowest cost generation, conventional baseload as system liabilities

The findings of the report found that the cost of solar and wind (onshore and offshore) generation is projected to at least halve by 2040 in the UK. This leads to a 'tipping point' whereby all new power generation capacity built is renewable (assuming no policy interventions) because they are so much cheaper than conventional generation assets. But there could be a hiatus before then as policy undermines deployment.

As early as 2030, there will be whole weeks where wind and solar power generation meet and even exceed total demand at some point every day. This creates a very challenging environment for in-flexible 'baseload' technologies that cannot quickly ramp up or down,

such as nuclear. More flexible renewable technologies with baseload characteristics, such as biomass and energy from waste, are better able to adjust to this situation and combining these with wind and solar would lead to a sustainable cost-effective de-carbonisation of the grid.

So the ramifications are that inflexible baseload technologies such as nuclear, become a 'liability' to the system rather than an asset, and low carbon, low cost wind and solar are able to 'keep the lights on' at very high levels of deployment. Therefore the justification for a Capacity Market type support for conventional inflexible baseload generation is much reduced as such assets exacerbate system stress.

By 2040, when variable renewables are providing over 65% of the country's power in the model, we still only need the same amount of backup power generation as in 2017. By this time only 3% of power generated is curtailed despite such large amounts of variable generation.

With increased flexible resources available, such as DSR and energy storage, this curtailment can be reduced and managed, and costs avoided – which is one of the key findings of the report. The UK will need more flexible generation options and longer-duration storage products to cover times when there are gaps between supply and demand. The study finds that new storage capacity with a supply duration of four hours or more would reduce the need for back up capacity by 20%, and increase the efficiency of the remaining back up generation by a similar amount.

Smart energy system opportunities

The opportunities provided by energy storage and flexible assets such as DSR will help revolutionise the energy sector in the UK, so it is important to consider how best to support the deployment of such assets and how they can help manage system stress. This has been acknowledged in numerous reports including '*Smart Power*' from the National Infrastructure Commission and BEIS-commissioned research by Imperial College and others, with savings to the system identified of up to £8 billion a year by 2030.

Building 'Whole System Costs' into support mechanisms

There has been discussion within the industry of whole system costs and how to incorporate these into power support programmes for a number of years now. The REA is not against such a move (see our paper on Market Stabilisation Mechanism CfDs from 2015), as, depending on methodology, such a method could better reflect the carbon impact of particular technologies while reflecting the differing net impact on running the system. A 'wholesystem costs CfD/CM Contract' would have to adequately reflect the cost of carbon as an absolute starting point. In particular, Solar PV and wind would be able to compete when combined on-site with energy storage.

Biomass power and energy from waste could have their unique benefits recognised under such a mechanism, but the support of a different kind may be required for more emerging technologies such as marine, Advanced Conversion Technologies and geothermal. It should be noted that while we support the commissions ambitions for an open, competitive and technology neutral power auctions, purely price driven metrics could see the UK lose out on leading the development of innovative renewable technologies that offer additional decarbonisation potential in areas such as heat, transport and waste management. Careful

consideration must therefore also be given to how less established technologies can also be deployed in a cost-effective way outside of straight power auctions.

Network management

One area that must also be addressed in the development of power support mechanisms and their ability to support both larger and smaller generators is through ensuring appropriate network charging and management. Changes announced to embedded benefits in 2017 saw the main rate cut from c.£45/kW to c.£3-7/kW, phased over three years from April 2018 to 2020. This has negatively impacted on renewable embedded generation projects, increasing their costs and restricting the ability innovative storage business models to be delivered. This is something that is now a key focus of the Targeted Charging Review that is currently underway. The decision also highlighted the need for reform the rules and governance of the grid network. At present, almost innumerable, byzantine committees administer the rules for grid operation, connection to and usage of, which are dominated by the incumbent players. We believe such groups should be opened up and more parties enabled to participate in the discussions and votes (which are signed off by Ofgem).

The CMA in its interim findings on the energy market acknowledged that this was an area in need of reform as smaller players face a lack of resources to fully participate in the discussions. One solution could be an Ofgem-funded representative on behalf of smaller and medium-sized market participants tasked with informing stakeholders and representing these organisations' views on the committees.

Overall future electricity mechanisms should recognise that:

- In the next decade and a half inflexible baseload generation such as oil and nuclear becomes a liability on the system and that renewables can increasingly deliver the majority of power requirements when combined with flexibility options. This represents the most cost-effective form of ensuring long-term affordable energy security.
- A 'whole-system costs' approach to allocating power system support could be effectively provided if it accurately reflects the carbon intensity of each technology and system stability impacts are impartially assessed. Baseload renewables able to respond relatively easily, such as biomass power and energy from waste, should be recognised here.
- We support the need for a continued stable carbon price with long-term trajectory, as underpinning the move away from fossil fuels (though it must be set at a sufficiently high level otherwise has in effect a negative total impact), and a border carbon price is a logical extension to create a level playing field and prevent carbon leakage, encouraging subsidy free deployment of renewable projects.

Nuclear power is an expensive form of generation and is unlikely to get built without Government intervention. However, if electricity is selected as the primary way to heat our buildings in the future, it is unlikely that renewables could generate sufficient electricity to meet total demand. It is also unclear whether system stability can be maintained with very high levels of renewables.

16) What are the critical decision factors for determining the role of new nuclear plants in the UK in scenarios where electricity either does or does not, play a major role in the decarbonisation of heat? What would be the most cost-effective way to

bring forward new generation capacity? How important would it be for cost-effectiveness to have a fleet of nuclear plants?

As demonstrated in both our responses to question 14 and 15, the assertion that nuclear provides a greater level of power and heat energy security than renewables should be challenged. The development of deliverable flexibility options combined with energy storage, which is already taking place, suggests that within the timetable of new nuclear being built they could well become a liability on the system - unable to meet the demands of a flexible grid system. For further evidence in relation to this please refer to the REA, Eaton and Blomberg New Energy Finance Report available here: https://uk.eaton.com/content/content-beacon/RE-study/GB/home.html?wtredirect=www.eaton.com/tippingpoints

A fleet of flexible resources, including dispatchable bioenergy technologies like Biomass and Energy from Waste, will be better at meeting changes in demand within a future flexible energy system. What's more, these technologies are already at price levels below or highly competitive to the cost of building new nuclear plants, demonstrating their cost-effectiveness.

Carbon capture and storage have the potential to support the transition to a low carbon energy system in multiple ways, including enabling the creation of greener gases for heating and reducing emissions for fossil fuel power stations and industry. However, it has had a difficult history in the UK. Internationally, it is predominantly used for enhanced oil recovery, rather than reducing carbon dioxide emissions.

17) What are the critical decision factors for determining the role of carbon capture and storage in the UK in scenarios where electricity either does, or does not, play a major role in the decarbonisation of heat? What would be the most cost-effective way to bring it forward?

No response intended.

Waste can be a valuable fuel for the difficult-to-decarbonise sectors. New and established technologies could make a contribution to the heat and transport sectors.

18) How should the residual waste stream be separated and sorted amongst anaerobic digestion, energy from waste facilities and alternatives to maximise the benefits to society and minimise the environmental costs?

Essential to this question is the commission's ability to improve and analyse the available data to determine the amount and nature of the waste that is currently arising and how this will change in the future. Combined with this, Government must be clear about what they would like to see delivered from new technologies, such as Advance Conversion Technologies (ACT), which have the potential to provide solutions to help decarbonise the heat and transport sectors. Once this is decided, Government will need to put in place appropriate policies which the market will be able to react to and deliver the most cost-effective use of the waste. As such, evidence-based policy making using reliable models should be used to set clear objectives, this will allow the market to respond in order to use the available waste resource in the most efficient way possible.

Key assessments of this question will also need to examine the efficiency of waste collection systems used by Local Authorities, considering how both the quality and quantity of usable waste can be secured. For example, it is clear that far more could still be done to increase the amount of food waste being collected. Government intervention providing a timeline for the introduction of mandatory food waste collection could significantly increase the amount of available feedstock and drive demand for a larger AD market. Similarly, within the Energy from Waste sector, it is evident there is a need to reverse the trend that sees 3 million tonnes of waste exported abroad at a net cost to the UK. This resource should be being utilised within the UK and the appropriate waste management capacity developed to see it reshored.

We are aware the commission is already conducting studies to model and examine the extent of waste arising, as well considering how to prioritise the use of this waste appropriately. REA members have been involved in this process and have provided data as part of the Commission stakeholder outreach programme. We hope that this detailed analysis also forms a basis for the work being carried out by DEFRA and BEIS as they develop the respective Waste and Resource Strategy and Bioeconomy strategy announced within the Governments Clean Growth Strategy. It is important that work in this area is not unnecessarily duplicated but taken forward with industries continued involvement.

The first best option to reduce waste costs for households and businesses is to minimise the amount of waste produced. The packaging recovery note system places costs on the producers of packaging to account for the end-of-life impact.

19) Could the packaging regulations be reformed to sharpen the incentives on producers to reduce packaging, without placing disproportionate costs on businesses or creating significant market distortions?

No response provided

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[i] National Grid (2017) *Future Energy Scenarios*, Available online: http://fes.nationalgrid.com/

[ii] REA (2017) *REView 2017*, Available online: https://www.r-e-a.net/resources/rea-publications

[iii] Cadent Gas Ltd (2017) *Review of Bioenergy Potential,* Available online: https://cadentgas.com/getattachment/About-us/The-future-role-of-gas/Renewable-gas-potential/Promo-Downloads/Cadent-Bioenergy-Market-Review-SUMMARY-Report-FINAL.pdf

[iv] REA (2017) *Green Gas certificate demand smashes the 1TWh barrier* Available online: https://www.r-e-a.net/news/green-gas-certificate-demand-smashes-the-1twh-barrier Further information on the GGCS can be found here https://www.greengas.org.uk/certificates

[v] APSE Energy and REA (2017) *The Merton Rule, Available here: http://www.apse.org.uk/apse/index.cfm/local-authority-energy-collaboration/apse-energy-publications1/the-merton-rule-an-apse-energy-publication/*

[vi] Form more information see http://www.eachhomecounts.com/