

## Looking through the FOG- Future of Gas Networks

### GB gas network decline and stranding - why a policy and regulatory dialogue must start with RIIO-3

Maxine Frerk and Judith Ward

#### **Gas network decline : a policy and regulatory challenge**

There is still significant uncertainty around the decarbonisation of heat but under any scenario it seems inevitable that gas networks will play a smaller role than today. Government has committed to clarify thinking on household heat by 2026. Meanwhile, the National Infrastructure Commission is advocating against the use of hydrogen for household heat, or in other buildings<sup>1</sup>. Even if hydrogen is shown to be a viable domestic heat solution in particular areas, we can expect a strong stress on electrification, growth of heat networks and a patchwork of heat solutions- with far-reaching consequences for the GB gas networks.

This Viewpoint is focused on questions for policy and regulation of gas network decline: customer disconnections from the gas network, possible network stranding and eventual decommissioning. Most of the costs in owning and running a gas network (investment, operational) are around ensuring safety. While there is gas in the pipes, this must remain the over-arching priority. But with costs set to be spread over a declining gas-customer base there could be relatively significant near-term bill impacts, with the potential for the most vulnerable to be hit hardest. While this challenge is widely acknowledged, there has so far been little considered debate around what this means at a practical level for future policy and regulation of the GB gas networks, for their investors and, above all, for customers.

The proposal for the independent FSO (Future System Operator) to produce a long-term cross-vector network plan, potentially to undertake spatial energy planning, and to produce cross-vector regional system plans – and how these plans will intersect in practice with all of the energy networks and local communities- still needs far more definition. What is clear however is that future gas network decommissioning must be a very carefully managed process. Even if this is only in certain geographic areas or as yet some way off, thinking must start now to inform near-term decisions around investment, regulatory approaches, network cost-recovery and consequences for consumers.

#### **Policy and regulatory approaches to gas stranding: work to date**

In 2016 Frontier Economics produced a paper on Future Regulation of the UK Gas Grid for the CCC<sup>2</sup> that started to explore these questions, with the aid of some high-level modelling. While it concluded that under some scenarios the impacts would be manageable, it highlighted that under a low gas scenario with costs being recovered over a dwindling customer-base there were increased stranding risks. It argued for Ofgem to identify a clear approach to allocating stranding risk between customers and companies and for more work to be done on the practicalities of de-commissioning.

In GD2 (2021-26) Ofgem applied a simple rule-of-thumb for investment appraisal, requiring a payback by 2036 for any new investment but at the same time continued to use a 45-year (front-loaded) asset life for depreciation. In their appeals to the Competition and Markets Authority (CMA), the gas distribution networks (GDNs) argued for a higher cost of capital because of the stranding risks but the CMA concluded that the right approach would (in principle) be to reduce asset lives.

In October 2023, in their decision on Frameworks for Future Systems and Network Regulation<sup>3</sup>, on addressing uncertainty in the gas sector, Ofgem reiterate that:

*“we noted stakeholder concerns about increased risk to the longer-term life of the gas networks given likely longer-term decline in their use and suggested two principle ways of mitigating this risk: through the choice of depreciation rates and regulatory asset lives; and through price control reopeners. We will consider carefully how prices and charges should be set for gas infrastructure in RII0-3 and beyond, ensuring both efficiency in future spending but also fairness in how different generations of gas customers pay for the sunk costs of historical investment in the gas grid...”*

Richard Lowes very helpful recent paper for RAP<sup>4</sup> articulates the issues around asset stranding at a high-level with a number of suggestions on next-steps for government and regulators (Ofgem, HSE). It argues for greater consideration of the issues of decommissioning, continued capital investment and the role of local area planning in gas network decision-making. It also presents three high level options around how the risks might be better managed covering BAU (with a potential decommissioning fund), regulation to encourage gas networks into clean heating, or nationalisation with a planned wind down.

The recent paper by Arup<sup>5</sup> on the Future of the GB Gas Networks, jointly commissioned by the National Infrastructure Commission (NIC) and Ofgem, is a comprehensive technical study to model the potential costs - capital and decommissioning - for the GB gas networks of three 2050 scenarios for a hydrogen-transition – high, balanced and low. In particular, the low scenario<sup>6</sup> assumes no use of hydrogen for heat in buildings for households or for business customers. The low scenario therefore provides an informed technical assessment of wide-scale gas network disconnection and decommissioning – at both transmission and distribution level – including the operational steps, likely associated costs, potential timescales, uncertainties, materiality and key sensitivities. The Arup study thus offers an extremely helpful start-point from which to develop policy and regulatory thinking around different practical approaches to future GB gas network disconnections, stranding and decommissioning. However, important issues for policy, for regulation and for consumers were out of scope for Arup. See our further deep-dive topics that we identify below.

The NIC, informed by their detailed assessment of hydrogen for home heating<sup>7</sup> plus the Arup study, recommend that government should plan for the end of the use of natural gas for heat in buildings. Inter al, they call for government to establish a national disconnection and decommissioning plan for removing properties from the gas network, including clarifying roles of national, devolved and local government, Ofgem, HSE, energy system planners and operators<sup>8</sup>.

In its official response to the Climate Change Committee's (CCC) annual report the government has recommitted to carrying out hydrogen heating trials, to keep that option on the table, but said that heat pumps and heat networks “will be the primary means of decarbonisation for the foreseeable future” and hence customers should not delay getting heat pumps<sup>9</sup>. In our view, whatever the ultimate decision on hydrogen for heat, the NIC's recommendations around preparing for a world with less gas still stand.

Linked to a new EU requirement for heat and cooling plans<sup>10</sup>, RAP (for ECF) expect to conclude a high-level review in late 2023 of current thinking on decommissioning of gas distribution networks in five countries (Denmark, Germany, Netherlands, Austria & UK). Many distribution networks in Europe are small and also municipal, so the RAP review may offer limited lessons for GB given we have 24 million gas customers – plus a well-developed view of our gas networks.

### **Policy and regulatory approaches to gas network stranding : a structured dialogue for RIIO-3**

From their modelling, Arup identify the two most material and uncertain cost-factors to arise for the future of the gas networks as (1) the transition costs for domestic customers and (2) gas network decommissioning. At the same time the *regulatory* implications of customer disconnection from the gas networks and subsequent network decommissioning were out-of-scope for Arup. They do not address different options for recovery of network costs in the event of stranding – nor implications for consumers, including distributional questions. Likewise, other work to date on gas network stranding and decommissioning – including likely time-frames - leaves many unanswered questions for government, for regulators, for investors, for customers and bill payers.

A well-structured dialogue on policy and regulatory approaches to gas network decline would therefore inform priorities for more detailed work. A better line-of-sight now – ‘through the FOG !’ - would help identify options for policy and regulation and improve preparedness for the future challenge of customer disconnections at scale, potential network stranding and eventual decommissioning.

Different actors have very different interests and agendas in future gas wind-down - and so this picture needs addressing in-the-round. Sustainability First has a long and highly-regarded history of facilitating systematic multi-party dialogue on complex issues<sup>11</sup>. We see an independently-led process of thought leadership also needed on gas network decline. This could start with a series of structured topic-based workshops with key actors around the table.

### **Gas network decline : scoping main topics for a ‘deeper-dive’**

In their sensitivity analysis (pp 139-143), Arup identify a number of questions in need of further thought for the domestic customer transition and for approaches to customer disconnection and to decommissioning (with the aim of keeping down costs).

Taking the Arup low-hydrogen scenario as a start-point, because it makes the issues more stark, there is a need to explore the implications of hydrogen being ruled-out - or heavily limited – for heat for households and in buildings in the DESNZ strategic decision expected in 2026. The merits of different low-carbon heat solutions for households are already being considered in great depth, including emissions impacts, and are not our focus here. Instead, there is a need to focus on two likely alternative worlds for “gas-decline” - each with very material implications- both for future costs and for consumers – and each needing greater attention:

- **Planned : a largely planned and mandated approach to disconnection from the gas network and decommissioning** (as per Arup). A main Arup assumption (under all three of their future hydrogen scenarios) is a mandated top-down plan for network decommissioning in the 2040s. Implicit in this – but not spelt out- is a need for firm end-dates for gas-boiler operation by geography. So, beyond government’s stated ambition of phasing out gas-boiler sales by 2035, policy questions around ending gas-boiler operation also sit at the heart of any planned approach to gas-network decommissioning.  
– as against-
- **Choice-led : today’s world of a largely market-led / ‘voluntarist’ approach to heat electrification.** Arup’s low scenario for gas network decommissioning does not reflect today’s reality. For example, in its October 2023 response to the CCC Annual Report, government states<sup>12</sup>: *“Anyone wanting to install a heat pump should do so, irrespective of location. No one should hold back on installing a heat pump or connecting to a heat network on the basis that hydrogen may become an option later”*. The government’s recent winding back on previous environmental commitments to ban fossil-boilers in off-gas-grid areas from 2026 illustrate a general reluctance to limit consumer choice on heat. However, as heat-electrification gathers pace, without explicit intervention, the gas networks face an unplanned and piecemeal decline – even in the coming decade. The prospect for higher network costs in a world of largely unplanned heat choices is also raised in a recent report by Citizens Advice<sup>13</sup>.

Either way, both worlds lead to an eventual gas network “death spiral” – albeit one more planned than the other – with significant policy and regulatory questions arising for continued safe network operation, cost-minimisation, approaches to network cost-recovery and stranding as well as impacts for consumers of gas network disconnection and eventual network decommissioning. There’s therefore an unmet need to drill down into the practical implications of these issues for fair outcomes- which policy and regulation need to address.

Building on the work by Frontier, Lowes, the NIC and Arup we have identified four major topic-areas in need of more attention. The topics closely intersect and could be approached in a number of ways – but we would start here.

- **Technical questions – and opportunities for innovation**
- **GT3/GD3- the approach to gas network cost allowances**
- **Beyond RIIO-3 – how might asset stranding look beyond RIIO-3? And what are potential remedies?**
- **Ensuring a line-of-sight for customers and wider policy.**

An initial round of high-level dialogue on these topics could usefully feed into Ofgem’s current thinking for GT3 and GD3 and into the gas transmission and distribution company Business Plans (2026-2031). Such a dialogue could also help identify longer term questions (beyond 2031) in need of more in-depth work beyond RIIO-3. Any such thinking must draw out the main considerations for ‘planned’ and ‘less-planned’ approaches to gas network decline.

## Topic 1 - Technical questions – and opportunities for innovation

The Arup study helpfully informs technical considerations relating to gas network decline but further thinking as follows would be helpful.

**Safety**- What impact does piecemeal decline in customer demand have on the ability of operators to run their gas networks safely ? Are there differences between transmission and distribution? For example, with only a small number of customers left on a part of the distribution network would new technical issues arise (e.g related to pressure management)? How would safety be managed in such scenarios?

**Customer Disconnection and Network Decommissioning** – Arup address detailed technical steps for both disconnecting customers and thereafter de-commissioning segments of the network – including likely scale of costs attaching to these separate steps in each of their three scenarios. Can these technical questions therefore largely be taken ‘as read’- or is there scope for innovation to help contain the costs ? Arup’s sensitivity analysis raises major policy questions around different approaches to disconnections at scale – initially effectively at the meter i.e. at the emergency control valve (EVC)- and later from the gas network itself – which touch on approaches to contain costs, whether for disconnecting customers or for longer-term decommissioning of whole network segments (as noted, Arup assume a mandated and top-down planned process). Major questions of principle arise from a consumer standpoint around mandation and planning- versus a more ‘choice-led’ world. We return to these issues in the consumer section below.

**Re-purposing** – What, if any, unexplored opportunities might exist for re-purposing the gas networks? Significant work has been done on hydrogen but might there be other alternatives ? Given the cost of digging trenches is a significant part of the cost of laying new cables, could gas pipes be put to other uses- such as carrying wires / fibre, or indeed water ? What opportunities are there for re-cycling equipment, for example compressors ? Arup touch on recycling, but further work, including potential innovation projects, would seem helpful.

## Topic 2 – the approach to gas network cost allowances in GT3/GD3

In any world of declining gas-use, recognition is needed that gas network regulation is looking at a radically different future. This longer-term sea-change must actively inform regulatory approaches for the GT3/GD3 period (2026-2031).

**Gas network cost allowances**- to allow an informed and strategic debate for RII0-3, the regulatory framework and the financial “model” for the gas networks needs to be set out in a way that wider stakeholders can understand and which draws out the implications of declining gas off-take by customers. Specifically, we will need to understand a good deal more about the impacts in terms of the different cost-allowance building blocks – what the networks are allowed to spend (ie what is justified in terms of CBA or as a legal requirement), how the networks are allowed to recover that expenditure over time (i.e. their allowed revenues which depends on assumed asset lives for example) - and how those annual revenues are then recovered from end customers through network charges. Having a view of the future trajectory of these network charges is essential to working through the inter-generational tradeoffs and informing decisions for GD3 / GT3.

**Drivers of gas network expenditure** – In deciding what level of expenditure is justified in GD3 / GT3, Ofgem will take account of any legal requirements and also the engineering justifications / CBAs that the networks include in their Business Plans. In GD2 Ofgem required all non-mandatory expenditure to have a payback (in terms of its CBA) by 2036. Ofgem’s decisions on acceptable payback periods for capital investment in GD3/GT3 will therefore be key (and should in turn depend on assumptions around the timeframes for ultimate decommissioning / repurposing under different scenarios).

Gas network expenditure is primarily safety-related maintenance / investment costs, including delivery of the HSE mandated IMRRP (iron mains risk reduction programme- repex) which runs to 2032 and which DESNZ and Ofgem are presently reviewing. This expenditure can also support network resilience and also helps reduce the environmental impacts of leakage. Our assumption- to be tested- is therefore that the majority of ongoing gas network costs are not related to the volume of gas demand (unlike much new electricity expenditure being load-related) but instead are essentially fixed costs, even as gas demand declines (and assuming that disconnection / decommissioning costs are not a material consideration for GD3/GT3). While there is gas flowing through the networks they must be kept safe.

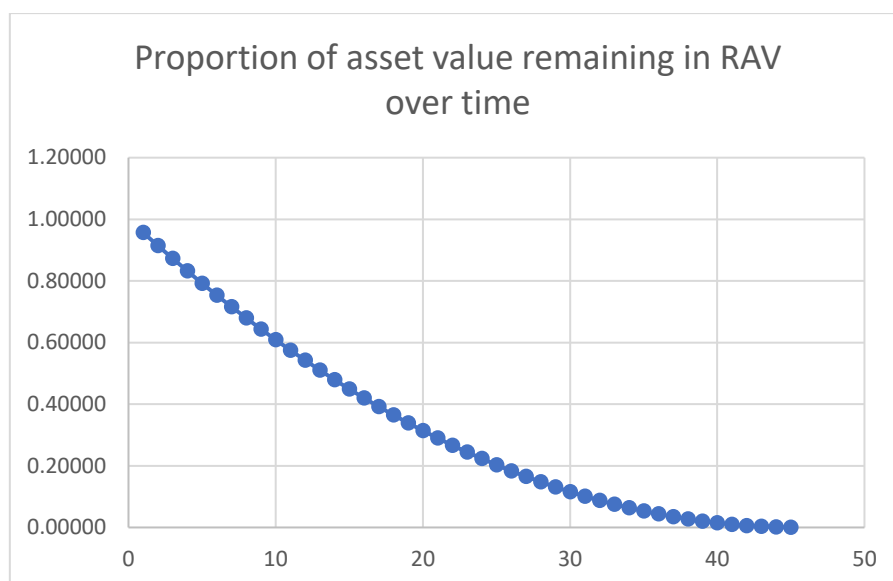
However, as part of testing whether gas network expenditure is justified Ofgem will, as always, want to ensure that alternative options have been considered even for safety related spend. For example, is the **Iron Mains Risk Reduction Programme (IMRRP)** still justified and what are the alternatives in terms of more reactive maintenance? What about climate adaptation? Flooding and land-slips linked to climate change may risk leaving parts of the gas network exposed and unsafe. How far can high risk locations be identified and what options are there to minimise new investment?

**Gas networks allowed revenues** – under RIIO the networks’ expenditure is split into “fast money” (representing operating costs) that the networks can recover that year and “slow money” (representing capital costs) that is added to their RAV (the Regulatory Asset Value) and recovered over a much longer period (the “asset life”) through depreciation. Because the network companies are paying upfront for the investment there is also an allowed return on the RAV to reflect their cost of capital (a mix of debt and equity). The revenues the networks can recover each year thus comprise a share of that year’s annual expenditure (“fast money”) plus depreciation and a return on the RAV.

As a result, even if it were possible to reduce the gas networks’ expenditure in GD3 / GT3, the allowed revenues would not decline significantly in the short to medium term because the depreciation charge and return on the RAV account for the majority of the allowed revenue.

However, Ofgem’s decisions on the fast-slow money split and on asset lives will have a big impact on the rate at which networks recover their costs over time and on the level of the RAV (and hence on future charges). We can expect a tension between keeping bills low for today’s customers while avoiding storing up problems for the future.

The current asset life is 45 years but with depreciation on a front-loaded “sum of years” basis<sup>14</sup>. This means that assets installed today will not be fully depreciated until 2068 albeit that after 25 years – in 2048- they will be 80% depreciated, as shown in the chart below.



*Source : Grid Edge Policy*

Determining an appropriate depreciation methodology is not easy. It can also be problematic shifting from one basis to another (as Grid Edge Policy highlighted in relation to ED2)<sup>15</sup>. This paper advocated a move away from the concept of asset lives to an approach more like that used in water where the fast-slow money split and depreciation rates are defined more flexibly and can vary year on year (rather than being viewed as fixed features dependent on the type of assets). Such an approach would appear also to have merit in the context of gas networks allowing the profile of annual revenue allowances to reflect wider considerations including inter-generational equity.

**Network charges** – With their allowed revenues determined as described above, gas networks (T&D) recover this revenue through network charges levied on suppliers and hence passed through to customers. These charges comprise a mix of standing charges and volume related charges, in line with a detailed methodology set out in the UNC (Unified Network Code). Charges are set on an annual basis taking account of projected demand levels. As customer numbers decline, the allowed revenues will be recovered over a progressively smaller customer base. This will push-up the per customer costs and therefore risk creating further unplanned / voluntary defection by those that can switch away (in what is sometimes termed a “death spiral”). While this is generally viewed as a longer term issue, SGN have noted that within GD3 timescales if the Scotland 2030 heat decarbonisation target were met this would remove around one-half of SGN’s total customer base in Scotland, and without intervention, could result in a doubling of the average network charge for remaining customers<sup>16</sup>. Understanding the balance of charges between industrial and domestic customers will also be important in understanding this dynamic.

While the network charging methodology does not form part of the price control process, understanding these dynamics and the resulting level of bill impacts under different scenarios, through to 2050, is important to inform the debate on key elements of GD3 / GT3 as set out above.

### Topic 3 – Gas stranding – how might this look beyond RIIO-3? And what are potential remedies?

The most commonly cited definition of stranded assets is "[assets](#) that have suffered from unanticipated or premature [write-downs](#), devaluations or conversion to [liabilities](#)"<sup>17</sup> This can be as a result of market, policy or technological change but is becoming of increasing importance in the context of the energy transition.

In the case of regulated assets, there is a particular nuance given that the companies will often be obliged to make the investments while their ability to recover the costs is determined by regulation (i.e. for gas networks, little choice for operational or safety reasons, or the requirement to offer a connection).

CEER<sup>18</sup> note that "*regulated gas or electricity assets can be considered to be stranded when it is expected that regulated companies, as owners of those assets, cannot recover their efficient investment costs under the conditions for allowed revenues given the changes between the current and expected environment. One of the main reasons for such a situation is underutilisation of the assets, due to low demand, technical/environmental constraints, or policy decisions, among others.*"

In reflecting on this question of stranding, it is helpful to distinguish between **(1) the risks around the ongoing gas network costs** and therefore the longer-term ability of gas networks to recover the RAV from a declining customer base- and **(2) arrangements for recovery of "end of life" costs** (both disconnection and decommissioning), how these would be funded and where any longer-term safety liabilities might sit.

**First**, with accelerating uptake of electric heat, **full recovery of ongoing gas network costs** (capex, opex) **and recovery of the historic RAV via gas network charges could become problematic relatively quickly**. As noted, with assets being installed today not being fully depreciated until 2068 and with a declining customer base from which to recover these costs, there is a clear problem. If assets are decommissioned before they are fully depreciated, they should be considered as "stranded" although there is currently no mechanism that we are aware of to remove such assets from the RAV. There are good arguments for accelerating depreciation to address this problem. However, this also creates a tension with how increasing the costs of gas (whether commodity or network costs) might impact the cost-of-living in the near term.

Moreover, with declining customer numbers, this problem can be expected to be particularly acute for the less-able-to-pay who are less likely to be able to afford the upfront costs to move to electric heat. Understanding- and addressing- these distributional impacts will be important. Moreover, if escalating gas network charges become generally unacceptable (following widespread movement away from the gas network) then the networks face the risk that some historic costs become stranded, with questions around whether this would require compensation for network investors through some other source such as taxation.

Part of the regulatory compact around the RAV – and which is the basis for the low cost of capital for regulated utilities – is that the networks are guaranteed that the RAV will be honoured. This is not explicit in the licence<sup>19</sup> (beyond the duty on the regulator to ensure regulated businesses are able to finance their activities). However, the RAV (or RAB) model is presently being introduced for new nuclear plant and is also proposed for hydrogen. Hence there is also a wider public policy interest in providing assurance that assets will not ultimately be stranded under any of the scenarios envisaged. What that assurance might look like needs wider debate.



**Second**, the switch away from natural gas entails **two major new cost categories for the gas networks and potentially for customers, with no real clarity as to how these would be funded.**

- (1) **A vast increase in activity to safely disconnect gas customers from their local network** - while at present these costs are seemingly paid either by the disconnecting customer or perhaps waived, the arrangements are opaque and not evidently suited to dealing with the scale of change required.
- (2) **Eventual gas network decommissioning at scale** (Arup assume 2040-50).

Arup modelling for their low scenario (with no hydrogen for heat in buildings) indicates that taken together these activities represent material costs (£79 bn 2036-2050). In particular, Arup identify potentially high costs associated with customer disconnection from the network in their low scenario (£54 bn 2036-50), albeit they foresee that these costs could reduce with scale. These costs would largely be unavoidable and the networks arguably have an obligation to undertake aspects of this work to maintain safety even when there are no customers connected. What is unclear at this point is how these two new cost categories would be funded.

**Customer-premises disconnection costs** - Arup estimate a cost of £1150 per household at scale based on a 20% reduction as against the GDN weighted-average publicly quoted cost of £1450. They then assume that from 2040 with a mandated planned approach (which as we highlight is a critical Arup assumption) – there would be a separate entity charged with carrying out customer disconnections which could potentially reduce this ‘premises’ disconnection cost to £500. However, Arup also highlight the considerable uncertainty that exists around the scope of the work involved and the fact that current charges for customer disconnection are not subject to any regulatory scrutiny.

While GDNs do all offer quotations of this magnitude for disconnection this seems to be aimed at households planning major work on their property (or demolition) and includes capping-off the service pipe at the gas-main as well as at the Emergency Control Valve (ECV).

In contrast Octopus Energy<sup>20</sup> suggest that currently, given low numbers, they would waive their fee for removing the meter and capping off the supply (presumably at the ECV). They say that the GDN may then want to check that this has been done safely and that sometimes the network will need to make further changes for which there may be an additional customer charge.

Arup note that under the present Gas Safety Regulations the networks are required to permanently disconnect a customer from the network within 12 months of them coming off their gas supply. This entails capping the service pipe at the mains. It is unclear how this work is currently funded or indeed if there is a consistent approach across GDNs. Further research and innovation in GD3 aimed at developing more cost-effective solutions would seem justified given the potentially huge costs involved.

Aside from the question of the scope of this work, there is a need for clarity on who pays today and a wider debate on who will pay for disconnection from a gas supply in the future. Levying the costs on the individual disconnecting customer would seem to create an additional barrier to heat pump uptake. However, leaving these costs to be socialised across the remaining (declining) customer base would not seem fair (and creates a risk in terms of asset stranding). With the prospect of an increasing number of customers moving across to heat pumps in the next 5-10 years, these issues need proper scrutiny and debate as part of GD3.

**Costs of physically decommissioning network pipes from 2040 onwards** - in their low-hydrogen scenario Arup estimate that 60% of NTS could be decommissioned (and the remainder used for hydrogen storage) – as well as decommissioning GDN assets- all of distribution and the LTS (unless there is regional or residual gas demand). Some higher pressure pipes (NTS, LTS) may need filling-in etc for safety, but other pipes may simply be left in the ground ‘as is’.<sup>21</sup>

By definition, decommissioning only takes place once there are no customers left on that segment of a network. Given this, it is hard to see how decommissioning costs would be funded by remaining customers through network charges - an alternative source of funding would be required. If networks are to retain the residual responsibility for safety of these assets then a new funding mechanism will be needed.

Given the issues we describe at (1) and (2) above, major questions arise as to the options open to government and to regulators to fund future gas network costs arising from gas network decline- and which are unlikely to be met by customers. As noted, Richard Lowes paper briefly highlights these issues. It is also worth noting that these questions apply across all likely scenarios to some degree, not just in a full electrification world (as the Frontier paper also makes clear). These questions go to the heart of the RAV model and the extent to which companies can rely on the present regulatory compact to get their capital repaid.<sup>22</sup>

Major discussion areas for gas-asset stranding beyond RII0-3 therefore include :

**Investor perspectives** - what are the implications for investors? As noted above adjusting asset lives helps reduce investor stranding risk but there will be political pressure to avoid loading costs onto today’s customers via higher network charges. Understanding who owns what risks – and what the expectation was when the companies invested may also be relevant to questions around stranding. What might a ‘right balance’ of risk eventually look like between shareholders and residual gas customers (many less able-to-pay)? What lessons are there from other sectors? These questions need to start to be explored as part of GD3.

**Possible alternative approaches for funding stranded assets – plus approaches to the costs of customer disconnection and network decommissioning**- what are the wider options for dealing with these potentially stranded / unfunded costs? Suggestions floated in the Frontier paper and in Richard Lowes paper include an “exit charge”, building up a decommissioning fund, or, government taking on responsibility. Experience of the Coal Authority in dealing with residual liabilities may be worth considering, which Arup also suggest. All of these ideas have their challenges but a conversation is central to setting expectations for the GD3 process and a better line-of-sight beyond.

**Repurposing the gas networks** – GDNs would argue that the high costs highlighted by Arup for disconnection / decommissioning and the sunk costs in the RAV are why one should look hard at repurposing the gas networks for hydrogen. This clearly needs to feed into ultimate government decisions on heat alongside other evidence. Arup also note some alternative uses of the infrastructure (eg for carrying fibre) but note there are legal barriers associated with wayleaves etc. Further exploration of these options are clearly merited.

#### Topic 4 – Switch from natural-gas : line-of-sight needed for customers and wider policy

Critically, there is also a need to devote far more attention to what a switch away from natural gas might mean for today's 24 million gas-network customers<sup>23</sup> – and what desirable customer outcomes might look like, both near- and longer term.

This requires clear signals on policy intent, priority actions and likely time-lines. Government (national, devolved), the regulators, the future system operator and the gas networks must be transparent and coordinate for a smooth transition away from natural gas. GB gas customers need an effective line-of-sight to engage, whether today or tomorrow.

In the GT/GD3 period to 2031 a relatively gradual market-led switch away from gas will continue on the basis of customer choice. Around 1.7 million new gas boilers are presently installed each year<sup>24</sup>, each with a possible 10-15-year life, and government indicates that even with increasing heat pump deployment<sup>25</sup>, a minimum of 10 million further domestic gas boiler installations can also be expected between 2025 and 2035. From the early 2030s however, given the likely ban on new natural-gas boiler sales in England and Wales from 2035<sup>26</sup> (potentially earlier in Scotland<sup>27</sup>), it seems reasonable to assume that customer disconnections from the gas networks will accelerate. As already noted, this leaves an ever-smaller group of household customers into the 2030's connected to the gas networks, an increasing proportion of whom will be less-able-to-pay and / or in some way vulnerable, with a wide geographic spread across the gas distribution networks. For these consumers in particular, how should future gas-network decline and network cost recovery best be handled and managed ? What might fair outcomes look like for these residual customers ? Who should pay for what?

From our Topics 1-3 above, and ahead of the 2026 strategic decision on hydrogen for heat, very major questions arise for fair approaches to policy, regulation and management of gas-network decline from the consumer standpoint. This includes :

**Approach to signalling natural-gas boiler phase-out to customers** – government continues to affirm its ambition to end new natural-gas boiler installations by 2035<sup>28</sup>. But the recent back-track on a 2026 end-date for installing fossil-boilers in off-gas areas sends a mixed message and underscores the need to communicate a firm 2035 end-date, so that the ~80 % of households who today heat with gas start to have a better line-of-sight. In effect, how far- and for how long – does a narrative of choice on heat remain an effective signal to prepare customers for a switch to low-carbon heat ? The 2026 strategic decision on heat remains key. Beyond signalling a clear end-date for sales of natural-gas boilers, other 'end-dates' also need consideration- from both a network and household standpoint - including the right to request a new gas connection, *operation* of a gas boiler and other gas appliances (as against sales), plus possible timing of any final disconnection from a network. Today's customers will need to understand how the 2050 net-zero target (2045 in Scotland) might start to drive all such dates and timelines.

**Bill impacts of network charges borne by a dwindling customer group** – this is a major topic, especially for those less able-to-pay. As already noted, this includes :

- **The need to start a major conversation on the extent to which the costs of the gas networks should continue to be met in full through network charges.** And, if not, to understand the alternatives.

- **Distributional impacts** – how the shift away from gas will play out in practice must be far better understood in terms of distributional impacts. Low-income households, certain tenures and vulnerable customers are likely to be slower to move across to heat pumps, and hence without intervention, would increasingly be most affected by escalating gas-network charges.
- **Inter-generational equity** – as noted in Topic 2 above some of the options to avoid escalating future costs would involve today's customers paying more e.g through accelerated depreciation. Questions of inter-generational equity are notoriously difficult to resolve<sup>29</sup> but presenting a view of how charges could evolve over the period to 2050 (not just in RII03) is key<sup>30</sup>. How best should we think about these trade-offs?
- **Government policy-cost reallocation** – government is currently reflecting on whether certain of today's energy and social policy costs might shift from electricity bills, perhaps to gas. How do the wider gas network charging issues raised in this note play into that discussion? How far might higher gas (i.e commodity) costs exacerbate the network "death spiral" effect (by leading to even higher gas bills for some (disadvantaged) customers)?<sup>31</sup>

**Industrial customer impacts** – in their low hydrogen scenario Arup assume that certain large industrial gas customers (who use gas for process heat) will transition / migrate to hydrogen clusters. The logistics of this – as well as the costs and benefits- need to be better understood. Arup's low scenario assumes that all other gas customers, including business customers, do not connect to hydrogen networks and will eventually phase-out from natural-gas. All these issues need more consideration, taking account of the different dynamics associated with different industry and business needs.

**Geography of customer choice on low-carbon heat solutions** – outside any decisions on hydrogen for heat in 2026, differences around the country in both the pace and whereabouts of low-carbon heat uptake, district heat included, will create a geographic patchwork of customer disconnections from the gas networks. Given a typical boiler life, an approach shaped largely by individual customer choice won't see every customer moving off any specific gas network segment until well into the 2040s. As a result, the entire gas transmission and distribution networks would need to be maintained safely until then – and continue to be fully funded. As noted, Citizens Advice recently published a paper on the geography of low-carbon heat<sup>32</sup>.

**Coordinated approaches to the heat transition** – major issues arise as to how the FSO (Future System Operator) and its Regional Energy Strategic Planners (RESPs) will best discharge their new duties for cross-vector network planning, including outcomes for potential network stranding. How will they best set about considering household disconnections from the gas networks and any eventual network decommissioning? How will the RESPs best work together with local authorities to chart fair and good outcomes from a customer standpoint? Will a locally driven approach better serve customers and what would this look like?<sup>33</sup> Will the RESPs work closely with the gas networks to enable them to manage the costs efficiently of certain parts of their network declining, including the significant costs associated with customer disconnection and network decommissioning<sup>34</sup>. Above all, in terms of planning and coordination for network decline what might *customers* favour and what might be acceptable to them in practice?. This will also require a debate about the nature of additional support perhaps needed to fully close-down / disconnect particular network segments by geography i.e. in the end will it require partly- or fully-funded incentive payments for 'residual/final' customers to switch-off from their gas network (e.g perhaps to fund a heat pump install)? If so, how best to oversee / ensure that any such support is both fair and well-targeted? And who might fund and pay for any such residual programmes?

**Gas network response** – an important question, including for GD3, relates to how far the gas-networks might now start to respond more actively and plan for different customer needs – whether for those who remain connected - or for those who seek to disconnect. What should be the network response to a steadily reducing customer-base : should the networks remain largely passive ? How far should the networks become more proactive, seeking increased geographic coordination and planning to drive efficiency both in ongoing network costs and also in the costs of network disconnections. Some GDNs are starting to think in a more geographically nuanced way- but should this be an underpinning requirement for GD3? Are there any early opportunities through innovation projects or otherwise to explore a more co-ordinated approach eg for multi- occupancy buildings? What are the lessons from recent hydrogen trials for co-ordinating / mandating change (for example, the Whitby trial) ? From a customer standpoint, where alternative low-carbon heat options become an agreed course, what are the gas network next-steps on supporting a smooth approach to removing customers from their network (including a possible switch to hydrogen). Last and very important, from a customer standpoint how best to manage ongoing safety, maintenance and consumer service in a declining network. In other words, how best to resource, fund and ensure ongoing quality for all customers in the face of changing network priorities ?

**Planning for decommissioning gas networks from 2040** – finally, and importantly, and regardless of whether hydrogen is used in heat for certain households or buildings, major questions remain for the FSO, the new RESPs, and the devolved, regional and local governments on how best to plan and coordinate eventual decommissioning of some or all of the distribution networks plus redundant sections of the gas transmission network. As noted in Topic 3 above, major questions arise as to both the governance and funding arrangements. How best to bring down costs? Who to pay ? And, for the long-run, what arrangements might best serve the consumer and public interest.

#### **FOG – next steps.**

Customer disconnections from the gas networks at scale may seem some way off – and eventual network decommissioning even further off – but the four topics identified above demonstrate that a focused and structured dialogue needs to begin in RIIO-3 in order to scope key issues (and thus ahead of the 2026 decision regarding hydrogen heat). This involves a better understanding of areas of agreement and difference, any major policy or regulatory gaps and near-term priorities.

Further detailed work for RIIO-3 and beyond needs mapping now - for Ofgem, the networks, government and the devolved administrations, the FSO, the NIC, the CCC and the consumer bodies. Failing this, we cannot start to shape fair outcomes for gas customers and households.

In particular, there is a need to clarify :

- **Issues that need to be decided for RIIO3** – this to include innovation focus, approach to Iron Mains Risk Reduction Programme, payback rules on investment, and financial parameters (fast / slow money, asset lives).
- **Issues beyond RIIO3** – this includes dwindling customer-base and ongoing network funding, geographic approaches to ‘whole-network’ maintenance, funding and geography of customer disconnections and final network decommissioning
- **Main policy and regulatory gaps and issues for further work** - and who should start to take these forward and how.

Last, consideration is needed of **planning under uncertainty**: How does the expected 2026 decision on heat-policy and hydrogen affect all these matters (if at all)? Do we really need to await the 2026 decision before we start to improve the visibility of signals to gas consumers on expectations- and likely pace- of phase-out for natural gas. What other uncertainties exist? Recognising the uncertainty that exists around the net zero pathways, how do we approach decisions and the “real option value” around investing in the gas networks (to keep open the option of repurposing them for hydrogen or longer than anticipated gas network usage) while at the same time avoiding slowing progress on heat pump uptake in the near term.

To conclude, we are at the start of the new RIIO-3 gas price control process that will establish treatment of gas network costs out to 2031, including implications for network charges. As set out in this Viewpoint, the RIIO-3 price-control period is also critical for shaping GB gas networks longer term – and we need to look through the FOG. Decisions today will fundamentally shape the future landscape, not just for the GB gas networks but also for gas customers for many years ahead. Which is why a policy and regulatory dialogue about gas network decline and stranding needs to start now with RIIO-3.

Maxine Frerk  
Judith Ward  
Associates. Sustainability First  
4 December 2023

### **About us**

Sustainability First is a think-tank and charity working on social and environmental issues, with particular expertise on policy, regulation and consumer issues in the energy and water sectors. Much of our work is focused on the need for policy and regulation to balance fair outcomes in the energy transition for consumers today and the future in ways that best serve the long-term public interest.

Contact :

[maxine.frerk@sustainabilityfirst.org.uk](mailto:maxine.frerk@sustainabilityfirst.org.uk)

[judith.ward@sustainabilityfirst.org.uk](mailto:judith.ward@sustainabilityfirst.org.uk)

## References

---

<sup>1</sup> National Infrastructure Commission. Second National Infrastructure Assessment. 18 October 2023 – p.56  
<https://nic.org.uk/studies-reports/national-infrastructure-assessment/second-nia/#tab-decisions>

<sup>2</sup> Frontier Economics for the CCC. Future Regulation of the Gas Grid. October 2016 - [https://www.frontier-economics.com/media/vfholk2g/20161013\\_future-regulation-of-the-uk-gas-grid\\_frontier.pdf#page83](https://www.frontier-economics.com/media/vfholk2g/20161013_future-regulation-of-the-uk-gas-grid_frontier.pdf#page83)

Frontier Economics for the Energy Systems Catapult. ‘Gas Network Regulation for the Low Carbon Transition’. November 2021 - <https://es.catapult.org.uk/report/gas-network-regulation-for-the-net-zero-transition/?reportDownload=https://esc-production-2021.s3.eu-west-2.amazonaws.com/2021/11/20211108-FE-gas-networks.pdf>

<sup>3</sup> 26 October 2023 - paras 4.33 & 4.35, p.22 - <https://www.ofgem.gov.uk/publications/decision-frameworks-future-systems-and-network-regulation>

<sup>4</sup> RAP paper by Richard Lowes. ‘Decompression: Policy and regulatory options to manage the gas grid in decarbonising UK’. August 2023  
<https://www.raponline.org/knowledge-center/decompression-policy-regulatory-options-manage-gas-grid-decarbonising-uk/>

<sup>5</sup> Arup. ‘Future of Great Britain’s Gas Network’. 18 October 2023  
<https://nic.org.uk/studies-reports/national-infrastructure-assessment/second-nia/arup-gas-network-analysis/>

<sup>6</sup> The Arup low-hydrogen scenario builds on the FES scenario - Consumer Transformation

<sup>7</sup> NIC NIA – Technical Annex. Hydrogen Heating - <https://nic.org.uk/app/uploads/NIA-2-Technical-annex-hydrogen-heating-Final-18-October-2023.pdf>

<sup>8</sup> NIC NIA p.60 - <https://nic.org.uk/studies-reports/national-infrastructure-assessment/second-nia/>  
*“Recommendation 11: Government should plan for the end of the use of natural gas 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<sup>2</sup> 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”.*

<sup>9</sup> HMG. ‘Responding to the Climate Change Committee’s (CCC) 2023 Annual Progress Report to Parliament’ – 26 October 2023 – pp 61-62 <https://assets.publishing.service.gov.uk/media/65393f4ae6c968000daa9b0e/cce-annual-progress-report-2023-government-response.pdf>

<sup>10</sup> Directive (EU) 2023/1791 on Energy Efficiency – 10 Oct 2023. A25 (6). Both member-states and local government - - [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL\\_2023\\_231\\_R\\_0001&qid=1695186598766](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2023_231_R_0001&qid=1695186598766)

<sup>11</sup> Sustainability First – Access to Smart Meter Data for a Public Interest Purpose – [PIAG](#) – and Sustainability First. [Fair for the Future](#)

<sup>12</sup> P.61

<sup>13</sup> Citizens Advice. 'Heat GB. Calculating the network costs for low-carbon heating'. October 2023. <https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/heat-gb-calculating-the-network-costs-for-low-carbon-heating/> This report does not cover gas network decline and decommissioning. Rather, LCP Delta model network costs associated with 12 'network archetypes' - across 4 2050 scenarios for low-carbon heat (e.g. all-electric, hydrogen). Their Scenario 4 – with an *unspecified mix* of heat technologies – results in network costs to double on average due to the large-scale network upgrades needed (wires, pipes). The modelling finds that the heat scenarios that are more planned – i.e. that take account of factors such as location, density, property-type - would deliver lower network costs overall. LCP Delta (main report p.48) clarify that their model did not examine gas network decommissioning costs associated with any of the heat-scenarios.

<sup>14</sup> In contrast to electricity assets that are depreciated on a straight line basis, the "sum of years" approach used in gas is an accounting approach that results in higher depreciation charges in the early years and lower ones in the later years.

<sup>15</sup> <https://www.ofgem.gov.uk/sites/default/files/2022-07/GEP%20Understanding%20Asset%20Lives%20260122.pdf>

<sup>16</sup> One example of the distribution transport network charge for 2023 (SGN) for a typical domestic gas consumption of 12,900 kWh is £167.00. In 2023, National Gas state that transmission represents 1.6% (or £9 p.a) of the end-customer gas bill.

<sup>17</sup> Smith School of Enterprise and the Environment - [here](#)

<sup>18</sup> See CEER Note on Stranded Assets in Distribution Networks - [here](#)

<sup>19</sup> Dieter Helm touches on the regulatory risk around the RAB in his paper <https://dieterhelm.co.uk/economics/the-cost-of-capital-the-regulatory-asset-base-and-risk/>

<sup>20</sup> <https://octopus.energy/blog/disconnecting-your-gas-supply/>

<sup>21</sup> Arup p 120 section 6.6.

<sup>22</sup> Arup do not look at RAV remuneration issues arising from the decommissioning costs they identify - p.144

<sup>23</sup> In 2021, 24 million domestic customers were estimated to be connected to the GB gas networks (NIC. Hydrogen Heating Annex. P 21). Of these, ~0.5m might be business and industry customers.

<sup>24</sup> DESNZ Consultation. 'Improving Boiler Efficiency'. December 2022 – p. 8 [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1134917/Improving\\_boiler\\_standards\\_and\\_efficiency\\_consultation.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1134917/Improving_boiler_standards_and_efficiency_consultation.pdf)

<sup>25</sup> The government response to the CCC Annual Progress Report 2023 states that "Heat pumps and heat networks are established technologies that will be the primary means for decarbonising heating over the next decade and play a key role in all 2050 scenarios. Annual deployment of heat pumps will potentially need to reach up to 1.6 million installations by 2035". 26 October 2023 – p 61 - <https://assets.publishing.service.gov.uk/media/65393f4ae6c968000daa9b0e/ccc-annual-progress-report-2023-government-response.pdf>



<sup>26</sup> Government recently clarified its ambition to start phasing-out the sale of new gas boilers from 2035, while exempting unsuitable homes (hard to insulate / high-cost upgrade for electricity connection). DESNZ. 23 October 2023 -

<https://www.gov.uk/government/news/heat-pump-grants-increased-by-50-per-cent#:~:text=To%20prevent%20hardworking%20people%20being,phasing%20them%20out%20from%202026>

*“The government has also set an exemption to the phase out of fossil fuel boilers, including gas, in 2035, so that households will not have to switch to a heat pump if their home is not suitable.*

*Homes may not be suitable for a heat pump if they need expensive energy efficiency upgrades (particularly solid wall insulation that can cost £10,000 to £15,000) or if they would need a significantly upgraded electricity connection that may not be feasible.*

*We will explore alternative approaches to decarbonising off the gas grid homes via a consultation next year.*

*The consultation will make clear we do not propose that any household installs a low carbon option which is not suitable for their home”.*

The points on fossil phase-out were reiterated in government’s response to the CCC Annual Progress Report – 26 October 2023 - <https://assets.publishing.service.gov.uk/media/65393f4ae6c968000daa9b0e/ccc-annual-progress-report-2023-government-response.pdf> p 37 : *“we aim to phase out new and replacement installations of fossil fuel heating systems, for all households, including off the gas grid in England, from 2035, where it is clear a heat pump or alternative low carbon heating technology will work effectively. This will allow sufficient time for the transition, and ensure households will not need to make major energy efficiency upgrades (such as expensive solid wall insulation) in order to comply with the policy”.*

<sup>27</sup> Scottish Government. Delivering Net Zero for Scotland’s Buildings. A consultation on proposals for a Heat in Buildings Bill. November 2023 -

<https://www.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2023/11/delivering-net-zero-scotlands-buildings-consultation-proposals-heat-buildings-bill/documents/delivering-net-zero-scotlands-buildings-consultation-proposals-heat-buildings-bill/delivering-net-zero-scotlands-buildings-consultation-proposals-heat-buildings-bill/govscot%3Adocument/delivering-net-zero-scotlands-buildings-consultation-proposals-heat-buildings-bill.pdf>

<sup>28</sup> The Heat and Buildings Strategy (p. 184) on kick-starting the transition to low-carbon heat states : ‘we will use natural replacement cycles and trigger points and set long-term signals to build markets now’....and.. ‘For on-gas-grid buildings this means ...setting the long-term ambition to phase out installation of new natural gas boilers from 2035, once the cost of low carbon alternatives has come down’.

BEIS. Heat and Buildings Strategy. December 2021 -

[https://assets.publishing.service.gov.uk/media/61d450eb8fa8f54c14eb14e4/6.7408\\_BEIS\\_Clean\\_Heat\\_Heat\\_Buildings\\_Strategy\\_Stage\\_2\\_v5\\_WEB.pdf](https://assets.publishing.service.gov.uk/media/61d450eb8fa8f54c14eb14e4/6.7408_BEIS_Clean_Heat_Heat_Buildings_Strategy_Stage_2_v5_WEB.pdf)

The government repeated its intention to ‘completely transition away from natural gas for heating by phasing out the installation of natural gas boilers by 2035’ in its response to the BEIS select committee report on Decarbonising Heat in Homes – in May 2022 -

<https://committees.parliament.uk/publications/22252/documents/164775/default/> - and most recently, on October 2023, <https://assets.publishing.service.gov.uk/media/65393f4ae6c968000daa9b0e/ccc-annual-progress-report-2023-government-response.pdf> - in its response to the CCC Annual Progress Report to Parliament reiterated the expected end date of 2035

<sup>29</sup> See Sustainability First paper - [here](#)

<sup>30</sup> In a recent paper, Citizens Advice touch briefly on considerations for inter-generational fairness relating to increasing depreciation rates of gas network assets 'Balancing Act'. 5 October 2023 – p.19 - [https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/Balancing%20act%20\(4\).pdf](https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/Balancing%20act%20(4).pdf)

<sup>31</sup> Citizens Advice recent paper 'Balancing Act'. 5 October 2023 – discusses the implications of transferring policy levies from electricity to gas bills - [https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/Balancing%20act%20\(4\).pdf](https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/Balancing%20act%20(4).pdf)

<sup>32</sup> Citizens Advice. 'Heat GB. Calculating the network costs for low-carbon heating'. October 2023. <https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/heat-gb-calculating-the-network-costs-for-low-carbon-heating/>

<sup>33</sup> Work by the Energy Systems Catapult and the Centre for Sustainable Energy on Local Area Energy Planning touched on this

<sup>34</sup> Arup Low Scenario – total costs £79bn. (Customer transition costs – ie disconnection costs = £54 bn 2036-2050. Decommissioning costs = £25bn 2040-50)

Sustainability First is a think tank and charity focused on developing practical approaches to promote social, environmental and economic wellbeing in essential services.

**WWW** [www.sustainabilityfirst.org.uk](http://www.sustainabilityfirst.org.uk)



[info@sustainabilityfirst.org.uk](mailto:info@sustainabilityfirst.org.uk)



[@sustainfirst](https://twitter.com/sustainfirst)