Scottish & Southern Electricity Networks

RIIO-ED2 Investment Decision Pack

Connectivity++

Investment Reference No: 21/SSEPD/IT-ASSET/CONNECTIVITY++

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Definitions and Abbreviations	
ADMS	Advanced Distribution Management System
BEIS	Department for Business, Energy and Industrial Strategy
BPDT	Business Plan Data Table
CAPEX	Capital Expenditure
CEG	Community Energy Group
CIM	Common Information Modelling
CRM	Customer Relationship Management
DER	Distributed Energy Resources
DG	Distributed Generation
DMEU	Data Model for Energy and Utilities
DSO	Distribution System Operator
EDT	Energy Data Taskforce
EJP	Engineering Justification Paper
ESC	Energy Systems Catapult
EV	Electric Vehicle
FTE	Full Time Equivalent
GIS	Geographical Information System
ICP	Independent Connection Provider
IDNO	Independent Distribution Network Operator
IDP	Investment Decision Pack
LA	Local Authority
LCT	Low Carbon Technology
MDM	Master Data Management
MPAN	Meter Point Administration Number
OPEX	Operational Expenditure
PV	Photo Voltaic (solar power generation)
WAM	Work and Asset Management

1. Executive Summary

An accurate network connectivity model is a fundamental building block for the Flexibility Market. In ED1 we did a lot of work ensuring that our EHV/HV connectivity model was correct in all of our systems, and this work will be concluded in ED2 to include LV and Customer connectivity, so we understand exactly what is connected to our network, where and how it connects. This work will include the phase connection, as far as this is feasible, and will draw heavily on many data sources, especially smart metering. The Connectivity model, down to Customer level, will be the main foundation for Flexibility and Open Data, and without it these critical deliverables for Net Zero would be severely compromised.

2. Investment Summary Table

Summary Table			
Name of Scheme / Programme	Connectivity ++		
Primary Investment Driver	Progress to Net Zero		
Scheme Reference / Mechanism or Category	21/SSEPD/IT-ASSET/CONNECTIVITY++		
Output References / Type			
Cost (CAPEX)	[redacted]		
Delivery Year	RIIO ED2		
Reporting Table	C4		
Outputs Included in RIIO ED1 Business Plan			
Spend Apportionment	**ED1**	**ED2** [redacted]	**ED3**

3. Introduction and Background Information

In RIIO-ED1 we deployed a new Geographical Information System (GIS) that uses an electrical connectivity model as its base. This was the first UK deployment of GE's Electric Office, and it was chosen both for its capabilities around maintaining a connectivity model, and its ability to work closely with GE PowerOn Advantage, building towards an Advanced Distribution Management System (ADMS). We also instigated a major project (Connectivity+) to improve our connectivity model accuracy, including improving our update mechanisms. By the end of RIIO-ED1 we expect to have our electrical connectivity model accurate in our systems at HV and EHV voltages, and work well underway at LV feeder level.

In RIIO-ED2 we will continue to build on our electrical connectivity model to move towards a single source of truth for our network. We will further enhance our model to provide the necessary level of detail to import into our Power Analysis tools and Protection Settings calculation tools. We will look to use the connectivity model to import directly into our ADMS, starting with LV Networks (ref: ADMS+). We need to ensure a good level of accuracy at customer level, especially regarding Low Carbon Technology (LCT), Telecommunications and Flexibility. Connectivity++ will ensure that all details about what a customer has connected to our network is both known and maintained. The project will develop a Telecommunications layer to enable management of the telecom's infrastructure. This will be achieved by a combination of new tools and analyses, physical survey, and by new data exchanges between market participants (subject to market agreements). By the end of the period we expect to have all customer connection details mapped across our network at phase level to a good level of accuracy, and mechanisms in place to ensure accuracy is maintained.

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

Phase 2 of our connectivity improvement (Connectivity++) will use a combination of new tools and apps, analytics, and physical survey, backed by additional details from market information. Tools and techniques are under rapid development in this area and we will undoubtedly use our supply chain to ensure we continue to improve information whilst ensuring good value from the work. For example, it is already possible to determine the phase connection of a property from smart meter data, subject to knowing the actual phase of 3 properties in that locality. Quick field tools to determine phase are already in limited use, and we expect the efficiency and cost of these tools to improve over the next few years. These, coupled with the new customer registration facilities already planned for RIIO-ED1 and proposed in RIIO-ED2, will enable us to deliver a customer connectivity model down to phase. Specific deliverables of this project will include:

- A ‘customer overlay’ end point data set, including LCT.
- A shared customer connectivity model forming the foundation of the Digital Twin across our main systems, down to LV phase, especially GIS, ADMS and the new Flexibility Market tools, shared in near real time.
- Telecommunications layer(s) added to the core GIS systems showing our physical telecoms assets and their interconnectivity.
- A model that can be shared with Stakeholders using standard formats such as CIM, subject to security, privacy and commercial requirements.
- Make use of some of the latest information sources, such as smart meters (including neutral fault indications).
- Provide a base of information for many other projects, tools and initiatives, such as ‘MERLIN’, LV Monitoring, Smart Metering, Forecasting Capabilities, Load Disaggregation Modelling, etc.
- The data to enable our Business Automation toolsets to work at all levels of the network, including allowing 'launch in context' from 'point on map' to agreements, etc.
- The data to enable navigation between geographic, schematic and asset views of customer connectivity.
- Use agile, lean and continuous improvement methodology throughout the life of the project, to ensure that data is of the highest confidence level practicable, and this quality is maintained.

5.1.1 Alternative Options

A critical foundation for Flexibility and Open Data is a sound Network Connectivity model, including LV and Connected Customer (e.g. what customers have connected to the network, such as EV, PV, Heat Pumps, etc.). As Flexibility and Open Data are key ED2 deliverables, a do-nothing option is not acceptable.

The work set out in this project is an optimal combination of data, analytics and field surveys. No single method will deliver all the necessary information to deliver a connectivity model that is accurate enough to meet the desired outcomes. Whilst manual calculation methods have been set out as a partial alternative, this would only deliver the Power Systems Analysis aspects. This alternative would not deliver all other aspects delivered by a sound Connectivity model, down to Customer level, leaving other areas compromised, especially Open Data, Flexibility coordination (i.e. more constraints would occur) and self-service connections.

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

6. Stakeholder Evidence

A sound connectivity model giving details of customer connected equipment will be vital to enable all the functions requested by our customers and stakeholders regarding being able to access or supply LCT. If data about customer connected equipment is poor, that will seriously curtail our ability to deliver efficient Flexibility, which will negativity

affect both customer value for money and opportunities for LCT connecters: both of these aspects are listed as high priorities in our recent stakeholder engagements.

More details of overall stakeholder engagement are set out in the ***Digital Investment Plan (Annex 5.2).***

7. Analysis and Cost

Costs have been built up 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 solutions 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 improvements through the period. 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	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
ED2 OPEX	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]
ED2 Benefits	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]
5 Year OPEX	[redacted]					
5 Year Benefits	[redacted]					
NPV 5 Year (Recommended Option)	[redacted]					
NPV 45 Year (Recommended Option)	[redacted]					
NPV 5 Year (partial Alternative Option)	[redacted]					
NPV 45 Year (partial Alternative Option)	[redacted]					

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
15% of the benefits achieved using PSA+, as without an interoperation connectivity model it would be take a significant amount of additional time to maintain the models	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Note that the information could feed into a 'tell us once customer service portal', so that when customers enter details we know where they are and what equipment they have. This function will be provided by the Tailored Insights project.

The following financial benefits have been identified, and could be monetised:

- Reduced manual maintenance of the connectivity model (reduction in new staff required)
- Reduced manual effect providing the connectivity model to Stakeholders (reduction in new staff required)
- Reduced manual effort providing customers with the information we hold about them (reduction in new staff required)
- Provides the base data for Analytics
- Enables further insight 'behind the meter' (Battery Storage, Solar etc), giving the ability to map and understand where technology is connected
- Provides the business with a better view of both the network and customers enabling further insights.

7.2.2 Non-Financial Benefits

The following non-financial benefits have been identified:

- Better management of Flexibility.
- Better quality of Open Data.
  Better engagement of staff into digital journey.

7.2.2.1 Foundation to other Projects/Initiatives

The project will support many other initiatives, most particularly:

- MDM & Data Lake.
- Analytics.
- All Flexibility market projects.
- Business Automation.

7.3 Key Assumptions

The current programme and costings assume that all planned RIIO-ED1 system changes, in particular the Connectivity+ and PowerOn Advantage projects, will be complete before the start of RIIO-ED2. If some of the current planned application changes are not completed, this will increase the complexity, and hence cost and timescale, of this project.

7.4 High Level Dependencies

The success of the project, particularly regarding maintenance of data, will be affected by the agreements reached for the exchange of market data, particularly smart meters.

There are many issues that will need to be resolved in the area, including:

- Field visibility of data (device capability and comms, affecting getting and maintaining data).

- Whether neutral monitoring will be switched on smart meters.
- Resolving GDPR issues, such as MPAN
- Agreeing data standards and 'Common keys' across the industry.

7.5 Deliverability & Risk

Our ***Ensuring Deliverability and a Resilient Workforce (Chapter 16)*** 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, and we have now refined our bottom-up efficiencies and work plan phasing. 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.

8. Conclusion

This project will conclude the work undertaken in ED1 to have a sound connectivity model shared across all our systems, down to LV feeder level. It will build on this base to include customer connected equipment and, where feasible, the phase connected. It is a fundamental building block for the Flexibility Market and Open Data.