

RIIO-ED2 Investment Decision Pack

Commercial Optimisation

Investment Reference No: 40/SSEPD/IT-DSO/SYS_ECOMOMICS



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Definitions and Abbreviations

BPDT	Business Plan Data Table
CAPEX	Capital Expenditure
CBA	Cost Benefit Analysis
DER	Distributed Energy Resources
DG	Distributed Generation
DSO	Distribution System Operator
EJP	Engineering Justification Paper
FTE	Full Time Equivalent
IDP	Investment Decision Pack
LCT	Low Carbon Technology
LEO	Local Energy Oxford
LV	Low Voltage
MERLIN	Modelling the Economic Reactions Linking Individual Networks
NPV	Net Present Value
OPEX	Operational Expenditure
PSA	Power System Analysis

1. Executive Summary

Flexibility Markets represent the single biggest change to the electricity sector since its inception, which is why in some parts of the world the change is referred to as 'Electricity 2.0'. The technical and commercial aspects of this challenge are without a doubt complex and require intelligent tools and systems to ensure best possible value for customers and solid facilitation of the low carbon future we desire. This project will deliver the commercially orientated tools and systems we need to make the informed and affordable decisions needed to provide maximum value for customers.

2. Investment Summary Table

Summary Table			
Name of Scheme / Programme	Commercial Optimisation		
Primary Investment Driver	Progress to Net Zero		
Scheme Reference / Mechanism or Category	40/SSEPD/IT-DSO/SYS_ECONOMICS		
Output References / Type			
Cost (CAPEX)	■		
Delivery Year	RIIO ED2		
Reporting Table	C4		
Outputs Included in RIIO ED1 Business Plan			
Spend Apportionment	ED1	ED2 ■	ED3

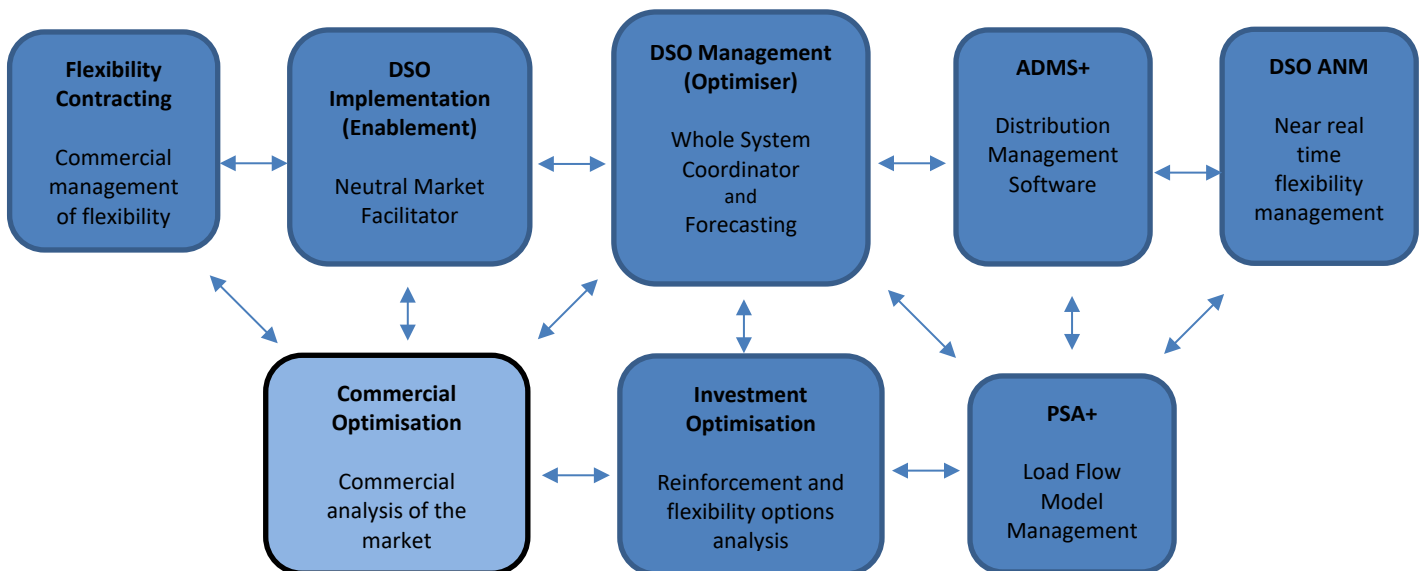
3. Introduction and Background Information

“The design and operation of successful competitive electricity markets requires a sound understanding of both power systems engineering and underlying economic principles of a competitive market.”¹ Until recently commercial expertise was positioned elsewhere in our industry, however with Distribution System Operation being on the forefront of our development activities, the ability to understand and get the most of markets is now critical. As RIIO-ED2 progresses the Local Flexibility Markets will increase exponentially and we will need to have tools and data that enable us to achieve best value for our customers.



This project will build on the work we have done in Project MERLIN (Modelling the Economic Reactions Linking Individual Networks), Transition, Local Energy Oxford (LEO) and the learnings from other industry research and innovation. This will enable us to optimise our choices regarding actions and interventions, both day to day decisions, and future investments. The developed capability enables an informed choice on which is the most economic investment by analysing the behaviours of the markets and participants to suggest commercial suggestions to improve market performance. This allows for a formal and auditable process to decide on which flexibility solutions or traditional reinforcement options are considered for SSEN’s network and ultimately chosen. The tools and systems will interact with other systems to ensure that we make optimal and sustainable decisions on the best measures across our network.

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.



¹ Fundamentals of Power System Economics, 2nd Edition, Daniel S. Kirschen, Goran Strbac

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

The commercial optimisation of our networks, especially the LV system, represents one of the most complex energy market propositions in the world. To ensure that the appropriate costs and value of network solutions are effectively considered, the use of appropriate financial modelling will help optimise costs profiles. The tools and techniques we use to make informed choices about the best and most sustainable decisions will need to be based on the best current information and developments in our industry. Collaboration with academia, industry, our supply chain and peers, as well as government and regulator, will be vital and we fully expect changes of approach within and beyond the RIIO-ED2 period. At present we expect the tools and techniques to include:

- Tools to assist in day to day management of the Flexibility market focusing particularly on the commercial aspects and enabling ongoing optimisation of the markets.
- Tools to run different scenarios for asset investment and combine schemes, to include economic model (e.g. as in MERLIN and Transition):
 - A Distributed Energy Resource (DER) valuation mechanism based on investment planning economics and market analysis.
 - Be able to run baseline scenario analyses on the network models e.g. time-series power flow and hosting capacity.
 - Enable network CBAs in Investment Optimisation to identify the most cost-efficient solution considering reinforcement and flexibility.
 - Defining a set of investment scenarios for the networks based on the DER valuation mechanism.
 - Simulating investment planning scenarios ensure the best overall cost for our customers.
 - Being able to bring in market data to update the ongoing appraisal of the most cost-efficient solution.
- Interfacing and informing other key systems, notably:
 - DSO Management (Optimiser), to ensure the best use of DERs.
 - Investment Optimisation, to enable more informed choices between various options.
 - PSA+ as this will rely on its outputs.
 - EnviroTrack, to ensure any decisions can be informed by overall impacts.
 - LCT Analytics to minimise the impact and maximise the opportunities for peer to peer trading.
- Externally interfacing with market rules and our stakeholders to ensure ongoing relevance.

We currently expect this project to be run as an initial larger deployment, followed by several iterations to refine and improve the tools and techniques based on customer and stakeholder feedback.

5.1.1 Alternative Options

The prime driver for this project is the commercial optimisation of our networks, to ensure that we maximise Flexibility, and defer reinforcement and other network capital works where better value can be obtained. The alternative to an IT system would be to employ a lot of specialist staff to undertake this work manually. Our estimate for these expert staff has been set out in the benefits. The cost for this is far more than an IT system to deliver the same outcomes, moreover such expert staff will be very much in demand over the next few years, so very difficult to obtain. Note that without these analyses, many of the proposed benefits of Flexibility would not be possible, therefore doing nothing is not an option.

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 at project commencement to ensure the best value solution at that time is chosen for delivery.

6. Stakeholder Evidence

There is an expectation that DNOs operate local markets effectively through Distribution System Operation. As our experience grows, we will rely on the evidence our commercial processes to improve the market's performance and the experience of the market participants.

Much of our stakeholder engagement for DSO has been through Open Networks where industry positions and ideas have been shared with stakeholders to gain honest feedback and support to determine affordable solutions. There is related work around real time data exchange that has been developed in WS1b which will be developed collaboratively.

In our *Digital Investment (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 solutions. IT systems in the sector are rapidly changing, therefore 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, rounded to 2 decimal places for simplicity. The bulk of work will be undertaken in the early years of the period, with updates and new devices in subsequent years. Costs and benefits have been set out in the years they are expected to occur. In line with CBA guidance, as all options are additional expenditure from ED1 (as they are to support the new Flexibility Markets) both options show negative NPVs, however doing nothing would compromise many elements of Flexibility. 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
Reduction in the number of new specialists that would need to be employed to deliver the additional optioneering required to support the Flexibility market by analysing all the commercial trades and interactions to suggest better commercial strategies with this more holistic data. 10 FTE assumed, SS09 rate.	■	■	■	■	■	■

The prime benefit will be optimised use of DERs and improved investment decisions. Both will have economic benefits.

Some of the other key benefits include:

- Efficient and timely to run required analysis
- Enabling quicker decision making to avoid paying over the odds
- Being able to identify the optimal time to swap from flexibility to traditional reinforcement
- Identifying the most cost-effective solutions
- More effective use of staff time for doing simplified analysis manually

Note that there are many international studies showing the benefit of DSO and overall System Economics, such as in China², US³, and the UK⁴.

7.2.2 Non-Financial Benefits

This development will deliver many different benefits for our customers and stakeholders; for example, optimising best use of flexibility and investment for greatest customer value whilst maximising system capabilities will save waste through efficiency and lead to a smaller business carbon footprint and associated benefits.

7.2.2.1 Foundation to other Projects/Initiatives

None.

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. If some of the current planned application changes are not completed, the delivery of this project will be extended.

7.4 High Level Dependencies

This project will be dependent on many industry Innovation projects, notable MERLIN and the other DSO related projects such as LEO and Transition from SSEN's projects. The learning emerging from Open Networks Workstream 1A will also be highly influential.

Our suite of DSO projects all rely on each other to create an optimised and holistic approach to DSO. If any one of these are unable to be delivered it would significantly undermine our DSO capability leading to a substantial increase in ongoing resource to undertake the capabilities manually while reducing our agility and scope for optimisation.

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 Engineering Justification Papers (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.

² <https://www.sciencedirect.com/science/article/pii/S0921344919304641>

³ https://www.epa.gov/sites/production/files/2018-07/documents/mbg_2-5_economicbenefits.pdf

⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/568982/An_analysis_of_electricity_flexibility_for_Great_Britain.pdf

- 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

Commercial Optimisation tools and systems will be vital to ensure that we always deliver the best solution for our customers. These tools must be able to balance cost, risk and overall impact such to help deliver Net Zero whilst maintaining a safe and reliable network. Without this type of system, we will not be able to capitalise effectively on the huge amount of commercial information and expertise from ramping up of our Local Markets. All of this will help us improve the service to our customers and maximise efficiencies in the outcomes we deliver via the safe and effective management and operation of our electrical distribution systems.