



Scottish & Southern
Electricity Networks

RIIO-ED2 Investment Decision Pack

Low Carbon Technology Analytics

Investment Reference No: 30/SSEPD/IT-DSO/LCT_ANALYTICS



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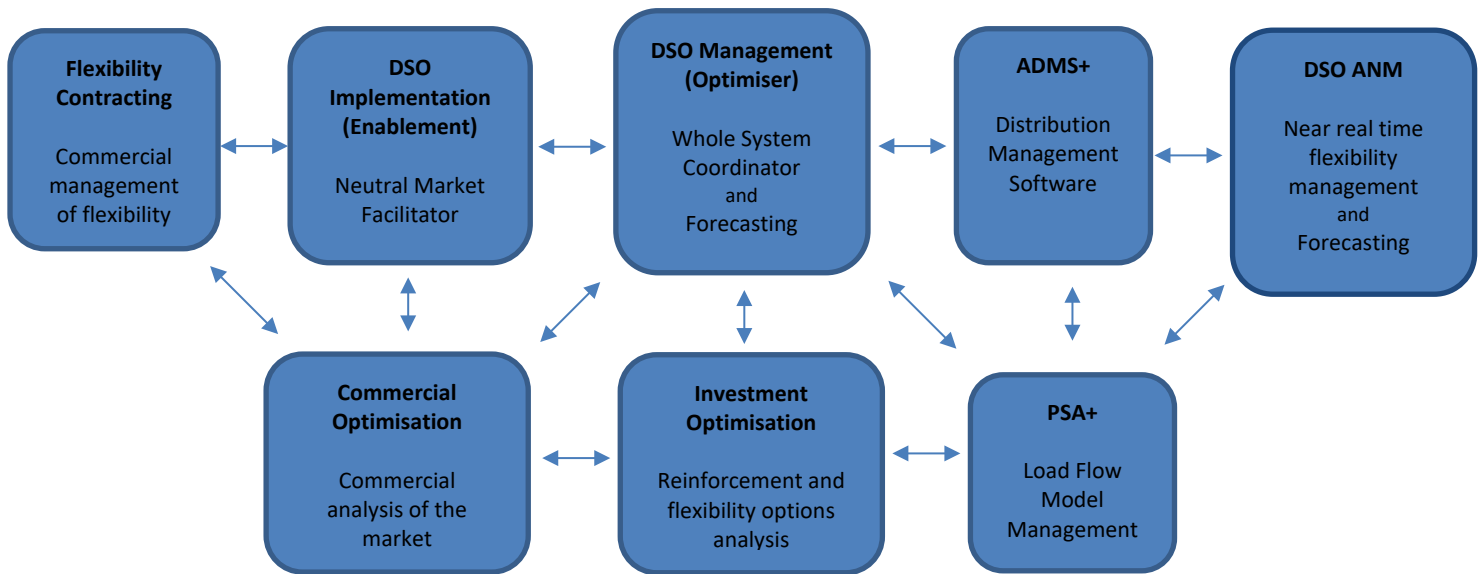
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Definitions and Abbreviations	
BPDT	Business Plan Data Table
CAPEX	Capital Expenditure
CEG	Community Energy Group
CMZ	Constraint Managed Zone
DER	Distributed Energy Resources
D-FES	Distribution Future Energy Scenarios
DG	Distributed Generation
DSO	Distribution System Operator
DUoS	Distribution Use of Service
EJP	Engineering Justification Paper
ENA	Energy Network Association
EV	Electric Vehicle
FTE	Full Time Equivalent
IDP	Investment Decision Pack
IT	Information Technology
LCT	Low Carbon Technology
MDM	Master Data Management
MDM	Master Data Management
NDP	Network Development Plan
NIA	Network Innovation Allowance
NPV	Net Present Value
ODIF	Output Delivery Incentives - Financial
OPEX	Operational Expenditure
PSR	Priority Services Register
V2G	Vehicle to Grid
V2X	Vehicle-to-everything

1. Executive Summary

This project is required to meet the needs of the Low Carbon Technology (LCT) market Stakeholders for granular and timely information to both support their day to day operations of their existing assets, as well as facilitating planning for new assets. It builds from our other IT investments, in particular MDM (Master Data Management) and Data Lake, Open Door, Investment Optimisation and Analytics. It is also a more cost-effective solution than alternative delivery options (e.g. manually providing the information). Although the project is Stakeholder driven, it has positive benefits and better Net Present Values, and as such offers great value for our customers.

The diagram below shows the interactions between the key systems outlined in our IDPs related to DSO. It should be noted that these systems will be integrated with our main business systems, e.g. our Asset Management Database and Geographic Information System.



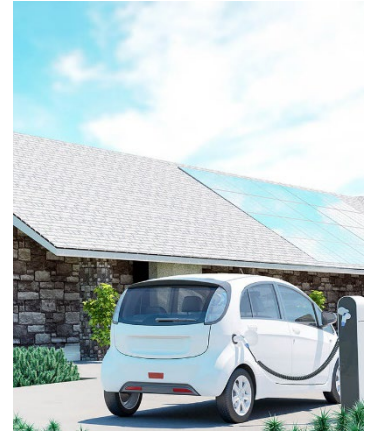
2. Investment Summary Table

Summary Table			
Name of Scheme / Programme	Low Carbon Technology Analytics		
Primary Investment Driver	Progress to Net Zero		
Scheme Reference / Mechanism or Category	30/SSEPD/IT-DSO/LCT_ANALYTICS		
Output References / Type			
Cost (CAPEX)	■		
Delivery Year	RIIO ED2		
Reporting Table	C4		
Outputs Included in RIIO ED1 Business Plan			
Spend Apportionment	ED1	ED2 ■	ED3

3. Introduction and Background Information

In RIIO-ED2 we will build on our RIIO-ED1 work establishing core applications as the base to analytics tools. Our MDM (Master Data Management) & Data Lake project will deliver a solid foundation for both Open Data and Analytics, and we have a number of Analytics based projects that will provide insights for both us and our Stakeholders in this period.

Low Carbon Technology (LCT) will be the basis for the Flexibility market, and will require many new forms of analysis, that will become increasingly complex as more is deployed across the country. With the growth of Electric Vehicles (EVs) on the UK's journey to net zero, as well as the more familiar low carbon generation facilities such as wind, solar and hydro, storage such as batteries, Heat Pumps from the decarbonisation of heat; there will be many other facilities needed during the period. These include wave and tidal power, river flow-based hydro, alternative storage such as compressed air or Vehicle to Grid (V2G), and of course developments in the use of hydrogen technology. These technologies will need to be controlled accordingly to ensure effective integration into the electricity system. All will require complex and varying analysis through the whole of RIIO-ED2 and beyond, to provide external and internal stakeholders the insights they need to make informed decisions.



4. Business Plan Fit

This project can be mapped to following strategic themes:

Progress to Net Zero	Safe, resilient and responsive networks	A trusted and valued service to customers and communities	Positive Impact on Society
✓	✓	✓	✓

5. Optioneering

This topic is subject to a significant amount of research across the world, including some of the projects which we are leading. We will therefore be working heavily with our supply chain, academia, and many other organisations to develop the most meaningful insights for all Stakeholders. This area will build on the Near Real-time Data Access (NeRDA) Flexr Pathfinder project, where we have been acting as one of the pathfinder DNOs to develop a shared DNO data provision and standardisation service for a range of stakeholders. Through our Open Door and Tailored Insights projects, we will encourage others to build their own analyses, and make these available where possible building on and utilising the experience of our SSE Group Data and Analytics Centre of Excellence. We expect that the areas of coverage and granularity to increase throughout the period, so will undertake this work as an on-going set of iterations. Currently we expect the analyses to include:

- Using detailed analysis to understand the impact and requirements of the growth of LCT on our network, consumption, flexibility, customers and workforce, across a variety of use cases.
- Productionise the EV Trigger Tool discovery, extending to all LCT and fully integrate into Distribution Future Energy Scenarios (D-FES, e.g. <https://www.regen.co.uk/project/future-electricity-networks/>) and further development of our Load Model to enable continuous improvement as consumption behaviour evolves.
- Derive information to facilitate the growth of LCT to enable net zero targets through analysis understanding the impact of growth scenarios and optimising the value of system investment.
- Deploy analytical projects from the ENA such as the cut-out identification app for EV chargers.

- Building on advanced notifications from customers seeking to connect LCTs (the NIA project Skyline) to inform real-time LCT capacity impacts, which will feed self-serve capabilities, capacity maps, flexibility systems and SSEN investment planning giving customers more timely and impactful information.
- Incorporating LV monitoring and smart meter data to support management of networks (planning and investment) in relation to LCT uptake and capacity constraints.
- Use of analytics as part of an EV tourism toolkit to support Local Authorities with deployment of solutions to meet expected EV tourism challenges, where our investments are primarily built upon LCT uptake and demand from residents but where networks may be constrained from short-term visiting demand from tourists. This builds upon the NIA project E Tourism.
- Supporting our customers in vulnerable situations by using analytics to determine areas where there are sociodemographic/ vulnerability markers which would prompt us to offer more support to customers in those areas, such as resilience measures for disabled/vulnerable customers (PSR markers) by using emerging technology like V2X (vehicle to various devices) services ready to help power their medical equipment/ lighting/ heating and/or support services from other parties who could top up EVs to ensure those vehicles are always charged.
- Combine contextual information with our data (from Investment Optimisation for instance) to provide insight from combined consumption and load data with external data such as traffic flow provide insights on the constraints and opportunities for LCT (e.g. <https://www.youtube.com/watch?v=Fz0lPrX2xKk>).
- Build on the current suite of Innovate UK MEDApps projects in the provision relevant datasets and development for ongoing work.

All shared information will be effectively triaged to manage any risks. In terms of tools, whilst we will look to maximise the use of our RIIO-ED1 investments, modelling tools and analytics platforms (e.g. Microsoft Azure), we fully expect that new tools yet to be released will form a very important part of delivery.

5.1.1 Alternative Options

The information being provided in this project is an extension to the Open Data requirement, as well as providing other support for organisations and individuals regarding LCT. As such, doing nothing is not an option. The alternative would be manual provision of the information. Not only is this more expensive than the IT based solution (see NPV and Benefits), it does not meet the expectations of stakeholders in terms of timeliness nor ease of access.

The proposed solution has been based on the best value IT solution that is currently available. However, given the pace of IT development, the market will be re-examined throughout the project lifecycle to ensure the best value solutions at that time are chosen for delivery.

6. Stakeholder Evidence

Our stakeholders are keen to understand the impact of LCTs on our networks, on their installations, what existing system scope is available for development, and how they will play their part in the journey to net zero. There is a significant amount of change underway, so our stakeholders want more detailed and accurate information on this transformation. This enables them to make more informed decisions on their own plans and investments while also enabling them to give us more useful insight into their decisions. Mutually understanding the impact and growth of LCT is critically important to us both.

Our stakeholders have requested additional analytical information on the scope for connections to be made available at all times, so they can better understand their options. This ranges from larger resource suppliers, to individuals considering EVs, and for both charging and exporting opportunities.

In our **Digital Investment Plan (Annex 5.2)** we run through our stakeholder evidence and triangulation in detail.

7. Analysis and Cost

Costs have been developed using a bottom up approach and have been based on the best currently available solution. However, IT is a rapidly changing area, so the market will be re-examined prior to delivery, and the best value option to meet the requirements set out above will be chosen. The project has been assessed over a 5-year lifecycle, with both Opex and Benefits equated for that operational period, as IT projects often need updating after 5 years. NPVs of both 5 and 45 years have therefore been quoted below.

7.1 Cost Profile

This project has the following cost profile and will be delivered as a series of iterations. The NPVs have been determined using the standard CBA spreadsheet, with the benefits in 7.2.1 below being used as the cost for the manual alternative. The full build-up of costs is contained in the ED2 IT Investment Plan (Non-Op Capex) Cost Estimate spreadsheet.

	Total £'M	2023/24 £'M	2024/25 £'M	2025/26 £'M	2026/27 £'M	2027/28 £'M
CAPEX	■				■	■
ED2 OPEX	■					■
ED2 Benefits	■					■
5 Year OPEX	■					
5 Year Benefits	■					
NPV 5 Year (Recommended Option)	■					
NPV 45 Year (Recommended Option)	■					
<i>NPV 5 Year (Alternative Option)</i>	■					
<i>NPV 45 Year (Alternative Option)</i>	■					

7.2 Benefits

7.2.1 Financial Benefits

Benefits are shown for the first 5 years after the project is implemented.

	Total	Year 1	Year 2	Year 3	Year 4	Year 5
A reduction in new staff to manually provide analytics to LCT providers - assume a conservative number of 50 people @ 3 hours/week, the equivalent of 4 FTE, SS08 rate used.	■	■	■	■	■	■
A reduction in new staff to manually provide analytics to customers - assume a 275 people @ 0.25 hours/week, the equivalent of 3 FTE, SS05 rate used.	■	■	■	■	■	■
Assist the planning of optimal investment (aid to LCT providers) – conservatively assume 0.2% of deferred reinforcement.	■	■	■	■	■	■

An example of the sort of projects and benefits that could be better facilitated using this investment is the identification of connection of equipment in the home can help customers understand what can be connected to their premises, for example – EV charging equipment. Please note that an app is being developed under ENA to help determine if a cut-out is sufficiently rated for the for connection of LCT which will lead to greater customer satisfaction.

This capability also enables the business rules to enable customers to self-serve, along with the base data and assumptions. It enables the continue and agile development of this capability and will help facilitate our Whole System aspirations with greater effect

Visualisation and representation of LCT related data can help the proactive engagement with Third Parties (e.g. councils) on an urban planning scale. It could show heat maps where availability on the network exists and overlay other useful contextual data. It could enable specific APIs to support our stakeholders. Algorithms developed here can also facilitate data quality identification and corrections using assumptions developed through the analysis.

Fundamentally this capability supports meeting Ofgem requirement to provide open data under the Modernising Energy Data Best Practice

Key personnel LCT Analytics will facilitate:

- Planners doing connection enquires.
- System planning on developing more sophisticated planning models.
- System planning on better and more efficient development of the DFES.
- System planning on better and more efficient development of the NDP.
- Commercial planning team (as per the DSO ED2 plan) for better forecasting insight.
- Increased accuracy in our DUoS forecasts and submissions.

7.2.2 Non-Financial Benefits

Non-Financial benefits include:

- The more detailed understanding of the uptake of LCTs will assist the planning of optimal investments
- Once the LCT update is well understood and shared effectively it will encourage external investment
- The nature of the highly granular data derived in this IDP will help optimise the HV, and later in the period LV, charging locations for EVs
- Facilitation of local flexibility using LCTs will be facilitated by better understanding the detailed interactions of the LCTs on our network
- We will be able to improve our understanding of usage profiles of LCT to make better:
 - Operational decisions.
 - Assist in reducing our business carbon footprint.
 - Improved use/ management of flexibility and CMZ deployment.
 - Mythologies to accommodate increased adoption of EVs and heat pumps.
 -

7.2.2.1 Foundation to other Projects/Initiatives

None, the outcomes from this development will however help facilitate many of our other Net Zero projects.

7.3 Key Assumptions

The current programme and costings assume that all planned RIIO-ED1 system changes will be complete before the start of RIIO-ED2. It is important to deliver this project to limit the complexity, and hence cost and timescales and ensure effective deployment.

7.4 High Level Dependencies

This project is reliant on other projects, notably MDM Data Lake & Analytics, Connectivity++, as well as Open Door and Investment Optimisation.

8. Deliverability & Risk

Our Ensuring Deliverability and a Resilient Workforce (describes our approach to evidencing the deliverability of our overall plan as a package, and its individual components. Testing of our EJPs has prioritised assessment of efficiency and capacity, and this has ensured that we can demonstrate a credible plan to move from SSEN's ED1 performance to our target ED2 efficiency. We have also demonstrated that SSEN's in house and contractor options can, or will through investment or managed change, provide the capacity and skills at the right time, in the right locations. This assessment has been part of the regular assessment of our EJPs, IDPs and BPDTs. Our ***Deliverability Strategy (Annex 16.1)*** and ***Supply Chain Strategy (Annex 16.2)*** are included in the Business plan Submission.

Our deliverability testing has identified a major strategic opportunity which is relevant to all EJPs.

- In ED2 SSEN will change the way Capital Expenditure is delivered, maximising synergies within the network to minimise disruptions for our customers. This is particularly relevant for a Price Control period where volumes of work are increasing across all work types.
- The principle is to develop and deliver Programmes of work, manage risk and complexity at Programme level and to develop strategic relationships with our Suppliers and Partners to enable efficiency realisation.

9. Conclusion

As we enter a price control period with an unprecedented amount of change for the energy sector our stakeholders and customers are needing better insight and more system information than ever before. Just like us, many of our key stakeholders and customers need granular, accurate and timely information to make the most effective decisions so together we can support the transformation of the energy sector to deliver future goals and accountabilities. As this change gathers momentum and we deploy DSO and digitalisation initiatives, complexity of the interactions of the connected technology, customers and networks significantly increases. The LCT Analytics capability fundamentally supports our customers and stakeholders engage in this journey effectively and proactively and provides a big data type solution designed to add much value for our stakeholders and customers. The IT based solution also offers better value than manual alternatives.