



I want to connect to the transmission system

19 – I want to connect to the transmission system

What is this stakeholder priority about?

This priority is about what we do to connect, modify or disconnect new and existing sources of gas supply and demand as our customers' requirements change. Our connections service is essential to the effective working of the competitive wholesale energy market. It is an enabler for decarbonisation of the gas and electricity systems and it can support the connection of new low-carbon biomethane sources.

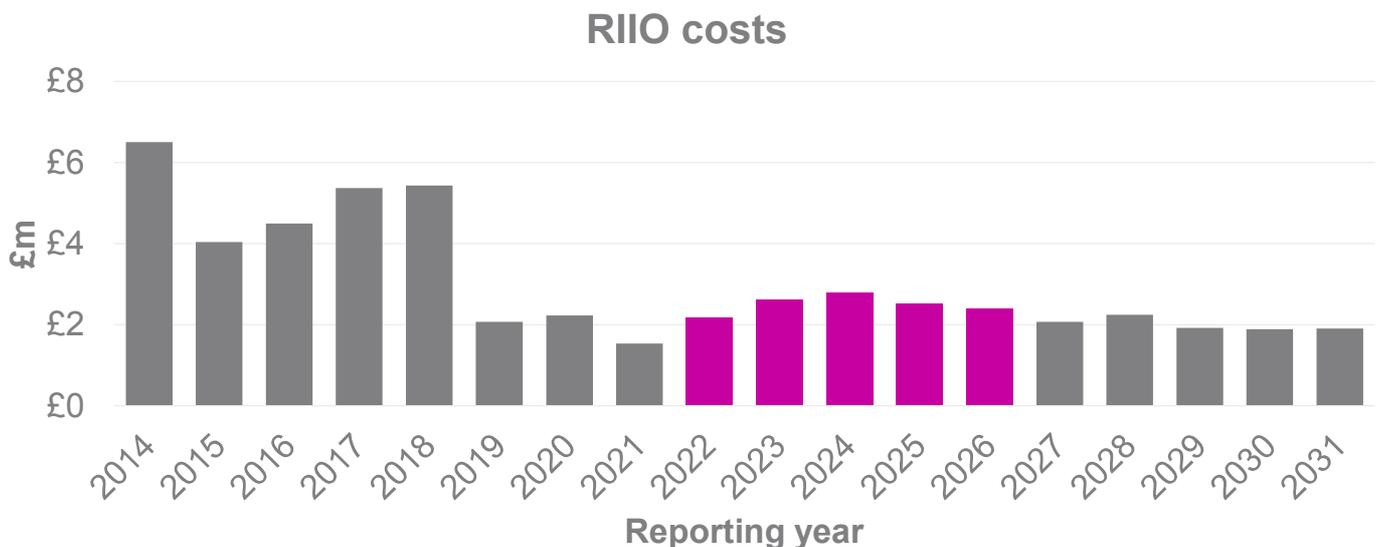
What have stakeholders told us?

Stakeholders have told us they want it to be quicker and cheaper to connect and for us to be more transparent in our processes. They want our connections service to enable decarbonisation, decentralisation and future energy systems transition.

During RIIO-2 we will:

- be proactive in marketing of connections, actively looking for new low carbon connection customers
- continue to support the liquidity of the energy market by providing an efficient process for connection and capacity applications and making process and policy improvements
- make best use of the existing network and put a simpler process in place to substitute unused capacity
- deliver more capacity where underpinned by customer commitment and informed by robust options analysis.

Figure 19.01 RIIO-1 and RIIO-2 spend profile 'I want to connect to the transmission system'



We will spend £3m per year (0.5 per cent of our RIIO-2 plan) of base revenue to run connections and capacity processes, including customer service improvements, through enhanced digital tools. We will be investing in the automation of parts of the connections process to boost efficiency, so more resources can be used to add value to customer interactions.

We have received a planning and advanced reservation of capacity agreement (PARCA) application in South Wales at the Milford Haven aggregated system entry point. If this scheme proceeds, we expect physical reinforcement of the network will be necessary. Funding for this would be outside our base revenue and covered by an uncertainty mechanism.



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1. What is this stakeholder priority about?

Our network connects supplies from nine gas importation facilities to nearly 100 offtakes for distribution networks, power stations and interconnectors, as well as eight storage sites. Four of the importation terminals provided over 80% of total GB gas supply in 2017/18.

As well as the physical connections, we manage the processes customers use to reserve capacity which enable them to flow gas onto or off the network. If there is not enough existing network capability, load-related reinforcement of the network may be necessary to provide additional capacity. Sometimes we also divert parts of our network to make way for other national and local infrastructure developments, for example road, rail and housing developments. The costs are met by the relevant developers. We also provide support to our stakeholders by administering the processes to bring new industry participants into the market, so they can trade and/or bring gas into or out of GB.

2. Our activities and current performance

Track record

Our connections performance is a current RIIO-1 output measure monitored by Ofgem. We publish quarterly reports about our connections performance on our website¹⁰⁴. We have seen an increase in connection and capacity application workload. This is driven by:

- interest from new entrants with smaller flow rates, such as biogas and compressed natural gas connections
- customers modifying terms to maximise value from existing sites or assets
- customers seeking to align gas connection and capacity reservations with electricity capacity market timelines
- increased activity around disconnections and decommissioning.

In response we have issued all customer offers on time¹⁰⁵. We have listened to what customers want and innovated through our customer low cost connections (CLOCC) project to make it easier for new types of customer to connect to our network.

Connections and capacity processes

Our connection obligations are set out in the Uniform Network Code (UNC). It is the number and type of connection and capacity applications we receive that drives our volume of work, rather than the volume of connected supply or demand. The level of connection activity is inherently uncertain and dependent on changing customer and energy market requirements.

The costs of our connections, diversions and capacity reservation work are paid by the relevant customers on a cost pass-through (no-profit) basis. If firm customer commitments trigger deeper network reinforcement, our costs for the work would be met by a separate revenue driver¹⁰⁶ mechanism agreed with Ofgem.

Figure 19.02 connection applications in RIIO-1

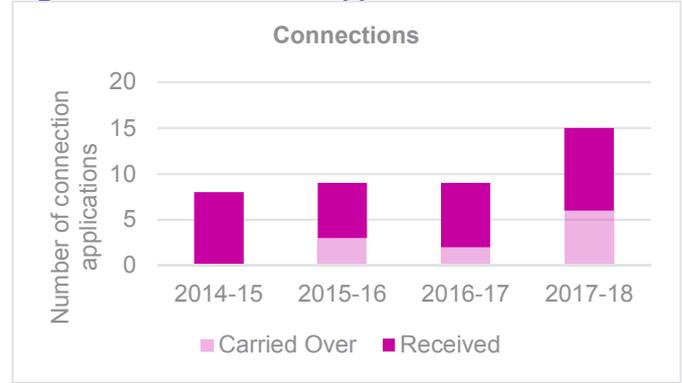
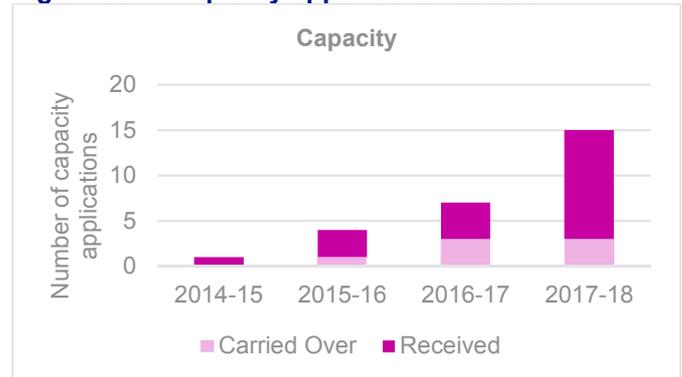


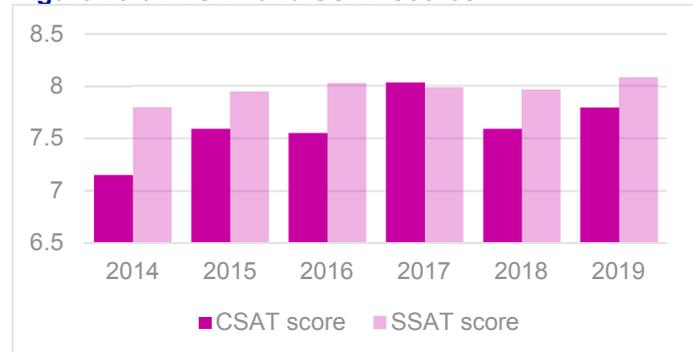
Figure 19.03 capacity applications in RIIO-1



Customer satisfaction

We are incentivised to improve our customer and stakeholder satisfaction (CSAT & SSAT). We have increased our CSAT score from 7.1 at the start of RIIO-1 to 7.8 in 2018/19.

Figure 19.04 CSAT and SSAT scores



We believe improvement in our scores is attributable to changes we have made during RIIO-1 to become more customer-focused. We are listening more intently than ever before to our customers' needs (see customer journey and customer satisfaction sections below).

Customer journeys

We interact with customers through the complete lifecycle of their projects from initial enquiry, application, commissioning, operation and disconnection to decommissioning. Our customer journey work has been focused on transforming the experience customers have through their lifecycle with us. Our ambition is to meet and exceed our customers' expectations, so we have

¹⁰⁴ <https://www.nationalgridgas.com/connections/applying-connection>

¹⁰⁵ One connection offer delivered two days outside specified timescale with consent of the customer in question

¹⁰⁶ Special Conditions 5F/5G of the gas transporter licence by which NGGT allowed revenue may be adjusted for provision of incremental entry/exit capacity.



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engaged with them to understand their pain points, thoughts and views on the service we provide. We regularly ask our customers for informal feedback and undertake formal customer satisfaction surveys. This feedback has also helped shape the proposals for the RIIO-2 period.

Our focus on improving the customer experience has delivered (amongst other things):

- implementation of a customer transformation programme focussed on key principles generated through customer feedback
- formation of a monthly experience governance body chaired by our Chief Operating Officer to challenge decisions that affect our customers and net promoter score (NPS)¹⁰⁷ programme to drive cultural changes at all levels of our organisation
- the development of a customer relationship management system that, moving forward, will enable a consistent experience, drive efficiency and support our goal of delivering a personalised customer experience.

Facilitating energy markets and decarbonisation

Our connections service provides essential 'liquidity' for the competitive wholesale gas market to work effectively, allowing market participants to bring the cheapest sources of gas supply into the GB market through different entry points. Most of our exit direct connections to date have been for gas-fuelled power stations and these help the electricity market to operate competitively. Our connections service is a key enabler for decarbonisation, decentralisation and future energy systems transition. For example, we have facilitated the almost complete switch from coal to gas as the fuel of choice for flexible electricity generation; the carbon intensity of electricity generated from gas is roughly half that of electricity from coal¹⁰⁸.

Innovation through Project Customer Low Cost Connections (CLOCC)

Stakeholders told us that our costs and timescales can be a blocker to connecting to our network, particularly for smaller, non-traditional gas producers and consumers. In response, we initiated project CLOCC¹⁰⁹ a gas Network Innovation Competition (NIC) project undertaken alongside three small and medium-sized enterprises (SMEs). CLOCC fundamentally challenged every aspect of our connection process, aiming to provide new connection options suitable for the needs of our changing customer base. The project met its goals, delivering a suite of changes. These pave the way for small and medium connections at a cost of less than £1m and in less than 12 months from initial enquiry to 'gas on'. We've made key improvements in the following three areas:

- **A new online gas connection application portal to provide improved and standardised information.** It allows potential customers to identify candidate connection points through a map-based interface and to be provided with capacity availability and immediate cost estimates. There is 24/7 access to check and track application progress. We currently have 66 companies registered, and 103 cost estimates have been completed by these potential customers exploring connection options. Historically, we have received approximately 10 pre-connection requests over a 12-month period, therefore this increase in connection interest is notable. In addition, feedback on the delivery of the new online connections platform from SSAT scores has been overwhelmingly positive, with one customer (a biogas company) providing a satisfaction score of 10.
- **New pre-approved and pre-appraised standard design connections.** Suitability of over 200 AGI sites for accommodating standardised connections have been pre-screened and implemented in the software platform.
- **Improved commercial terms,** implemented through code modifications where necessary. Upfront application fees are reduced from £109k to £13k for simple connections and we have created a quicker route through capacity reservation for pre-screened, green light connection locations.

Optimising use of the existing system

As we moved into the RIIO-1 period, there was significant uncertainty about the supply and demand mix covering storage, liquefied natural gas (LNG) imports and potential new combined cycle gas turbine (CCGT) power stations. Given the uncertainty about load-related investment, the regulatory framework included uncertainty mechanisms to adjust our base revenue when circumstances changed. Our RIIO-1 base revenue did include the Avonmouth pipeline output (designed to help manage the consequences of the Avonmouth LNG storage facility closure). Through working collaboratively with key stakeholders, we determined this was not required and we returned the relevant allowance of £215m (2017/18 prices) to consumers.

When we assess applications, we decide on the most efficient way to meet our customers' needs. Where we can, we meet customer capacity requirements by substituting capacity from one point on the system to another, and this ensures we make best use of the existing system. It avoids the cost and time that could be involved in deeper system reinforcement to provide more capacity. During the RIIO-1 period (up to 2018), we managed all changing customer requirements without needing investment in incremental capacity. We have accommodated the equivalent of several large power stations through substitution.

¹⁰⁷ NPS is an index ranging from -100 to +100 that measures the willingness of customers to recommend a company's products or services to others.

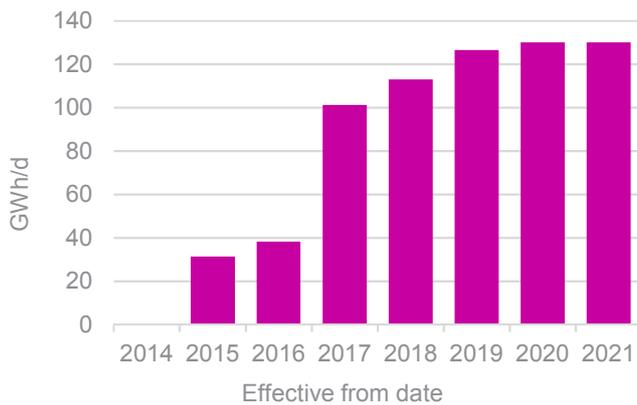
¹⁰⁸ https://www.parliament.uk/documents/post/postpn_383-carbon-footprint-electricity-generation.pdf

¹⁰⁹ <http://projectclocc.com/>



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Figure 19.05 cumulative use of substitution to meet entry and exit requirements during RIIO-1



New incremental capacity

Substitution will not always provide a solution to meeting customer capacity requirements, there are areas of the network where physical system reinforcement would be required. On 15 March 2019, we published a notice, in accordance with the uniform network code (UNC), that a planning and advanced reservation of capacity agreement (PARCA) application in South Wales had progressed to Phase 2. Network entry capacity has been reserved for 163GWh/d of funded incremental obligated entry capacity at the Milford Haven aggregated system entry point. The indicative registration date is 1 January 2026. If this scheme proceeds, we expect physical reinforcement of the network in south Wales will be necessary. Funding for this would be outside our base revenue and covered by an uncertainty mechanism.

The Gas Act, Licence, UNC and subsequent methodologies define National Grid's obligations, activities and processes in determining the release of incremental capacity. They are subject to review and amendment through established industry governance processes and seek to achieve the right balance between user commitment and socialisation of costs across industry participants. The PARCA process is designed to enable customers and National Grid to progress projects simultaneously and it contains a number of measures that mitigate against the possibility of wasted expenditure.

Diversions

We work with various third-party building projects (like road, rail and housing developments) that are close to our gas network infrastructure. Where necessary, we divert our pipelines so that their projects can go ahead without compromising the safety of the gas transmission system. We co-ordinate our work with third party developers and other affected utilities to minimise the costs and operational impact of these diversions. So far in the RIIO-1 period we have diverted pipelines at a cost of £23m but this doesn't impose a net cost on transmission system customers because it is funded by the relevant third-party developer on a cost pass-through basis.

Case study – Fordoun, our first compressed natural gas (CNG) connection

We have been working on a new connection with Air Liquide and CNG Services in Scotland which will be the first of its kind for the NTS (and for any other 75 bar transmission grid in EU). This is a CNG mother station which will use gas from the NTS to fill trailers to deliver CNG to the whisky industry. This is Europe's largest such "virtual" pipeline, transporting gas to off-grid distilleries to support the transition from oil (used for raising steam in the boilers) to cleaner natural gas with a 30% reduction in CO₂ emissions. This is an exciting development as it is using the new concept of self build. Under this approach, the customer has been responsible for the design and build of the whole project including the NTS connection assets. In addition, following risk assessment, we were able to agree that there was no requirement for a remotely operable valve to be installed which helped to reduce the capital costs. This project has been able to accommodate a number of firsts in our approach to the connection, reducing costs to the customer wherever possible. Once the project has been fully completed, we will review the project with those involved to understand technical and commercial benefits to customers and consider how this concept can be taken forward.

Case study – our first bio-methane connection

We have been working with Biocow, a leading operator of anaerobic digestion plants and CNG Services to develop a connection for biomethane to enter the NTS, the first of its kind. This included allowing a more flexible oxygen specification using a new risk assessment. We are working towards the completion and commissioning of the project in early 2020. When injection of the biogas begins, it will be the first time a biomethane product enters the high-pressure NTS. This underlines our support for the UK's Clean Growth Strategy and is an example of how the gas network can be used on the journey to decarbonise transport, heat and power generation. We will be working collaboratively with Biocow and CNG Services to learn from the project and further review our policies and procedures in light of this new connection.

3. What have stakeholders told us?

The primary stakeholders for this topic are our customers – people and entities who pay us for the products and services we provide. This includes gas distribution networks, shippers and directly connected customers including gas storage sites and gas-fuelled power stations. We have established relationships with them through various forums spanning operational matters, code changes, connection applications and management of the various industry commercial agreements involved.



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Table 19.06 stakeholder engagement

	Connections
Stakeholder segments engaged	Customers, including entry, exit, shippers and gas distribution networks.
Objective	Understand views on current connections service and how this might change in the future.
Channel/method	Customer journey engagement, workshops, acceptability testing, webinars and value of the network study.
Key messages	Stakeholders would like greater visibility of capacity for new connections, embed project CLoCC, and continue to improve customer service and remove blockers for smaller and unconventional parties.
Trade-offs and stakeholder influence on the plan	We tested the acceptability of our proposals. This resulted in the majority of domestic consumers supporting the current plans and related costs (76%), however, 16% of respondents only support the proposed actions but not the related costs.
SUG and Challenge Group feedback	The Challenge Group have stated that our work is incomplete in this area based on feedback from some customers who still feel the process for bespoke connections is unacceptably long. We wanted to acknowledge this feedback from our customers and hope the work we have done to improve standard connections and the overall connections process shows our commitment to continuous improvement. We will continue to improve these processes through customer journeys and develop further enhancements to our connection process. See our proposals below.

4. Our proposals for RIIO-2 and how they will benefit consumers

Table 19.07 proposals

What our stakeholders have told us	Commitment	Output type	Consumer benefit
Continue to improve customer service, facilitate decarbonisation and the energy system transition and provide greater visibility of capacity for new connections.	Continue to improve our customer satisfaction in RIIO-2 measured by the continued financial incentive. We will do this through customer journey work and customer relationship management systems as we have done throughout RIIO-1 and embedding Project CLoCC. We will actively promote NTS connection opportunities to new classes of customer including those developing low carbon solutions. We will improve our customer self-service capability and provide customers with unified, timely and continuous access to relevant information by continuing to invest in the gas connections applications portal.	ODI - Current proposed cap 0.5% revenues/collar 0.5% revenues Target: 7.8/10	We support affordable energy bills by: <ul style="list-style-type: none"> - providing a better service to new and existing customers, promoting a faster route to market e.g. web portal - lower connection costs open up new locations where offtake connections were not previously seen as economically viable - keeping costs down helps GB retain a buoyant energy-intensive industry sector, in turn supporting employment for UK plc. Our plan supports a sustainable lower carbon future because we make it easier for lower carbon biogas to enter our system. Embedding Project CLoCC could provide a consumer value proposition (CVP) of £33m. For more information on CVP8 please see annex A10.05.
Facilitate the market and remove blockers	Support the energy market liquidity by meeting timescales for connection and capacity offers. Ofgem has decided to retain our existing RIIO-1 licence obligation relating to connections – specifically to comply with the connections process requirements of the UNC.	Licence obligation	Our connections service plays a vital part to ensure the cheapest sources of gas are available for GB consumers. We are part of a global gas market. The effectiveness of our processes has an impact upon the attractiveness of GB as a destination for the economic supply and consumption of gas. We ensure diverse domestic and international sources of gas can access our network efficiently. Diversity contributes positively to security of supply for consumers.
	Optimise use of existing system by substituting capacity where possible rather than building new capacity.	Commitment	Our plan supports an affordable energy bill because where possible we provide capacity without building new assets. This keeps costs down and avoids uncertainty about the enduring value of new assets in future.
	Deliver more capacity when underpinned by customer commitment, informed by robust options analysis and use of incremental capacity reopener.	Uncertainty mechanism - Trigger: Case-by-case basis, 1% baseline revenue threshold.	The UM approach avoids anticipatory investment (which could give rise to stranded assets) while enabling a timely response to development of new capacity. The UM approach and associated UNC rules seek to achieve the right balance between individual user commitment and socialisation of costs across the generality of gas consumers.



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Facilitate pipeline diversions / land developments in the vicinity of our assets	We will only seek recovery of pipeline diversion costs via transmission charges to the extent that they cannot be reasonably recovered from parties requesting the diversion. More information on UMs is provided in annex A3.02 and for non-customer funded diversions in annex A19.01.	Uncertainty mechanism - Trigger: <i>Annual iteration reopener process, 1% baseline revenue threshold.</i>	This situation can arise due to the terms of legacy deeds between National Grid and land owners. We respect the legal rights of owners upon whose land our assets are situated, while protecting the commercial interests of gas consumers.
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Customer satisfaction survey (CSAT)

We propose to retain the customer satisfaction incentive (which is wider than connections), using feedback gathered through the voice of the customer during the second half of RIIO-1 CSAT process. We shared this at two webinars and an operational forum. The results are shown below:

Favourable for this being a financial incentive:

- webinar 1 100% overall
- webinar 2 80% customers, 89% all stakeholders.

Favourable for our proposed approach:

- webinar 1 100% overall
- webinar 2 80% customers, 88% all stakeholders.

For more information please see annex A3.03.

5. How will we deliver?

As the energy market decentralises, we have seen a surge in connection requests from smaller customers, many of whom are new to the sector with less knowledge of the gas system and the industry's ways of working. These new entrants expect easy to use digital tools to help them connect to the network and existing customers are also coming to expect easy and instant access to information that helps them run their businesses.

IT systems

The changes we are implementing because of Project CLoCC are spearheading how we are being more responsive to all customer needs. Our new gas connection application portal is now live and this will benefit all customers regardless of size and type. Throughout RIIO-2, we will continue to invest in the portal, related internal systems and other aspects of our website to improve our customer self-service capability and provide customers with unified, timely and continuous access to relevant information. We will invest in the IT capability of digital experience, channels and engagement. New functionality¹¹⁰ introduced by these tools makes us more efficient, cutting down paperwork, reducing administration and saving time. For example:

- automatic generation of key files and standard contracts with customer data
- three types of customer journey; standard connection design, bespoke and PARCA
- email notification to customers and NGGT employees about changes in application status
- customers can self-serve downloading/uploading offers and acceptances
- ability to raise and track invoices.

Our second key enabler for improved delivery is the implementation of our Customer Relationship Management (CRM) system. This system will underpin how we manage our customer connection process across its entire lifecycle. CRM is the most efficient and effective way to manage customer data, our processes for interacting with customers and our identification of opportunities or issues. Following deployment in 2018 we've begun to digitise parts of that journey but, to ensure we can offer an end to end simple, tailored and flexible service to customers, we will need to invest to bring more aspects of our customer interactions into the CRM system's remit.

RIIO-2 competition

We have considered Ofgem's business planning guidance request to identify projects with a value over £50m that are potentially suitable for early competition. We identify the network reinforcement project to increase entry capacity at Milford Haven as a candidate that meets this threshold value. However, we "unflag" this project on the grounds that we do not think it is suitable for contestability. This is because alternative, non-asset, solutions have already been thoroughly considered and ruled out in our assessment of the PARCA application. We are uniquely qualified to perform this assessment due to our privileged access to information in our joint role as TO and SO in GB. For late competition we have flagged it as it is over £100m. As the project is in early phases it is too early to know if this would be suitable for late competition. As the process progresses, we will work with Ofgem to determine if the project should be considered for late competition. For further detail see chapter 20.

Native competition

To discover the most efficient costs for large projects, such as the Milford Haven capacity increase, we will apply best practice competitive procurement processes. The specific timing and conduct of tender events will be determined on a case by case basis considering where development consent order land use planning approval is required.

Customer choice "self-connect" competition

Some customers have told us they would like the opportunity to deliver their own local connection works, rather than relying upon us to connect them to our system. We are currently supporting a 'self-connect' trial and this will provide valuable learning about the changes in process, roles, responsibilities and commercial

¹¹⁰ <http://projectclocc.com/uncategorised/2257/>



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arrangements that would be necessary to offer a self-connect option more widely. As part of this work, we will consider if it is appropriate to charge a profit margin on work that we deliver. This should support an overall cost reduction for our customers.

Innovation

Table 19.08 innovation in RIIO-2

Theme	Projects
Fit for the future	Digital platform enhancements to improve our customer self-service capability (business as usual innovation). Digital twin technology for customer connections. Taking a whole energy approach to connections through online tool enhancements.
Ready for decarbonisation	Use artificial intelligence, machine learning to improve our customers' connection experience.
Decarbonised energy system	Develop commercial and asset related requirements for future hydrogen customer connections. Impact assessment of hydrogen blending for existing connection assets.

6. Risk and uncertainty

Our future workload is uncertain because so much of our activity is driven by the number and complexity of the connection and capacity applications that we receive from customers. We assess workload by tracking the enquiries that we have received and monitoring market trends including outputs from the Future Energy Scenarios process. Through Project CLoCC, we already know there

is increased interest from customers who want to connect. This confirms that the time and cost savings we've identified for the application process make connection to the network a viable option for new kinds of customer. Considering the inherent uncertainty around future work requirements, we're proposing that only business as usual costs in our control are included in our base revenue. Expenditure for project specific connection or capacity schemes will only be incurred if customer activity triggers a requirement for the work, and it will either be customer-funded on a case-by-case basis or handled by regulatory uncertainty mechanisms (see annex A3.02). This is in consumers' interests because it means that, wherever possible, we will only incur costs based upon firm customer commitments.

7. Our proposed costs for RIIO-2

Our estimated costs for RIIO-2 reflect a balance between the increase in workload we are seeing, our increased spending on IT, and the efficiency benefits we expect to achieve from working smarter, for example, using the customer portal. We have assumed that we can flex resources across internal teams to meet peaks and troughs in workload, with zero net cost for customer-funded work. The following tables show our system operator activities base revenue to cover operating costs for the customer account management, connections contract and network analysis teams who manage our portfolio of commercial agreements with customers. Customer service (IT) is for investment for more responsive customer service including: website, connections portal and customer relationship management system.

Table 19.09 summary of connections costs by activity

Activity spend (£m in 18/19 prices)	2022	2023	2024	2025	2026	Total RIIO-2	Annual RIIO-2	Annual RIIO-1
System operator activities	0.9	0.9	0.9	0.9	0.9	4.5	0.9	1.2
Customer service (IT)	1.1	1.5	1.7	1.4	1.3	7.0	1.4	1.3
Pension costs	0.2	0.2	0.2	0.2	0.2	1.0	0.1	0.0
Total spend	2.2	2.6	2.8	2.5	2.4	12.5	2.5	2.6

Note to table 19.09: Diversions and local connection works are not included, as these costs are borne by customers on a cost pass-through basis.

Table 19.10 summary of connection costs by RRP category

RRP category (£m in 18/19 prices)	2022	2023	2024	2025	2026	Total RIIO-2	Annual RIIO-2	Annual RIIO-1
Direct costs (BPDT 2.02)	1.0	1.0	1.0	1.0	0.9	4.8	1.0	1.1
Non-operational capex (BPDT 3.07)	0.7	1.1	1.2	1.0	1.0	5.0	1.0	1.0
SO capex (BPDT 3.08)	0.3	0.4	0.5	0.4	0.3	2.0	0.4	0.3
Controllable pension costs (BPDT 2.02)	0.2	0.2	0.2	0.2	0.2	0.8	0.2	0.0
Grand total	2.2	2.6	2.8	2.5	2.4	12.5	2.5	2.6

Notes to table 19.10: Direct cost includes the team to carry out connection activities. Non-operational capex includes customer service improvements (IT).

Please note we have provided costs to one decimal place and hence some columns may not equal to the totals. Pension costs are based on proportion of total TOTEX.