Watt-Logic

Response to RIIO-3 SSMC Consultation – Watt-Logic

About Watt-Logic

Watt-Logic is an independent energy consultancy founded by Kathryn Porter. Watt-Logic was established in 2016, initially as a blog which grew into a consulting business that now works with clients around the world on projects across the energy value chain. Projects include supporting clients in negotiating commercial contracts and gas and electricity trading arrangements; assisting businesses in evaluating new investments in solar generation, behind-the-meter storage and energy-from-waste; advising on the effects of regulatory reform such as the impact of potential changes to market price formation; and acting as an expert witness in energy-related disputes.

Watt-Logic's founder, Kathryn Porter has extensive expertise in physical and financial electricity, gas and oil markets, as well as significant experience in financial services across risk management /hedging, and debt and equity financing in both public and private markets.

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Future of Gas

OVQ1. Do you agree with our proposal for how RIIO-3 should interact with the Hydrogen Transport Business Model?

Yes. It will be important to align the existing gas (methane) and potential future hydrogen infrastructure plans so that any existing assets which can be repurposed are transferred appropriately.

OVQ2. Are there any additional activities relating to the development of hydrogen transport infrastructure, or repurposing of natural gas assets, that you think should be funded through RIIO-3, and if so, why do you think this is justified?

The level of cost incurred by existing gas customers in relation to hydrogen should be limited to those which can be shown to result in a demonstrable benefit to those customers.

OVQ3. Do you agree with the proposal that network costs relating to hydrogen blending at both distribution and transmission level should be included in RIIO-3 net zero related UMs? If so, which mechanism do you think is most appropriate for these costs and why?

It is difficult to justify blending on a cost basis – inclusion of hydrogen is likely to make grid gas more expensive since hydrogen itself is likely to be expensive. Arguments around hydrogen being potentially produced by "surplus" renewable generation with a short-run marginal cost of production close to zero ignore the likely high level of government subsidy that is likely to support initial green hydrogen projects. In the same way that renewable generation is not sold at close to zero prices, it is unlikely that hydrogen pricing will be close to zero either regardless of the production method. It is therefore likely that the costs of grid gas will rise as a result of the blending of hydrogen, so a clear cost-benefit analysis would be needed to ensure these additions to consumer bills are justified. Given this, and the wider cost of living pressures, it may be that any such decisions are delayed until they are more affordable for consumers.

I therefore agree that any infrastructure related costs which may arise as a result of a future decision to blend hydrogen into grid gas should be managed through UMs.

OVQ4. What are your views on the proposal of using the GD specific Heat Policy re-opener, the RIIO-3 net zero related UMs, or a mixture of both to fund network costs incurred as a result of the government's 2026 decision on hydrogen for heating (where RIIO is deemed to be the most appropriate funding mechanism for these costs)?

Given recent developments with local hydrogen for heating trials it seems increasingly unlikely that the Government would be in a position to make a definitive decision on the use of hydrogen for heating in 2026, two years from now. Therefore, excluding such costs from RIIO-3 and managing them through a re-openers or UMs would be appropriate.

OVQ5. What are your views on our proposal to not enable funding for further evidence relating to repurposing the existing network for hydrogen heating ahead of government's decision on hydrogen heating in 2026?

It is difficult to see how the Government will be in a position to determine whether or not to proceed with hydrogen for heating in the absence of local trials, however the strength of public opposition suggests that such trials will be difficult to implement, particularly while energy costs remain high. Unfortunately it seems unlikely that energy costs will fall in the coming years, so it seems more likely that a wider improvement in economic conditions and personal wealth would be needed before consumers were willing to accept changes which might make them less well off. The near-term focus should be on constraining consumer costs in order not to erode what support remains for a potential switch to hydrogen for heating.

OVQ6. Should RIIO-3 help to manage future gas network decommissioning costs? If so, do you have views on what these costs could be and what mechanisms should be used, including for anticipatory funding?

No. The timing of any gas grid decommissioning is deeply uncertain. Few models predict no methane use in 2050 and several models predict that there will be significant hydrogen use. In the absence of any plan for decommissioning, including what would trigger decommissioning of any particular piece of network equipment, it is difficult to justify disrupting the funding model of grid operators by incorporating any decommissioning charges. Please see the attached report "Gas Network Decommissioning for further details.

Role of Scenarios and Planning Pathways

OVQ7. Do you agree with the proposal to use the FES framework for selecting the RIIO-3 scenarios?

I have significant reservations about the use of the FES.

First of all they are not forecasts, they are subjective illustrations of possible future market outcomes. Secondly, they have a poor track record of predicting actual market outcomes – while they are not intended to be forecasts, in order for them to be useful, outcomes should fall within those set out by the FES, however analysis of historic FES and out-turn data indicates that often the out-turn is on the edge of previous FES expectations[1]. This suggests a degree of directional bias within the modelling.

Caution is also required in that NG ESO, like Ofgem, is not responsible for delivering net zero. However, from its messaging, one could be forgiven for thinking ESO thinks it is responsible for net zero delivery (it must not act as a barrier, but does not have the powers to ensure net zero targets are met, for example it needs to ensure renewable generation can connect to the grid but it cannot create those renewable projects in the first instance).

Mission confusion can lead to a tendency to assume that net zero targets must be met and must be shown to be met, but this is not necessarily true. While there are currently legal targets for net zero, it is open to any future government to change or even remove these targets through passing new legislation. The performance of the FES to date suggest that a belief that net zero is required to happen will drive outcomes, but it is important that scenarios which do not conform to this belief are retained.

It is my understanding that ESO is considering discontinuing the Falling Short scenario. This would be a mistake. It is important to continue to maintain scenarios where net zero targets are not met, to reflect the possibility that recent trends in policy softening may continue, particularly as costs become more acute for consumers.

Of the FES scenarios currently available, Falling Short represents the most appropriate scenario for modelling the gas grids since it represents the conservative position ie the one in which gas grids have the highest usage in coming decades. Using this or a similar non-compliant scenario would ensure that ongoing investment in existing infrastructure is maintained at the levels necessary for safe operation until such time as it is no longer required.

OVQ8. Do you agree with the proposal to use FES Leading the Way as the planning scenario for ET in RIIO-3?

Leading the Way assumes significant growth in electricity infrastructure and in that sense could be considered conservative. It also assumes lower levels of consumer behavioural change which is also likely to be more realistic. However, caution is needed, in part due to the limitations of the FES noted above (and the frequency with which the scenarios are changed), and in part because the world described in Leading the Way will be very expensive for consumers, with high levels of renewable generation and associated network costs.

OVQ9. Do you agree with the proposal to use two FES planning pathways for the gas networks, ie Leading the Way and Falling Short as the additional common conservative scenario?

The only scenario that should be used for gas planning is Falling Short. Leading the Way represents a future system outcome that is relatively unlikely to be realised – historic analysis indicates that the least compliant scenarios perform better when compared with out-turn data – and it is a conservative view on the amount of gas infrastructure that is likely to be needed on an ongoing basis.

[1] https://watt-logic.com/2023/07/19/are-the-fes-useful/

It is likely that failure to adequately maintain gas infrastructure that continues to be used will carry higher physical and financial risks than failure to adequately anticipate the end of use of the infrastructure and its decommissioning. Therefore, the more cautious, Falling Short scenario should be adopted for planning purposes (and ESO should be required to continue producing it).

OVQ10. Is Falling Short the most appropriate common conservative planning scenario to be used for the gas networks? Or is a common gas network developed scenario more appropriate?

I see no particular dis-benefit to using Falling Short and creation of a new scenario may create additional work for minimal additional benefit. However, ESO should be required to back-test its scenarios to ensure that they are in fact credible and have genuine utility for planning purposes.

OVQ11. Is it feasible for all network companies to initially plan against FES 2023 before updating business plans in line with FES 2024, as proposed?

It is reasonable to question the extent to which it is useful to adjust long-term strategic plans based on short-term modelling changes. It would be disappointing if FES-24 contained material differences from FES-23 for the period covered by RIIO-3. If this were to be the case, then, absent material policy change, ESO should be challenged over its methodology and approach to preparing the FES.

Basing gas network planning on the 2023 Falling Short scenario should be a reasonable approach and one that is least likely to see material changes between FES-23 and FES-24 for the RIIO-3 period.

For electricity networks there is a higher risk of changes in the Leading the Way scenario as it represents a faster pace of change. It is also more likely that regional differences will have a higher impact for electricity networks than for gas networks. The challenge for electricity networks is to ensure investment is planned ahead of need, but the failure of AR5 and partial failure of AR4 (with several wind projects failing to take FID) indicate risks to assuming a fast pace of change is maintained. The increased CfD levels for AR6, and the wider context around supply chain inflation both indicate that costs for offshore wind in particular are likely to increase in coming years. This could have a significant impact on the pace of deployment – on the one hand developers may struggle to make projects economic and on the other hand, affordability constraints may limit government appetite for new projects at higher prices.

These (and other factors) introduce significant uncertainty around the pace of change in electricity markets that are not present in the gas sector. Network companies also face supply chain challenges with lead times for key electricity infrastructure growing and costs rising. This may mean it is not possible to deliver on fast-paced scenarios despite the best efforts of network operators since essential raw materials could be subject to limited availability.

Global supply chains of all kinds have faced bottlenecks in recent years, in part due to the effects of the covid pandemic and the Russian invasion of Ukraine. Prices for both energy and raw materials have soared and there have been shortages of certain critical minerals, semiconductors and other components. Grid technology supply chains were severely affected, for example 50 MVA power transformers had typical procurement times of 11 months before the pandemic, but are now over 18 months as manufacturers struggle to cope with labour and material shortages. Electricity grid operators around the developed world are simultaneously trying to upgrade aging infrastructure and deliver expansions necessary for the energy transition. This is creating huge resource competition[2].

It is important that electricity grid operators factor these constraints into their planning. While the FES may be the starting point, they may need to deviate from its assumptions based on local needs and the availability of materials and labour for the new infrastructure required.

Outputs and Incentives

I have no specific comments on this section other than to note that caution is needed to ensure the cost of regulatory compliance does not become disproportionate, and that Ofgem does not move too far into operational decision-making which is particularly a risk in relation to UMs.

Reporting on emissions and in particular scope 3 emissions is potentially of minimal benefit since most network infrastructure requires materials which are highly polluting to produce and often can only be sourced from countries with poor labour, social, environmental and human rights practices[3]. There is a risk that an undue focus on emissions reductions limits the ability of network operators to deliver on their business plans without suffering reputational damage from failing to reduce carbon emissions when those emissions are incurred higher up in the supply chain and there are limited options for changing procurement practices.

Environmental targets should focus on elements within the operational control of regulated companies, such as water management, waste, company vehicle emissions etc rather than supply chain emissions.

In terms of climate resilience, this could arguably also apply to supply chains. Many mines are located in areas of existing water stress, with extraction having both high water needs and reducing the availability of clean water as a result of pollution. This may restrict access to raw materials. In terms of local climate impacts on the networks themselves, it is not so much the frequency of events that matters but their severity. In this sense, past events may form a basis for assessing the resilience of networks to extreme weather events such as the 1987 hurricane.

The impact of an aging population should also be considered. Loss of electricity or gas, particularly in winter, is likely to result in fatalities. An early evening winter power blackout would result in road deaths and fatalities in the home as a result of falls etc, particularly among the elderly. Longer outages create risks around loss of heating. Network operators need to consider how to protect consumers from harm, advising them on risk mitigation strategies (for example older people could ensure they have torches located around their homes in case of a sudden power outage), and putting in place local support plans for example where remote areas suffer extended disconnection in the aftermath of severe weather. Fully weather-proofing networks is unlikely to be cost-effective, but operators should develop contingency plans for temporary supply from the use of portable generators, power trucks and so on.

In terms of workforce resilience, there are risks relating to possible gas network decommissioning as workers /potential workers may consider the sector unattractive resulting in reduced access to staff.

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[2] https://watt-logic.com/2023/12/18/power-grids-energy-transition/

[3] https://watt-logic.com/2023/11/07/esg-disclosures-scope-3-emissions/

This would affect the ongoing operation and maintenance of networks at appropriate levels, and adds to the importance of avoiding premature action on decommissioning.

Truth Telling and Efficiency Incentives

No comment

Managing Uncertainty

No comment other than to note the large number of UMs risks making the price control unwieldy and involving Ofgem too much in operational decision-making.

Cost of Service

When considering who should cover the costs of gas grid decommissioning the following points are relevant:

- Recovery from gas consumers alone may involve increasing costs being recovered from decreasing numbers of consumers, raising questions of fairness;
- Recovery from gas consumers at the time of decommissioning may allow previous gas consumers to escape responsibility for the charges in a way which is unfair;
- Recovery from gas consumers alone ignores the fact that a wider set of people has an interest in decommissioning being done correctly ie avoiding the collapse of roads under which gas pipes run.

These considerations would suggest that the fairest way to recover such costs would be through taxation (which would also be the least regressive approach), however the government may not be amenable to such an approach.

A fairer approach within the energy sector would be to recover these costs from electricity rather than gas consumers as a proxy for citizens, reflecting the wider societal benefits of properly managed decommissioning. While such cross-subsidisation is not currently permitted by law, a case can be made that with the recent end to the separation of gas and electricity for the purposes of system planning though the creation of the National Energy System Operator, consumers could also be designated as energy rather than gas and electricity consumers. This would be consistent and would enable the costs of gas grid decommissioning to be fairly recovered when the time comes.

It would also enable Ofgem to begin to introduce the costs slowly, ensuring the impact in bills is small. This could be used to create a decommissioning fund which would be invested to earn some level of return and which could be drawn down once actual decommissioning work is required. The existence of a levy would also create an income stream which network operators could securitise in order to fund capital intensive works.

The proposal for accelerated depreciation of the regulated assed base is highly risky. This is discussed in detail in the attached report, *Gas Network Decommissioning*.

Cyber Security

No comment.

Innovation

No comment.

Data and digitisation

It is important that the energy sector adheres to the principles of GDPR in terms of data minimisation. There may be a temptation to collect all possible data, but care needs to be taken to ensure the privacy and safety of consumers.

For example, a few months ago an industry colleague shared a business proposal with me which would involve cross referencing data from smart meters, the Land Registry, social media and other sources to determine the occupancy of a home and when the occupants were typically present, and use this information to propose certain energy solutions. Unfortunately the extent to which the safety of customers could be compromised by such profiling was not considered, for example, sharing information that a woman is likely to be home alone in the evenings could create a number of unacceptable risks and vulnerabilities should bad actors access the information.

It is therefore important that the protections contained within GDPR, particularly data minimisation and data protection by design are implemented in the energy sector.

GAS NETWORK DECOMMISSIONING

March 2024

ABSTRACT

The Government and Ofgem are under pressure to address the question of decommissioning gas infrastructure on the assumption that net zero plans will make it redundant. But questions over the realistic timing of decarbonisation and the possible use of hydrogen mean gas networks could continue to be used for decades to come. Premature or poorly defined actions on decommissioning such as accelerated asset depreciation risk the financial stability of gas network operators and threaten their ability to carry out essential ongoing investment.

Kathryn Porter

Watt-Logic

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Image: lamp-lighter, London 1950
World Image Archive / Alamy Stock Photo

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Executive Summary

The UK Government has entered into a legal commitment to reduce the country's net carbon dioxide emissions to zero by 2050. There are several pathways that have been identified to achieve this goal – one alternative is to pursue widespread electrification with electricity supplied from renewable and other low carbon sources such as nuclear. Another alternative involves the use of hydrogen to displace methane, including potentially for home heating.

These alternatives require significantly different infrastructure. In the case of the former – a massive increase in electricity transmission and distribution networks will be needed, while existing gas networks would become largely redundant. The second alternative would potentially have a lower requirement for new electricity infrastructure and would enable the ongoing use of existing gas networks.

While no policy decisions have been taken to date on any role for hydrogen in decarbonisation, it is looking less likely to be the preferred approach to the decarbonisation of heating, a major source of gas demand, particularly for distribution networks. While the Government has a plan to phase out the use of gas boilers from 2035, this timetable may slip, and various forecasts suggest the use of methane will continue well into the 2040s and even past 2050, meaning gas will still be in use for another two to three decades or more. The Government has no plans in respect of what will happen to gas infrastructure if and when the use of gas is phased out. And since there is no plan, there is no funding, and no decision on how the costs will be covered and by whom.

Ofgem is considering whether it should take the lead and begin to apply some of these costs in the next price control period, however it is reluctant to act prematurely in respect of a specific consumer decommissioning charge. But it does recognise that gas assets may have shorter lives as a result of decarbonisation and is considering adjusting depreciation rates to take account of this. This would reduce the regulated asset value, and may require network operators to repay debt and cancel associated swaps to maintain debt covenants such as gearing ratios. These early repayments and cancellations may incur financial penalties, creating additional costs that must be recovered from consumers.

Reducing the asset base will make it harder for network operators to raise capital and enter into interest rate, currency and inflation derivatives. It may impact their refinancing programmes, and, given the long-dated nature of regulated utility debt (10-15 years or longer), this could become a problem almost immediately as network companies attempt to issue debt maturing after 2035. They may find it is not possible to do so, particularly in the absence of a wider decommissioning plan which would limit them to shorter tenors and risk unusually large debt maturities, with the associated refinancing risk, in the mid-2030s.

Ofgem needs to be very cautious about any changes to the price control methodology. Making such changes in respect of gas network decommissioning while there is still so much uncertainty over the timing of such decommissioning, and in the absence of a wider plan including a funding plan, risks undermining the financial resilience of network companies, raising the cost of debt, limiting the ability of gas network operators to manage financial risks, and restricting their access to capital. That would increase costs to consumers (since the costs of capital are included in network charges) and would create a risk that network companies are unable to finance ongoing network operations prior to any decommissioning.

Approaches to decarbonisation in Great Britain

In order to consider if or when the gas networks should be decommissioned, it is useful to explore the different models pertaining to ongoing use of gas in Britain in future, whether this is ongoing use of methane, biogases, a switch to hydrogen, or a combination of these.

The main models in use today are National Network ESO's ("NG ESO's") Future Energy Scenarios[1] ("FES"), and forecasts prepared by the Committee on Climate Change ("CCC") in its most recent carbon budget[2].

NG ESO Future Energy Scenarios

In its FES, NG ESO presents four possible scenarios for the future energy system. These are not forecasts, but are intended to illustrate a range of possible outcomes. These scenarios are:

Consumer Transformation: the net zero target is met in 2050 with measures that have a greater impact on consumers and is driven by higher levels of consumer engagement. Consumers will have made extensive changes to improve the energy efficiency of their homes and most of their electricity demand will be smartly controlled to provide flexibility to the system. A typical homeowner will use an electric heat pump with a low temperature heating system and an electric vehicle ("EV"). The system will have higher peak electricity demand managed with flexible technologies including energy storage, demand side response ("DSR") and smart energy management.

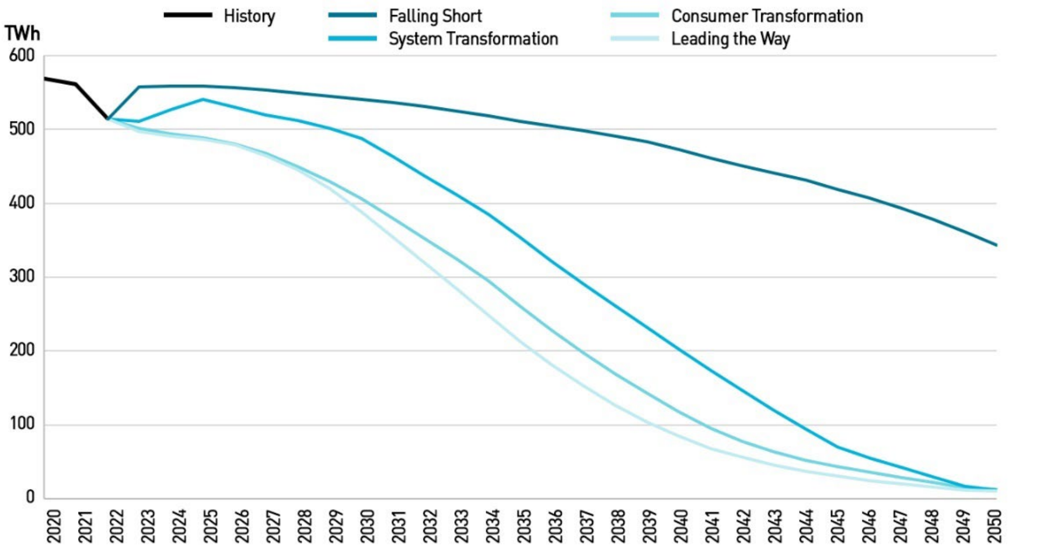
Leading the Way: the net zero target is met by 2046. NG ESO assumes that GB decarbonises rapidly with high levels of investment in world-leading decarbonisation technologies. Consumers are highly engaged in reducing and managing their own energy consumption. This scenario includes more energy efficiency improvements to drive down energy demand, with homes retrofitted with measures such as triple glazing and external wall insulation, and a steep increase in smart energy services. Hydrogen is used to decarbonise some of the most challenging areas such as certain industrial processes, produced mostly from electrolysis powered by renewable electricity.

System Transformation: the net zero target is met in 2050. The typical domestic consumer will experience less change than in Consumer Transformation as more of the significant changes in the energy system happen on the supply side. A typical consumer will use a hydrogen boiler with a mostly unchanged heating system and an electric or a fuel cell vehicle. They will have had fewer energy efficiency improvements to their homes and will be less likely to provide flexibility to the system. Total hydrogen demand is high, mostly produced from natural gas with Carbon Capture, Usage and Storage ("CCUS").

Falling Short: this scenario does not meet the net zero by 2050 target. There is still progress on decarbonisation compared to today, however it is slower than in the other scenarios. While home insulation improves, there is still heavy reliance on methane, particularly for domestic heating. EV take-up grows more slowly, displacing petrol and diesel vehicles for domestic use. Decarbonisation of other vehicles is slower still with continued reliance on diesel for heavy goods vehicles. In 2050 this scenario still has significant annual carbon emissions, short of the 2050 net zero target.

1 https://www.nationalnetworkeso.com/future-energy/future-energy-scenarios/documents
2 https://www.theccc.org.uk/publication/sixth-carbon-budget/

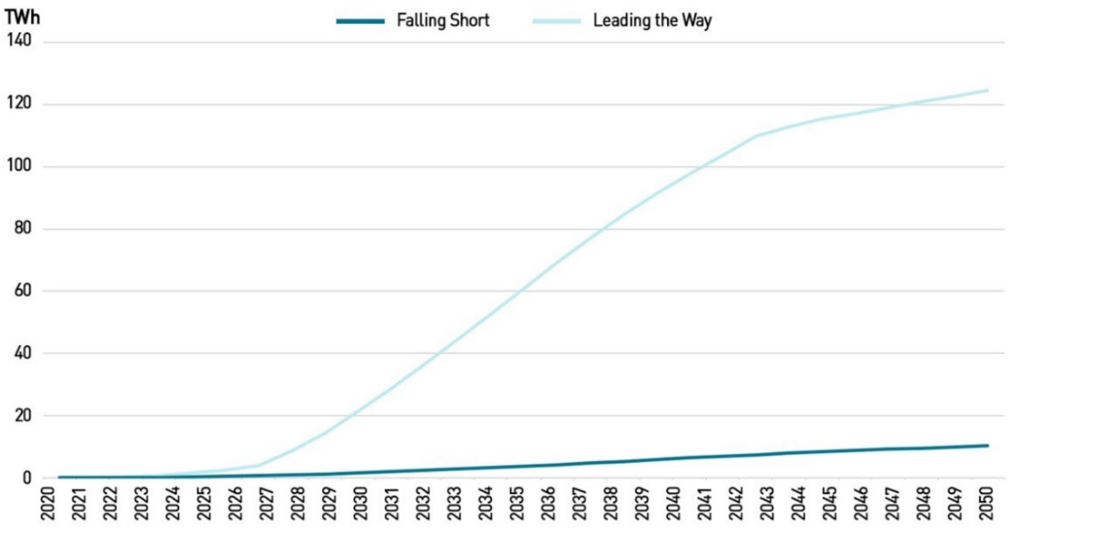
Future Energy Scenarios gas (methane) demand



Source: National Network ESO

While in most of its scenarios methane use collapses to 2050, this is not the case in the Falling Short scenario. In System Transformation there is still significant methane demand in the 2040s. Only in Leading the Way and Consumer Transformation does methane use fall significantly in the 2030s. Similarly, there is a wide range for potential hydrogen demand across the scenarios, with the highest demand in Leading the Way and minimal demand in Falling Short.

Future Energy Scenarios hydrogen demand



Source: National Network ESO

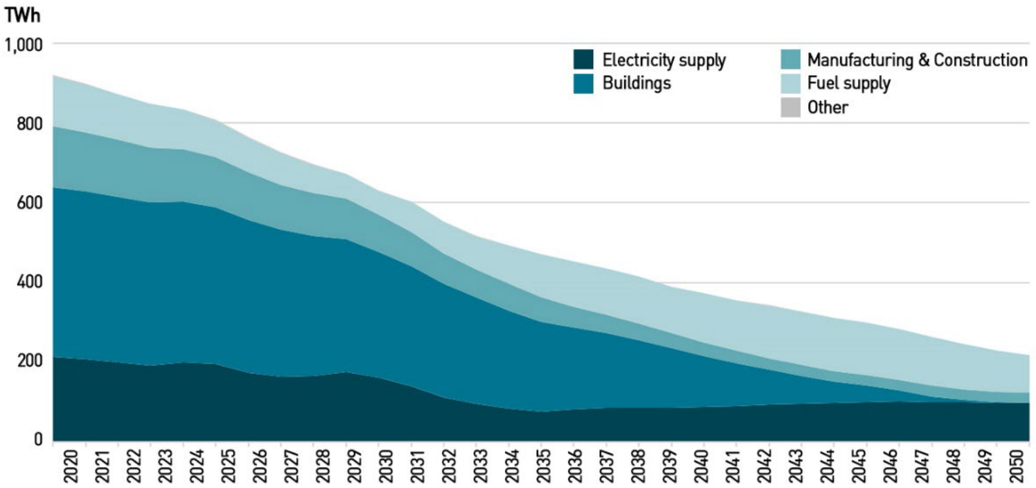
NG ESO does not assign probabilities or likelihoods to its scenarios. Previous Watt-Logic analysis[3] questions the usefulness of the FES, noting that out-turn data often fall on the edge or even outside previous FES ranges, indicating the scenarios lack predictive power.

[3] https://watt-logic.com/2023/07/19/are-the-fes-useful/

CCC Balanced Net Zero Pathway

The CCC's Balanced Net Zero Pathway suggests the economy will become significantly more energy efficient, with total energy demand falling by around 33% in end-use sectors between 2020 and 2050. The energy sector moves almost entirely from the high-carbon fuel sources to low-carbon alternatives. Methane use drops by 70% while from the 2030s a hydrogen economy develops "to a scale that is comparable to existing electricity use by 2050".

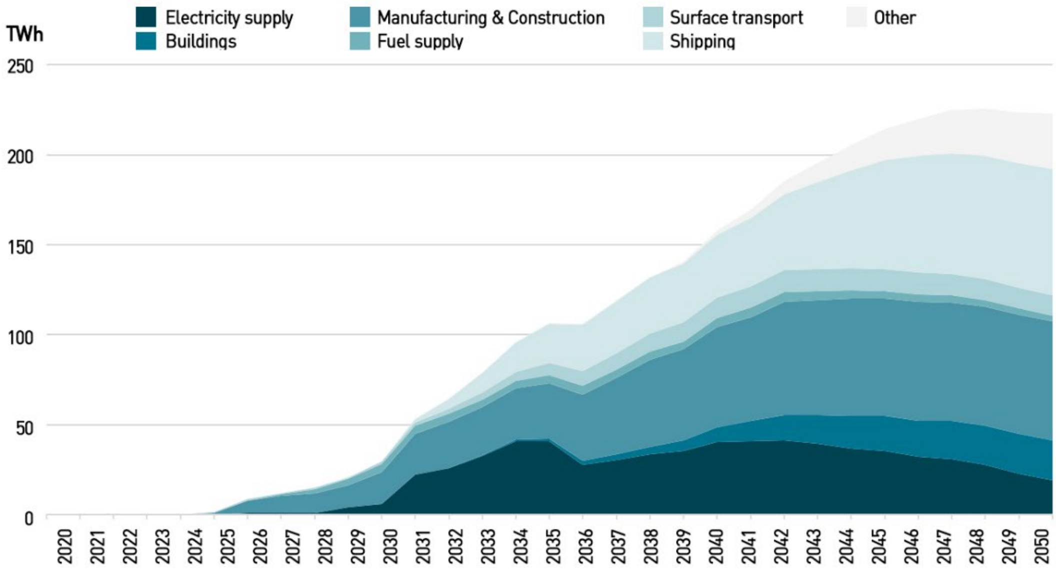
Gas (methane) demand in the Balanced Net Zero Pathway



Source: Climate Change Committee

However, while methane use declines, it does not disappear, and remains significant in the power sector in 2050, according to CCC projections. While the Sixth Carbon Budget refers to industrial hydrogen being supplied over private pipelines, it is unclear how the rest of the hydrogen and natural gas projections correspond in terms of infrastructure.

Hydrogen demand in the Balanced Net Zero Pathway



Source: Climate Change Committee

Both methane and hydrogen are used in the power sector for example – but it is unclear if the CCC envisages separate pipeline networks, perhaps on geographic lines, blending, or something else. The CCC references fewer customers using the gas network, but does not reconcile this with possible hydrogen use. It is clear that even in 2050, the CCC expects significant amounts of gas, in one form or another, to be in use, requiring some kind of pipeline delivery. And since the CCC is less confident[4] that the Fifth and Sixth Carbon Budgets will be met, this gas use is likely to be even higher.

While NG ESO outlines possible future system profiles in the FES, the CCC provides a pathway to achieving net zero targets. Although in the FES, methane use falls to minimal levels in three of the four scenarios, this does not correspond to the CCC expectations of methane use in 2050, which is higher. Arguably, the FES Falling Short scenario is more likely to reflect reality, as reflected by the lack of alignment between historic FES expectations and actual market behaviours. The FES also show some methane demand being replaced with hydrogen, suggesting an ongoing requirement for gas infrastructure.

Ofgem is considering developing planning scenarios as part of its price control process[5] (see later), with the options being the FES Leading the Way and Falling Short scenarios. While Leading the Way is being considered for electricity network operators, Ofgem is inclined to use a more conservative approach for gas networks and is consulting on the use of the Falling Short Scenario. In a policy working group[6], Ofgem sought stakeholder views on scenario planning – one stakeholder expressed that the Falling Short is the most credible scenario, with its higher overall gas demand than the three net zero compliant pathways. On this basis, investment in gas networks will also be required for some time, so gas network planning based on a net zero complaint scenario could result in significant underinvestment, risking system resilience.

This stakeholder expressed a view that the projections for offshore wind in the net zero compliant scenarios are not credible – this is likely true based on the total failure of AR5 and the partial failure of AR4, and the wider issues with cost inflation and turbine manufacturer losses. Should the amount of offshore wind be lower than expected, this would necessitate more gas-fired electricity generation which is one of the key assumptions underpinning the higher medium term gas demand in the Falling Short scenario.

This makes sense and it is positive that Ofgem is considering the Falling Short scenario for its gas network planning, at least in the near term, since this is the most likely to reflect reality.

[4] https://www.theccc.org.uk/publication/2023-progress-report-to-parliament/
[5] https://www.ofgem.gov.uk/sites/default/files/2023-12/RIIO-3%20SSMC%20Overview%20Document.pdf
[6] Referenced in the RIIO-3 Sector Specific Methodology Consultation - Overview Document

National Infrastructure Committee's Second National Infrastructure Assessment

In its Second National Infrastructure Assessment[7], the National Infrastructure Committee ("NIC") has taken a different approach to NG ESO and the CCC. In the NIC's view, the only credible approach to the decarbonisation of heating is electrification, and says that the "Government also needs a plan for phasing out the use of fossil fuels which addresses how the gas network will be decommissioned."

However, it also advocates for hydrogen as well as methane with carbon capture and storage for power generation, although it should be noted that the technology for generating electricity from methane fitted with carbon capture technology has yet to be demonstrated, and the handful of power-CCS projects with coal-fired generation cost more and captured less carbon dioxide than was hoped, and have largely closed. This suggests that while NIC believes the gas distribution system should be decommissioned, it would not be possible to decommission the gas transmission system due to the requirement to support power generation, although it should be noted that some combined cycle gas power stations are connected to distribution networks and not the transmission system.

While the NIC notes that France reduced the use of natural gas for domestic heating, it fails to mention that French electricity demand is highly temperature sensitive as a result, and France is typically forced to import electricity during cold weather. It is able to do so because its neighbours primarily have gas-based heating and therefore do not see such steep increases in electricity demand during cold snaps.

The dynamics of cross border trading if countries share similar demand profiles, and in particular similar generation mixes presents risks to energy security. GB, in common with much of Europe, is following a wind-led energy transition, but as cold weather is often characterised by low wind output, there is a real risk of electricity shortages if capacity is not managed appropriately. Widespread switching to electric heating will magnify these risks.

The NIC recommends that Government should plan for the end of the use of natural gas (methane) for heat by:

- banning new connections to the gas network from 2025;
- regulating, by 2025, to end the use of fossil fuel heating in commercial buildings over 1,000m^2 by 2035;
- ending the sale of all new fossil fuel boilers in 2035;
- making provisions for the process of disconnecting customers and decommissioning, or repurposing, the gas network;
- establishing a mechanism for local democratic input into decommissioning plans;
- working with Ofgem and the Health and Safety Executive on a plan to ensure the switch is safe and efficient and that consumers in vulnerable circumstances are protected.

The UK Government is currently consulting on its Future Homes and Buildings Standards[8] which will require all new homes to be "zero carbon ready" by 2025. This consultation runs until 6 March 2024 and with the intention that the new rules would be implemented this year and applicable from next year. These rules mean it would be difficult if not impossible for any methane-based heating system

[7] https://nic.org.uk/studies-reports/national-infrastructure-assessment/second-nia/
[8] https://www.gov.uk/government/consultations/the-future-homes-and-buildings-standards-2023-consultation

to be implemented in a new home from 2025, including hybrid systems. However, existing gas boilers would not be phased out until 2035.

The Government recognises that a move towards air source heat pumps will mean the fabric of buildings needs to be of a higher standard if comfort levels are to be equivalent to those achieved with gas boilers, and that “whilst higher standards will increase comfort and reduce bills, there will be a commensurate increase in build costs to achieve these higher standards” – ie the cost of new homes will increase.

The NIC also recognises cost implications, saying that in order for consumers not to be worse off under its proposals, the prices of gas and electricity would need to be “re-balanced” and “the price of gas would need to be kept higher than would otherwise be the case”. This implicitly recognises that consumers would be worse off under its proposals. The fuel poor would be particularly affected.

These plans indicate that gas distribution networks will need to be maintained in their current form until the mid-2030s, however there are real questions over public acceptance and the commitment to these deadlines – the gas phase-out was initially mooted to be 2025 and has already been pushed back by a decade, and recent polling[9] suggests widespread public opposition to a forced move away from the use of methane for heating. This could yet derail the Government’s plans, since as the deadline approaches and costs for the consumer become imminent, public opposition may grow to a degree that forces another delay or even a more radical change of approach.

Image: The Fens gas pipeline being lifted by a row of Caterpillar 583 pipelayers. Work on laying the Fens gas pipeline started in June 1967. Over 600 men worked on the project to lay 36 inch diameter steel pipes which crossed four rivers and numerous dykes and ditches. (Heritage Image Partnership Ltd / Alamy Stock Photo)

9 https://www.telegraph.co.uk/news/2024/01/14/rishi-sunak-backlash-net-zero-tory-voters-heat-pumps-petrol/

Box: The myth of gas and electricity price "re-balancing"

There has been a belief among policy-makers and some parts of the industry as well as the wider public that electricity prices are artificially high since they are based on the price of gas – the marginal generation fuel. However, this is to mis-understand the fundamental economics of the electricity system.

The reason many believe that electricity prices could be lower if the costs of gas were excluded is because the price of renewable generation is artificially low. Many of the costs of renewable generation are borne, not by the generator, but by the consumer: subsidy costs are socialised, but so too are the costs of intermittency (higher balancing costs and the Capacity Market costs) and the additional network connections required to connect this new, geographically dispersed, generation.

When intermittent renewable generation is built, it is necessary to build or maintain a similar amount of alternative capacity, in the form of dispatchable generation or electricity storage in order to deliver electricity at times when wind and solar output are low (noting there is no solar contribution at all during peak winter hours since these occur after sunset). Self-evidently, this makes the true cost of renewable generation ***to the consumer*** higher than would otherwise be the case. The fact that wholesale prices for renewable generation, reflecting their near-zero short-run marginal cost ("SRMC"), would be very low is irrelevant since the additional costs are charged to consumers through other means for renewable generation in a way that is not the case for conventional thermal and nuclear generation.

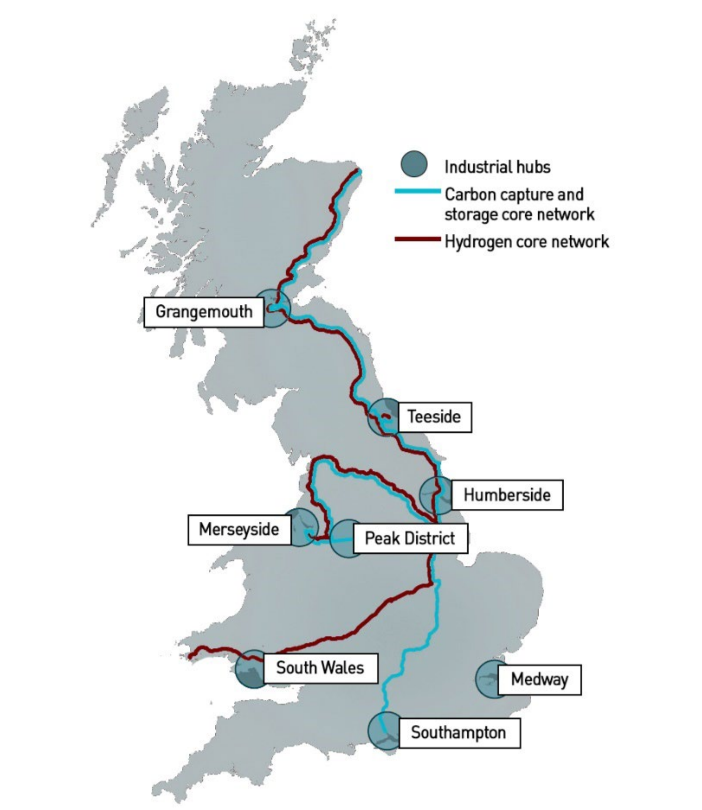
In addition, renewable generators do not receive an electricity price linked to their SRMC, they receive the strike price under the Contracts for Difference scheme. Indeed were they to receive a price linked to their SRMC, they would likely never be able to recover their capital costs through the sale of electricity, rendering the economics of the sector unworkable.

For this reason, talk of "re-balancing" gas and electricity prices lacks economic sense. Electricity prices may become independent of gas prices, but this does not necessarily mean they will be cheaper. It is likely that end-user costs would be higher due to the doubling of capacity required to manage intermittency.

In September 2023, the Daily Telegraph published an article[10] saying a leaked draft of the NIC report indicated that decommissioning the gas network would cost £65 billion. The final report did not include any cost estimate for decommissioning any parts of the gas network. While the NIC did not deny the claimed figures when approached for comment, a Government spokesperson did, saying: "This claim is simply untrue. Our gas network will always be part of our energy system and therefore any such estimations are wrong."

[10] https://www.telegraph.co.uk/business/2023/09/09/household-energy-bills-britain-gas-network-shut-down-net-zero/

Proposed hydrogen and carbon dioxide pipelines



Source: National Infrastructure Committee

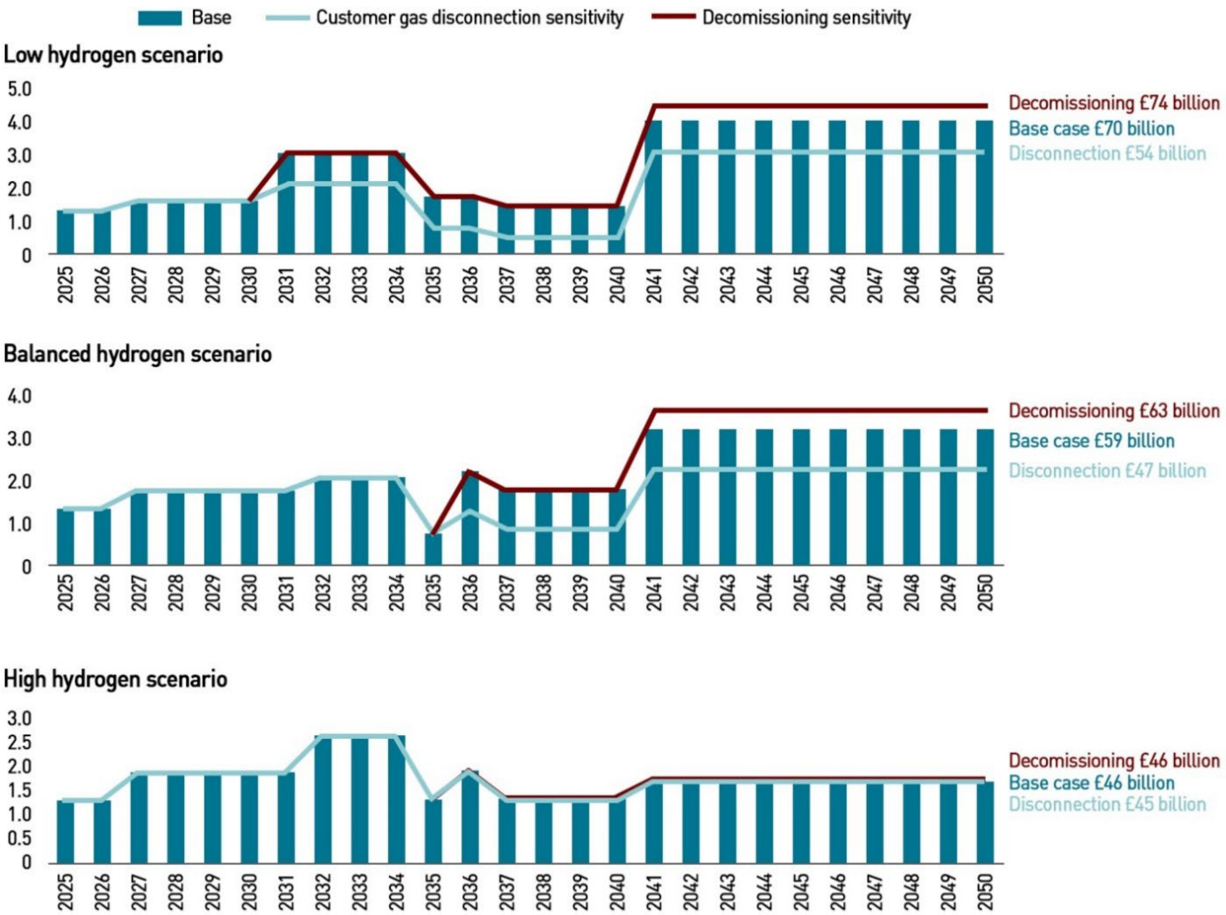
The NIC also recommends construction of hydrogen and carbon dioxide pipelines to facilitate CCUS – there could be potential for re-using some elements of the existing gas network in this regard, although that is not mentioned in the report. Indeed, the core hydrogen network recommended by the NIC extends from Grangemouth and North East Scotland, through Teesside, Humberside and Merseyside to South Wales with carbon dioxide pipelines omitting South Wales and reaching Southampton instead. The NIC estimates the cost of building the core networks it recommends will be in the range of £12-22 billion.

In October 2023, Arup produced a report[11] commissioned by the NIC and Ofgem to examine the costs associated with the future of Britain's gas networks, including decommissioning, which it estimated to be between £17 billion and £25 billion, but could be as high as £74 billion due to the uncertainties involved with the calculations. Arup looked at a high hydrogen scenario based on NG ESO's System Transformation scenario, a "balanced" hydrogen scenario, based on the NG ESO's Leading the Way scenario, and a low hydrogen scenario based on the NG ESO Customer Transformation scenario. There was a high degree of uncertainty over decommissioning costs across all scenarios, with the value of the uncertainty being very material in all but the high hydrogen scenario (since this would require the lowest amount of decommissioning).

[11] https://nic.org.uk/app/uploads/Arup-Future-of-UK-Gas-Networks-18-October-2023.pdf

It should be noted that the Arup analysis excluded any remuneration of the gas networks for the existing regulated asset value, as well as the wider costs of winding down the networks such as pension liabilities etc. Including these would substantially increase gas network decommissioning costs.

Annual gas network transition-related capital expenditure (£ billions)



Source: Arup

The NIC is not alone in calling for a decommissioning plan for Britain's gas network – in August 2023, The Regulatory Assistance Project ("RAP"), a clean energy NGO, published its own report[12] into the future of the UK gas network, suggesting that if plans for the decarbonisation of heating by 2050 are successful, there is a "high likelihood" of stranded UK gas network assets. There would also be costs associated with physical disconnection of buildings and decommissioning the gas network. Since these costs would ultimately be the responsibility of consumers, RAP proposes three options for the UK Government to manage these issues:

- Business-as-usual wind-down with accelerated depreciation and the potential for a decommissioning fund;
- Evolutionary regulation to encourage gas networks into clean heating;
- Nationalisation with planned wind-down.

[12] https://www.raponline.org/wp-content/uploads/2023/08/2023-08_decomissioning_gas_FINAL.pdf

The report points out that there will be significant costs associated with the physical decommissioning of the gas network, but there is currently no funding set aside to cover these costs. It also points out since over half of UK gas demand outside the power sector goes to households, with the vast majority of gas meters being associated with households and small businesses, the gas distribution network is "fundamentally a heating asset". This means that if gas, whether in the form of methane or hydrogen is no longer used for heating, the gas network, particularly the distribution network, would become redundant. However, it says that the use of hydrogen for heating has been "comprehensively debunked". In addition, as the use of gas for heating declines, fewer customers would bear the cost of operating and maintaining the gas infrastructure, meaning the costs per customer would rise, potentially significantly, becoming unaffordable.

These arguments presuppose that decarbonisation targets will be met. Recent experience suggests public resistance to the costs of the energy transition, and an unwillingness on the part of politicians to force the issue. There is therefore significant uncertainty over the timing of any decline in the use of the gas network.

There is widespread resistance among policy-makers, and others around the question of hybrid heating systems due to a desire to decarbonise in one step. However this is unlikely to be realistic, particularly for existing building stock. The main reason for this is the cold weather performance of air source heat pumps, the primary, and apparently preferred approach to the decarbonisation of heating. In cold weather, energy must be used to warm the external heat pump equipment in order for it to function. This means less energy is available for indoor heating, reducing the efficiency of the equipment. In addition, heat pumps provide low grade heat, meaning that larger surface areas for radiators are needed to maintain the same warmth levels. It also means that poorly insulated buildings will struggle to achieve desired warmth.

Heat pump proponents argue that newer models have better cold weather performance, however there is still an efficiency deficit. They also say that in cold countries such as the Nordic nations, heat pumps are widely used, and homes are satisfactorily warm. However, not only are many of these homes better insulated than those in Britain, it is common for Nordic houses to have secondary heating, either in the form of an additional heat pump, or wood-burning stoves – a 2019 study found 83% of Norwegians surveyed regularly used wood stoves in winter[13], in part because it is seen as a means of reducing electricity demand, and its associated costs[14]. Collecting wood from the local area for use in stoves is commonplace for rural Scandinavian communities. Efforts to restrict the use of wood for heating in Sweden in 2017 resulted in widespread protests[15].

This suggests that the costs of decarbonising heat satisfactorily in Britain using heat pumps will be higher than currently anticipated, with householders being required to invest in more than one heat source as well as making improvements to the fabric of buildings. These higher costs make public resistance to the project even more likely. One solution to this problem would be the use of hybrid systems, where methane-fired boilers supplement heat pumps in cold weather. This would greatly reduce the emissions associated with heating, and would make it easier for people to achieve warm homes at the same time.

[13] https://uis.brage.unit.no/uis-xmlui/bitstream/handle/11250/2680995/Peteranderson_Michal.pdf?sequence=1
[14] https://iopscience.iop.org/article/10.1088/1755-1315/352/1/012022/pdf
[15] https://www.sciencedirect.com/science/article/pii/S0301421522002427

Impact of gas grid decommissioning on network operator income

What is RIIO?

Gas and electricity transmission and distribution networks operate as monopolies. For this reason, they are subject to price controls and are prohibited from owning generation or storage assets and are not allowed to sell to end consumers in the same region as their network. Under the price control Revenues are linked to Incentives, Innovation and Outputs ("RIIO"). RIIO was introduced in 2010[16], replacing the previous RPI-X model, based on Ofgem's belief that this approach would better incentivise network operators to deliver the investments necessary to meet decarbonisation objectives. Ofgem believed this would require a doubling of the rate of investment seen over the previous 20 years, and that the focus would move away from a purely efficiency-driven approach to one that would encourage investment and innovation while also protecting consumers from un-necessary costs.

Network companies now have to meet performance targets and are penalised for being inefficient. For example, if a network firm delivers a project under budget it gets to keep some of that saving as extra revenue, and consumers also gain as the development costs less to build. Similarly, the firm's revenues fall if a project costs more to deliver than expected.

The current price control period, RIIO-2, runs from April 2021 to March 2026, and Ofgem has begun to work on RIIO-3. One of the considerations was whether to roll over the current price controls for an additional two years for gas distribution networks, beginning the next proper price control in 2028, given "the existing uncertainties impacting the sector and future developments for gas networks". Last summer it published an open letter[17] indicating its decision not to do this, and to begin the next gas price control from 2026 as normal, saying that it is unlikely there will be any significant de-energising of the gas networks before the early 2030s (ie corresponding to the end of the normal 5-year RIIO-3 period).

[16] https://www.ofgem.gov.uk/sites/default/files/docs/2010/10/re-wiringbritainfs.pdf
[17] https://www.ofgem.gov.uk/publications/open-letter-decision-future-gas-price-controls

How are revenues earned under RIIO?

Under RIIO, network operators earn revenues based on outputs which fall into three categories:

1. Meeting the needs of consumers and network users;
2. Maintaining a safe and resilient network; and
3. Delivering an environmentally sustainable network.

Ofgem determines the efficient level of expected costs necessary to deliver the output which is known as the total allowable expenditure ("totex") which is the sum of controllable operating expenditure ("opex"), capital expenditure ("capex") and replacement expenditure ("repex"). Where there is under- or over-spend against the allowed totex the difference is shared between the network operators and its customers through an adjustment to revenues in future years. This incentivises the network company to provide the outputs as efficiently as possible to retain around 50% of any totex savings.

RIIO totex costs are split between "fast" and "slow" money. Fast money represents totex which the company can recover in the year in which the cost is incurred, while slow money is added to its regulated asset value ("RAV"). In addition to fast money, the network company can recover a portion of the RAV (regulatory depreciation) each year, and a return on the outstanding RAV balance. As the RAV increases, this portion of a network company's income increases, and vice versa as the RAV falls.

To date, the regulatory depreciation calculation for UK gas distribution networks has been 45 years using a sum of digits depreciation methodology for assets added since 2002.

Gas distribution RAV

The regulated asset value of gas network assets is expected to be £26 billion[18] through to the end of RIIO-2 and the beginning of RIIO-3, with illustrative depreciation cost modelling[19] suggesting it may drop to £20 billion by the end of RIIO-3, and to £3 billion in 2050 (in 2018/19 prices) if all capital investment in gas networks were to end immediately. It is currently assumed that regulatory/ financial asset lives are 45 years, although new pipes may last for more than 100 years.

The size of the asset base of a regulated utility drives both the size of revenues it can earn, as described above and the amounts it can borrow. It is common for network operators to have financial conditions in their debt finance under which an event of default would occur if net debt was equal to or greater than some ratio, for example 70% of the RAV.

Regulated utilities such as gas networks typically issue long-dated debt (10-15 years or even longer), and will often also enter into interest rate swaps to manage their interest rate risks, partly in recognition of the cost of debt approach used in the RIIO methodology, and cross currency swaps where the debt is issued in a currency other than Sterling. Since the returns allowed to network operators under RIIO are linked to the 17 year trailing average of the iBoxx Utilities 10 yr+ index[20], they may well swap fixed rate debt into a floating rate exposure and then overlay a portfolio of interest rate swaps to fix the effective interest rate over different tenors, which allows them to mirror the iBoxx rate more accurately than they could through a static fixed rate debt portfolio. This also allows network companies to issue longer-dated debt which better matches the lives of their assets. They also often enter into long-dated inflation linked swaps to hedge part of their inflation exposure.

[18] https://www.ofgem.gov.uk/sites/default/files/2023-12/RIIO-3%20SSMC%20Finance%20Annex.pdf
[19] https://www.ofgem.gov.uk/sites/default/files/2024-01/Illustrative%20Depreciation%20Costs.xlsx
[20] https://www.ofgem.gov.uk/sites/default/files/2022-11/RIIO-ED2%20Final%20Determinations%20Finance%20Annex.pdf

These cross currency and longer dated interest rate swaps are generally ranked *pari passu* with the senior debt, and have similar maturities to the corresponding debt instrument. Debt is typically refinanced prior to maturity through the issuance of new debt, whose proceeds are used in part to repay debt which is close to expiry. Swap portfolios will typically be remoulded at the same time.

The question of gas network decommissioning presents various challenges under a regulated asset base approach since it assumes shrinkage of the asset base, while at the same time having a high cost which must be financed. The estimate attributed to the NIC noted above is more than three times the RAV. Specifically, the problems are:

(i) Decline in long term revenues due to the reduced regulatory asset value;

(ii) Reduction in the ability of gas network companies to borrow, and a requirement to repay debt early in order to ensure gearing remains below the level specified in the debt agreements;

- these early debt repayments may trigger early repayment penalties, and cancellation of the associated swaps would incur tear-up payments. These could be especially punitive in the case of inflation swaps, particularly in light of recent increases in the rates of inflation;
- these additional costs would need to be recovered from consumers, not least because Ofgem has indicated that it expects network operators to pay down debt as RAV declines, so any additional costs for doing so as a result of accelerated depreciation would require compensation;

(iii) Likely difficulties in entering into future interest rate, currency and inflation hedging. As there is an established secondary market for the trading of public debt, but no liquid equivalent for derivatives, hedge providers tend to be more sensitive to changes in the creditworthiness of counterparties – gas network operators would likely encounter difficulties with maintaining their swaps portfolios before borrowing became affected by the reduction in RAV and the impact of decommissioning.

Recovering the costs of decommissioning gas networks

Network companies raise capital on the basis of their regulated income streams and the strength of their asset base. Decommissioning by definition involves a reduction in the asset base and therefore a reduction both in income and the ability of gas network operators to raise capital and hedge associated interest rate and currency risks. There are two further challenges. The first is how the decommissioning costs will be met and by whom. The second is whether the expected reduction in the asset base will be reflected in the price controls.

The normal approach to raising capital to finance capital investments would not apply in the case of network decommissioning since there is an implicit reduction in both assets and income which form the normal basis for raising capital. This means there would have to be some other means of providing the funding. There is some speculation that these costs could be met through general taxation and funds transferred to the network operators, or even through re-nationalisation prior to decommissioning. Alternatively, the costs could be recovered from consumers through some form of network charging which could potentially be securitised to provide the necessary capital. However, there are some difficulties with this approach since the customer base would progressively shrink as the decommissioning progresses, placing the cost burden on an ever small number of customers.

There are also questions over equity – should people who live in homes built after 2025 which are not connected to the gas network be exempt from contributing to the costs of decommissioning the network? Should people who elect to move away from gas heating prior to decommissioning be able to opt out of paying such costs? In its RIIO-3 methodology document, Ofgem poses some of these questions, including whether some of the costs should be front-loaded into the RIIO-3 price control so that more consumers are exposed to contributing. But this has risks if, for example, decommissioning is delayed, and it may be unfair to exclude people not currently connected to the gas network from costs which are arguably a social good – they may not be connected to the network, but perhaps they do drive on roads which may collapse if gas pipes which run beneath them are not properly decommissioned. In other words, they still benefit from the process despite not being a gas consumer at the time the decommissioning charges are levied.

Of all the cost recovery options, Ofgem does not appear to consider that customers other than gas customers should pay for gas network decommissioning – there is an argument for applying the charges to electricity bills on the basis that unless they are recovered through taxation, this is a more equitable reflection of the wider social benefits of decommissioning properly (as and when any decommissioning takes places it will be important that it is done correctly to ensure that collapsing pipes do not undermine other infrastructure such as roads and buildings). However, this would require a change in law to allow for such cross-subsidisation.

To avoid imposing costs on existing customers which are higher than necessary, and given the policy uncertainty surrounding these questions, Ofgem is proposing to restrict itself to adjustments to the rates of depreciation and asset lives reflecting updated assumptions on the future of gas assets. This will accelerate the reduction in RAV and long-term revenues, while increasing network operator income in the near term. It will also bring forward the need for debt repayment in order to maintain gearing ratios, with the increase in income due to the accelerated depreciation being used for this debt repayment. It may also trigger early termination of derivatives contracts as these companies may have restrictive covenants in their bonds or internal policies prohibiting over-hedging (which may result in a speculative position since it creates an exposure which is not hedged).

Since there is very little secondary trading of derivatives, banks are typically more rigorous in their financial and other covenants for swaps than for public debt since there is a liquid secondary market for trading debt. The derivatives market will likely be the canary in the coal mine, signalling a change in creditor sentiment towards the sector.

Ofgem is currently consulting on this approach, and it is likely that gas companies will be making strong representations in relation to the impact such a change would have on their finances and ability to manage risk.

Impact of network decommissioning policy on investor sentiment

The markets will become increasingly concerned about the equity and credit stories of gas network operators in respect of both possible gas network decommissioning and Ofgem's potentially premature approach to addressing this prospect. It is important to recognise, and to communicate with debt and equity investors, that gas network decommissioning is uncertain – gas networks may still be required for decades to come depending on the pace of decarbonisation and any switch to hydrogen or even carbon dioxide (although that is probably less relevant for distribution networks) which may mean any decommissioning is limited in scope.

While current government policy suggests the use of methane for heating will be phased out in the mid-2030s, this timing could be optimistic. Experience to date suggests that as costs become imminent, they are delayed, so while the use of hydrogen for heating at this point seems unlikely, the use of methane may well extend into the 2040s for heating and far beyond that in the power sector and possibly some parts of industry. Indeed, in the power sector it may never be worthwhile to fully migrate away from fossil fuels, although if use drops below a level at which maintenance of gas infrastructure becomes onerous, any remaining gas-fired power stations could potentially switch to fuel oil which could be stored on site. It is likely that it will never be cost effective to fully remove fossil fuel generation once the network is mostly decarbonised, since it would only run for very brief periods, making the cost-benefit difficult to justify in that the climate impact of very low utilisation would be too small to justify the very high costs of alternative solutions.

Gas network operators not only face the risk that the gas networks may at some point be decommissioned – and this is something investors will understand - they also face the risk that pre-emptive and arguably premature actions by Ofgem could cause a deterioration in their financial stability at a time when they still need to maintain and operate these networks. If investors become concerned about Ofgem's approach, they will see the sector as being more risky, thereby raising the cost of capital, something which would have to be paid for by consumers. This would also limit the ability of network operators to raise capital, may worsen the terms on which capital is raised (eg lower gearing ratios) and make it harder to enter into financial derivatives for risk management.

There could also be a contraction in the types of capital markets network companies are able to access both in terms of investors should credit ratings deteriorate (which would prevent some investors from holding their debt) and it could reduce appetite from overseas pools of capital such as US, Asian or even European investors who may be unwilling to get to grips with a new regulatory regime which they view as transient. If they decide that gas networks are in fundamental decline they may simply opt to focus on other sectors with better long-term prospects. A reduced ability to manage financial risks would further increase the cost of capital. This may force network companies to migrate solely to the bank market for debt and swaps.

Ofgem is concerned that consumers are not left paying more than is justified, and it has determined that starting to charge them now for potential future gas network decommissioning would be inappropriate, but if it causes the cost of capital to increase, and access to capital to be restricted, they will end up paying more anyway. Consumers would also be exposed to costs if network operators became unable to finance ongoing investments in network infrastructure prior to decommissioning as a result of changes in the regulatory regime.

These challenges will arise much sooner than the middle of the 2030s because of the timetable on which network companies refinance their debt. Even now, a network company trying to refinance debt with a 15-year maturity is likely to face an increased risk premium compared with what would otherwise be the case, due to the uncertainty around the timing of the decarbonisation of heating and possible gas network decommissioning. This could even see network companies having to limit themselves to maturity dates before 2035, potentially creating an imbalanced maturity profile with larger than normal repayment dates around that time. Given the expectation that gas networks will continue to be in use into the 2040s and possibly the 2050s and beyond, this could severely constrain network companies in financing their normal continuing operations. While bond markets might have a higher risk appetite, the swaps markets may not, with debt structures becoming sub-optimal based on hedging-specific constraints.

While Ofgem may think gas network decommissioning is a post RIIO-3 issue, if it introduces accelerated depreciation in RIIO-3 that could have a dramatic and immediate impact on the ability of network operators to raise finance and manage risk, potentially derailing the entire financial model for the sector.

Conclusions

The Government has ambitious net zero plans which rely on decarbonisation of heating, transport and the power system. The transport sector is largely irrelevant as far as methane is concerned although there may be some applications in respect of hydrogen. What is not speculative is that gas infrastructure for the ongoing use of methane will be required for at least the next decade. The big unknown is what will happen beyond that.

While Ofgem is not responsible for energy policy, it does now have duties in respect of net zero delivery. This places the regulator in a difficult position – it needs to structure market rules which encourage decarbonisation but it must also ensure that consumers are not exposed to undue costs, including those which may arise as a result of a lack (or perceived lack) of resilience. If Ofgem fails to act in relation to gas network decommissioning it risks breaching its net zero duties, but if it acts inappropriately or prematurely, it risks destabilising the entire financial model for gas network operators.

On the one hand current Government policy and a desire to move away from the use of methane certainly has implications for the life of network assets and the way that RAV should be viewed. Ofgem also uses NG ESO FES quite extensively despite the fact they are explicitly not forecasts, and this may lead it to a belief that gas networks may become redundant earlier than may actually be the case. On the other hand, the Government may decide to deal with issues relating to gas network decommissioning through the tax system or even by nationalising the networks, taking them outside the price control framework altogether.

Ofgem needs to weigh these risks. However, while the risks of failing to meet net zero targets may be serious, they are ultimately not Ofgem's responsibility. For example, the government may decide to change its net zero targets, and in particular the target dates for phasing out the use of methane in domestic heating. Electrification of heating will require not insignificant sacrifices on the part of consumers, many of whom will need to finance not only heat pumps but also extensive upgrades to their properties to ensure they are sufficiently well insulated to maintain comfort levels. This will be expensive and disruptive, and may prompt changes in the timetable.

However, premature regulation to pre-empt gas network decommissioning whether that is in the form of customer charges, accelerated depreciation or other approaches, risks destabilising the financial model for gas network operators, undermining their ability to enter into risk management transactions and limiting their ability to raise capital. And this could start to be the case almost immediately as network companies attempt to issue debt with maturities beyond 2035. Network companies are also likely to have to repay debt early in order to maintain gearing ratios. Premature regulatory action risks making network operators prematurely uninvestable, ie before the time when the assets they manage become redundant, meaning they are less able to maintain them and carry out upgrades necessary for maintaining service levels.

The conclusion must be that prior to taking any action in relation to the value or lifetime of regulated gas network assets, Ofgem and/or the Government should set out the principles behind gas network decommissioning and how it will be financed. A piecemeal approach risks significant adverse unintended consequences which will potentially be very detrimental to consumers as gas network costs become more expensive but the networks themselves become less reliable.

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