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## NIA Project Registration and PEA Document

### Date of Submission

Apr 2026

### Project Reference Number

NIA\_UKPN0122

## Project Registration

### Project Title

Green Energy Tool

### Project Reference Number

NIA\_UKPN0122

### Project Licensee(s)

UK Power Networks

### Project Start

May 2026

### Project Duration

1 year and 10 months

### Nominated Project Contact(s)

innovation@ukpowernetworks.co.uk

### Project Budget

£509,553.00

## Summary

When applying for connections, customers could supply inaccurate load estimates, particularly where Low Carbon Technologies (LCTs) are being connected. A new approach is needed to provide customers with a more accurate means of estimating their load requirements. Current tools use after diversity maximum demand (ADMD), developed before LCTs were widely adopted by consumers. This means that the approach has limited capability to provide a useful demand forecast for those technologies. Tools using this method suffer from inconsistent and inaccurate (usually overestimated) capacity estimates. To improve the connection application process, Green Energy Tool will explore the development of a visual, easy-to-use tool, leveraging more accurate load estimation.

## Third Party Collaborators

Environmental Resources Management (ERM)

## Nominated Contact Email Address(es)

innovation@ukpowernetworks.co.uk

## Problem Being Solved

When applying for connections, customers sometimes supply inaccurate load estimates. This is particularly true where LCTs are being connected. A new approach is required to provide customers with a means to more accurately estimate their load requirements.

The current connection application process can provide a poor customer journey, as customers (especially small and medium-sized property developers) are reliant on third-party tools to estimate their capacity requirements. ADMD was developed at a time before LCTs were being widely adopted by consumers. This means that the approach's capability to provide a useful demand forecast for those technologies is limited. Tools based on this method can suffer from inconsistent and frequently inaccurate (usually overestimated) capacity estimates. One cause of this is inconsistent load profiles being used for LCTs within the industry. This could

lead to:

- Delays for customers connecting LCTs as the overestimated values are above the available capacity;
- Reinforcements being triggered unnecessarily, or installing plant larger than required, which wastes resources and lost opportunity costs;
- Additional work for network operators to repeatedly revise connection requests, as customers revise their proposals to try to reduce cost estimates; and
- Poor support to the decarbonisation of domestic heat and transport.

The ADMD methodology typically used by Distributed Network Operators (DNOs) today for estimating capacity requirements is becoming unfit-for-purpose because:

- It only considers the annual maximum demand and does not consider seasonal variations;
- It does not consider the true interaction between different LCT types on a customer's load profile, especially generation LCTs such as Photovoltaic (PV);
- The impact on capacity requirements from some customer equipment is not well understood, especially equipment for medically dependent or vulnerable customers, such as power wheelchairs or ventilators, but also devices such as hot tubs;
- It does not consider the effects of customers who dynamically change their load profiles using, for example, time-of-use (ToU) tariffs; and
- It is assumed that the same ADMD capacity estimated for a local substation should be used for all voltage levels above the connection. In reality, there is likely to be additional diversity as you move up to higher voltage levels; however, the scale of this is not known. This may mean higher voltage levels are being reinforced sooner than required or by a larger amount than required.

## Method(s)

The project will consist of two phases: a research phase, and a development phase.

Research:

The project will investigate whether LCT profiles produce increased estimate accuracy when compared to the traditional ADMD approach. The method for this element of the project is a desktop research activity and will:

- Collate and validate information from industry and innovation projects, carried out in the UK, related to LCTs and how they affect the daily and seasonal energy profile;
- Investigate the impact on the daily and seasonal energy profile for domestic customers of special electrical equipment used by medically dependent or vulnerable customers ;
- Identify and define the types of consumers (passive, active and dynamic), in relation to their involvement in flexibility services, and the expected daily and seasonal energy curves for all LCTs;
- Evaluate whether using load profiles instead of ADMDs is a viable approach to estimating customer capacity requirements and if it is likely to improve the accuracy of those estimates; and
- Identify other factors that affect property energy consumption, and efficiency of individual LCTs (e.g. heat pump daily energy curve for properties with an Energy Performance Certificate (EPC) rating below C).

The outcomes of the research will be assessed to evaluate if LCT profiles provide more accurate estimates compared to ADMD and, if so they will be incorporated into the second phase tool development.

Development:

To improve the connection application process, it is proposed that an easy-to-use, online tool which provides an API to allow integration with other tools and systems is designed and implemented.

One element of this solution, to be explored and defined as the project progresses, is who the target audience should be, as this will

determine the system requirements, including what systems it connects to and what the customer's needs will be. This will be reviewed by considering that customers may be categorised in three ways depending on the connection application route they go through:

- Large Projects customers – customers with larger capacity requirements (over 100 kW with greater complexity or disturbing loads), who are more well-informed, go through the Projects team;
- Small Connections customers – customers connecting up to four properties at once, and have smaller capacity requirements. These customers are likely to be less well-informed. These customers go through the Connection Services team; and
- Mid-sized connections customers – customers with larger capacity requirements than small connections customers (>69kVa), but who are likely to be less well informed. These customers may be handled by either the Projects team or by the Connection Services team.

The overall method, combining research, tool development, and customer testing, will investigate whether LCT profiles provide a more accurate way of estimating customer demand, which features of such a tool are useful to customers, and which customer groups will use such a service.

## Scope

The project scope will include:

- Research elements to understand and build usable LCT load profiles;
- Prototyping and user testing elements to validate the tool;
- Refinement, production-ready development and testing; and
- Business integration and handover.

The project will be delivered across four discrete work packages:

### Work Package 1 – LCT Energy Profiles

Instead of using ADMDs, it is proposed that capacity requirements are estimated based on annual and daily load profiles, which consider the interaction between different LCT types. The primary focus will be on local generation, dynamically changing profiles from dynamic customer use. For example, from time-of-use tariffs and including additional information such as the use of specialised equipment, especially for medically dependent or vulnerable customers.

This work requires research to determine the interaction between all the different load profile factors and builds on findings from projects including Neighbourhood Green, Optimise Prime, and Envision, which investigated the effect on capacity requirements from heat pumps, EV chargers, and LCTs generally, respectively.

Data will be gathered on load profiles through desktop-based research and collaboration with key teams. It may also be possible to get load profile data from external partners such as energy suppliers or aggregators. It is noted that the profiles found during this project phase are unlikely to be completely accurate and reliable, as has been found in Neighbourhood Green, due to insufficient data from a small sample size. The project will therefore include provision for these load profiles to be updated and maintained through a business-as-usual (BAU) process as more load profile data becomes available.

### Work Package 2 – Voltage Level Diversity Factors

Voltage level diversity will be investigated to determine if and how much additional load diversity might be available as loads from connection requests are considered at higher voltage levels. If it is shown that capacity savings could be found from this method, then this functionality should be included within the online tool.

### Work Package 3 – Tool Development and Trial

Work Package 3 will focus on the design and development of an online tool. Initially, this will take the form of a clickable prototype, which can be tested with customers to gain insight and inform the customer journey. If successful, we will then progress to the development of a fully production-ready version of the tool.

## Work Package 4 – Business Process Review & Update

The project must update any business processes or standards as required for the solution.

### Objective(s)

The project aims to achieve several objectives within its delivery:

- The project will evaluate whether using load profiles instead of ADMD is a viable approach to estimating customer capacity requirements;
- The project will assess the current assumed diversity for different loads/customer types when considered at higher voltage levels;
- The project will investigate the impact on network capacity requirements from specialised equipment, such as for medically dependent or vulnerable customers; and
- Create an easy-to-use tool that supports customers in assessing their load requirements.

### Consumer Vulnerability Impact Assessment

The project enables domestic decarbonisation through greater efficiency in the connection of LCTs, this means that all customers will benefit from the outcomes of the project. The project considers vulnerable customers, specifically, by considering their capacity requirements, especially from specialised equipment needed for medically dependent or vulnerable customers.

### Success Criteria

The project will be considered successful based on the achievement of the following outcomes:

- Development of a tool which provides customers with the ability to calculate their load requirements;
- Learnings from the tool's integration into business processes have been fully documented and disseminated; and
- An understanding of whether the use of load profiles, in place of ADMD, results in more accurate forecasting of requirements.

### Project Partners and External Funding

In Work Package 1 and 2, the work related to ADMD/voltage diversity will use external resources from the energy consultancy Environmental Resources Management (ERM). In Work Pack 3, the user experience and user interface elements of the tool will be developed by our existing website provider, Tangent. These external partners are not contributing to the project funding.

### Potential for New Learning

We expect the project to provide the following learnings:

- Whether capacity requirements, estimated based on annual and daily load profiles, which consider the interactions between different LCT types, provide more accurate estimates when compared to the traditional ADMD approach;
- Whether capacity savings could be found from this novel capacity estimation method;
- If and how much additional load diversity might be available as loads from connection requests are considered at higher voltage levels, and whether this would provide additional whole system benefits;
- Which customer types will get the greatest benefit from tools which provide a more accurate demand estimation, and what features are most useful to them; and

What business, technology and process changes are required to develop and integrate such a tool .

### Scale of Project

The project will include all three of UK Power Networks' Licence areas. Each of our areas is diverse in respect of environment and customers, and we therefore need to ensure that the usefulness of the tool is validated across this spectrum to ensure application to as

many of our customer types as possible.

### **Technology Readiness at Start**

TRL5 Pilot Scale

### **Technology Readiness at End**

TRL8 Active Commissioning

### **Geographical Area**

The project will take place across the following licence areas:

- South Eastern Power Networks Plc.
- Eastern Power Networks Plc.
- London Power Networks Plc.

### **Revenue Allowed for the RIIO Settlement**

No funding was provided within the current RIIO settlement that will become surplus to requirements as a result of this project.

### **Indicative Total NIA Project Expenditure**

The total project budget is £509,553, of which 90% (£458,598) will be recovered from NIA

# Project Eligibility Assessment Part 1

## Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations

Please answer **at least one** of the following:

### How the Project has the potential to facilitate the energy system transition:

LCTs are a fundamental element of the energy system transition. This project will provide the industry with a greater understanding of how such technologies interact with the network, and impact diversity at a range of voltage levels. It will also allow more accurate sizing of connections and reinforcement where LCTs are connected, and potentially enable LCTs to be connected faster, facilitating the energy transition.

### How the Project has potential to benefit consumer in vulnerable situations:

While not specifically focused on consumer vulnerability, the project considers vulnerable customers by considering their capacity requirements, especially from specialised equipment needed for medically dependent or vulnerable customers.

## Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

### Please provide an estimate of the saving if the Problem is solved

N/A RIIO-ED2 Project

### Please provide a calculation and/or description of the expected benefits of the solution

The overall expected benefits for the project across RIIO-ED2 and ED3 are as follows:

Improve customer capacity estimations - The accuracy of customer connection applications is improved and right first time, rather than having to iterate with the customer. This improvement is currently estimated at 10%.

Process efficiency - Reduce the number of revised quotes that need to be completed, which will save engineers time and effort. The total resource savings attributable to Green Energy Tool are £1,434k.

These predicted benefits are based on the following assumptions:

Not all customers will be inaccurate in their estimates; we have therefore assumed half of customers already estimate their capacity requirements accurately and therefore will see no benefit from Green Energy Tool.

Not all customers will choose to use the tool, so we have accounted for a low initial uptake of Green Energy Tool.

Planning profile efficiency – The project may improve the profiles used by Network Planning, allowing them to right-size reinforcement. The scale of the potential benefits of this are unclear at this stage, but the project will seek to explore whether any benefits can be achieved in this area.

Base Cost (Net Present Value (NPV)) – £2,868k

Method cost (NPV) – £1,574k

Total NPV – £1,294k

The benefit recipients are as follows:

#### Connecting Customers

More accurate estimates may result in some customers' connection application requests being smaller, which will reduce their connection costs.

#### Existing Customers

Improved capacity estimates and additional diversity at higher voltage levels may prevent some upstream reinforcement, optimising network investment. This is currently uncertain, but will be investigated during the project

### **Please provide an estimate of how replicable the Method is across GB**

The method is replicable across GB, for tools which aim to address load calculations for similar load and consumer types.

### **Please provide an outline of the costs of rolling out the Method across GB.**

The cost to develop the tool is expected to be around £160k. The tool is being developed using UK Power Networks' existing platforms, and it is assumed that each licensee would need to pursue a similar approach and therefore incur a similar cost to roll out. This approach also means that there are no additional licence or support costs, however this may not be the same for other adopters, depending on the structure of their existing systems.

### **Requirement 3 / 1**

Involve Research, Development or Demonstration

Projects must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

- A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).
- A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)
- A specific novel operational practice directly related to the operation of the Network Licensees system
- A specific novel commercial arrangement

Involve Research, Development or Demonstration - Please select all that apply

- A specific piece of new equipment (including monitoring, control and communications systems and software)
- A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven
- A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)
- A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology
- A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution
- A specific novel commercial arrangement

### **Specific Requirements 4 / 2a**

### **Please explain how the learning that will be generated could be used by the relevant Network Licensees**

We expect the project to provide the following learnings, applicable to relevant Network Licenses:

- Whether capacity requirements, estimated based on annual and daily load profiles, which properly consider the interactions between different LCT types, provide more accurate estimates when compared to the traditional ADMD approach;

- Whether capacity savings could be found from this novel capacity estimation method;
- If and how much additional load diversity might be available as loads from connection requests are considered at higher voltage levels, and whether this would provide additional whole system benefits;
- Which customer types will get the greatest benefit from tools which provide a more accurate demand estimation, and what features are most useful to them; and

What business, technology and process changes are required to develop and integrate such a tool.

n/a

### Is the default IPR position being applied?

Yes

## Project Eligibility Assessment Part 2

### Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed. Networks must explicitly mention similar projects that they have considered and how these differ.

### Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

Based on the ENA portal and broader horizon scanning, no such projects, which seek to validate the accuracy of LCT profiles when compared to ADMD, are being carried out or have been completed. Much of the innovation carried out so far within the industry, exploring LCT has been focused on understanding the impact of decarbonisation on the electricity network and on developing flexibility markets. This project seeks to build on those learnings, by assessing the combined impact of LCTs and customer behaviour. The outcomes from this new research will then be leveraged to create an innovative tool which allows customers to more accurately assess their connection needs.

### If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

Not applicable

## Additional Governance And Document Upload

### Please identify why the project is innovative and has not been tried before

Tools which help customers determine their demand requirements have been produced by other DNOs; however, these are based on traditional ADMD approaches. Market scanning carried out during project scoping found no evidence that a tool, which uses LCT load profiles, accounting for the interactions between them as well as impact upstream across voltage levels, has been produced domestically or internationally. This makes the tool a first of its kind in GB, supporting customers in the energy transition.

### Relevant Foreground IPR

Relevant Foreground IPR generated by the project is expected to include:

- Research outputs on LCT energy profiles and voltage level diversity factors;
- Technical assets such as customer journey and user interface requirements;
- Learnings from building the Green Energy Tool; and
- Learnings from the development of new business processes related to the introduction, operation and maintenance of the tool.

### Data Access Details

UK Power Networks recognises that Innovation projects may produce network and consumption data, and that this data may be useful to others. This data may be shared with interested parties, whenever it is practicable and legal to do so, and it is in the interest of GB

electricity customers. In accordance with the Innovation Data Sharing Policy, UK Power Networks aim to make available all nonpersonal, non-confidential/non-sensitive data on request, so that interested parties can benefit from this data.

To view the full Innovation Data Sharing Policy, please visit UK Power Networks' website here:

<https://d1oyzg0jo3ox9g.cloudfront.net/app/uploads/2025/10/UKPN-InnovationDataSharingPolicy-Nov25-v1.pdf>

### **Please identify why the Network Licensees will not fund the project as a part of it's business and usual activities**

As a tool of this kind has not previously been built, there is significant uncertainty whether LCT load profiles can be used to create a calculation of customer connection requirements, and whether they will result in greater accuracy. Because the approach is untested, and given the current TRL of the method, this represents a level of technical and financial risk which is not appropriate for BAU funding.

### **Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks (e.g. commercial, technical, operational or regulatory) associated with the project**

Support from the Network Innovation Allowance (NIA) is required because the project carries commercial, technical, and operational risk.

The project depends on developing an untested methodology, which may or may not yield sufficiently accurate outputs for load estimation. NIA funding is designed specifically to enable this kind of exploratory research where outcomes are uncertain but potentially transformative. The project aligns with NIA guidance for early MTRL innovation, enabling the UK Power Networks and ERM to trial and validate new methods before considering wider adoption. This project therefore requires NIA support to mitigate risk and demonstrate value before any future implementation.

### **This project has been approved by a senior member of staff**

Yes