DSO Benefits Methodology

APRIL 2025 - MARCH 2026

DSO
DISTRIBUTION SYSTEM OPERATOR

UK Power Networks
Delivering your electricity

01

SECTION 01

Introduction

Purpose of this document

We established an independent Distribution System Operator (DSO) in April 2023 to ensure we can better respond to the changing needs of society. This keeps our focus on customers as we enable progress towards Net Zero.

This document explains how we quantify benefits that UK Power Networks' DSO delivers, as reported in our DSO Performance Panel Reports[1].

We first published our methodology in Dec 2024 to provide transparency and clarity to customers and stakeholders. It looked to address feedback from Ofgem's DSO Performance Panel and supports the ongoing development of best practice reporting across all DSOs. This updated methodology incorporates changes and additional information for our 2025/26 DSO Performance Panel submission, including:

- reflecting DSO standardisation including price base change to 2020/21;
- explaining our approach compared to other DSOs (Section 2.3); and
- quantifying benefits to DERs from Connections Lab (Section 3.2).

We welcome feedback on our benefit methodology to DSO@ukpowernetworks.co.uk so that we can continue to improve our approach.

Recap of Ofgem Panel criteria

We summarise the Ofgem baseline expectations[2] that shaped our approach to benefits quantification below:

- use of well-established methods of economic appraisal (e.g. HM Treasury Green Book);
- consideration of impacts on different stakeholders, including wider system benefits;
- that benefits are well-evidenced and correspond to the DSO strategy ambition;
- clear articulation of benefits realised within the RIIO-ED2 period;
- evidence of proactively adapting plans and course-correcting to increase benefits; and
- robust processes / KPIs for tracking.

Context

In the RIIO-ED2 Final Determinations, Ofgem introduced the Distribution System Operator (DSO) incentive to drive DNOs to develop and manage their networks more efficiently.

This includes the publication of an annual report to be assessed by an independent panel. The baseline expectations for this annual report require companies to quantify and report on the 'delivery of benefits' facilitated by their DSO strategy.

[1] UK Power Networks, DSO Performance Panel Report - https://dso.ukpowernetworks.co.uk/
[2] Ofgem, Distribution System Operation Incentive Governance Document, 2023, 2025, https://www.ofgem.gov.uk/sites/default/files/2025-03/DSO-Incentive-Governance-Document_v1.2.pdf

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SECTION 02

Overview of approach

In line with Ofgem's DSO Performance Panel criteria, we followed HM Treasury Green Book[3] guidance in our approach to quantifying the benefits of our DSO strategy. The HM Treasury Green Book provides best practice guidance from the government on how to evaluate the benefits of policies or projects. We outline the steps we took below.

2.1 Framework of quantifying benefits

Step 1:
Stakeholder consultation to identify DSO activities that could drive benefits

We carried out a series of workshops with teams across the business to:

- identify DSO activities that may be delivering benefits, either in the current year or in future years of RIIO-ED2 (Apr 2023 – Mar 2028);
- clearly focus on DSO activities separate from DNO activities that drive benefits; and
- understand how the activities relate to the commitments UK Power Networks outlined in its RIIO-ED2 DSO strategy.

We developed a long list of DSO activities across each work area with the potential to deliver benefits.

Step 2:
Develop theories of change

A theory of change is a framework for understanding how a policy, or activity, will achieve its desired outcomes and benefits.

This approach is considered best practice in the HM Treasury Green Book and is widely used in policy design by UK government, public sector organisations and nonprofit organisations.

We explored the relationship between the DSO's activities and the ensuing benefits by developing theories of change.

The value of developing a 'theory of change' is that it:

- clearly describes what UK Power Networks is seeking to achieve through its DSO strategy;
- illustrates how activities link to benefits in a systematic way (i.e. cause and effect);
- considers how other initiatives and external factors may impact on relationships between activities and benefits;
- defines data that needs to be collected to measure success; and
- provides a basis for monitoring and evaluating the benefits of the DSO strategy.

[3] HM Treasury, Green Book, 2022, https://www.gov.uk/government/collections/the-green-book-and-accompanying-guidance-and-documents

Figure 1 provides an example of a 'theory of change'. The key components are inputs, activities, outputs, outcomes and benefits, all of which are used in developing impact pathways (see definitions in step 5). Additionally, the 'theory of change' provides a holistic view of how different activities drive benefits by mapping out the relationships and clarifies whether a benefit stems from multiple activities to avoid double counting.

Step 3:
Identify benefits driven by DSO activities

Informed by the theories of change, we identified benefits being delivered or due to be delivered by DSO activities.

These included (but were not limited to):

- cost savings to consumers;
- enhanced customer experience;
- cost savings to distributed energy resources (DERs);
- cost savings to National Energy System Operator (NESO) and wider system;
- cost savings to Distribution Network Operator (DNO);
- cost savings to local authorities; and
- environmental benefits.

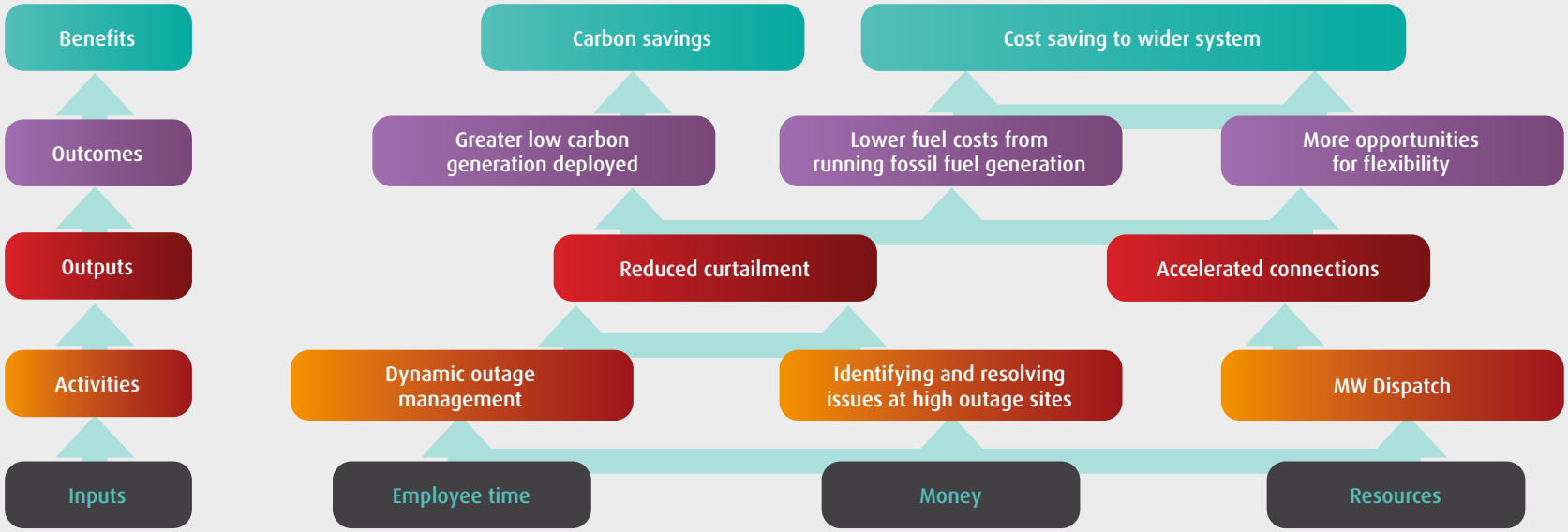

Figure 1 Illustration of an example 'theory of change'

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Step 4:

Prioritise DSO activities driving identified benefits

We developed a prioritisation process to determine activities for which we would estimate benefits. Each activity had to satisfy four separate criteria for its benefits to be quantified and valued, illustrated by **Figure 2**.

We assessed over 30 DSO activities against our prioritisation criteria which resulted in seven that were prioritised for quantification in the 2023/24 Panel submission to which we added two more in 2024/25 and one in 2025/26 (**Figure 3**). We continue to monitor activities against the prioritisation criteria as more information becomes available.

Step 5:

Develop impact pathways

'Impact pathways' build on the 'theory of change' to describe, in greater detail, how activities lead to benefits in a linear chain of cause and effect, so that each potential benefit can be assessed.

Figure 4 shows how 'impact pathways' clearly distinguish between inputs, activities, outputs, outcomes and benefits.

The 'theories of change' and 'impact pathways' approach assists in mapping out the relationships between activities and benefits, and clarifies where benefits stem from multiple activities.

By considering each step of each impact pathway, we mitigate the risk of double counting benefits.

*Materiality is judged based on an estimate of the order-of-magnitude of the benefit.

Figure 2 – Prioritisation process

Prioritised activity	Expected benefits
Distribution Network Options Assessment (DNOA)	Cost savings to consumers
Flexibility tenders	Cost savings to consumers
Connecting customers flexibly to the network	Cost savings to DER customers
Connections Lab	Cost savings to DER customers
Dynamic outage management	Reduction in carbon and wider system costs
Identifying high outage sites and resolving issues to reduce curtailment	Reduction in carbon and wider system costs
MW Dispatch (enable NESO access to DER)	Reduction in carbon and wider system costs
Technical Limits (accelerating connections)	Reduction in carbon and wider system costs
Supporting Local Area Energy Plans (LAEP)	Cost saving to local authorities
Charge Point Navigator tool	Cost saving to local authorities

Figure 3 – Summary of prioritised activities

Figure 4 – Illustration of an 'impact pathway'

Step 6:
Establish a robust counterfactual and the timing of benefit realisation

We followed the HM Treasury Green Book approach to determine a robust counterfactual and the timing of benefit realisation.

The HM Treasury Green Book defines an appropriate counterfactual as business-as-usual, or the 'continuation of current arrangements'. In the context of the DSO, the counterfactual can be defined as 'what would have happened if the DSO had not been established' (i.e. the DNO approach to network operation and management continued).

It is important to only claim benefits when costs would have otherwise been incurred under the counterfactual. **Figure 5** illustrates the point at which we measured each benefit.

Figure 5 – Timing of benefit accrual illustration

Step 7:
Group benefit and activities into benefit areas

Ofgem's criteria outlines that there should be consideration of impacts on different stakeholders. In turn, we group benefit and activities into benefit areas based on which stakeholder is positively impacted.

There are five benefit areas:

- benefits to consumers
- benefits to DER customers;
- environmental benefits;
- wider system benefits; and
- benefits to local authorities.

Step 8:
Develop methodologies for each benefit

We developed logic flow diagrams to lay out:

- methodology steps;
- data inputs; and
- assumptions.

These underwent a robust challenge process within UK Power Networks' DSO before drafting the methodology for each prioritised benefit. We also verified our approach with the NESO where benefits relate to the transmission system.

Further details are provided in section 3.

Step 9:
Construct a model and embed it into the business

We constructed an Excel model to produce estimates for each benefit. This included the development of scenarios to support sensitivity analysis.

The model was independently quality assured before the results were finalised.

The processes to update the model and governance arrangements for benefit reporting have been created and embedded into the DSO business. This involves identifying clear benefit owners and data owners, which ensures both robustness of reporting and ease of updating to track progress.

Step 10:
Report on benefits realised and forecast estimates

Ofgem's criteria emphasises that each DSO should clearly articulate benefits realised within the RIIO-ED2 period through the delivery of its DSO strategy.

In our Panel submission, we:

- distinguished between benefits realised up to the current reporting year, and RIIO-ED2 forecasts;
- how we have performed year-on-year and against RIIO-ED2 targets; and
- used a consistent 2020/21 price basis (changed from 2023/24 to standardise across DSOs) to allow for comparison of benefits over time.

To maintain transparency, we intend to continue reporting in a consistent manner in future submissions.

Step 11:
Tracking our progress

Benefits realised and forecasted are updated and reviewed at periodic points during the year to check progress against RIIO-ED2 business plan targets ahead of the Panel report submission. These review points also allow for improvements and consideration of other activities as described in section 2.2.

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2.2 Introducing new benefits and activities

The benefits methodology will develop and evolve over time based on better data and improvements driven by experience and feedback. Changes will be included in future updates to this document.

Changes to the methodology can result from:

a) Adding more activities – we will follow the framework described in section 2.1 to add activities. In 2024/25 we added DSO activities that support local authorities undertake local decarbonisation and in 2025/26 we added Connections Lab.

b) Extending currently reported activities to cover more benefits – we currently report on the main impact pathways of a given activity, hence some benefits of that activity may not be included. Where a benefit is subsequently judged to have passed the prioritisation process (step 4 of the framework), we will extend the methodology to include the new benefit following the framework from step 5 onwards. In 2024/25 we extended the quantification of benefits from reduced curtailment of low carbon generation to include its impact on lowering wholesale costs (previously only environmental benefits). We also included the benefit of chargepoint rollout replanning using Charge Point Navigator in 2025/26.

c) Revising currently reported benefits – occurs when we identify improvements to existing methodologies described in section 3. This involves revisiting steps 6-9 of the framework. This can include changing source of data, assumptions, and calculations. In 2024/25 we improved how we calculated benefits to DER customers through flexible connections, by calculating counterfactual costs for each customer connecting rather than using an average cost.

d) Change grouping of benefits – benefits from activities are currently grouped into benefit areas based on stakeholder segment, with environment as its own segment. The benefits in each grouping are independent, meaning there is no double counting and so can be summated. We will review the groupings in future to ensure that it continues to be the best way to present benefits. In 2024/25 we added the benefit of DSO activities that support local authorities as a new grouping.

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2.3 DSO reporting standardisation

We are proactively collaborating through the DSO collaboration forum to standardise approaches to benefit monetisation to improve comparability between DSO reports. As a result of standardisation this year we have rebased our benefit figures to 2020/21 prices, having previously reported in 2023/24 price base. Bill savings from reinforcement deferral and environmental benefits are direct social benefits as defined under the common appendix and hence comparable between DSOs. More information on which areas are standard can be found in the common appendix[4].

For transparency and to support future standardisation, **Figure 6** presents the key principled approach we take to benefit reporting which may differ to other DSOs. This was reviewed and challenged by our independent DSO Supervisory Board to ensure our approach remains robust and well justified. We will however keep this under review based on future DSO Performance Panel feedback and DSO collaboration.

Principle	Our approach	Other approaches	Rationale for our approach
The period over which benefits are reported	Report actual benefits realised within the RIIO-ED2 period only.	Report long-term CBA evaluation to give justification for an activity or intervention undertaken within the RIIO-ED2 period.	• The purpose of the report as set out in the scoring guidance on delivery of DSO benefits[5] is to report actual benefits realised within the RIIO-ED2 period i.e. objective accounting of outturn benefits. • Projected benefits beyond RIIO-ED2 are uncertain including regulatory treatment, likely to have optimism bias, and hence could overstate benefits. We therefore only include forecast elements to show estimated total benefits to be realised within the RIIO-ED2 period.
How far removed is the benefit from the activity/ outcome	Only report benefits that follow directly from the activity/ outcome.	Report benefits that are indirect or second order to the activity/outcome.	• Direct benefits can be credibly attributed to the activity/outcome and more robustly monetised. • Indirect and second-order benefits have tenuous attribution and less robust monetisation. We therefore do not report these to ensure our benefit numbers remain credible and trusted.

Figure 6 – Principal approach to benefit reporting

[4] ENA, DSO common appendix and glossary, Apr 2026 - https://www.energynetworks.org/publications/ena-dso-performance-panel-collaborative-appendix-(apr-2026)
[5] Distribution System Operation Incentive Governance Document, Appendix 6 – DSO Performance Panel assessment scoring guidance, Benefits realisation

The DSO collaboration work identified a range of benefits that could be reported for common outcomes (reinforcement deferral, accelerated connections, and outage management). Based on this analysis we have reviewed the benefits we do not currently report and whether they should be included as shown in **Figure 7.**
This is not an exhaustive list exluding indirect and second-order impacts, such as economic value, for the reasons explained in **Figure 6.**

Benefit	Is it feasible to monetise and is it material?	Do we undertake relevant activities to drive this benefit?	Rationale for our approach
Carbon savings from reinforcement deferral	Unlike cost deferral with social time preference benefits, carbon deferral value is unclear.	Reinforcement deferral value case is driven by social time preference of cost.	Not included because value is unclear and not the primary driver.
Carbon savings in dispatch of flexibility services	Small dispatch volumes give relatively low benefits.	Supporting low carbon technologies to participate in flexibility.	Not included because benefits are relatively immaterial.
Reduced bills from lower network charges (for connections, and operational costs)	Possible to quantify although not currently considered material.	Reduced cost of connections from DERMs is already captured under benefits to DERs. Outage management aims to increase DER generation, already captured under carbon and wider benefits. There could be additional operational cost savings but not currently primary driver.	We don't currently consider this material and a primary driver but will keep under review for future years.
DER financial revenues	Can be calculated with assumed generation output and market prices and likely to be material. However, this additional revenue is likely to be a transfer from another DER under the counterfactual. From the perspective of society, the benefit derives from the differential in generation costs which is already monetised under wider system benefits.	We undertake activities to accelerate DER connections, monetised under carbon and wider system benefits.	The system benefit of displacing more expensive generation with lower cost generation sources is already monetised. To monetise private revenues could be counting an economic transfer between DERs which does not contribute additional social or system benefit. We therefore do not include.

Figure 7 – Benefits we do not report and rationale

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SECTION 03

Methodology for each benefit

DSO activities underpinning each benefit area are summarised in **Figure 8**. Activities can benefit multiple areas, however we have focused on the main impact pathway to minimise double counting and make it simpler to understand.

Benefit area	DSO activities underpinning benefit areas
Benefit to consumers	Identifying opportunities for flexiblity through DNOA Running twice-yearly flexibility tenders
Benefit to DER customers	Facilitating customers to connect flexibly in areas with distribution constraints Develop and maintain the Connections Lab tool Facilitating customers to connect flexibly in areas with transmission constraints
Environmental benefits and wider system benefits	Dynamic outage management Identifying high outage and resolving issues to reduce curtailment Accelerating connections via MW Dispatch Accelerating connections via Technical Limits
Benefit to Local Authorities	Supporting Local Area Energy Plans (LAEPs) ChargePoint Navigator tool

Figure 8 – Summary of DSO activities underpinning benefit areas

3.1 Benefits to consumers

Description of benefit area

Cost savings to consumers due to deferred reinforcement.

How do DSO activities drive this benefit?

The impact pathway in **Figure 9** illustrates how activities undertaken to manage constraints, including flexibility tenders and the DNOA evaluation, can lead to deferred network reinforcement. This directly manifests as any cost increases in the electricity bill being kept to a minimum. Engaged consumers that participate in flexibility also receive additional benefits via flexibility providers.

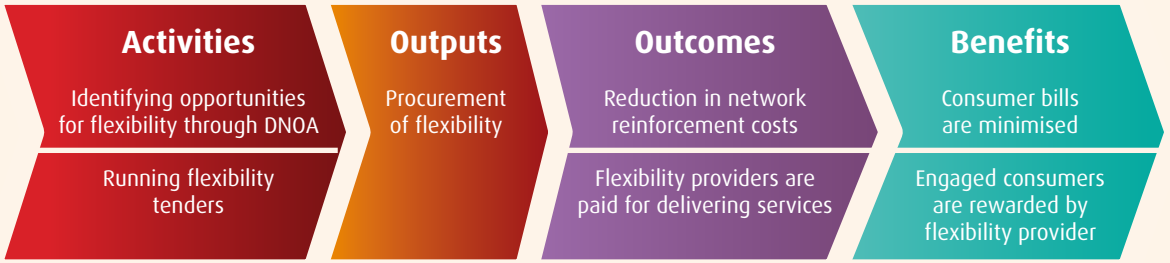

Figure 9 – Impact pathway - Benefits to consumers

Establish a robust counterfactual and timing of benefit accrual

Counterfactual: Under the counterfactual, network constraints are resolved through network reinforcement.

Outturn: Network constraints are managed through the use of flexibility, subsequently deferring network reinforcement. The benefit accrues to consumers when the cost savings from deferred reinforcement flows through to minimised electricity bills. The timing of benefit accrual is illustrated in **Figure 10**.

Figure 10 – Timing of benefit accrual - Benefits to consumers

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Engaged consumers that provide flexibility receive additional benefits via their flexibility provider through standalone payments or credits on their energy bills. Note whilst this benefit is quantified, since it is a benefit to end consumers, it is not added to the total DSO benefit number to ensure overall benefits that stem from deferring reinforcement are not double counted.

Methodology

Benefit to consumers through network cost component of the electricity bill

1. Follow the DNOA Methodology to evaluate future network needs on both the low-voltage and high-voltage network, where flexibility could be used to defer reinforcement. This evaluation informs targeted procurement of flexibility through flexibility tenders, specifying network needs in terms of volume of flexibility required and maximum payments for flexibility.

2. Calculate the value of deferred reinforcement per site, per year, (achieved from each RIIO-ED2 tender to date) that has been realised or unlocked over the remainder of RIIO-ED2[6].

a. Applicable to sites where flexibility contracts have been awarded to effectively deliver the network need.

b. Realisation of benefit occurs when reinforcement would have otherwise taken place.

c. The value of deferred reinforcement is based on the cost profile of reinforcement under the counterfactual.

3. Calculate the total annual value of deferred reinforcement across all sites in RIIO-ED2 to date.

4. Forecast the value of reinforcement that could be deferred arising from future tenders per year for the remainder of RIIO-ED2.

The total benefit is the sum of deferred reinforcement across the whole of RIIO-ED2 based on realised, unlocked, and forecast ambition of deferred reinforcement arising due to flexibility procured via tenders.

To estimate the consumer bill impact of deferred reinforcement we calculate the RIIO-ED2 regulatory treatment from the net benefits (above calculated benefits minus payments to flexibility providers), using Ofgem's CBA[7]. As per our RIIO-ED2 Business Plan commitment, £410m savings from flexibility sits outside our price control allowances and not subject to the sharing factor. This means 100% of the savings flow to bill-payers.

Benefits to engaged consumers who receive rewards for participating in flexibility

1. Request contracted flexibility providers to provide data on payments to consumers and the number of engaged consumers participating for the reporting year.

2. Validate data submission against contractual information on payments and contracted sites.

3. For flexibility providers that did not provide information estimate the proportion of payments that their engaged consumers would receive.

4. The total benefit is the sum of all payments received by engaged consumers and can be expressed in terms of payment per customer.

[6] In accordance with Ofgem's requirements, benefits reported should be that realised within the RIIO-ED2 period
[7] Ofgem CBA - https://www.ofgem.gov.uk/consultation/riio-ed2-data-templates-and-associated-instructions-and-guidance

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3.2 Benefits to DER customers methodology

3.2.1 Flexible connections

Description of benefit area

Cost savings to customers connecting flexibly in areas of distribution and transmission constraint due to the avoided cost of network reinforcement.

How do DSO activities drive this benefit?

The impact pathway in **Figure 11** illustrates how DSO activities that make it easier for customers to connect flexibly result in avoided reinforcement at both a distribution and transmission level. This directly manifests as a cost saving to customers connecting flexibly, who would have had to pay the cost of reinforcement under the counterfactual.

Establish a robust counterfactual and timing of benefit accrual

Counterfactual: Under the counterfactual, customers wanting to connect would have to opt for a firm connection, triggering reinforcement for which they would have to pay.

Outturn: DSO activities give customers the option to connect flexibly and avoid paying the cost of reinforcement. The benefit accrues to the flexibly connecting customer at the point they connect as this is when spending on reinforcement would have been underway under the counterfactual. The timing of benefit accrual is illustrated in **Figure 12**.

Methodology

The methodology differs according to whether customers connect flexibly onto the distribution network due to a distribution or transmission level constraint.

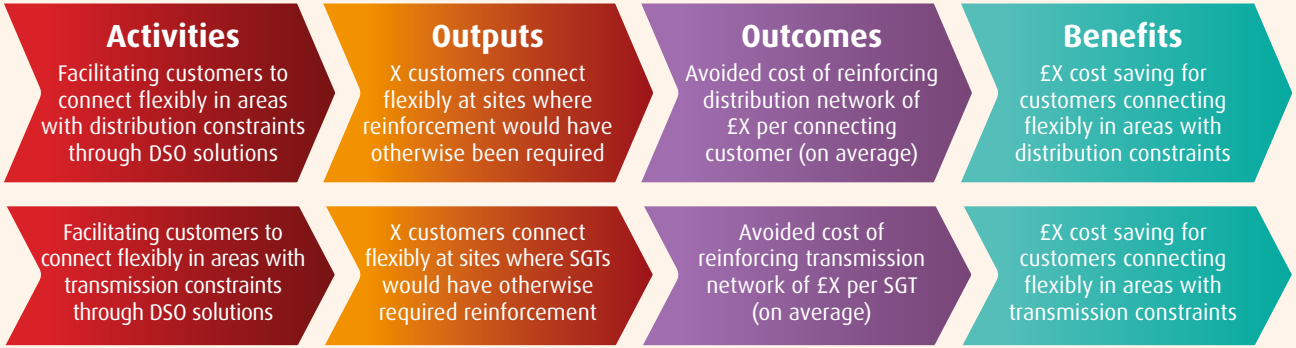

Figure 11 – Impact pathway – Benefit to DERs – flexible connections

Figure 12 – Timing of benefit accrual – Benefit to DERs – flexible connections

Distribution level

1. Calculate the counterfactual cost of reinforcement to provide a firm connection for customers that have connected flexibly based on site-level evaluations. The costs are only the proportion payable by connecting customers subject to connection charging rules.

2. Do the same for future customer connections for the remaining years of RIIO-ED2 using the latest connection pipeline and making a conservative assumption on their energisation dates.

3. Only count counterfactual reinforcement costs the first time it was triggered to connect a DER customer. Subsequent customers that connect flexibly that triggers the same reinforcement are not costed to avoid double counting benefits.

4. Summate the total value of deferred reinforcement for each year in RIIO-ED2.

Transmission level

1. Calculate the average cost of reinforcing a super-grid transformer (SGT) based on connection costs from the NESO.

2. Determine the number of SGTs where reinforcement has been deferred in RIIO-ED2 to date. Double counting is avoided by only counting an SGT where reinforcement is deferred once in RIIO-ED2, regardless of the number of customer connections or driver associated.

3. Using the latest connection pipeline, forecast the number of SGTs by year for the remainder of RIIO-ED2 where reinforcement is expected to be deferred due to customers connecting flexibly. Double counting is avoided in line with step 2.

4. Estimate the total value of deferred reinforcement in each year of RIIO-ED2 based on the average cost of reinforcing an SGT (step 1) and the number of SGTs deferred (step 2 and 3).

3.2.2 Connections Lab

Description of benefit area

Cost savings to customers in reduced connection applications from using the Connections Lab, a free, publicly available web app that lets customers run detailed pre-application connection assessments across our network. Available to both generation and demand customers.

How do DSO activities drive this benefit?

Customers can use Connections Lab to run self-serve connection studies and thereby make fewer, targeted connection applications. This reduces the overall cost of connection applications. The impact pathway is illustrated in Figure 13.

Establish a robust counterfactual and timing of benefit accrual

Counterfactual: Customers pay for multiple connection applications to establish viability of different points of connection.

Outturn: Customer uses Connections Lab to establish viability before making fewer, targeted connection applications. The benefit accrues to the customer at the point they would have otherwise made more connection applications as illustrated in Figure 14.

Figure 13 – Impact pathway – Benefit to DERs – Connections Lab

Figure 14 – Timing of benefit accrual – Connections Lab

Methodology

1. Estimate the number of counterfactual connection applications in the absence of Connections Lab

a. Extract the number of studies ran on Connections Lab not associated with an existing connection offer.

b. Multiply by a deflator to give the number of counterfactual connection applications.

c. The deflator accounts for Connections Lab being free to use whilst a connection application incurs a fee so the number of applications will be materially less than the number of studies on Connections Lab.

2. Estimate the number of actual connection applications from users of Connections Lab

a. Currently, Connections Lab studies are not linked to actual connection applications, however this functionality is a potential future development. We therefore estimate the number of connection applications based on the number of users multiplied by a conversion factor

b. The conversion factor is an assumed ratio between the number of users to the number of connection applications.

3. Calculate the reduction in the number of connection applications being the difference between 1) and 2). Multiply by the average connection application charge to give the £ saving.

4. Forecast future year benefits using assumptions on growth in users of Connections Lab.

The total benefit is the sum of the value of the distribution level and transmission level reinforcement avoided by flexibly connecting customers and Connections Lab over the whole of RIIO-ED2.

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3.3 Environmental benefits

Description of benefit area

Reduced emissions from marginal system generation through:

- reduced curtailment of low carbon DG; and
- accelerated connection of low carbon DG capacity.

How do DSO activities drive this benefit?

The impact pathway in **Figure 15** illustrates how DSO activities, such as dynamic outage management and resolving issues at high outage sites, reduce curtailment of low carbon DG. The impact pathway in **Figure 16** outlines how DSO-NESO collaboration activities, MW Dispatch and Technical Limits, accelerate connection of low carbon DG. The benefit of these activities manifests as an increase in generation from low carbon DG, which indirectly displaces emissions from the marginal generator on the system.

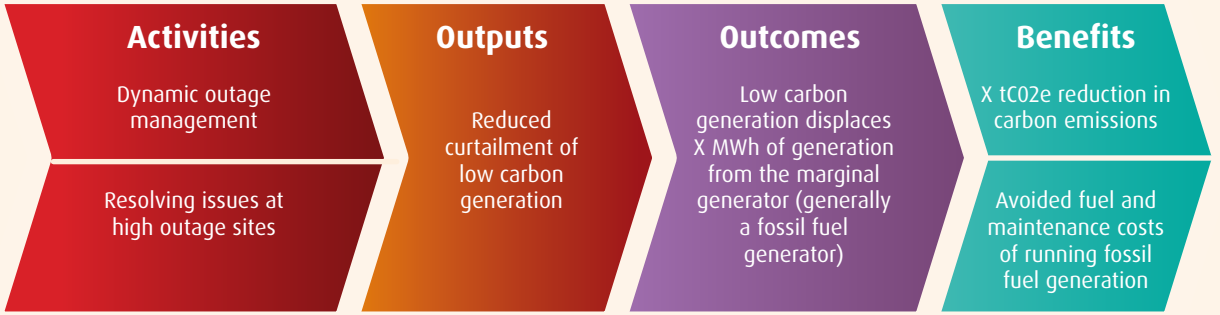


Figure 15 – Impact pathway – Environmental and wider benefit of reduced curtailment of low carbon DG

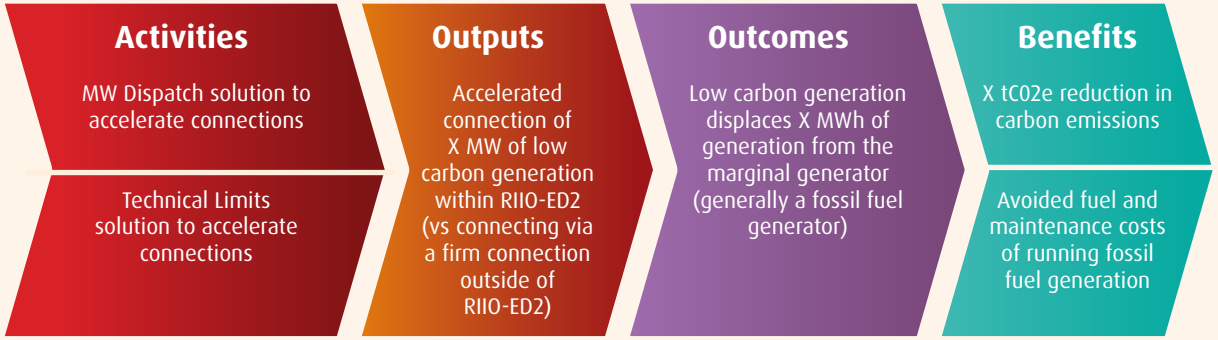


Figure 16 – Impact pathway – Environmental and wider benefit of accelerated connections of low carbon DG

Establish a robust counterfactual and timing of benefit accrual

Reduced curtailment of low carbon DG

Counterfactual: Under the counterfactual, low carbon DG would experience a higher level of curtailment due to outages and unresolved site issues. During this curtailment, generation from the marginal generator on the system, generally a fossil fuel generator, would increase resulting in higher carbon emissions.

Outturn: Low carbon DG experiences a lower level of curtailment due to dynamic outage management and resolution of specific site issues. The environmental benefit is realised when low carbon generation produces more output and displaces the marginal generator. The timing of benefit realisation is illustrated in **Figure 17**.

Accelerated connection of low carbon DG

Counterfactual: Under the counterfactual, the marginal generator on the system, generally a fossil fuel generator, would be generating and emitting carbon emissions.

Outturn: Low carbon DG connects in areas of network constraint a number of years sooner as customers do not have to wait for reinforcement to take place. The environmental benefit is realised when low carbon generation can connect and generate, hence displacing the marginal generator. The timing of benefit realisation is illustrated in **Figure 17**.

Methodology

The methodology differs according to whether we look at the benefit from reduced curtailment, or accelerated connection, of low carbon DG. We follow HM Treasury Green Book guidance on valuing carbon emissions to estimate the emissions reductions, and ultimately 'carbon savings'[8].

[8] HM Treasury Green Book, Valuation of energy use and greenhouse gas emissions for appraisal, 2023, https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

Figure 17 – Timing of benefit accrual – Environmental benefits

For reduced curtailment:

1. Determine the additional low carbon generation output facilitated due to dynamic outage management (excluding flexible connections so not to double count step 2), using low carbon generation output (in MWh) that took place during outages.

2. Calculate the additional low carbon generation output (connected flexibly) by resolving specific site issues by comparing:

- actual curtailment level of DERs for the given year; and
- average counterfactual level of curtailment, based on curtailment levels experienced by DERs prior to the DSO starting its activities.

3. Estimate the total additional low carbon generation output (in MWh) that would take place each year in RIIO-ED2 by summating outputs from step 1 and 2.

For accelerated connection of low carbon DG:

1. Determine the level of low carbon generation output (in MWh) that has been accelerated by DSO solutions using data collected on the output of generation connected to the network. We assume that in the absence of these DSO solutions, accelerated low carbon DG would have connected outside of RIIO-ED2 due to the time required to reinforce the network to accommodate a firm connection.

2. Forecast the maximum capacity of accelerated low carbon DG (in MW) that is expected to connect each year in the remainder of RIIO-ED2, by technology type, based on accepted MW Dispatch and Technical Limits offers. We assume that in the absence of these DSO solutions, accelerated low carbon DG would have connected outside of RIIO-ED2. The capacity forecasts are also based on assumptions around:

- the proportion of MW Dispatch and Technical Limits offers cancelled;
- connection pipeline aligned with Connections Reform adjusted for potential further delays; and
- the exclusion of battery storage so not to overstate benefits (as the carbon impact of its operation depends on the generation mix at the time).

3. Estimate the low carbon generation output each year for the remainder of RIIO-ED2, by technology type (e.g. solar, onshore wind), using DESNZ long-run average load factors to convert from maximum MW capacity to MWh and assume that new low carbon DG connections experience an average level of curtailment.

4. Calculate the cumulative sum of accelerated low carbon generation output (in MWh) each year for the remainder of RIIO-ED2, across all technology types, based on the assumption that once low carbon DG is connected it continues to generate over time.

Estimating the carbon savings

Following HM Treasury Green Book guidance, we convert additional low carbon generation output (in MWh) from reduced curtailment and accelerated connection into carbon savings.

1. Estimate the reduction in carbon emissions each year (in tCO2e) across the whole of RIIO-ED2 using the DESNZ marginal grid emissions factor. We assume that low carbon generation output displaces the marginal fossil fuel generation, such that a level of fossil fuel usage is avoided.

2. Estimate the 'carbon savings' in monetary terms using DESNZ carbon values (under DESNZ's core scenario).

The total benefit is the sum of 'carbon savings' due to reduced curtailment and accelerated low carbon DG during RIIO-ED2.

3.4 Wider system benefits

Description of benefit area

Cost savings to the wider system due to reduced curtailment and accelerated connection of low carbon DG capacity displacing the marginal generator on the system, generally a fossil fuel generator, which has higher running costs.

How do DSO activities drive this benefit?

The activities driving this benefit also feature in the methodology for 'environmental benefits'. However, they are separate benefits because the end benefit accrues to the wider system as a cost saving, as opposed to the carbon emissions reduction discussed in 3.3.

The impact pathway in **Figures 15 and 16** outlines how activities to reduce curtailment and accelerate connections manifests as a reduction in the cost of electricity generation due to displacement of fossil fuel generation by low carbon generation, recognising the generation cost of low carbon DG is lower. This then indirectly results in lower wholesale energy costs for all GB consumers.

Establish a robust counterfactual and timing of benefit accrual

Counterfactual: We use the same counterfactual as under environmental benefits but the impact extends to higher system costs due to higher marginal generation.

Outturn: We use the same output as under environmental benefits but the impact extends into lower system costs as more low carbon generation displaces the counterfactual marginal generation, generally a fossil fuel generator, which has higher running costs. The timing of benefit realisation is illustrated in **Figure 17**.

Methodology

1. Use the estimated additional low carbon generation output enabled in RIIO-ED2 as calculated under environmental benefits (in MWh).

2. Estimate the avoided operational costs and fuel costs (in £) associated with displaced marginal generation per year in RIIO-ED2 using DESNZ estimates for electricity generation costs[9].

The total benefit is the sum of cost savings due to enabling more low carbon DG to displace fossil fuel generation over the whole of RIIO-ED2, recognising that the generation cost of low carbon DG is lower.

We currently do not convert this system-level saving into a domestic bill saving due to the complexity in the translation. This incudes complexity in how wholesale prices are set, how suppliers procure energy, and how suppliers then charge end consumers.

3.5 Benefits to local authorities

Description of benefit area

Cost savings to local authorities in planning and delivery of local decarbonisation.

How do DSO activities drive this benefit?

The DSO provides local authorities with access to the LAEP+ and Charge Point Navigator tools containing rich datasets alongside bespoke support such as training. The local authority benefits in faster and lower cost of decarbonisation planning and deployment. The impact pathway is given in **Figure 18**.

Establish a robust counterfactual and timing of benefit accrual

Counterfactual: the local authority produces local area energy plans (LAEP) and plans public electric vehicle charging infrastructure using internal and external resources and proprietary tools and datasets.

Outturn: the local authority produces local area energy plans (LAEP) and plans public electric vehicle charging infrastructure faster and at lower cost through use of DSO tools, datasets, and support. The timing of benefit accrual is given in **Figure 19**.

Methodology

The calculation of benefits to local authorities varies depending on whether it is LAEP development or charge point activities.

[9] DESNZ, Electricity Generation Costs 2023, Annex A, Additional estimates 2025, https://www.gov.uk/government/publications/electricity-generation-costs-2023

03

LAEP development benefits

1. Procuring external support to develop a LAEP

a) estimate the number of local authorities that have produced or is expected to produce a LAEP in each year of RIIO-ED2.

b) estimate the average cost saving in producing a LAEP from DSO support, tools and datasets. Use available cost data from local authorities that was and was not supported by UK Power Networks' DSO.

c) multiply a) with b) to give the total cost saving in developing a LAEP.

2. Internal resource time saving

a) estimate the number of local authorities that have produced or is expected to produce a LAEP in each year of RIIO-ED2.

b) estimate the time saved by the local authority due to DSO support including training and convert into monetary terms based on salary assumptions.

c) multiply a) with b) to give the total time saving in developing a LAEP.

3. Tool and data cost saving

a) estimate the number of local authorities that would have procured alternative tool and data if the LAEP+ tool was not available.

b) estimate the cost of procuring alternative proprietary analytical tools and data.

c) multiply a) with b) to give the total cost saving from not having to procure alternative tools and data.

Charge Point Navigator benefits

1. Funding application time saving

a) estimate the number of local authorities that used Charge Point Navigator to support their application for Local EV Infrastructure (LEVI) funding.

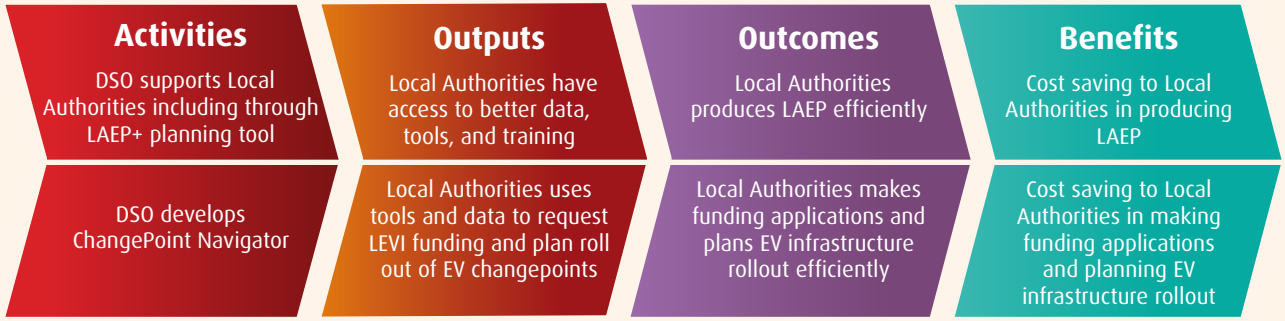


Figure 18 – Impact pathway - Benefit to local authority figures

Figure 19 – Timing of benefit accrual

b) estimate the time saving by a local authority in making LEVI funding applications with and without Charge Point Navigator and convert into monetary terms based on salary assumptions.

c) Multiply a) with b) to give the total time saving in making LEVI funding applications.

2. Charge point rollout planning time saving

a) estimate the number of local authorities that are using or is expected to use Charge Point Navigator in future years of RIIO-ED2.

b) estimate the time saved by a local authority undertaking charge point planning, and re-planning, by using Charge Point Navigator.

c) multiply a) with b) to give the total time saving in planning charge points.

3. Tool and data cost saving

a) estimate the number of local authorities that would have developed a plan even if Charge Point Navigator was not available.

b) estimate the cost of procuring alternative proprietary analytical tools and data.

c) multiply a) with b) to give the total cost saving from not having to procure alternative tools and data.

The total benefit to local authorities from DSO support, data, and tools is the sum of the above cost savings throughout RIIO-ED2.

04

SECTION 04

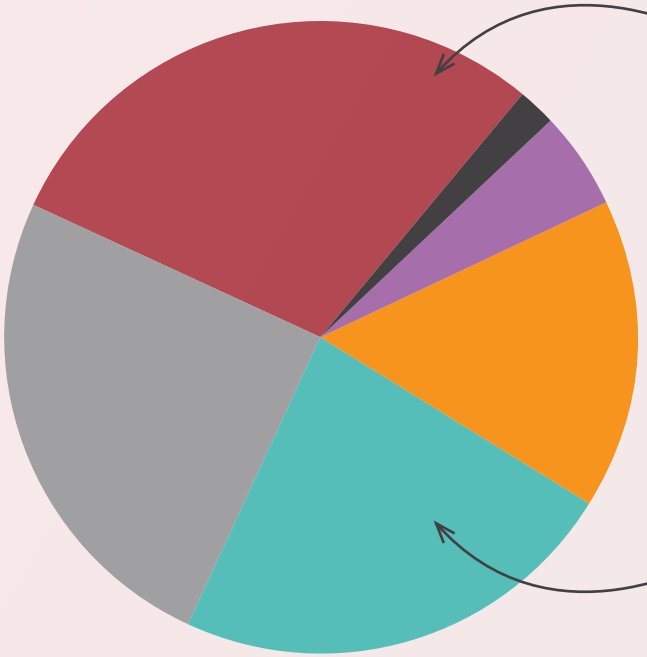
How the DSO keeps customer costs to a minimum

Benefits to DER customers

DERs can connect to the grid flexibly, reducing their connection costs. Whilst the impact pathway quantified in the methodology is the benefit to the DER, it should also benefit the consumer by reducing wholesale costs due to the increase in low carbon generation.

Environmental benefits

DSO activities can reduce carbon emissions, including reducing curtailment, and accelerating connections of, low carbon generation. This benefits consumers indirectly in reducing the grid carbon intensity and hence supports decarbonisation objectives.



Wider system benefits

Enabling more low carbon generation displaces higher cost marginal system generation, which reduces wholesale costs.

Benefits to consumers

Deferring reinforcement costs using flexibility minimises the distribution network cost component of customer bills. Engaged consumers will also receive additional payments or rewards for providing flexibility services subject to arrangements with their flexibility provider.

Wholesale Costs | **Environmental and social obligation costs** | **Network Costs** | **Operating Costs** | **VAT** | **Other direct costs**

Ofgem, Breakdown of an electricity bill, 2021: https://www.ofgem.gov.uk/all-available-charts?sort=created&page=3

05

SECTION 05

Glossary

CBA	Cost Benefit Analysis
DG	Distributed generation
DER	Distributed energy resources
DESNZ	Department of Energy Security and Net Zero
DNO	Distribution network operator
DNOA	Distribution Network Options Assessment
DSO	Distribution System Operator
EV	Electric Vehicle
NESO	National Energy System Operator
LA	Local Authority
LAEP	Local Area Energy Plan
LEVI	Local Electric Vehicle Infrastructure
SGT	Super-grid transformer