

Cadent

Your Gas Network

December 2019

Appendix 07.04.09 Supporting Off Gas Grid Communities

This output case describes how we will support off gas grid communities wanting to connect to an increasingly low carbon gas network.

During RIIO-2 we will undertake a trial, proactively bringing gas to communities.

We will deliver:

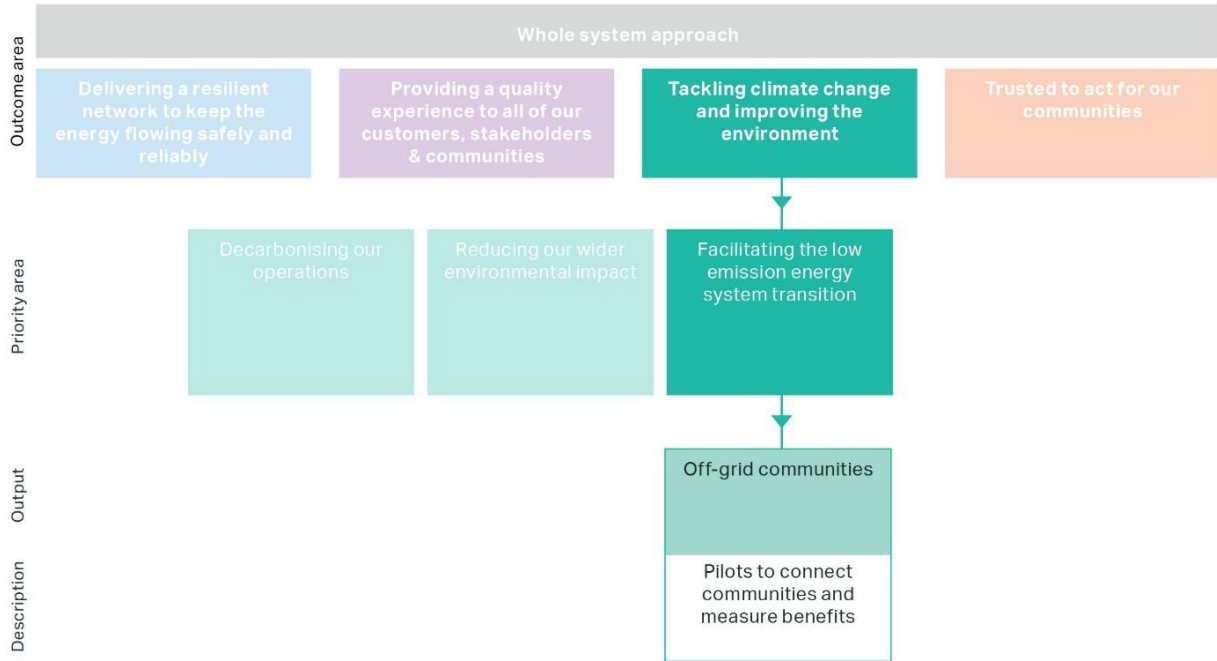


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How we have developed our proposals

1. **We considered the context** – One approach to reducing the emissions associated with heating is to encourage households to use gas in preference to more carbon-intensive fuels. There are around 20,000 homes within 2km of our gas network. Many of these could be supplied with gas without requiring network reinforcement.
2. **Engagement has shaped our thinking** – Our engagement with customers and other stakeholders revealed broad support for us to support off gas grid communities. However, there was a desire for us to do so in a cost-effective way.
3. **We undertook focused research** - We asked NERA Economic Consulting to undertake a study into the social benefits of extending the gas network to off gas grid communities. Their study showed that connecting off gas grid communities creates significant societal benefits both in urban and in rural areas.
4. **This provided us with a clear problem statement** – How should we best support off gas grid customers?
5. **We drew on international experience and best practice** – We reviewed the arrangements to support the extension of the gas network on the island of Ireland. We also benefited from expert input from Affordable Warmth Solutions, our fuel-poverty partner.
6. We considered three options:
 - o Option 1 – Introduce a managed service to make it easier for communities to explore connecting to the gas network.
 - o Option 2 – Undertake a trial, proactively bringing gas to communities.
 - o Option 3 – Undertake a large trial, proactively bringing gas to communities.

All of these options would be coupled with interaction with Government to highlight the benefits of extending the gas network.

7. **We considered a range of research and analysis** – Through our Business Options Testing, we sought the views of business and domestic customers on each option. The least ambitious option (Option 1) proved to be the most popular. However, we have also taken account of Government policy, Ofgem's views and our own strategy. On the basis of this, we consider there is justification for an initial trial (Option 2).
8. **We confirmed our proposal in our October plan** and have tested this along with other aspects of the plan in our acceptability-testing process.
9. We are seeking £644k in funding to deliver this, and will seek additional funding for a trial estimated at £2.3m via innovation allowances – However, we have calculated a net benefit of £4.4m in delivering these commitments based on the increase in properties connected during the trial.
10. **What will the future look like after we embed our RIIO-2 commitments?** – We will have benefited off gas grid customers and helped develop a consensus on how best to address the needs of this customer segment.

The table below summarises our commitment in this area:

Table 1 Our commitments

Output: Off-grid communities	
Common / Bespoke	Bespoke
Output type	NIA / SIC
Comment	Pilots to connect communities and measure benefits.
Target	Managed process introduced to support communities. Gas network extended to allow the connection of up to 500 properties during RIIO-2
Cost implications (annual)	£129k (plus additional innovation funding for a trial)
Incentive range	n/a
CVP	£4.4m

1. Defining our customers' needs



The UK has challenging decarbonisation targets set in legislation and the Government has recently announced its ambition that the UK becomes carbon neutral by 2050. Decarbonisation of heat is a key requirement in achieving this ambition.

This Output Case offers an opportunity to quickly reduce the emissions associated with off gas grid households that predominantly use more carbon-intensive fuels, while also tackling fuel poverty.

This policy has been effective in other parts of the United Kingdom, as evidenced in the best practice research outlined in this output case.

There are around 20,000 homes in communities of more than 50 households within 2km of our gas network. Many of these could be connected to the gas network without requiring network reinforcement.

In addition, there is evidence that significant socio-economic benefits arise from the connection of off gas grid communities to the gas grid as demonstrated by a NERA report discussed in this document.

The Government is assessing options to decarbonise heat across the UK. They are planning to publish a Roadmap in 2020 and to make the key strategic policy decisions in the middle of the next decade.

In parallel with this policy development, the Government are assessing near-term actions to decarbonise high-carbon domestic heating systems in homes that are not connected to the gas grid. A call for evidence was issued in 2018, with a conclusions report issued in December 2018.

Off gas grid homes are therefore likely to be the trailblazers for UK heat policy, ahead of the implementation of wider policy for the majority of homes that currently use methane for heating and cooking.

The Government's stated aim for off gas grid decarbonisation is the establishment of a regulatory framework to promote economical and efficient decarbonisation, with a focus on the use of electrification.

We have advised the Government that electrification will not deliver the scale of fast-paced change required and will struggle to command public support due to the level of disruption it would cause. We have championed using green-gas offsets on an extended gas network as an approach that can deliver emissions reductions more quickly and economically, and which will be received positively by households.

Homes that are off the gas grid, and use high-carbon fuels for their heating are likely to be required to replace their heating systems during the RIIO-2 period.

Currently, off gas grid communities can request a connection to our network and follow an application process. Without advertising this offer, around 300 communities approached us to explore this option during RIIO-1. None completed the process, which indicates we could take a more proactive and improved approach in the future.

Ofgem has publicly indicated during the RIIO-2 Whole Systems Stakeholder Workshop, that off gas grid connections are a clear example of a whole-systems approach, whereby gas connection costs avoid the need for increased electricity investment, ultimately benefitting consumers.

In addition, given the continued high dependency by such communities on the most carbon intensive fuel sources, it can be inferred that home heating solutions that utilise electricity have failed to provide a significant pull factor.

1.1. What insights are shaping our thinking?

There are wide socio-economic benefits of bringing gas to off gas grid communities that are forced to use high carbon fuels for heating and cooking.

The Northern Ireland Assembly commissioned research into fuel poverty given its prevalence in the region. The research noted that Northern Ireland has a significantly lower proportion of gas-network connected homes than the other UK regions. The research found that the cost of energy services and fuel efficiency are two of three main factors which result in fuel poverty.

Connection to the gas grid provides customers with the opportunity to reduce fuel costs, where they are using higher-cost fuels to heat their homes, and to install a new, highly efficient gas boiler to potentially increase their fuel efficiency.

In addition to the reduction in fuel poverty levels in off gas grid communities, there is a wider social benefit as a result of a reduction in carbon emissions.

To test the social benefit of connecting off gas grid communities, we commissioned NERA to undertake a study to measure whether this hypothesis could be proved or discarded.

1.2. Sources of insight



11,140

Stakeholders and customers engaged



21

Sources of insight



20

Tailored RIIO-2 engagement activities

We engaged with stakeholders and customers across a range of methods to understand their views on how we can best support off gas grid communities and the UK's decarbonisation goals.

Key to scores

Criteria	Robustness		Relevance
The score shown is based on a combination of the robustness of the source information (judged on whether it was recent, direct and representative) and the relevance to this area.	<1.5	One or zero criteria met	Limited relevance
	1.5 – 2.0	Two criteria met	Significantly relevant and contributory
	>2.0	All criteria met	Highly relevant and contributory

Table 2 Engagement activities

Phase	Date	Source name	Source description	Questions asked	# of stakeholders	Score
Historical Engagement	May-18	Stakeholder advisory panel	As a precursor to our CEG, the Stakeholder Advisory Panel offered us a forum to raise and discuss issues with a range of interested parties including representatives from Citizens Advice, Age UK and the Energy and Utilities Alliance.	We presented to the panel on a range of topics across the years of its existence, including build up for our RIIO-2 business plan on areas such as the environment, vulnerability and fuel poverty.	11	2.0
Discovery	Aug-18	Renewable energy association teleconference	N/A	N/A	4	2.0
	Aug-18	Ofgem's RIIO-2 Customer and Social working group on 30 Aug 2018	N/A	N/A	12	3.0
	Sep-18	Deliberative workshops	We delivered full day deliberative workshops in each of our regions to discuss what services customers find important, find our customer expectations of GDNs and gather feedback on our (at the time) four draft customer outcomes. The sessions began with information-giving and building knowledge of Cadent, then eliciting participants' views of services and priorities.	Participants were asked about their awareness of us and expectations of a GDN. Participants were also asked for their views on the four draft outcomes in our business plan: keeping your energy flowing safely, reliably and hassle free; protecting the environment and creating a sustainable energy future; working for you and your community safeguarding those that need it most; value for money and customer satisfaction at the heart of all our services. The aim of the discussions was to shape these draft outcomes and identify any gaps.	206	2.0
	Sep-18	Ofgem RIIO-2 whole systems workshop	N/A	N/A	35	2.0

Discovery	Oct-18	Focus groups with hard to reach groups	We held focus groups with individuals considered 'hard to reach' in each of our regions. Each group contained 8-10 participants and lasted two hours. Participants covered three groups: urban customers with English as a Second Language, Future Generations and Non-Customers (predominantly from rural areas). These built on our previous deliberative workshops, whose voices could otherwise become 'lost within the crowd'.	Participants were asked what they expected of us. The four draft outcomes for the business plan were shared with participants and they were asked for their views on these, what they wanted to see from us and whether there were additional outcomes that we should include.	57	3.0
	Jan-19	Parliamentary renewable and sustainable energy group meeting	N/A	N/A	50	2.0
	Aug-19	Cadent's Environment & Sustainability Commitments - Executive Summary	We commissioned Enzen to compile a report on our environmental and sustainability commitments. This provided us with a view of what other organisations are doing to help to tackle climate change. Whilst most organisations have robust plans surrounding their direct operations, few go beyond this to actively engage with their employees outside of the workplace.	N/A	0	1.0
Willingness To Pay	Jan-19	NERA report for Cadent: The benefits of extending the gas network to off-grid communities	We commissioned NERA to estimate the social benefits of extending the gas network to off-grid communities or supporting fuel poor customers in obtaining connections to the gas grid. The report concludes that the value of providing a network extension is higher in rural areas and trends upwards over time due to growth of uptake. Furthermore, from 2030 onwards, the value of the extension depends upon the evolution of the mix of heating technologies.	N/A	0	3.0

<p>Business Options Testing</p>	<p>Jun-19</p>	<p>Cadent customer forum, round 4, Traverse</p>	<p>We held our fourth customer forum in Ipswich, London, Birmingham and Manchester to get customers' views on their priorities on a range of issues. This cross section of customers discussed with us various options (some proposed by us, some suggested by them) in a deliberative style session. Key topics discussed included: customer service, replacing pipes, reinstatement, interruptions, fuel poverty, carbon monoxide, decarbonising energy and becoming carbon neutral.</p>	<p>Participants were asked questions about a range of topics. On customer service, we explored what "great" looks like. We also asked about timeliness and communication with respect to reinstatements. We also tried to understand the level and type of service customers want during an unplanned interruption, including views on provisions, length of time without gas, and timeslots for getting the gas turned back on. We also asked for views on our options for addressing fuel poverty and carbon monoxide.</p> <p>With regards to resilience, we sought to understand what risks customers prioritise when replacing mains pipes and how this is influenced by bill impact as well as views on minimum standards of service.</p> <p>On the environment, we discussed: whether the theft of gas should be a priority (and who should benefit from successful recovery), whether connecting off-grid communities was a good way to decarbonise (and who should pay for this) and customer views on our plans to make our business operations carbon neutral.</p>	<p>200</p>	<p>2.0</p>
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Business Options Testing	Aug-19	Cadent customer forum, round 5, Traverse	<p>We held our fifth customer forum in Ipswich, London, Birmingham and Manchester with 130 participants to get customers' views on their priorities on a range of issues. This cross section of customers discussed with us various options (some proposed by us, some suggested by them) in a deliberative style session. Key topics discussed included: minimum standards and compensation; options for raising PSR awareness; interruptions - both acceptable length and appropriate provisions; supporting customers in vulnerable situations; options for our objective to become a carbon neutral business, the merits of connecting off-grid communities; and roadworks information and communication.</p>	<p>Participants were asked questions about a range of topics. On minimum standards, customers were asked whether current standards and levels of compensation were appropriate. With respect to PSR awareness, customers were asked about their preferred package of options. For interruptions, we discussed which provisions customers feel we should provide as a core package and how customers would like to be informed of the availability of those provisions as what an acceptable duration for interruptions was. We also explored if there is an appetite for our engineers to be trained to do minor pipe and appliances repairs. On environmental options, we discussed our commitments around becoming a carbon neutral business and the connection of off grid communities. Finally, we discussed which communications methods customers prefer with respect to roadworks.</p>	130	3.0
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<p>Business Options Testing</p>	<p>Aug-19</p>	<p>Public consultation, BOT, qualitative phase, Traverse</p>	<p>We commissioned Traverse to conduct a survey of 2,605 members of the public to understand views on certain aspects of our business plan in each of the 4 outcome areas (environment, quality experience, trusted to act for society and resilience). The survey revealed strong support for utilities working together to minimise disruption and for outstanding customer service, as well as providing useful information on the relative importance to customers of different types of information and different environmental initiatives.</p>	<p>Participants were asked questions to understand their views and preferences on issues within each of the four outcome areas. On resilience, customers were asked which one single improvement we should make to reduce disruption the most. In relation to a "quality experience", customers were asked what level of service they'd love the most and how much they'd be willing to pay to ensure a customer in a vulnerable situation could get enhanced help if their gas stopped working. On the environment, customers were asked their relative preference for initiatives to achieve carbon neutrality and eliminate avoidable waste to landfill. Customers were also asked how much they knew about the decarbonisation challenge. Finally, for "trusted to act for society", customers were asked what the most important information to know about us was and how we can help the customer / Cadent conversation flow. We also asked about their awareness of us.</p>	<p>2,605</p>	<p>1.5</p>
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Business Options Testing	Aug-19	Domestic and business surveys, quantitative phase, Traverse	We commissioned Traverse to conduct a survey of more than 2000 domestic customers and more than 500 business customers to understand preferences between the different business options under consideration across 14 different service areas. The options presented combined service provisions e.g. educate 50,000 customers most at risk of CO poisoning and a monetary impact on the customer's annual bill. Across both the domestic and business surveys, the highest weighted average scores, supporting the most ambitious options, were achieved in areas relating to safety and protection of customers in vulnerable situations: responding to carbon monoxide incidents, repairing and replacing faulty appliances, helping customers in vulnerable situations without gas and carbon monoxide safety.	Domestic and business customers were asked their preferred options (with varying degrees of ambition / cost) for 14 commitments: 1. Carbon Monoxide Safety 2. Responding to Carbon Monoxide incidents 3. Repairing and replacing faulty appliances 4. Helping vulnerable customers without gas 5. Helping all customers without gas 6. Getting customers back on gas 7. Carrying out safety checks 8. Minimising disruption from our works 9. Tackling Fuel Poverty 10. Awareness of Priority Services Register 11. Priority Services Register training 12. Becoming a carbon neutral business 13. Communities not currently connected to gas 14. Keeping the energy flowing reliably and safely	2,547	3.0
Acceptability Testing	Oct-19	Phase 4 - Business interviews and surveys	We commissioned Traverse to test the acceptability and affordability of our proposed plan amongst business customers. This consisted of an on-line / face to face survey of 504 business customers and in-depth qualitative telephone interviews with 45 business customers. This showed that the plan had achieved high levels of acceptability and affordability from a business customer perspective.	Business customers were asked about the acceptability and affordability of our overall plan. If they said that the plan was unacceptable, they were asked to explain their response. If they said that it was neither acceptable nor unacceptable, they were asked what they would like to see in order to find it acceptable. Business customers were also asked to rate the acceptability of the outcome areas (environment, quality experience and resilience). Then, having learnt about the outcome areas, customers were asked as "informed customers" to rate the overall acceptability and affordability of the plan.	549	2.0

Acceptability Testing	Oct-19	Acceptability testing - final survey report on domestic customers,	We commissioned Traverse to test the acceptability and affordability of our proposed plan amongst domestic customers. This consisted of surveying 4,446 domestic customers through on-line and face to face methods. This showed that the plan had achieved high levels of acceptability and affordability amongst domestic customers, including those who are fuel poor.	Customers were asked about the acceptability and affordability of our overall plan. If they said that the plan was unacceptable, they were asked to explain their response. If they said that it was neither acceptable nor unacceptable, they were asked what they would like to see in order to find it acceptable. Customers were also asked to rate the acceptability of the outcome areas (environment, quality experience and resilience). Then, having learnt about the outcome areas, customers were asked as "informed customers" to rate the overall acceptability and affordability of the plan.	4,446	2.0
	Oct-19	Acceptability testing - focus groups with the general population	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 79 members of the public in regional focus groups. Participants were supportive of our plans for quality experience and resilience, but no consensus was reach on our environmental plans.	A group discussion was facilitated to discuss views on our plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	79	2.0
	Oct-19	Acceptability testing - customer forum	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 109 customers who had attended previous customer forums. Overall, participants found our plans to be both acceptable and affordable.	A group discussion was facilitated to discuss views on our plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	109	2.0

Acceptability Testing	Oct-19	Acceptability testing - focus groups with future customers	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 20 "future customers" (16-18-year olds) in 2 focus groups. Participants were supportive of our plans for the environment and resilience but questioned whether helping customers in vulnerable situations was part our remit.	A group discussion was facilitated to discuss views on our plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	20	2.0
	Oct-19	Acceptability testing - interviews with CIVs	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) by interviewing 20 CIVs. Overall, our plans were supported, and all found the plans affordable.	Throughout the interviews the CIVs were explained the elements of the plan, asked to comment on whether they found each outcome acceptable, which elements were important to them, and whether they had any additional comments. They were also asked whether the new business plan was affordable.	20	2.0
	Oct-19	Acceptability testing - fuel poor focus groups	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 35 customers in fuel poverty in regional focus groups. Overall, participants were supportive of our plans in all three areas.	A group discussion was facilitated to discuss views on our plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	35	2.0
	Oct-19	Verve business plan consultation	We commissioned Verve to gather views on our plans to reduce our carbon footprint from 25 customers. We did this through an online forum with customers and stakeholders to discuss the key components that we shared on our EAP. This included our intentions to support our employees to make a positive difference to tackling climate change.	Participants were asked about their awareness of us, discussed the three outcome areas (environment, quality experience and resilience), discussed the bill impact breakdown (both at present and as a result of the plan), risks and uncertainties and innovation funding.	25	2.0

1.3. How engagement has shaped our thinking

Many of our stakeholders and customers indicated that they want us to support off gas grid communities, which fits well with the whole systems approach that Ofgem expects in RIIO-2.

During the RIIO-2 Whole Systems Stakeholder workshop, with 35 participants, Ofgem indicated that off gas grid connections were a clear example of a whole-systems approach whereby gas-connection costs avoid the need for increased electricity investment. The 50 participants at the All-Party Parliamentary Renewable and Sustainable Energy Group meeting also emphasised that whole-system costs should be considered, including household costs and reinforcement of the electricity network.

Despite the widespread industry support for supporting off gas grid communities, the Renewable Energy Association indicated that they do not support extending the gas network.

By contrast, as part of our business options testing public consultation, over 60% of the 2,605 respondents believed that we should undertake trials of some nature into the extension of the gas network to support communities without gas supply.

Stakeholders and customers also provided a variety of suggestions regarding how we can best support off gas grid communities, recommending that we improve communication and affordability and consider solutions beyond gas connections.

Hard-to-reach stakeholders indicated that more information should be provided to off gas grid communities about the support we can provide for them. In particular, they were unclear about the benefits they would receive if they converted and requested much more information about how and when their areas might become connected.

1.4. Cost of connections

Discussions at the All-Party Parliamentary Renewable and Sustainable Energy Group meeting emphasised that whole-system costs should be considered. Additionally, a variety of stakeholders and customers wanted us to support off gas grid communities in an affordable manner. Our Stakeholder Advisory Board stated that we should use our off gas grid programme to tackle fuel poverty. The discussion at the All-Party Parliamentary Renewable and Sustainable Energy Group meeting also suggested that we need to consider how to mobilise the 'able to pay' and the 'not able to pay' markets.

Participants in deliberative workshops wanted us to extend connections to off-gas rural areas without charge, and participants in focus groups with hard-to-reach stakeholders suggested that we provide subsidised or free connections.

However, during Ofgem's RIIO-2 Customer and Social Issues Working Group, stakeholders recommended that we should consider fuel-poverty solutions beyond gas connections, paying close attention to the assistance we will provide to communities. While this does not indicate a lack of support for off gas grid connections, it does suggest that stakeholders want to see us going beyond these activities.

1.5. Research

We asked NERA Economic Consulting to undertake a study into the social benefits of extending the gas network to off gas grid communities. Their study showed that connecting off gas grid communities creates extensive societal benefits both in urban and in rural areas, with benefits increasing over time.

Table 3 below shows the net present value (NPV) of an example customer switching from a range of alternative fuels to a gas-fired boiler, as measured by the societal cost of the difference in fuel costs. This calculation assumes that the difference in fuel cost would be achieved over a 25-year period.

Table 3 NPV benefit of a customer switching to natural gas

Alternative Technology	NPV Benefit of Switching to Natural Gas in 2021, Measured by Reduction in Societal Cost of Fuel (£/customer)	
	Urban	Rural
Electric storage heater	4,520	4,844
Electric panel	12,744	13,068
Oil boilers	9,168	6,575
Solid fuel (wood, coal, coke)	38,743	18,000
LPG and bottled gas	11,200	11,146
Bio-LPG	10,171	10,432

Source: NERA analysis.

For an infill project to proceed under current practice, it would require a positive NPV based solely on comparing the NPV of expected network transportation charges with the cost of the extension.

The NERA report suggests that many more schemes would pass this economic test if wider socio-economic benefits were also included in the cost-benefit analysis.

If we were considering schemes to encourage gas uptake in a particular area (i.e. not to individual properties in which the fuel is known), we could take a weighted average of the benefit values shown in table 09.2. in order to assess a project’s societal benefit and viability.

2. Assessing the measurement options



2.1. How are off gas grid connections currently measured?

At Cadent, we record connections made to our network. Grid connections are measured via regulatory reporting and the Fuel Poor Network Extension Scheme (FPNES). However, no Ofgem incentive currently exists to facilitate the connection of off gas grid communities.

During RIIO-2, many connections have been made under the FPNES which helps fuel poor households that are not connected to the gas grid to switch to natural gas by providing funding towards the cost of the connection.

However, individual householders in the off gas grid communities we intend to target are not eligible under FPNES because either they are not classed as being fuel poor or they would qualify for the FPNES but the network does not extend sufficiently close to their property.

In these localities, where the FPNES is not a consideration, communities are able to make their own enquiries to us to understand the process relating to connection to the gas grid, including an indicative

cost. These communities are also able to make enquiries to independent gas transporters who are also able to install and operate a network extension.

Cadent has not overseen any connections to our network during the RIIO-1 period to date. Any communities that have connected during that period have done so via an independent gas transporter.

2.2. How does the current measure deliver against customer outcomes and priorities?

Given that no connections of off gas grid communities have been made directly to our network during RIIO-1, it is apparent that our current measures have not been successful in facilitating community connections.

This is disappointing given that such connections could lead to carbon reductions as most off gas grid communities continue to rely on significantly more carbon-intensive fuel sources than natural gas.

However, given the continued high dependency by such communities on the most carbon intensive fuel sources it is clear that alternative sources of fuel has also failed to provide a significant pull factor.

2.3. Assessing good practice

We have given careful consideration to the experience of connecting off gas grid customers on the island of Ireland. See Annex A.

2.4. Incentivising off gas grid gas connections in Great Britain

The gas networks have, in the past, operated large infill projects in which geographical areas off the gas grid are filled by extending the gas network. This required effective communication and wider stakeholder engagement to ensure there was the required support to make each network extension a success.

Affordable Warmth Solutions (AWS) is Cadent’s fuel-poverty partner and manages the provision of gas connections to homes who qualify under fuel poverty criteria. Gas central heating is still recognised as the most effective and economical option to reduce heating bills. Where the connection of a whole community is needed, AWS provides a managed service with a strong presence to ensure top-class engagement with the residents and other stakeholders when completing the necessary works. AWS has a strong track record in project delivery, with impressive testimonials from those involved. The expertise of AWS would leave them well placed to assist with the management of the connection of off gas grid communities if the criteria were altered and/or the projects described in this Output Case are progressed.

2.5. What options have we considered?

We have considered three options:

Table 4 Options to support off grid communities

Option 1: Introduce a managed service			
Element	Description	Pros	Cons
Process	We would introduce a managed service to make it easier for communities to explore connecting to the gas network and guide them through the application process.	<ul style="list-style-type: none"> Limited incremental cost over RIIO-1 	<ul style="list-style-type: none"> Engagement suggests awareness is low, so uptake is likely to be limited

Interaction with Government Policy	We will continue to lobby the Government to consider the benefits of extending the gas network to some communities. It represents an economical and efficient solution to deliver carbon reductions quickly and would be seen as a positive move by communities, rather than a least-worst option imposed in them.	<ul style="list-style-type: none"> No incremental cost over RIIO-1 	<ul style="list-style-type: none"> We are reacting to government policy decisions rather than trying to influence them in line with what we think would benefit off gas grid communities
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Option 2: Undertake a trial, proactively bringing gas to communities

This would involve connecting a community or communities of c. 475 homes as part of a trial that will demonstrate whether there is evidence to support proactively extending the gas grid.

Element	Description	Pros	Cons
Process	<p>We would undertake a trial in which we lay mains and service pipes to properties in off gas grid communities, and then offer to connect individual properties at a time convenient for them. We would then proactively approach residents in the community to offer them a connection.</p> <p>An engagement process would be used to identify homes that might want to connect.</p> <p>We would introduce a managed service to make it easier for communities to explore connecting to the gas network and guide them through the application process.</p>	<ul style="list-style-type: none"> Date of connection could be tailored to customer needs, e.g. we could connect them when they need to replace their boiler anyway Helps to raise awareness of the option to connect to the gas network and its potential benefits Makes it easier for communities to connect to the gas network Small trial mitigates the risk of asset stranding Aligns with best practice from elsewhere 	<ul style="list-style-type: none"> Small risk of assets becoming 'stranded' if few new customers connect to the network after we proactively lay mains Additional resource is required to establish and manage this process
Interaction with Government Policy	Connecting a community as part of a trial will demonstrate whether there is evidence to support proactively extending the gas grid. Using this evidence, we would continue to lobby the Government	<ul style="list-style-type: none"> Provides firm evidence of take-up rates in off gas grid communities 	<ul style="list-style-type: none"> May not be aligned with the future direction of Government heat policy

	<p>to consider extension of the gas grid as an efficient solution to deliver carbon reductions. The evidence from this trial will be valuable to inform Government policy and may result in heat or building policy becoming more supportive of gas network extensions, as a result of the observed local support for our approach.</p>	<ul style="list-style-type: none"> Evidence and learning from a more proactive process could be useful both to inform our future stance on network extension and government decisions 	
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Option 3: Undertake a large trial proactively bringing gas to communities

This would involve connecting a number of communities totalling around 1050 homes as part of a significant trial to demonstrate whether there is evidence to support proactively extending the gas grid.

<p>Process</p>	<p>We would undertake a larger trial in which we lay mains and service pipes to properties in off gas grid communities, and then offer to connect individual properties at a time convenient for them. We would then proactively approach residents in the community to offer them a connection. An engagement process would be used to identify homes that might want to connect. We would introduce a managed service to make it easier for communities to explore connecting to the gas network and guide them through the application process.</p>	<ul style="list-style-type: none"> Date of connection could be tailored to customer needs, e.g. we could connect them when they need to replace their boiler anyway Helps to raise awareness of the option to connect to the gas network and its potential benefits Makes it easier for communities to connect to the gas network Trial mitigates the risk of asset stranding Aligns with best practice 	<ul style="list-style-type: none"> Slightly larger risk of asset stranding than Option 2 if few new customers connect to the network after we proactively lay mains Additional resource required to establish and manage this process
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		from elsewhere	
Interaction with Government Policy	Connecting communities as part of a trial will demonstrate whether there is evidence to support proactively extending the gas grid. Using this evidence, we would continue to lobby the Government to consider extension of the gas grid as an efficient solution to deliver carbon reductions. The evidence from this trial will be valuable to inform Government policy and may result in heat or building policy becoming more supportive of gas network extensions, as a result of the observed local support for our approach.	<ul style="list-style-type: none"> Provides a larger evidence base that Option 2 of take-up rates in off gas grid communities Evidence and learning from a more proactive process could be useful both to inform our future stance on network extension and government decisions 	<ul style="list-style-type: none"> May not be aligned with the future direction of government heat policy

2.6. How the options deliver against our objectives

Table 5 Options appraisal against objectives

	Option 1: Maintain status quo	Option 2: Undertake a trial of greater proactivity in bringing gas to communities	Option 3: Undertake a significant trial of greater proactivity in bringing gas to communities
To deliver connections to off gas grid communities where this provides a net benefit	Yellow	Green	Green
To deliver connections as affordably as possible	Light Green	Light Green	Light Green
To design a process that is easy for communities to follow	Light Green	Green	Green
To provide Government policymakers with an accurate understanding of gas take-up rates and subsequent carbon reduction	Light Green	Light Green	Light Green
To ensure that communities are fully engaged during a connection process and that our approach is led by their preferences and needs	Yellow	Green	Green

No delivery	Weak delivery	Some delivery	Delivery	Strong delivery
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3. Assessing performance levels



The current Government's heat policy is focused on the electrification of heat, which could result in the decommissioning of the gas network. However, there are other carbon reduction options that the government could pursue, such as the injection of biomethane and/or hydrogen into the gas network and/or the use of the gas network to support electrified heat in times of peak demand. The connection of off gas grid communities prior to each of these scenarios would be beneficial in reducing carbon emission in all of those future scenarios.

We commissioned Enzen to compile a report on our environmental and sustainability commitments. Enzen concluded that we had delivered 49% of our 2021 FPNES target by March 2017.

This evidence of our strong delivery, taken together with the societal value of making gas connections as outlined NERA's research, suggests there would be a societal value in making gas connections to off gasgrid communities. NERA's research demonstrated a societal benefit over a 25 year period would result from new gas grid connections, thereby providing carbon reduction benefits in the short to medium term prior to the introduction of heat solutions in the long term.

As an input to the ongoing policy debate, we are proposing using trials to demonstrate the success of the practice. This is also prudent given the mixed support for connecting off gas grid communities that was demonstrated during our engagement.

For this reason, rather than proceeding to connect off gas grid communities indiscriminately without first demonstrating the benefits, we have considered three delivery approaches: maintenance of the status quo continuing to only connecting projects where the NPV is positive and not undertaking a trial, and two varieties of trials that can demonstrate the actual demand for gas connections in off gas grid communities and the wider societal benefit described in the research undertaken by NERA.

3.1. Cost assessment

Table 6 below outlines the cost implications of the three options alongside their impact upon customer bills.

Table 6 Indicative costs of the delivery approaches considered

Trial of proactive approach	Option 1: Managed service	Option 2: Trial	Option 3: Large Trial
Capex cost to achieve (RIIO-2 period)	0	£2.3m (Capex)	£10m (Capex)
Partnerships (RIIO-2 period)	Introduce a managed process	Introduce a managed process	Introduce a managed process
Opex cost to achieve (RIIO-2 period)	0	£0.6m	£0.6m
Total cost	0	£2.9m	£10.6m
Average customer bill impact per year	£0.01	£0.02	£0.09
Key assumptions / comments			

We used three off gas grid villages in our network areas as a basis to develop the indicative costs of Option 2 in table 09.3. The cost to extend our mains to each property, including engagement but excluding any services and inhouse works, equates to £4,800 (total, not NPV). The opex costs for Option 2 are based on four FTEs to manage the proactive customer engagement and managed service. Assessing this cost per property passed against the NERA NPV research indicates that a connection to the gas grid would be beneficial in 11 of the 12 cases NERA considered. The only instance in which the NERA assessed NPV as higher is when a customer is using storage heating in an urban setting and therefore is unlikely to be relevant to customers in off gas grid communities.

The capex costs for Option 3 are based on construction costs for four actual settlements in our regions and the opex costs are based on 8 FTEs. Assessing the cost per property passed for Option 3 against the NERA NPV research indicates that a grid connection would be beneficial in 9 of the 12 cases NERA considered.

3.2. Customer testing



Feedback from our Customer Engagement Group highlighted that there may be opportunities to align these trials with Ofgem funding initiatives that are supporting heat decarbonisation research and action on consumer vulnerability.

Our Customer Engagement Group suggested this approach, given Ofgem's key RIIO-2 objective, is that network companies support the transition to a smarter, more flexible, sustainable low-carbon energy system.

While we recognise that connecting off gas grid communities will not eliminate carbon emissions, it would act to significantly reduce carbon emissions by converting those customers currently burning home heating oil and coal.

In addition, potential innovations such as biomethane and hydrogen injecting in the gas network will serve to increase the benefits of conversion to the gas network.

Several different stakeholders, including our Customer Engagement Group, recommended the use of an independent organisation to engage with communities before during and after installation. This engagement should include discussions on the options available to the support the decarbonisation of a home's heating, including improved energy efficiency advice.

Business Options Testing (BOT)

As part of the August 2019 BOT, with over 2,500 business and domestic customers, with respect to supporting off-grid communities with the connection process, the least ambitious option - supporting off-grid communities without any pilots to examine the potential benefits - was the most popular, with 39% of the vote.

The more ambitious Options 2 and 3, which involved the additional provision of two and six pilots respectively, received 27% and 33% of the vote respectively. Option 1 was the favoured option in all four regions. At the qualitative workshops as part of the fourth customer forum, with 200 participants in Manchester and Birmingham, Option 3 was the clear preference. However, there was a significant discrepancy between the voting statistics (which were very supportive of trials and support for off-grid communities) and the tone of the conversation, which was more sceptical.

For the 525 businesses surveyed, results were similar, but Option 3 became the favoured option with 35% of the vote (compared to 34% for Option 1). However, zero-employee businesses favoured Option 1 with 38% of their votes.

At the fifth Cadent customer forum, in August 2019, the 130 participants were asked to vote for one of three options:

- Option A - Cadent will support off gas grid communities that are investigating connecting to the network (at a cost of £0.01).
- Option B - Support as in Option A with the addition of two pilots to examine the potential benefits of connecting off gas grid communities (at a cost of £0.02).
- Option C - Support as in Option A with the addition of six pilots to examine the potential benefits of connecting off gas grid communities (at a cost of £0.05).

The discussion centred around two main issues: the principle of running trials subsidised by customers, and the future use of hydrogen. Participants' decisions were mainly guided by three factors: price, environmental impact and safety. Many participants rejected the suggested options or caveated their support because they did not feel that this was something that should be subsidised by customers. Instead, they suggested that if we wanted to demonstrate the environmental benefits of gas, we should use our profits to pay for it. Similarly, when discussing the connections in the context of the switch to hydrogen, some participants raised concerns that their gas bill might increase.

Environmental impact was an important consideration for participants who cited it both as a reason to vote for Option C (on the assumption that gas is cleaner than oil and will be getting even cleaner in the future) and for rejecting all of the options (on the assumption that the country should invest in renewables instead). Safety was mainly raised in the context of connecting communities in the future to a grid powered by hydrogen. Some participants were worried about the safety implications of this change.

3.3. Which option is our preference and why?

It is important that we undertake triangulation to reconcile the views of customers, Government, Ofgem and Cadent when considering which option we should take forward due to the mixed opinions customers provided when asked about supporting off gas grid customers to connect to gas.

38% of consumers asked in our business options testing indicated they did not wish to support extensive work to connect off gas grid consumers by choosing Option 1. However, this does not mean that those customers wish to see no support for off gas grid communities; rather, they preferred an extension of the current, limited practice.

29% of those questioned supported Option 2, undertaking a trial into connecting off gas grid customers and 33% supported the more ambitious trial Option 3.

It is important to note that this means a strong majority of customers, 62%, support Cadent undertaking a trial into the connection of off gas grid consumers.

Given Ofgem's RIIO-2 support for a transition to a sustainable low-carbon energy system and customer support for trials to test the benefits of connecting off gas grid consumers, we believe there is justification to undertake an initial trial as detailed in Option 2. The exact number of properties targeted will depend on the engagement and other practicalities on the ground, but we would plan to provide the capability to connect in the order of 500 homes. The costings for and targets have been based on the 3 example communities which total 475 homes.

We recognise that, without replacing the gas with biomethane, hydrogen or blends of low or negative carbon gas, these communities would never reach net-zero emissions for heating via the gas network.

However, by connecting off gas grid communities that currently use higher-carbon emitting fuels than natural gas, during RIIO-2, we would be facilitating significant carbon reduction in the short to medium term, with reductions achieved at a faster pace.

Connecting such communities during RIIO-2 provides enough carbon saving over the next 20-years, as evidenced by the NERA research, to justify gas-network connection.

In addition, connecting off gas grid communities will enable those communities to benefit from innovation in hydrogen blending in future while also immediately reducing levels of fuel poverty.

If hydrogen ready appliances become available, as signposted by manufacturers such as Worcester Bosch, these could be installed as part of the trial, to enable residents to switch to hydrogen with minimal additional disruption, if their gas network converts at some point in the future within the lifetime of the appliance.

3.4. Funding mechanism

While we propose to undertake the off gas grid connections trial, BOT feedback has led us to consider the most appropriate funding option.

The varied regional support demonstrated by BOT has led us to deem inappropriate those funding mechanisms that would see customers in individual networks pick up their share of the cost. This is because some networks, such as the East of England, have significantly greater numbers of off gas grid communities.

Therefore, we are proposing that the cost should be spread across all energy users. We believe this is more appropriate as the resultant emissions reductions will deliver whole-system benefits to wider society.

The costs breakdown of our final proposal for innovation funding, under the Network Innovation Allowance, to meet the capex costs of £2.28m is outlined in Figure 09.04. The table also outlines the proposed opex costs which relate to a four-person team who would manage the process. These opex costs have been include in our base plan.

Table 7 Cost make up of final proposal

Cost Make-up of Final Proposal	
Innovation Funding cost to achieve (RIIO-2 period)	£2.28m
Opex Costs relating to the managed process	£0.64m
Total cost	£2.92m
Average customer bill impact per year	£0.02

If the trial proves successful and approval is given to extending the programme of off gas grid community connections, we propose that this be undertaken as a Price Control Deliverable (PCD), with Cadent given properties-passed and properties-connected targets to achieve. This is in line with good practice in Northern Ireland.

This trial will also scope whether changes are required to the Connection Charging Methodology to support and enable the extended programme of connecting off gas grid communities.

3.5. Acceptability testing

The environmental aspects of our business plan were found to be highly acceptable during acceptability testing:

- 36% of business customers surveyed the environmental aspects of the plan "very acceptable" and 47% "fairly acceptable" (83% in total). The breakdown across business sizes was broadly consistent, but overall acceptability was lowest for sole traders.
- 83% of domestic customers surveyed found the environment section of the plan acceptable, and only 1% found it unacceptable.
- Participants in qualitative follow up workshops with different groups (e.g. future customers, those in fuel poverty, those in vulnerable situations) also generally found it acceptable.

There were no specific comments raised on during acceptability on our commitments relating to off-gas grid customers.

4. Our commitments



We have included the following action in our Environmental Action Plan (Appendix 07.04.00).

Action
We will support off gas grid communities wanting to connect to an increasingly low carbon gas supply

Our current policy requires a guarantee of 40% consumer take-up of gas before we commit to connecting an off gas grid community. This policy is in place to minimise the risk of assets becoming 'stranded'.

However, it is evident from the lack of communities connecting during the RIIO-1 period that this high bar for immediate community take-up is impractical and has prevented communities from connecting.

Therefore, to facilitate connections in the trial areas, we intend to set targets in a new way.

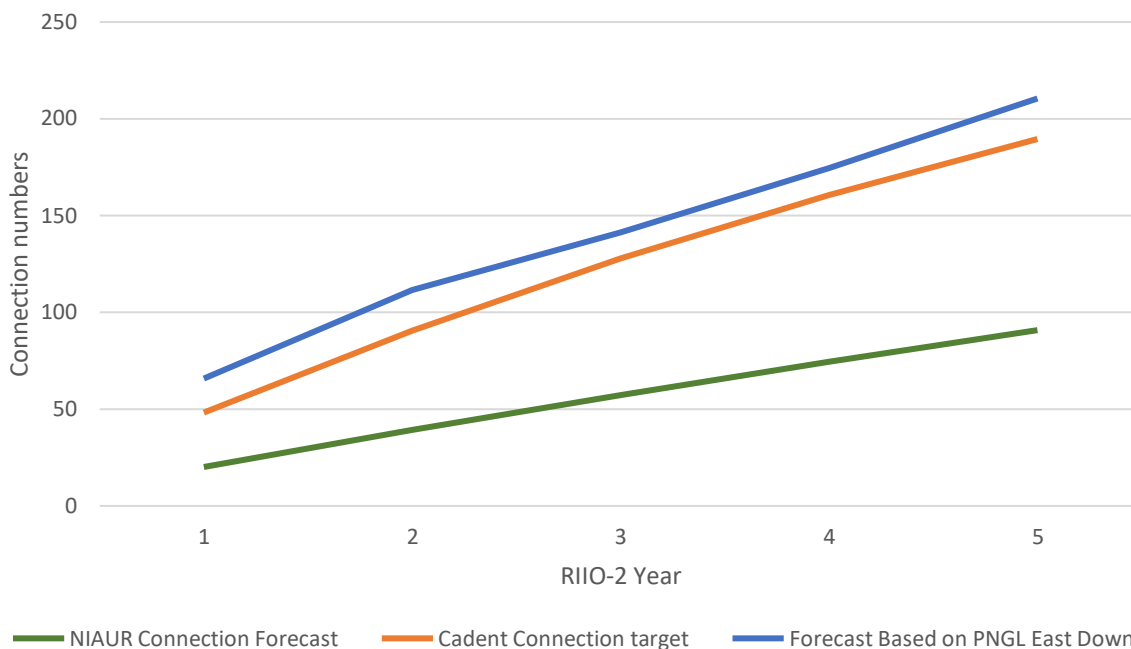
This will involve the introduction of a five-year path to the 40% connection target.

We will measure our performance by considering the number of properties connected each year as a proportion of the properties passed and total properties in the trial area.

This will enable us to report these figures to Ofgem and directly compare the connection rate to that of other regions, such as Northern Ireland, where connections are being made to off gas grid communities.

Figure 1 demonstrates the take-up rate we envisage over the RIIO-2 period. Our modelling is based on best practice from Northern Ireland where the gas network remains in the roll-out stage.

Figure 1 Cumulative connections forecast



5. Delivering our commitments



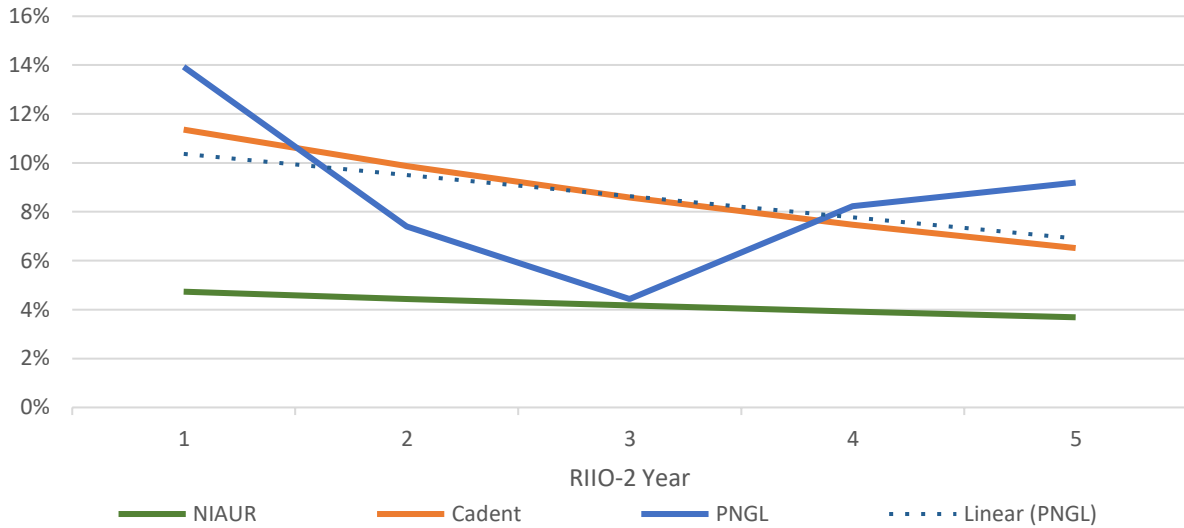
We set our targets by benchmarking against:

- The Northern Ireland Utility Regulator (NIAUR) formula for connection take-up (about 5% per year until a total of 85% of available properties have connected).
- the targets PNGL, owners of the Greater Belfast Network, set for connections for the East Down Project, which is currently working to facilitate potential connections for 22,000 off gas grid consumers. PNGL submitted actual connections estimates for the East Down area as part of the Northern Ireland GD17 Price Control process.

Figure 2 illustrates our related connection rate of around 12% per annum (i.e. the percentage of properties that will be connected per year out of the total available properties). Again, the Cadent target is shown alongside the target the NIAUR use to assess GDNs' connection targets and the PNGL connection rate forecast for their East Down Project.

We have set our target using the NIAUR formula but have forecast higher take-up levels, thereby forecasting a similar performance level to that which PNGL estimate for their East Down Project.

Figure 2 Connection rate



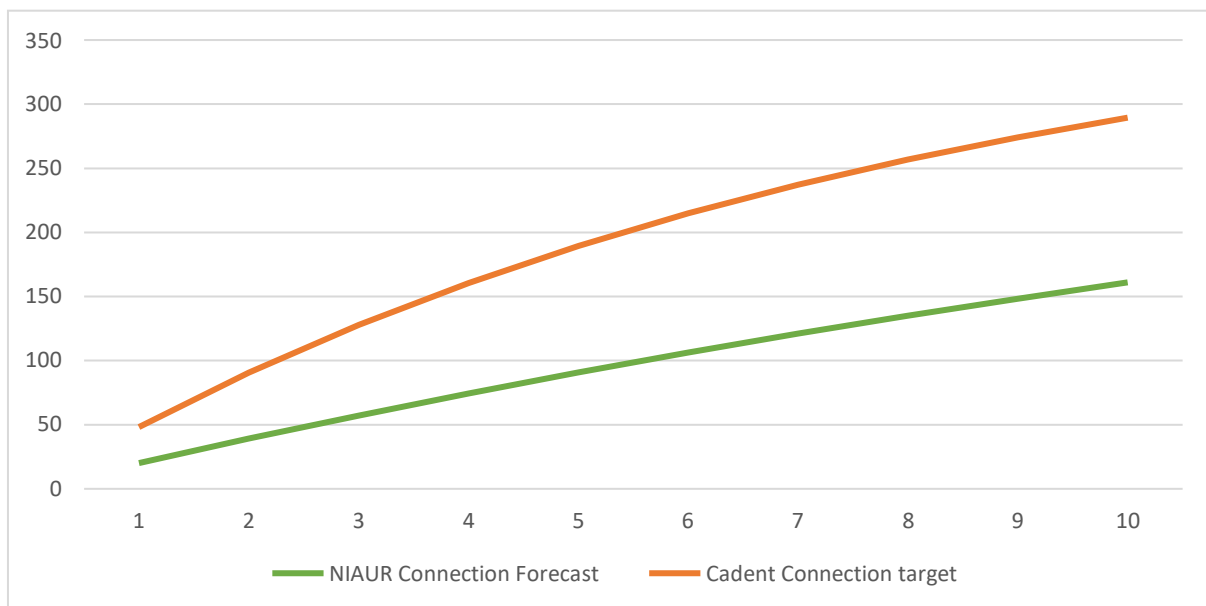
The connection rate starts higher and tails off slightly, reflecting the likely latent demand for gas connections in off gas grid communities, which will result in some customers connecting straight away.

5.1. Beyond RIIO-2

Figure 3 illustrates how we forecast connections in the trial community would progress after the RIIO-2 period, reaching over 60% of properties within ten years.

Again, this forecast demonstrates significant ambition when compared to the NIAUR forecast that predicts that one third of properties will connect within ten years.

Figure 3 Connections forecast RIIO-2 and beyond



6. Delivering our commitments



The four-person team that the opex funding provides for will be tasked with ensuring delivery of our 40% target by the end of RIIO-2.

They will undertake this task by establishing a managed service for the trial areas based on models we have previously used in partnership delivery of FPNES. This successful delivery approach includes energy efficiency measures alongside the installation of the new gas heating system.

This will involve proactively approaching residents in the community to inform them that gas mains will be laid in their area within a specified period.

We will subsequently undertake an engagement process to identify homes that might want to connect, with information provided to help residents identify the best low carbon solutions for their situation, including energy efficiency measures.

We will provide a managed service to ensure the connection process runs smoothly and the customer has a single point of contact throughout. We will also consider actions to support community take up, such as a coordinating service and boiler replacements, and energy efficiency improvements.

We will also conduct local advertising campaigns and community information events to make it easier for communities to explore connecting to the gas network and guide them through the application process.

These proposed activities are in line with the good practice of by Northern Irish GDNs who are presently connecting thousands of off gas grid customers per year. On this basis, we are confident that we can outperform the NIAUR connection rate.

6.1. Protection against non-delivery

The plans within this output case create in-built protection against non-delivery. This is because our plan is to undertake off gas grid community connections on a trial basis before wider rollout if the trial proves successful and is supported by Ofgem.

Even in an instance when support is forthcoming from Ofgem, a trial is undertaken and it proves unsuccessful due to limited customer take up, the cost impact upon customers would be relatively low given that costs would be shared across all customers' bills.

It is our intention to manage the rollout of the trial ourselves. However, if this was not possible our new contracting arrangements permit us to implement delivery of the trial indirectly via a partner such as Affordable Warmth Solutions or via a Utility Infrastructure Provider, who undertake infill projects of this nature as their day job.

Only after a successful trial would a wider rollout of connections to off gas grid communities take place.

By pursuing this approach we are minimising the risk of asset stranding that would result from significant capital spending on new network mains to off gas grid communities and a subsequent lack of take-up.

ANNEX A – Experience of connecting off gas grid customers on the island of Ireland

Incentivising off gas grid gas connections on the island of Ireland

Natural gas was first introduced to Northern Ireland via the Scotland to Northern Ireland gas pipeline in 1996.

GD17 is the price control for the six-year period from 1 January 2017 onwards for the three gas distribution operators in Northern Ireland. In its approach for GD17, the Utility Regulator of Northern Ireland stated that the main aim for GD17 was to “continue the growth and development of an economical gas network. This will mean a strong focus on ensuring the NI GDNs have appropriate incentives to grow their networks to allow new customers the opportunity to connect to natural gas. In addition, it will mean an emphasis on having the right mechanisms in place so that NI GDNs remain committed to connecting those customers with access to natural gas.”

In the final determination for the GD17 price control process, the regulator reaffirmed that the aim of the price control was “to deliver a gas industry with more connections and more mains network to extend the benefits of gas to more customers”.

Two mechanisms were included in GD17 to encourage the NI GDNs to continue growing an economical gas industry:

- a connections incentive, which rewards the NI GDNs for connecting owner-occupied domestic customers
- a properties-passed incentive, which incentivises the NI GDNs to lay infill mains to pass more properties that do not currently have access to natural gas

Uncertainty mechanisms for infill, new build mains and economic projects have also been put in place.

Connections incentive

The connections incentive is a per-connection allowance to encourage the connection of domestic owner-occupied properties. It was created due to initial difficulties in promoting gas connections. It is up to the NI GDNs how they spend the allowance, but it tends to cover the sales teams, advertising and marketing and associated overheads. There is an economic test for the connections incentive based on the principle that any new connection must be economical and therefore must pay for itself over a reasonable period. In principle, a package of new mains is considered to be economical if it does not increase the current domestic tariff. In practice, a limit of 40p per therm has been applied to determine economic infill for GD17.

The incentive allowance per connection for GD17 is £550 in 2017, decreasing on a path to £420 in 2022. This is supplemented by a ‘new areas’ allowance – a new incentive for GD17, which is not planned for future price controls. This incentive acknowledges that new areas may require greater incentives to educate customers about the benefits of natural gas. New areas are defined as significant new geographic areas, which have no experience of natural gas. A figure of £50 per property passed in the new area was determined, applicable to all properties passed by the gas network, whether connected or not, in GD17 or later. When converted into a per connection allowance, this supplemented the connection allowance by:

- £150 for Firmus Energy, increasing it to £700 in 2017, decreasing to £570 in 2022;
- £60 for Phoenix Natural Gas, increasing it to £610 in 2017, decreasing to £480 in 2022; and
- £560 for SGN, increasing it to £1110 in 2018, decreasing to £1010 in 2022.

However, the regulator applies a 'non-additionality' deduction such that a certain percentage of the NI GDNs' connection target is deducted from their actual number of connections before the per connection incentive allowance is applied. This is to reflect that there will be a certain number of owner-occupied connections that would occur anyway without direct marketing or selling to these customers. For Firmus Energy, this is 25%, but for Phoenix Natural Gas this was set at 33% to reflect that gas has now become the fuel of choice in Greater Belfast. For SGN, in recognition of the fact that it is at the beginning of its network development, no non-additionality deduction is applied. Where an NI GDN underperforms the annual connection target by more than 50%, a collar will apply such that only 25% of the per-connection allowance will apply. However, in circumstances where a negative allowance would result, this would be set to zero.

Properties-passed incentive

All NI GDNs are subject to a properties-passed mechanism to incentivise them to continue to extend the network as proposed. Each NI GDN is given a target number of properties passed and failure to achieve that target would result in a penalty of £50 for each property below the target. Exceeding the target would result in a reward of £20 for each property above the target. This annual incentive is subject to cumulative performance such that an annual penalty/reward would only be applied if cumulative performance is behind/ahead of target.

Uncertainty mechanisms

The final determinations include allowances for the construction of infill and new build mains to extend the gas network to serve existing and new properties. Uncertainty mechanisms are applied to adjust for the actual number of properties passed and the actual lengths required to pass a property, subject to predetermined caps on the lengths per property.

The economic project uncertainty mechanism manages unforeseen new connections to larger industrial and commercial (I&C) customers. It is subject to a materiality threshold of £100k of total investment net of contributions and requires the NI GDN to present a business case to the Utility Regulator.

Republic of Ireland

The 2018 Network Development Plan for Ireland notes that 300,000 households in Ireland using oil for central heating could be readily connected to gas, resulting in more convenient and cost-effective heating solutions and significant environmental benefits. Gas Networks Ireland (GNI) will pursue further new-town connections to increase the penetration of the gas network in Ireland, where such expansion is economical. GNI will also expand the natural gas network through the Suburban Projects policy, connecting streets or regions that are close to the existing gas network but not connected.

The last price control for GNI (PC4) was determined for the period from October 2017 to September 2022. As part of this, an incentive for new connections was established. The objective of this new incentive is to apply a financial bonus (or penalty) to GNI if it exceeds (or fails) to meet its price control connection targets. This would operate alongside the normal 'flex' process in place for capex allowances for new connections with the objective of:

- encouraging GNI to seek new growth opportunities (on the underlying premise that new connections are positive for network use and customers)
- allowing an incremental opex for new connections in the price controls to vary if the actual number of new connections delivered is lower or higher than assumed at PC4

The incentive therefore partly operates as a connections volume driver or uncertainty mechanism as well as an opportunity for GNI to outperform its allowed cost of equity by delivering on its growth plans.

The incentive applies both to domestic housing and I&C connections, with separate targets for both. Within domestic connections, there are separate targets for housing and apartment blocks. The bonus/penalty will be applied in PC5 on comparison of total delivered connections for the PC4 period. A symmetric penalty/reward rate is set for each connection above or below the target. This rate is set at €125, €300 and €160 for domestic housing, domestic apartments and I&C connections respectively. However, the total penalty/reward for each of the separate targets is subject to a symmetric floor/cap.