



CGI IT UK Ltd
20 Fenchurch Street
London
EC3M 3BY / UK
Tel. +44 (0) 7711 035 899
cgi.com/uk/utilities

9 May 2023

Ofgem
10 South Colonnade
Canary Wharf
London
E14 4PU

FAO: Digitalisation and Decentralisation; Energy Systems Management and Security

Subject: Call For Input | The Future of Distributed Flexibility

Dear Sirs,

CGI welcomes the opportunity to respond Ofgem's Call for Input on the Future of Distributed Flexibility. Our response is based on our research and practical experience of working with energy system actors on facilitating access to, and the use of, distributed flexibility.

The Call for Input is timely and we agree with its assertion that the market has not delivered a solution. We believe that Ofgem and the newly formed Department for Energy Security and Net Zero (DESNZ) have an important role to play by using their convening power with market participants to accelerate the participation of CERs and DERs in the provision of distributed flexibility services and improve market liquidity.

CGI is among the largest IT and business consulting services firms in the world, operating across 21 industry sectors in 400 locations worldwide. We deliver digital services and solutions across the utilities industry, including the electricity, downstream natural gas, and water and waste sectors. CGI is at the forefront of market change and innovation in the utilities sector and is trusted to deliver, operate and secure the systems that enable competitive utility markets around the globe to operate efficiently. These include the data systems at the heart of the GB Smart Metering Implementation Programme for the DCC, the balancing and settlement systems for ELEXON and the systems for MOSL in the competitive non-household water market.

Yours faithfully,

Rich HAMPSHIRE
M +44 (0) 7711 035 899
E rich.hampshire@cgi.com

Table of contents

1	The imperative, potential, and challenges of flexibility	3
2	The case for change	6
3	What that future could look like	9
4	Delivery considerations	11

1 The imperative, potential, and challenges of flexibility

Britain's legally binding commitment to achieve net zero by 2050 requires decarbonisation of the electricity system. This enables decarbonisation of land transportation and heat through electrification, which will result in fundamental changes in the dynamics of the energy system. On the supply side there will be a move away from large, dispatchable, flexible generation towards orders of magnitude more intermittent, inflexible, renewable generation assets. These new supply assets will take the form of distributed energy resources (DERs) and behind the meter Consumer Energy Resources (CERs).

On the demand side there will be a dramatic growth in demand from the electrification of heat and transport.

This combination of growth in new sources of demand and behind the meter generation is likely to lead to an increase in the demand volatility seen by the system and an associated increase in the system need for flexibility. This increased requirement for flexibility combined with the loss of the current primary sources of system flexibility (dispatchable fossil fuel generation) will create an opportunity for alternative sources of flexibility, such as distributed flexibility, to meet that system need. Achieving access to those sources of flexibility will require clarity on the market mechanisms and ease of access to those markets¹²³.

If the energy system is to be optimised economically, then access to distributed flexibility could deliver a *net* benefit of £1.4 bn - £2.4 bn per annum by 2030⁴ (at an electricity carbon emissions intensity target of 100 g/kWh – higher than the net zero limit set in June 2019).

Other figures for the benefits of flexibility are quoted as a *gross* benefit. These include a gross benefit of £3bn - £3.8 bn per annum⁵ at an equivalent 100 g/kWh carbon emissions intensity, increasing to a *gross* benefit of £7.1 bn - £8.1 bn per annum at an intensity of 50 g/kWh. Both figure ranges are based on a non-optimised generation portfolio.

When calculated on the basis of the generation portfolio being optimised, the total gross savings in terms of reduced operational and capital costs when comparing between low and high-flexibility systems are quantified at £4.5bn per annum⁶ for the 100 gCO₂/kWh emissions level (increasing to around £6bn per year for the 50 gCO₂/kWh).

The gross benefits of flexibility are determined from the projected reduced investment and operation costs for reaching a given emissions target. The system wide benefits of integrating new sources of flexibility relative to the use of conventional thermal generation-based sources of flexibility are £3.2bn - £4.7bn per annum⁷ in a system meeting a carbon emissions intensity of 100 gCO₂/kWh in 2030.

These figures were produced before the UK committed in 2019 to a legally binding target to bring all greenhouse gas emissions to net zero by 2050. It would be worth revisiting this research and establishing the *net* value of flexibility in a scenario that takes account of a fully decarbonised electricity system and the energy cost challenges that have emerged since 2022.

¹ [Energy Flexibility | Transforming the Power System by 2030](#) (2016), Utility Week Insight Report commissioned by CGI.

² [Demand Side Flexibility | Transforming the Power System by 2030](#) (2017), Utility Week Insight Report commissioned by CGI.

³ [Embracing Flexibility | Transforming the Power System by 2030](#) (2018), Utility Week Insight Report commissioned by CGI.

⁴ [An analysis of electricity system flexibility for Great Britain](#) (Nov 2016), a study by Imperial College and Carbon Trust for the BEIS and Ofgem in support of the A smart, flexible energy system: call for evidence (2016)

⁵ [Value of Flexibility in a Decarbonised Grid and System Externalities of Low-Carbon Generation Technologies](#) (Oct 2015), a study by Imperial College and NERA Economic Consulting for the Committee on Climate Change's Fifth Carbon Budget

⁶ [Delivering future-proof energy infrastructure](#) (Feb 2016), a study by Imperial College and University of Cambridge Energy Policy Research Group for the National Infrastructure Commission's Smart Power Report

⁷ [ROADMAP FOR FLEXIBILITY SERVICES TO 2030](#) (May 2017), a report by Imperial College and Poyry for the Committee on Climate Change's 2017 Report to Parliament – Meeting Carbon Budgets: Closing the policy gap.

In addition to these direct benefits in terms of the cost of energy, there are additional, indirect benefits to the economy of up to £1.3bn per annum⁸ to GDP and 10,000 jobs by 2050 in the domestic market for smart systems and flexibility solutions, with a potential additional £2.7bn per annum and 14,000 jobs arising from the export potential for smart systems.

1. What do you think distributed flexibility could contribute to the energy system?

Distributed flexibility from distributed energy resources (DERs) and consumer energy resources (CERs) that is easily accessible by the markets in which it creates value can play a significant role in economically decarbonising the electricity system. This will also ensure that consumers continue to benefit from the levels of reliability of supply they enjoy today. Additionally, enabling DERs and CERs to participate in the markets for flexibility will enable wider policy objectives around consumer empowerment and providing consumers with meaningful choices about how they satisfy their energy needs.

Specifically, DERs and CERs will be able to participate in the national, regional and local markets to offer system services. Access to distributed flexibility will enable the system needs for flexibility to continue to be addressed as the existing sources of system flexibility retire. It will also enable the emerging challenges associated with increasing demand volatility and 'masked demand' (due to behind the meter generation) to be dealt with.

Equally, consumers' ability to allow their CERs to participate in the markets for flexibility, either directly or by choosing to give agency over their assets to a flexibility service provider, will shift market power from the supply side towards the demand side⁹. Consumers, or their chosen agents (flexibility service providers, aggregators or demand side response service providers), will move from being 'price takers' to becoming 'price makers' through making their distributed flexibility available to the system.

The challenge is one of addressing barriers to participation of DERs and CERs in the markets for flexibility and ensuring those markets are well functioning. We therefore welcome the opportunity to respond to this Call for Input.

2. Will a focus on CER flexibility also help enable other forms of flexibility, especially distributed flexibility?

We agree with the Call for Input that activity to address barriers to distributed flexibility should consider the challenges to CERs participating in the markets for flexibility services and not just address the challenges associated with DER participation. Focusing on DERs without consideration of CERs risks inadvertently exacerbating the challenges of CER participation, which has the potential to further delay the CER opportunity (and therefore delay the decarbonisation of the electricity system) and reduce the liquidity in the market for alternative sources of system flexibility.

Focusing on CERs should enable the broadest identification of barriers to assets participating in the provision of flexibility services. The Paving the Way to Net Zero Insight Report¹⁰, commissioned by CGI, identified the importance of a cultural shift in many of the current market actors and the need for them to embrace new attitudes to risk. This is relevant because the transition to a more decentralised and active energy system

⁸ [Transitioning to a net zero energy system | Smart Systems and Flexibility Plan 2021](#) (July 2021), Policy Paper by Ofgem and Department of Business, Energy and Industrial Strategy

⁹ A CRITICAL INVESTIGATION INTO WHOLE SYSTEM TRANSITIONS TO LOW CARBON FUTURES AND NEW SOURCES OF ENERGY FLEXIBILITY IN GREAT BRITAIN'S ELECTRICITY SECTOR, Author: Mai Ngoc Nguyen (Dec 2020). A Doctoral Thesis sponsored by the Open University and CGI

¹⁰ [Paving the way to net zero | Data and digitalisation requirements for the energy transition: insights from an industry working group](#) (May 2021), page 12. Utility Week Insight Report commissioned by CGI.

changes fundamentally the risk landscape. This in turn has implications for regulation and how market actors are incentivised.

There are also significant challenges in setting out and agreeing a common set of rules on how market actors interact and what they should reasonably expect of each other. This leads to which actors have what rights over the dispatch of flexibility and in which circumstances; the 'Primacy Rules'.

We note that Ofgem funded the three TEF projects (TRANSITION, led by SSEN; EFFE led by WPD [now NGED]; and FUSION, led by SPEN) under the Network Innovation Competition in 2017 that were designed to explore the use of flexibility services from DERs and CERs. The learning from these projects should provide an evidential base that can be used to inform regulatory decisions.

2 The case for change

3. Is there a 'case for change' and a need for a common vision for distributed flexibility?

We agree with the Call for Input's assertion that the market has not delivered a solution. We would contend that Ofgem and the newly formed Department for Energy Security and Net Zero (DESNZ) have an important role to play by using their convening power with market participants (including representative groups) to establish a fair and equitable approach to the markets for flexibility, what participants can reasonably expect of each other and the interaction between markets for access to the common DER and CER resources.

There is precedent for Ofgem to use its convening power to establish stakeholder consensus. This comes from the Prospectus phase of the Smart Metering Implementation Programme. Ofgem and the then Department for Energy and Climate Change (DECC) convened a series of design working groups during 2010-2011 to define what the programme would procure and deliver.

Stakeholder research¹¹¹²¹³ conducted annually between 2016 to 2018 by Utility Week on behalf of CGI established that the top three barriers to flexibility consistently related to clarity on market arrangements, not technology. These were:

- Lack of a commercial/market framework to optimise the use of flexibility
- Commercial and regulatory barriers in the existing market arrangements for demand side flexibility
- Policy framework

Additionally, the networks businesses were concerned about:

- Lack of visibility of other market participants' demand-side flexibility arrangements
- Potential for conflicts between market participants, for example where several participants are competing for one supplier of demand-side flexibility.

4. What is your vision for how to accelerate the delivery of accessible, coordinated and trusted markets for distributed flexibility?

We agree with Ofgem's common digital vision that is future facing, future proofed, user-centric, accessible, simplifies participation by abstracting the complexity from the user, and data-rich. This will support the creation of trust between the system actors based on neutrality, transparency and clear accountability & responsibility.

These elements address many of the top barriers identified in the CGI commissioned research¹⁴¹⁵¹⁶ including providing a market infrastructure on which an agreed commercial / market framework can be implemented,

¹¹ [Energy Flexibility | Transforming the Power System by 2030](#) (2016), page 9, Utility Week Insight Report commissioned by CGI.

¹² [Demand Side Flexibility | Transforming the Power System by 2030](#) (2017), Utility Week Insight Report commissioned by CGI.

¹³ [Embracing Flexibility | Transforming the Power System by 2030](#) (2018), Utility Week Insight Report commissioned by CGI.

¹⁴ [Energy Flexibility | Transforming the Power System by 2030](#) (2016), page 9, Utility Week Insight Report commissioned by CGI.

¹⁵ [Demand Side Flexibility | Transforming the Power System by 2030](#) (2017), Utility Week Insight Report commissioned by CGI.

¹⁶ [Embracing Flexibility | Transforming the Power System by 2030](#) (2018), Utility Week Insight Report commissioned by CGI.

delivering visibility of other market participants' actions, and hence enabling conflicts to be identified and managed.

Whilst the Call for Input uses 3 'archetypes' to explore the scope of a future digital infrastructure that could address the barriers to distributed flexibility and enable the markets to function effectively, we apply a set of guiding principles to the scope of market operations.

These guiding principles for the scope of any digital infrastructure that supports the efficient operation of markets are that such infrastructure should only be responsible for:

1. activities that are **common to all market participants**;
2. activities where there are **significant economies of scale** that benefit all participants; and
3. where failure to fulfil activities correctly by **one participant has a disproportionate impact** on the ability of other participants to operate effectively, or **impacts the customers' experience of, and trust in, the markets**.
4. Additionally, the infrastructure should not be responsible for activities from which market participants can either **differentiate themselves** or **create cost leadership**.

When these fundamental principles are applied to the introduction of digital infrastructure that supports efficient market operation, the **value of the market is maximised** and the **barriers to competition minimised**. This makes it easier to get innovative new products and services to market, making it an attractive place to do business and **enhancing consumer choice**.¹⁷¹⁸

-
5. Will certainty of an end vision help accelerate enabling work and make it cohesive?
-

We agree that clarity on the vision should help accelerate progress towards an electricity system where DERs and CERs are able to participate equitably.

However, that clarity needs to be supported by the stakeholders having confidence in the stability of that vision. This can be achieved through an associated action plan or roadmap with key milestones and decision points with associated criteria.

-
6. When should a common digital energy infrastructure be in place? And therefore, when should development begin?
-

In research¹⁹²⁰²¹ conducted annually between 2016 to 2018 by Utility Week on behalf of CGI, industry stakeholders initially identified 2024 as a pivotal year for an up-tick in distributed flexibility, coming forward to 2023 in the final research report (2018).

Clearly the need to make progress is urgent. Activity should therefore commence as soon as is practical.

¹⁷ [Unique selling point](#) | Rich Hampshire | Utility Week, 03/10/2012.

¹⁸ [Beyond smart: Generating the demand-side flexibility opportunity for British energy](#) | Rich Hampshire | CGI, Sept 2017

¹⁹ [Energy Flexibility | Transforming the Power System by 2030](#) (2016), page 9, Utility Week Insight Report commissioned by CGI.

²⁰ [Demand Side Flexibility | Transforming the Power System by 2030](#) (2017), Utility Week Insight Report commissioned by CGI.

²¹ [Embracing Flexibility | Transforming the Power System by 2030](#) (2018), Utility Week Insight Report commissioned by CGI.

Realistically, allowing for agreement on market frameworks, generation of requirements, competitive procurement, build and deployment is likely to take 3 to 5 years based on programmes of similar scale and complexity.

On a more positive note, the foresight of Ofgem funding the three TEF projects (TRANSITION, led by SSEN; EFFS led by WPD [now NGED]; and FUSION, led by SPEN) under the Network Innovation Competition in 2017 should provide an evidential base that can be used to inform some of the necessary regulatory decisions and requirements.

3 What that future could look like

7. What should a common energy digital infrastructure look like, and why? Please consider the archetypes or develop your own proposition.
-

The 3 'archetypes' used in the Call for Input are useful to consider the scope of a future digital infrastructure that could address the barriers to distributed flexibility and enable the markets to function effectively.

We apply a set of guiding principles to the scope of any digital infrastructure that supports the efficient operation of markets. These guiding principles are that such digital infrastructures should only be responsible for:

1. activities that are **common to all market participants**;
2. activities where there are **significant economies of scale** that benefit all participants; and
3. where failure to fulfil activities correctly by **one participant has a disproportionate impact** on the ability of other participants to operate effectively, or **impacts the customers' experience of, and trust in, the markets**.
4. Additionally, it should not be responsible for activities from which market participants can either **differentiate themselves** or **create cost leadership**.

When these fundamental principles are applied to the introduction of digital infrastructure that supports efficient market operation, the **value of the market is maximised** and the **barriers to competition minimised**. This makes it easier to get innovative new products and services to market, making it an attractive place to do business and **enhancing consumer choice**.²²²³

Applying these guiding principles alongside Ofgem's Future Insights Paper 6 - Flexibility Platforms in electricity markets²⁴ provides a useful frame for the scope of such a digital infrastructure or Archetype.

We view the scope of a common energy digital infrastructure as being a variant of Archetype 3: Medium.

Using the platform tasks defined in the Ofgem paper, we would expect the primary functions of the digital platform to include (at least initially):

- Coordination
 - Coordinating platform tasks
 - Facilitating data flows
 - Harmonisation of standards and principles
 - Alignment with external platforms and markets
 - Conflict avoidance
- Flexibility Procurement
 - Attracting flexibility providers and purchasers to the market
 - Communicating requirements and availability
 - Matching providers and purchasers

As identified in the Call for Input, Verification of service delivery and Settlement of transactions are activities where there are existing capabilities within the market that could be enhanced to support settlement for

²² [Unique selling point](#) | Rich Hampshire | Utility Week, 03/10/2012.

²³ [Beyond smart: Generating the demand-side flexibility opportunity for British energy](#) | Rich Hampshire | CGI, Sept 2017

²⁴ [Ofgem's Future Insights Paper 6 - Flexibility Platforms in electricity markets](#) (Sept 2019) | Ofgem

flexibility services. Alternatively, if the market is able to offer a cost-effective solution for these activities, then this should be left to the market to deliver. Only if the 4 guiding principles are met should these activities be brought into the digital infrastructure.

Again, Market Services such as credit checking and asset qualification could be part of the scope of the digital infrastructure. However, it is likely that the market may be able to add value in the provision of these services, so they should only be incorporated within the scope of the digital infrastructure where the market does not deliver satisfactory solutions. The provision of analytical services via the digital infrastructure should follow the same assessment.

We see good reasons for keeping the Dispatch and Control activities separate from the coordination and procurement functions from a security perspective. This does not preclude the need for dispatch and control to be facilitated, but not as part of the primary scope of the digital infrastructure at the heart of this Call for Input.

8. What is your view on the desirability and feasibility of the archetypes or your own alternative proposition?

As detailed in the answer to Question 7, we view a variant on the scope of Archetype 3: Medium to be the most appropriate to facilitate participation of DERs and CERs in the provision of distributed flexibility services.

Archetype 1: Business as Usual has proven to present barriers to distributed flexibility.

Archetype 2: Thin does not appear to go far enough to optimise participation of DERs and CERs.

Archetype 4: Thick risks devaluing the overall potential for distributed flexibility and associated services and reducing customer choice.

4 Delivery considerations

9. Should a common digital energy infrastructure be new-build, or should it buildout from existing infrastructure?
-

It is likely that a common digital infrastructure in the context of this Call for Input will need to be new-build, especially if it is to meet the criteria of utilising modern technologies and being future facing.

It may be feasible for the infrastructure to be delivered via an extension to the roles and responsibilities of existing market entities. The opportunity to deliver this common digital infrastructure as part of other investments in industry change programmes and leverage potential economies of scale should be explored.

Some existing industry digital infrastructures may be able to be leveraged as part of the overall architecture.

10. What are the important areas for consideration when designing institutional delivery models for a common digital energy infrastructure?
-

There are organisations better placed to provide insights on this based on their roles and responsibilities.

11. What are the important areas for consideration when designing financial delivery models for a common digital energy infrastructure?
-

There are organisations better placed to provide insights on this based on their roles and responsibilities.