ofgem
Making a positive difference
for energy consumers

Consultation supplementary document

Key enablers for DSO and the long term development statement – evidence and coordination with existing initiatives

Publication date: 6th December 2019

Contact: Alex Walmsley, Senior Manager

Team: DSO and Whole Systems

Tel: 020 3961 8324

Email: flexibility@ofgem.gov.uk

This document is supplementary to the informal consultation 'Key enablers for DSO and the long term development statement'. There are many initiatives active or recently closed down that contribute to technology, data, and engineering competencies for distribution system operation (DSO). This supplementary document summarises a selection of relevant initiatives and the evidence they present for regulatory policy development. The document explains how Ofgem's regulatory work on key enablers for DSO fits in amongst other initiatives.

Contents

1. Introduction

1.1. This supplementary document accompanies the informal consultation 'Key enablers for DSO and the long term development statement'. This document offers a review of the work that industry has presented to us and the findings that have resulted in this work programme. It also summarises how this work is coordinated with ongoing initiatives across industry.

The aim of this document

1.2. Numerous initiatives that are taking place, or have taken place, consider different data, technical and engineering elements of DSO. These range from small scale demonstrator projects, through to national and international scale multi-million pound programmes of work investigating and developing DSO capabilities. Initiatives vary from focussed work on specific areas of DSO at a high technology readiness level, through to research on novel or unproven areas of DSO.

1.3. We recognise that this array of learning presents a clear input for advancement and implementation of DSO in the GB energy system. Our role as regulator is to enure that learnings are harnessed in the interests of the energy consumer.

1.4. The core aims of this document are:

1) To present the rationale of our approach to regulation for key enablers for DSO by:
    a. Present the prioritistion of forecasting and planning enablers, and the LTDS.
    b. Present our case for favouring the Common Information Model (CIM) as a suitable format to present the updated LTDS Form of Statement (FoS).

2) To explain how our work on key enablers for DSO is coordinated with existing initiatives.

The content of this document

1.5. First, Ofgem's strategic approach to DSO is summarised, before a review of industry initiatives explaining the rationale for improvements to forecasting and planning enablers and the LTDS. This highlights the requirement for regulatory engagement. Finally, we present a discussion on how our work relates to ongoing initiatives.

2. Ofgem's strategic approach to distribution system operation

DSO position paper

2.1. In August 2019, we published our position paper on DSO,[1] outlining our approach and regulatory priorities for developing distribution system operation in the interests of energy consumers. The paper explained our view of DSO as a set of functions required to take place to provide a smart, active energy system. We highlighted that there is value in optionality of decisions on DSO, and therefore believe it is in consumers' interests that DSO is pursued on a least regrets basis. This means that meaningful actions should be taken now without locking-in future institutional decisions.

2.2. In line with this approach, our key enablers for the DSO work programme is designed to: (1) ensure that progress on DSO is made now where data, technology and engineering practices are sufficiently mature; and (2) maintain policy optionality for contesting functions or wider institutional reform.

2.3. Using agile methods of working to deliver regulation, we will prioritise against feasible least regrets improvements where there is a body of evidence justifying the need for regulatory intervention.

2.4. Updating the LTDS will form the first regulatory policy action to formalise network licences to enable DSO. This will be the first instance of regulation implementing the findings of the Energy Data Task Force (EDTF),[2] and coordinated with the wider Modernising Energy Data (MED)[3] work Ofgem is conducting in collaboration with the Department for Business, Energy and Industrial Strategy (BEIS) and Innovate UK.

Feedback to our DSO position paper

[1] https://www.ofgem.gov.uk/publications-and-updates/ofgem-position-paper-distribution-system-operation-our-approach-and-regulatory-priorities
[2] https://es.catapult.org.uk/news/energy-data-taskforce-report/
[3] https://www.ofgem.gov.uk/publications-and-updates/modernising-energy-data-update

2.5. The responses we received show that we have broad, cross industry, support for our strategic outcomes and work packages on system operation reform.

2.6. We received near unanimous support for regulation to improve data transparency and interoperability, with industry agreeing that it is a priority area to facilitate DSO. Similarly, network and system operators sought open and accessible data from industry stakeholders. There was some concern from within the licenced networks as to the scope of the expected data sharing, with some raising fears around information security. Many third party industry participants expressed their support for the EDTF findings and especially the principal that all data is presumed open.

2.7. Many third party respondents expressed their support for maintaining optionality on DSO functions. Many identified the accelerated adoption of interoperability standards for data as critical for this strategy to work.

2.8. There is strong support for the prioritisation of planning and forecasting data in the near term to facilitate DSO. Many respondents agreed with the plan to update the LTDS as the first regulatory step to improving data availability in the interests of DSO.

3. Industry initiatives and key enablers for DSO

Industry provided evidence and key enablers for DSO

3.1. Numerous industry initiatives have sought to improve the technology, data and engineering competencies that underpin DSO functions. We recognise the value in these outputs, and seek to harness this learning to drive forwards DSO.

3.2. The ENA Open Networks Project workstream 3 product 5 has examined all Ofgem funded innovation projects against their assessment of DSO functions and competencies.[4] The ENA has commented that this work has revealed the wealth of knowledge generated by innovation projects. Based on the ENA's findings, we believe the findings from the projects should be harnessed and acted on to deliver consumer benefits as business as usual. We will seek to make appropriate regulatory changes to ensure DSO functions are delivered in the interests of energy consumers.

3.3. In 2016, the UK Energy Research Centre (UKERC) reported on the project readiness and learnings from Ofgem funded innovation projects.[5] The report found that whilst some innovation projects would inevitably fail to deliver customer benefits, there is a wealth of learning available from network innovation projects that should be embedded into business as usual practices.

3.4. BEIS have launched a competition titled Flexibility Exchange (FleX),[6] which has funded three demonstrator projects to develop and trial energy flexibility platforms capable of hosting multiple markets. This requires commonality in the data format and exchange

[4] The objective assessment of innovation projects will be published by the end of 2019, and will be made available here: http://www.energynetworks.org/electricity/futures/open-networks-project/workstream-products/ws3-dso-transition/products.html. The ENA ONP's definition of DSO functions and competencies are not the same as the DSO functions recognised by Ofgem. The ENA first published their assessment of DSO functional and system requirements in 2017, and superceded this in 2018. This assessment, along wider a wider industry review, contributed to Ofgem's thorough assessment and publication of DSO functions in our 2019 DSO position paper.
ENA Open Networks DSO Functional and System requirements:
http://www.energynetworks.org/assets/files/ON-WS3-P2%20DSO%20Functional%20Requirements.pdf
Ofgem DSO position paper: https://www.ofgem.gov.uk/publications-and-updates/ofgem-position-paper-distribution-system-operation-our-approach-and-regulatory-priorities

[5] http://www.ukerc.ac.uk/publications/a-review-and-synthesis-of-the-outcomes-from-low-carbon-networks-fund-projects.html

[6] https://www.gov.uk/government/publications/flexibility-exchange-demonstration-projects-flex-competition

between markets and platforms. Ofgem's '*Future Insights Series: Flexibility Platforms in electricity markets'* paper[1] concluded that interoperability and transparent data sharing were critical in maintaining multiple paths for future development, and that common principles should reduce barriers to innovation and potentially avoid costs of path correction at a later date. We consider that these projects demonstrate a body of evidence, supporting the need for regulatory action on key enablers for DSO.

Forecasting and planning enablers and the Clean Energy Package

3.5. Industry has provided evidence in support of improvements to forecasting and planning enablers for DSO. It is here that we believe there are clear least regrets actions to take now. We consider that common data exchange methods are foundational to ultimately realising system operation at distribution level.

3.6. The Clean energy for all Europeans package (CEP)[7] provides detailed articles on changes to energy networks. Accordingly, the present uncertainties over Brexit notwithstanding, the CEP highlights the direction of travel on energy networks across Europe, and adds further weight to the justification for formalising the mechanisms for sharing network forecasting and planning data.

3.7. In particular, article 32 of the EU directive 2019/944[8] discusses the implementation of a network development plan (NDP). The article states:

> *The development of a distribution system shall be based on a transparent network development plan that the distribution system operator shall publish at least every two years and shall submit to the regulatory authority. The network development plan shall provide transparency on the medium and long-term flexibility services needed, and shall set out the planned investments for the next five-to-ten years, with particular emphasis on the main distribution infrastructure which is required in order to connect new generation capacity and new loads, including recharging points for electric vehicles. The network development plan shall also include the use of demand response,*

[7] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans
[8] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0944&from=EN

energy efficiency, energy storage facilities or other resources that the distribution system operator is to use as an alternative to system expansion.

The distribution system operator shall consult all relevant system users and the relevant transmission system operators on the network development plan. The distribution system operator shall publish the results of the consultation process along with the network development plan, and submit the results of the consultation and the network development plan to the regulatory authority. The regulatory authority may request amendments to the plan.

Member States may decide not to apply the obligation set out in paragraph 3 to integrated electricity undertakings which serve less than 100 000 connected customers or which serve small isolated systems.

The Common Information Model

3.8. The ENA Open Networks Project (ONP)[9] 2018 products overview identified work required to improve visibility of network capacity, including a resource register,[10] and enhancements to heatmaps and the LTDS,[11] as shown in Figure 1.

[9] http://www.energynetworks.org/electricity/futures/open-networks-project/
[10] http://www.energynetworks.org/electricity/futures/open-networks-project/workstream-products/ws2-customer-information-provision-and-connections.html
[11] http://www.energynetworks.org/electricity/futures/open-networks-project/der-information/overview.html

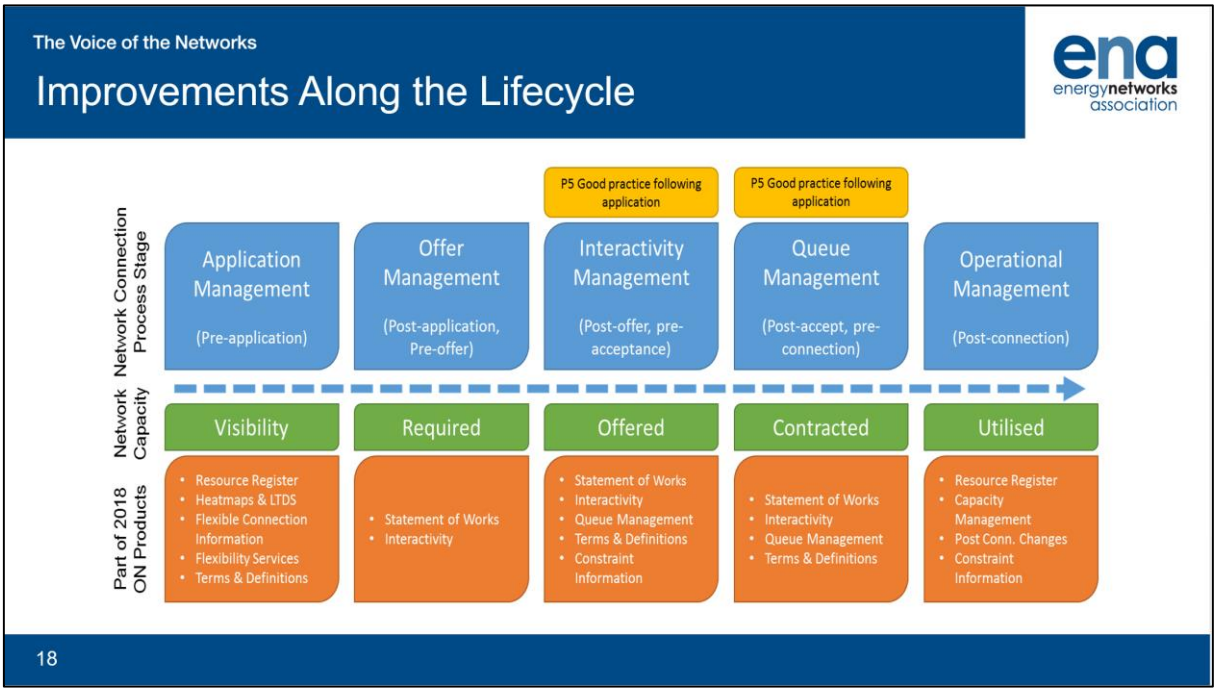

Figure 1. Energy Networks Association Open Networks Project graphic of sequential improvements to flexibility management.

3.9. The ONP 2019 workstream 1B product 4 report[12] states that further work will investigate and propose a route to establishing a common (CIM) method of data exchange. The proposal shall include the following items:

- "Recommendation to DSOs/TOs to adopt CIM as the method of data exchange in the future.
- Development of Plan
  - Agree simulation network construction standard
  - Build of simulation network
  - Agree CIM data transfer

[12] http://www.energynetworks.org/assets/files/ONP-WS1B-P4%20Data%20Scope%20-%20Final%20Report-FINAL.pdf

- Network analysis tool/software providers adoption of CIM standard
- Roll out CIM data transfer"

This product has developed significant cross network support for CIM adoption for network forecasting and planning data exchange, but has not developed the mechanism itself.

3.10. System and network operators have also individually developed strategies to support improvements in facilitating data sharing as a principal enabler for DSO. For example, the ESO write in their 2019-20 mid-year performance report[13] that:

> *stakeholders have told us that additional data submissions will be required to cover a range of additional scenarios at different points throughout the year. As a result we are acting on network companies' feedback to review the mechanism for data exchange, and considering the development of a Common Information Model (CIM).*

3.11. Similarly, SP Energy Networks commented in their submission to the RIIO-ED2 Open Letter Consultation[14] that:

> *We think DNOs should agree on a common standard for data sharing such as Common Information Model (CIM IEC 61968/61970).*

3.12. European transmission system operators (TSOs) coordinate data exchanges between them using the Common Grid Model Exchange Standard (CGMES) which is based on CIM.[15] CIM is being suggested and supported as a mechanism to do this under the TDX-ASSIST EU Horizon 2020 research project.[16]

[13] https://www.nationalgrideso.com/document/128421/download
[14] https://www.ofgem.gov.uk/publications-and-updates/open-letter-consultation-riio-ed2-price-control
[15] https://www.entsoe.eu/digital/cim/cim-for-grid-models-exchange/
[16] http://www.tdx-assist.eu/

Network Innovation Allowance case studies and the Common Information Model

Network companies have undertaken many innovation projects using the RIIO Network Innovation Allowance (NIA) and the Network Innovation Competition (NIC).[17] As set out across our price control documentation,[18,19] we have placed clear expectations on all network and system operators to embed successful innovation projects into business as usual.

Western Power Distribution's *CIM* project

Western Power Distribution's *CIM* NIA project defines a common vocabulary and basic ontology for aspects of the electric power industry via a IEC standard IEC 61970-301.[20] This project sought to:

- Extend network models to 11kV.
- Create replicable processes to combine data for EHV networks (Distribution Management Data, Geographical Information Data, and Power Systems Modelling Data).
- Test benefits that arise from creating CIM format network model in terms of software adoption, information exchange, and system interfaces.

The close down report associated with the WPD *CIM* project identifies that collating and presenting data in a portable format such as CIM may support the development of new services and applications, and support more efficient data exchanges with regulators and the transmission system operator. We believe the findings of the WPD *CIM* project are sufficiently mature to inform a structure for data management across DNOs.

[17] https://www.ofgem.gov.uk/electricity/distribution-networks/network-innovation
[18] https://www.ofgem.gov.uk/publications-and-updates/riio-2-framework-decision
[19] https://www.ofgem.gov.uk/publications-and-updates/open-letter-consultation-riio-ed2-price-control
[20] https://www.westernpower.co.uk/projects/common-information-model

UK Power Networks *KASM* project

UK Power Network's Kent Active System Management (*KASM*) NIA project[21] demonstrated the ability of the DNO to extract data from *PowerOn Fusion* and *PowerFactory* to a Contingency Analysis Application (CAS). Data from *PowerFactory* was written in CIM models, and a proof of concept demonstrated the ability to transfer this data in an interoperable format.

3.13. A piecemeal approach to data improvements, whereby system and network operators enhance individual systems, will not result in the level of interoperability that we seek for DSOs. In many instances, vendor capability to import and export to common data models such as CIM have been hailed as a route to system wide interoperability. Whilst it is encouraging to see such statements, we seek full realisation of standards such as CIM covering full bilateral comparisons of systems. Network operators should maintain a federated master dataset, rather than the current tendency to duplicate data in core systems.

Summary

3.14. Clearly there is significant interest in improving data quality, with specific reference to forecasting and planning data, and common models for data exchange. Notwithstanding the interest and enthusiasm, with the examples listed above considering good practice, scoping, investigating, and small scale demonstrators, there has been no rollout of a common model for network planning and forecasting data sharing from network initiatives. Given the clear support across industry for common methods of data transfer for planning and forecasting information, demonstrable project learnings, and our need for projects to deliver consumer benefits, we now consider that regulation is required to formalise changes and improvements. The LTDS will be updated as the first interoperable network data initiative to implement data exchange improvements.

[21] https://innovation.ukpowernetworks.co.uk/projects/kasm/

4. How key enablers for DSO fits in with ongoing initiatives

4.1. There are many initiatives underway in the DSO and data space. We are aware of the complexity of the policy landscape and the importance of navigating this space to ensure that work is not duplicated, and that outcomes are aligned. There are a number of ways that we are strategically engaging with different initiatives to achieve this.

Digital, data and technology (DDaT) strategies that our work is aligned with

4.2. The EDTF undertook a thorough investigation of energy system data, resulting in key findings and recommendations that have been endorsed in principal by industry, government and Ofgem, subject to coordination with existing regulatory frameworks.

4.3. Ofgem, BEIS and Innovate UK are continuing to collaborate and are using the EDTF findings to support their wider work on MED.[22]

4.4. The ongoing MED work and EDTF findings have set a strategic level approach to energy data. This work seeks to ensure that the use of energy industry data is coordinated with data from other industries,[23] and includes alignment with the approach taken by the Centre for a Digital Built Britain and the development of a national digital twin.[24]

4.5. Ofgem have adopted an agile approach to energy regulation, as set out in our strategic narrative 2019-2023.[25] This approach aligns with and is supported by the EDTF findings, the Industrial Strategy,[26] the Climate Change Committee,[27] and the National Infrastructure Committee.[28]

4.6. We are considering taking a principles based approach to energy system data regulation. This work is still in development. For DSO, we recognise that actions can be taken now on data access in an agile fashion, ahead of RIIO-ED2 and the maturation of

[22] https://www.ofgem.gov.uk/publications-and-updates/modernising-energy-data-update
[23] https://www.ukrn.org.uk/wp-content/uploads/2019/09/UKRN-Infrastructure-Data-Sharing-0919.pdf
[24] https://www.cdbb.cam.ac.uk/national-digital-twin-programme
[25] https://www.ofgem.gov.uk/publications-and-updates/ofgem-strategic-narrative-2019-23
[26] https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future
[27] https://www.theccc.org.uk/publication/net-zero-technical-report/
[28] https://www.nic.org.uk/publications/strategic-investment-and-public-confidence/

a principle based approach to energy system data regulation. Current data regulation is bound by existing licences, distribution codes and grid codes. Our work programme on key enablers for DSO will result in arrangements now that will interact with the transition to principles based regulation for energy system data.

4.7. Further, the EDTF final report makes the clear recommendation the LTDS should be improved in the near term.[29,30] Similarly, responses to our DSO position paper suggest that there is an appetite for specific actions in the near term and a desire to work with well-defined datasets for DSO improvements.

4.8. Similar to the EDTF findings, the Council of European Energy Regulatory (CEER) paper on digitalisation[31] also highlights the importance of network operators improving the quality of their data and data they hold on distributed energy resources (DERs) connected in order to:

- improve planning and forecasting
- provide this data to current and new flexibility market participants in an accessible manner
- consider the interoperability of this data

4.9. As part of their MED work, BEIS, Ofgem and Innovate UK have initiated two projects under the Prospering from the Energy Revolution (PFER) element of the Industrial Strategy Challenge Fund.[32] The first is to develop data best practice principles for energy data, and this is being undertaken by the Energy Systems Catapult for publication in Q1 2020.[33] This will provide a set of guiding principles for the data improvements in the energy industry, which we will take into account as we reform the LTDS. The second project is the '*Modernising energy data access'* small business

[29] https://es.catapult.org.uk/wp-content/uploads/2019/06/EDTF-Report-Appendix-5-Data-for-Multi-SO.pdf
[30] https://es.catapult.org.uk/wp-content/uploads/2019/06/EDTF-Report-Appendix-1-Recommendation-Actions.pdf
[31] https://www.ceer.eu/documents/104400/-/-/3aedcf03-361b-d74f-e433-76e04db24547
[32] https://www.ukri.org/innovation/industrial-strategy-challenge-fund/prospering-from-the-energy-revolution/
[33] https://es.catapult.org.uk/news/have-your-say-on-energy-data-best-practice/

research initiative (SBRI) to take place over 2020-2022.[34] This work will develop a common data architecture to interface sources and users of energy systems data, including an energy data catalogue, an asset registration strategy, and a digital systems map following the recommendations from the EDTF.

Initiatives we observe and review

4.10. Network companies have undertaken many projects related to DSO, data accessibility and interoperability, which we continue to observe and review. These vary across technology readiness level, geographical scale and ambition, covering NIA and NIC projects such as those listed above as well as Transition,[35] EFFS[36] and FUSION[37] (TEF) and Power Potential[38] as further examples, and also include project funded through other sources, for example European Horizon 2020 projects. The FleX competition, former BEIS innovation projects, academic and industry funded projects further contribute to the state of industry knowledge on DSO and feed in to our regulatory choices to progress DSO.[39]

Initiatives we actively monitor and engage with

4.11. The ENA's ONP is an industry led, owned and managed project;[40] Ofgem observe and monitor outputs, giving guidance on where we expect to see work focus areas. We value insight into network developments, and see this project as a forum to enable coordination and further contributions to the state of knowledge and understanding on DSO.

4.12. The ENA are re-establishing their data working group. We expect it will work to improve DNO data quality and measures to open siloed network data.

4.13. We collaborate with other regulators individually and in particular with European regulators through CEER, including through the CEER working groups. This enables our

[34] https://apply-for-innovation-funding.service.gov.uk/competition/491/overview
[35] https://ssen-transition.com/
[36] https://www.westernpower.co.uk/projects/effs
[37] https://www.spenergynetworks.co.uk/pages/fusion.aspx
[38] https://innovation.ukpowernetworks.co.uk/projects/power-potential/
[39] https://www.gov.uk/government/publications/flexibility-exchange-demonstration-projects-flex-competition
[40] http://www.energynetworks.org/electricity/futures/open-networks-project/

policies to both drive and reflect international progress, and coordinate with international initiatives.

Initiatives that we own and manage

4.14. As set out in the main document, the Long Term Development Statement will be delivered through the following forums:

- Ofgem will convene and chair a new working group.
- This new working group will define the scope and specification of the FoS content and format.
- An independent delivery body will build and deliver the new FoS. The delivery body will report to the working group.
- A secretariat to manage the administration of the LTDS delivery.

4.15. In addition to the LTDS, our work on technology, data and engineering improvements is coordinated across all of Ofgem's projects and programmes. Enhancements to network forecasting and planning will also contribute to our Access and Forward-Looking Charges Significant Code review by providing more granular network visibility, and ensuring that appropriate charging designs are developed.[41]

4.16. The RIIO price controls will have significant impacts on DSO function deployment. There are likely a range of new requirements on networks for RIIO-ED2;[42] however, this does not mean that action should not be taken in the near term through the current RIIO-ED1 price control that runs to March 2023. We anticipate that actions on forecasting and planning data, through reforming the LTDS, will help with the technical readiness of DNOs to undertake some DSO functions in RIIO-ED2.

[41] 'Charge design options for distribution and transmission charges', 5.25-5.27: https://www.ofgem.gov.uk/publications-and-updates/access-and-forward-looking-charges-significant-code-review-summer-2019-working-paper
[42] https://www.ofgem.gov.uk/publications-and-updates/open-letter-consultation-riio-ed2-price-control

4.17. Our work at the engineering standards review[43] will inform technical practices for DSO, and compatibility of existing practices with a smart flexible energy system.

4.18. Ofgem and BEIS co-chair the Smart Systems Forum. This forum provides an opportunity for horizon scanning of new issues as the GB energy system evolves. It also offers a means for us to share our work and update industry on developments on the actions points in the Smart Systems and Flexibility Plan.

4.19. We will be holding a joint meeting with BEIS in early 2020 that will explain in more detail the work being undertaken by Ofgem and BEIS impacting the provision of flexibility to the GB system, and how the individual actions work together to support our goal of a more flexible system.

4.20. The joint Ofgem and BEIS Future Energy Retail Market Review is considering how the regulatory framework could better enable a wider range of new business models, products and services to come to market, while also ensuring appropriate safeguards are in place for all consumers.[44] This includes exploring potential consumer protection frameworks for intermediaries in the market, which could also cover those intermediaries delivering DSO functions that are consumer-facing.

4.21. In Figure 2 we map our views on the various initiatives and our understanding of their level of specificity and the extent to which they can be applied now (technical readiness level).

[43] https://www.gov.uk/government/publications/electrical-engineering-standards-independent-review
[44] https://www.gov.uk/government/consultations/flexible-and-responsive-energy-retail-markets

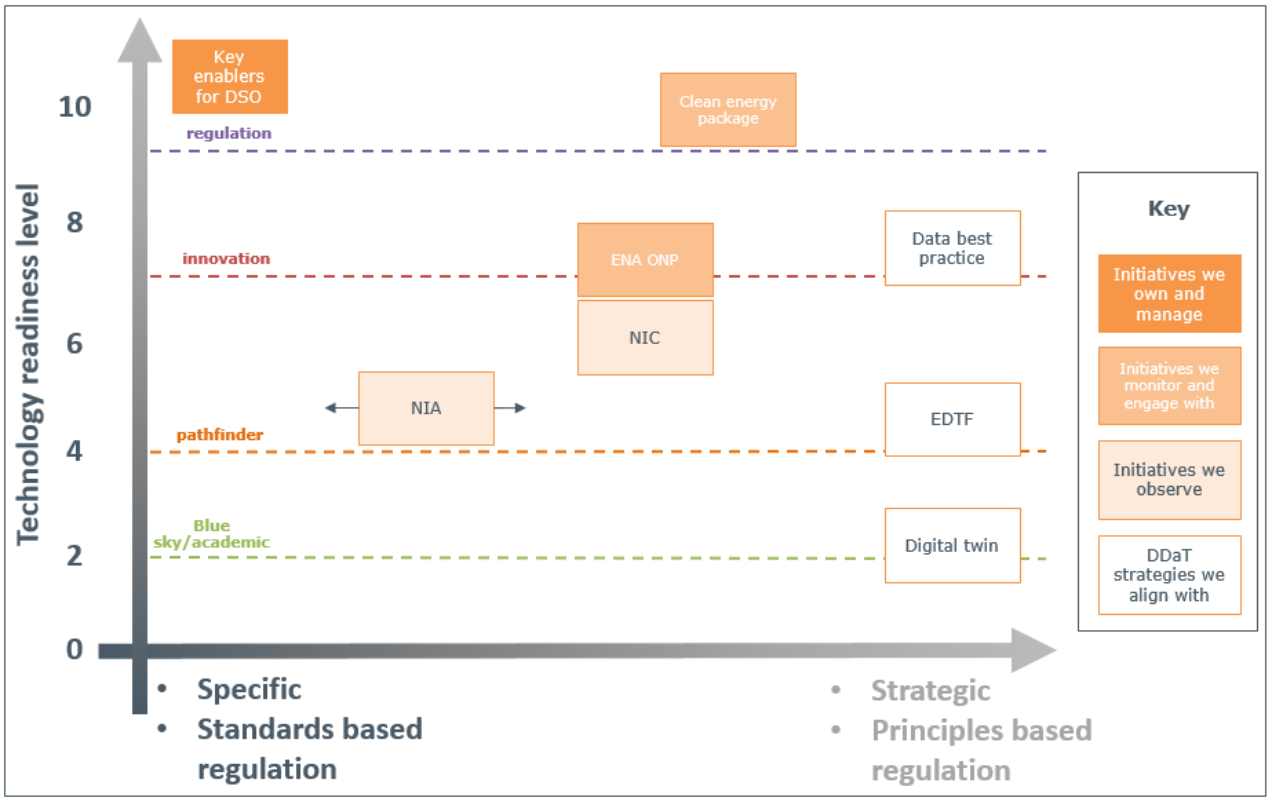

Figure 2. Mapping of initiatives that key enablers for DSO coordinates with. Figure shows the differences in specificity and technology readiness level of initiatives.

Summary

4.22. We do not aim to duplicate work being undertaken elsewhere. Instead, we intend to draw on learnings from this work and to ensure that we contribute to the overall direction of travel. By aligning with industry and regulatory initiatives, we embed wider learning into business as usual and prove emerging concepts of data transparency and openness in an agile way that will form a use case for others to follow.