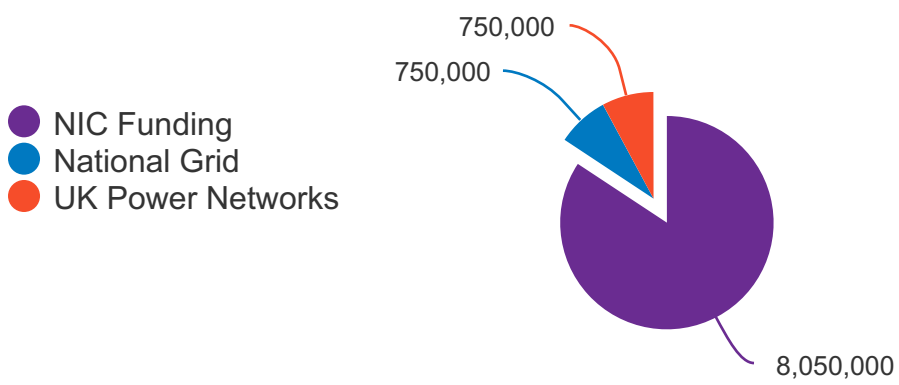
Power Potential (TDI 2.0)

"working together to create market opportunities for our customers"

Project Key Facts

Project Budget: £9.56m



Funding Mechanism: Ofgem Network Innovation Competition (NIC)

Project Lead: National Grid in partnership with UK Power Networks

Status: Funding Awarded
Start date: Jan 2017
End Date: 2019

Working in partnership:

nationalgrid

UK Power Networks
Delivering your electricity

Challenges

Capacity to connect more generation on the South East of England (Canterbury, Sellindge, Ninfield and Bolney) is being restricted due to upstream constraints on National Grid's transmission network. The challenges National Grid face in this area have been driven by the previous growth in low carbon technologies connecting to the distribution network:

- High voltage in periods of low demand;
- Low voltage under certain fault conditions;
- Thermal constraints during the outage season.

These constraints lead to the following challenges:

Fewer low carbon technologies can connect in the area.

High risk of operational issues in the network.

High cost managing transmission constraints.

Aim

In order to provide voltage support in the area, increasing reactive compensation is needed. Distributed Energy Resources (DER) connected in the distribution network have the potential to provide reactive and active power services to the system.

TDI 2.0 seeks to give National Grid access to resources connected in UK Power Networks South East network to provide it with additional tools for managing voltage transmission constraints.

In partnership with National Grid, the TDI 2.0 project will include the creation of a regional reactive power market which will be the first of its kind in the United Kingdom and help defer network reinforcement needs in the transmission system.

Stakeholder Benefits

The project will help enable more customers to connect in the South East and for new and existing customers with the possibility of providing services to National Grid and accessing additional revenue streams.
Services procured from DER will be coordinated such that operation of the distribution and transmission networks are kept within operational limits and constraints are not breached.

When deployed, TDI 2.0 can deliver:

3720 MW of additional generation in the area by 2050.

Savings of £412m for UK consumers by 2050

How Will We Achieve This?

National Grid leads the project and is supported by UK Power Networks. This project will use a Control Software which enables DER to offer reactive power services to National Grid and active power reduction to both UK Power Networks and National Grid to resolve system constraints.

Example: UK Power Networks will act as one of the routes to market and technical coordinator, collating the available DER capabilities, costs and making sure that any actions taken by the services do not undermine the safe operation of the distribution network. It would then present National Grid with details of the service availability and cost at each participating Grid Supply Point. National Grid will then be responsible for looking at all available options and triggering the most economical solution for the constraints. National Grid will procure the services according to the needs of the system and the Control Software will calculate the DER set point according to the network running arrangement at the time and dispatch them accordingly.

The project will create a regional reactive power market which will trial the Distribution System Operator (DSO) route to market where the DSO facilitates local participation. Other market routes explored include the extension of the existing reactive power market run by National Grid and including DER on it.

TDI 2.0 Supports Our Transition from DNO to DSO

The project will enhance and develop new business capabilities needed for UK Power Networks to move from a Distribution Network Operator (DNO) to Distribution System Operator (DSO):

Enhanced Capability – increase visibility and control of DER on the distribution network.

New Capability – provide ancillary services (active and reactive power) to National Grid using the resources, such as solar PV and wind farms, connected to the distribution network to manage the transmission constraints and distribution constraints in a coordinated manner.

Increased control of resources connected in our network is one of the key capabilities needed for transitioning DNOs to DSOs in the future

How Can We Control DER?

The diagram shows the possible interactions between National Grid, UK Power Networks and the DER participating in the trial. UK Power Networks will be able to control the DER via the TDI 2.0 Control Software which will be installed in UK Power Networks' Control Room. Once calculations have been made to ensure the security of the DNO's network, the TDI 2.0 Control Software can send signals to the DER to change their outputs according to National Grid and UK Power Networks' needs.

Real time:

1. National Grid to instruct the service*
2. UK Power Networks' control room receives instruction.
3. Power Potential Control Software will:
   - Run power flow analysis to calculate DER response to achieve service request.
   - Prevent that no distribution constraints are being violated
   - Instruct the DERs
4. DER change set point and produce service according to the Power Potential Control Solution instruction
5. The Power Potential Control Software monitors if response produced is as required
6. National Grid receives service at the Transmission-Distribution interface.

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MVAr
MW*

Service response per GSP

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Power Potential Control Software

Instruction

Service Response
MVAR
MW

Distributed Energy Resources (DER)

Aggregators

*Some services might be either automatic dispatch or on bid basis

For more information on the TDI 2.0 project please contact:
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