

First Tier Pro-forma

Notes on completion
Before completing this form, please refer to the LCN Fund Governance Document. Please use the default font (Verdana font size 9) in your submission, the text entry areas are predetermined and should not be changed. Please ensure all content is contained within the boundaries of the text areas. The full-completed submission should not exceed 4 <u>pages</u> in total.
Project title
Voltage Management on Low Voltage Busbars
DNO
Electricity North West
Participant DNOs
Project summary
<p>The decarbonisation of energy production, transport and heating are expected to result in significant increases in electricity demand and power flows on the LV networks. This will increase the likelihood of line voltages moving outside of acceptable statutory thresholds.</p> <p>This Project is concerned with exploring the potential for alternative technical solutions to the management of voltages on low voltage networks, in the face of increased network loads.</p> <p>The Project will concentrate on developing innovative and economic alternatives to traditional network reinforcement, which typically accompanies voltage problems on LV networks. It will seek to deploy a range of voltage management technologies and techniques across 15 distribution substations, which will be assessed in terms of their ability to effectively regulate line voltage in real-time in a safe and economical manner. In addition to voltage management, the ability of compensating devices to correct for poor power factor will also be assessed. The Project will develop understanding of the potential for these alternative techniques to address issues of voltage regulation of low voltage networks in response to increases in loads and penetration of generation, and inform the development of Electricity North West's operating practices.</p>
Problem(s)
<i>Please provide a narrative which explains the Problem(s) which being addressed by the Project.</i>
<p>As the demand on the network increases, the likelihood of line voltages falling below acceptable thresholds becomes increasingly more likely. In addition, the expected increase in penetration on the LV networks of forms of generation such as PV, small wind and micro-CHP are likely to give rise to line voltages exceeding acceptable thresholds during periods of low demand.</p> <p>In order to avoid the potentially high cost associated with traditional forms of reinforcing existing networks to resolve this issue, consideration of new alternative solutions is required. This problem is expected to materialise initially at the low voltage network level and reduce power quality; this project intends to focus at this level. Existing voltage regulation exists primarily at the 11kV busbars and expectations are that this will need to expand down to the LV busbars to meet the future requirements of dynamic networks.</p>

Problem(s) continued
<p>The forecast load and generation growth is anticipated to place significant stresses on the existing LV network infrastructure. Thermal problems are expected to represent a challenge at the transformation point of the LV busbars and other LCNF initiatives are ongoing investigating how this issue can be addressed. However, it is the expected fluctuation in line voltages which will need to be addressed if appropriate voltage quality is to be maintained and reinforcement avoided. It is currently unclear how the future demand will affect the voltage and this project will be informed by another of Electricity North West's LCNF T1 projects - Low Voltage Network Solutions. However, the dynamic nature of future loads will require increased ability to control voltage at points other than just the 11kV busbars.</p>
Method(s)
<p><i>This section should set out the Method or Methods that will be trialled in order to solve the Problem. The type of Method should be identified where possible e.g. technical or commercial.</i></p> <p>This project is concerned with exploring the potential for alternative technical solutions to the management of voltages on low voltage networks in the face of increased network loads. Existing voltage regulation exists primarily at the 11kV busbars and expectations are that this will need to expand down to the LV busbars to meet the future requirements of dynamic networks.</p> <p>The solutions that are to be deployed can be categorised into two types:</p> <ol style="list-style-type: none"> 1. Tap changers for distribution transformers - voltage regulation at the source in response to changes in demand. 2. Reactive compensation - deployment of reactive compensation devices including capacitors/inductors, energy storage systems/batteries and static var compensators. <p>The outcome of the project will be to establish new and novel operating practice via alternative standard design and applications for the control and management of voltages across the LV networks. Using this Project, Electricity North West will be able to assess methods to avoid extensive and potentially expensive network reinforcements in future price control periods.</p>
Scope and Objectives
<p><i>Please describe the scope and objectives of the Project should be clearly defined including the benefits which should directly accrue to the Distribution System.</i></p> <p>This project will seek to deploy a range of voltage management technologies and techniques across 15 distribution substations. They will be assessed in terms of their ability to effectively regulate line voltage in real-time in a safe and economical manner. In addition to voltage management, the ability of compensating devices to correct for poor power factor will also be assessed. The focus of the project is to learn about techniques to regulate voltage and avoid future reinforcement requirements, rather than to offset planned spending in the DPCR5 period.</p>
Success Criteria
<p><i>Please give details of how the DNO will evaluate whether the Project has been successful.</i></p> <p>Success criteria are: Establish learning on a range of alternative techniques for management of voltages on low voltage networks; Deploy new technology on the network for improved voltage regulation and measurement of the effect on voltage profiles in response to changes in demand; Produce standard designs/applications for installation of alternative voltage management techniques; Measure voltage profiles and their behaviour in relation to changes in load over the load cycle and compare with reference networks; Improve efficiency (i.e. reduction in network losses and optimised real power distributions) on low voltage networks via improved power factor; Improve power quality through a reduction in voltage perturbations.</p>

TRL	5
<i>This should be between 5-8 to be eligible for Tier 1 Funds.</i>	
Predicted start and end dates.	
<i>DNOs should provide an estimate of the expected project starting and completion dates.</i>	
Start Date: 04/2011	End Date: 10/2012
Project partners and external funders	
<i>Please give details of actual or potential Project Partners and External Funding Support as appropriate</i>	
<p>There are no Project Partners or External Funding for this for this Project. The University of Manchester will be a Project Supplier, working in partnership on the development of the project and the subsequent analysis of the data. Electricity North West also expects to work with appropriate equipment manufacturers such as AREVA and ABB. Further academic and equipment suppliers, and project supporters, may also be approached as the project scope is further developed.</p>	
Potential for new learning	
<i>Detail what the parties hope to learn and how the learning will be disseminated.</i>	
<p>This project is expected to provide much greater understanding of the potential for LV regulation to cope with future demands and to effectively regulate line voltages as a viable alternative to traditional network reinforcements. Correction for poor power factor will be assessed as will the ability to improve network losses. In addition to annual reports, the close-down report and the annual LCNF conference, dissemination will occur via the University of Manchester and via the Electricity North West website.</p>	
Risks	
<i>The DNO should highlight any material, known risks that could impact the Project's costs and/or programmes.</i>	
<p>This project is expected to carry low risks both in terms of its delivery and its use of new technology. We will create a risk register during the project, and intend to share this on our website.</p> <p>The scope of the project is well understood and delivery is expected to be via internal resources. Whilst the application of the technology on the low voltage network is novel, the technology in itself is not new.</p>	
Scale of project	
<i>Please justify the scale of the Project. In particular, the DNO should explain why there would be less potential for new learning if the Project were a smaller scale.</i>	
<p>Loads across the network can vary both in terms of magnitude and profile. In order to ensure that the learning associated with the project is maximised and that future application of the technology is well understood, it is necessary to trial the technology across a number of sites. The distribution tap changing transformer will be trialled at 5 sites. The reactive compensation and other voltage management devices will be trialled at 10 sites.</p>	
Geographical area	
<i>Details of where the Trial(s) will take place. If the Project is a collaboration, the DNO area(a) in which the Trial(s) take place should be identified.</i>	
<p>Within the region covered by Electricity North West, the geographical areas most likely to be affected by this trial are Greater Manchester and Lancashire. Further work is required to determine the exact locations.</p>	

Estimated Project funding			
<i>An indication of the revenue allowed for within the DPCR5 settlement that is likely to be saved as a result of the project.</i>		<i>An indication of the total Allowable First Tier Project Expenditure that the DNO expects to reclaim the for the whole project.</i>	
Revenue allowed for in the DPCR5 Settlement (£)	0	Indicative total Allowable First Tier Project Expenditure (£)	£485,000
Please tick if the project involves making payments to related undertakings			<input type="checkbox"/>
<i>The DNO must set out all payments that it proposes to make to itself or any Related Undertaking. Further, if a payment is to be made to any Related Undertaking that is a Distribution System User, the DNO must demonstrate that it has offered the same terms to similar Distribution System Users on the part of the network that is within the Project boundary and has used reasonable endeavours to identify such Users.</i>			
Please tick if the project conforms to the default IPR arrangements set out in the LCN Fund Governance Document?			<input checked="" type="checkbox"/>
<i>The DNO should indicate if the Project does not conform to the default IPR conditions. A justification for alternative arrangements and why the Project should still be approved must be provided, in accordance with paragraph 2.18 of the Governance Document.</i>			
Please tick if you do not consent to the First tier pro-forma being published in full.			<input type="checkbox"/>
If you do not consent please identify any information in the completed First Tier LCN Project Registration that you do not wish to be published.			
<i>The DNO must demonstrate that it (or its Project Partners) will face commercial harm from its disclosure and that information is considered eligible for exemption under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.</i>			
<i>All information submitted within the First Tier LCN Project Registration Pro-forma will be made available on the Ofgem website, unless Ofgem has agreed otherwise as part of the Registration process set out above.</i>			