

SPD 2004 – Response to question SPD006

ARC WORK PACKAGE OVERVIEW

Sub Work Package	Activity	Specific Learning	Costs excluding resources	Resources
0.1 – Project Management	•Overall project management and coordination	-	£65k Legal (£50k contractors), audit (£10k contractors) and Exceptional expenses (£5k T&E)	800 MD (PM) 400 MD (FNM)
0.2 -Decommissioning	•Decommissioning of equipment at end of trial if necessary	-	£30k	40MD(Tech)
1.1 – Stakeholder Forum	•Creation of a forum for relevant parties to discuss generation connections issues within the context of this project.	•How can improved dialogue between DNOs, developers and other parties such as local authorities and planners help with the connections process. •Feedback from Stakeholders on the project progress	£200k Stakeholder forum (£176k for external assistance/contractors), 16 Stakeholder (1 per quarter) Forums with an estimated cost of £11k per event using external resources to facilitate, hiring of a venue and documenting/publishing the outcome of each event.) Customer information packs (£14k contract), regular documentation to be provided to customers to inform of developments and how the project impacts /benefits them. Customer survey (£10k contract) at beginning and end of project to determine level of success and obtain feedback as per Successful delivery reward criteria 9.8. To be undertaken by independent organisation and results publication.	160MD (SM) Stakeholder manager will be responsible for managing the contractors, attending the events and dealing with day to day issues of this work package.
1.2 – Provision of Network Data	•Provision of network data including more frequent LTDS and network heat maps to allow well informed connection enquiries to be developed.	•Understanding what information and how is this best presented to help inform customers of network capabilities for new generation to empower them to make well informed and quality applications. •Provide a view of alternative connection options	£300k Development to existing GIS system (£150k IT) to provide a portal for customers to access this system which will feature the enhanced network data and provide more information on the operation of the network. Costs based on information provided by with existing GIS provider . Development of heat maps and extraction of data from design systems (£50k IT) which will be developed as part of WP 2.3, work to be undertaken by contracted IT. All IT resources used by Scottish Power and outsourced and £100k (contractors) has been estimated as the necessary contracted resource to modify existing systems to reflect the changes made above.	80 MD(SM) 80MD (CL) Stakeholder manager and Connections Lead will be involved in specifying the nature and format of information that will be provided. Resource will also be used to review with stakeholders to ensure appropriate.
1.3 – Viability Study	•Introduction of a 'Viability Study' option whereby SPD can work with the developer prior to making a formal application to help them look at the potential options for their connection.	•Develop process maps for information flows to customers to enable greater empowerment and understanding of options as part of the connections process.	£60k Assistance from SGS to undertake constraint analysis (£60k contractors) as a result of the ANM scheme that will be deployed and more complex operating arrangements.	400MD(CL) Dedicated connection resource for dealing with enquiries in trial area over and above existing resources. Necessary to produce multiple options and examine best approach for the customer.

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2.1 – Design Policies	<ul style="list-style-type: none"> •Review and update policies to accommodate ARC proposals •Develop commercial framework to support new arrangements 	<ul style="list-style-type: none"> •Commercial framework required to support new connection arrangements (e.g. Application of Last in, first off for constrained areas). •How can Business as Usual design accommodate active network management. •Connection of DG to alternative points on the network. 	£25k External technical support to assist in the refreshing of design policies where necessary	320MD (tech) 80MD (CL) 160MD (REG) Review and update of policies as well as training and awareness for staff to accommodate the technology and approach this project will deploy.
2.2 – Network Visibility	<ul style="list-style-type: none"> •Use of existing data sources, learning and models from other LCNF projects and off-line state estimation to provide visibility on the operation of the network 	<ul style="list-style-type: none"> •Use of off-line state estimation compared to deployment of further monitoring on the network. •Application of learning from other LCNF projects 	£25k (+£50k BIK) External technical expertise in interpreting data (£25k),and creation of an off-line state estimation tool (£50k BIK from SGS)	320 MD (Tech) 160 MD (CL) Review of existing data sources and understanding how these can be better used and incorporated into the off-line state estimation tool developed by SGS. Application of State estimation tool.
2.3 – Planning Tools	<ul style="list-style-type: none"> •Integration of PI, GIS and design software to improve design process 	<ul style="list-style-type: none"> •Streamlining of design process for faster turnaround of designs 	£475k Finalise scope, requirements and specification (£35k) Analysis of interface capabilities, strategy and select vendors(£30k) Purchase of Design software license (£20k IT software) Customising design software (£85k IT resource and software) Customise GIS (£55k IT resource and software) Customise data historian and integration with GIS to present load information geographically (£125k IT resource and software) Testing and validation of interfaces (£55k) IT Management (£50k) Training and training materials (£20k) All costs provided by Scottish Power IT provider (IBM) based on budgeting process that is normally used for projects of this nature.	320 MD (Tech) Technical resource input into the development of Planning tools and assisting with testing, validation and training of staff to use these developments.

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3.1 – Design and Evaluation of Enablers	<ul style="list-style-type: none"> •Study of the optimal level of investment in top down enablers compared to incremental. •Study of who and how these enablers should be paid for in future. 	<ul style="list-style-type: none"> •Analysis and developing methodology for the deployment of top down opposed to incremental deployment. •Building on the analysis undertaken by Smart Grid Forum WS3 activity 	£50k University of Strathclyde (£25k) assistance in the evaluation of deploying enabling technology and how this informs future decisions SGS (£25k) Assistance in the design of enabling technologies, in particular telecoms requirements and ANM.	200MD (Tech) 80 MD (Telecoms) 80 MD (RTS) 80 MD (Reg) Resources to develop specification and design of enabling technology as well as undertake evaluation and detail the evaluation process for future investments.
3.2 – Telecoms platform for communicating across network	<ul style="list-style-type: none"> •Establishment of a expandable telecoms platform across the trial area for communication with ANM and other technology as required to 	<ul style="list-style-type: none"> •Potential technology for establishing such a network which is proposed for ED1 	£500k Funding for establishing 10 radio links between various substations across the trial area due to the rural location of the sites no other technology is available. Cost per radio link of c£45k - £31.5k for equipment, £13.5 for contractors to install and £1.35k for operating costs (counted as IT). This is network infrastructure rather than IT which is why the costs are against materials and contracts.	320MD(telecoms) 160MD(Tech) Resources for the specification, installation and maintenance of the telecoms links.
3.3 – ANM platform for managing generators	<ul style="list-style-type: none"> •Establishment of an ANM platform such that it is interfaced with PowerOn for any generators to join as required 	<ul style="list-style-type: none"> •Development of ANM platform and demonstrating new ANM functionality not previously developed 	£1000k £320k of equipment will include the controllers and control panels within substations and existing generators which interface with the network. These are viewed as network equipment which is the reason why they are detailed as equipment. £340k for contractors which will cover the resource requirements from SGS on the project, which consists of approximately 450 Man days. £340k for IT which includes a fully managed service for the ANM platform, applications as well as back up support. This is a fully managed service rather than purchasing the actual software and servers separately.	800 MD (Tech) 320 MD(RTS) Resources for installing equipment on site and integrating with existing platforms.
3.4 – Substation Environment	<ul style="list-style-type: none"> •Replacement of auxilliary equipment where necessary including tap changers and protection relays to facilitate ANM. 	<ul style="list-style-type: none"> •Level of modernisation required when retro-fitting new technology 	£400k £250k equipment to upgrade 5 primary transformers to accommodate reverse power flow including protection modifications where necessary. £100k contractors with specialist skills to undertake such modifications, £50k Contingency should an additional primary transformer require modification.	160 MD(Tech) 160 MD (Eng) Engineering and technical resource to identify, design and deliver modernisation where required.

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4.1 – Management of Exporting Distribution Networks	<ul style="list-style-type: none"> •Define the National Grid requirements for visibility of ANM to the TSO •Develop an interface which allows for visibility of generation and ANM across the grid boundary through Inter Control Centre Protocol Link •The use of ANM as an alternative to multiple individual inter-tripping schemes to provide coordinated management and enabling/disabling of generation. 	<ul style="list-style-type: none"> •How is DG managed across the Grid boundary? •Alternative solutions for exporting Grid Supply points which normally require statement of works. •Facilitating additional generation at an exporting site which would normally be constrained. 	<p>£300k</p> <p>Internal IT £100k – establishment of Inter control centre protocol between SP and National Grid as a means to exchange network information.</p> <p>£50k equipment to provide ANM controllers at GSP and with existing generators which can provide measurement data and control function.</p> <p>£135k for SGS to interface the ANM system with the ICCP, of which £50k is BIK from SGS.</p>	<p>160MD (Tech)</p> <p>160MD (RTS)</p> <p>Internal technical resource to oversee linkages being established</p>
4.2 – Active Management of Generation Around Constraints	<ul style="list-style-type: none"> •The use of ANM to manage non-firm connections and facilitate more DG to be connected. •The use of advanced voltage control to manage the voltage at substations •The use of novel generator control to manage power flows around constraints. 	<ul style="list-style-type: none"> •Active management of N-1 thermal and voltage constraints. •Use of fast acting and novel controls at generator. •Commercial arrangements for constrained connections. •Alternative network technologies which assist with DG connections. 	<p>£350k</p> <p>£10k for IT/Real time systems modification to integrate AVC into ANM scheme</p> <p>£150k (equipment) for the deployment of active voltage control across 5 substations which will provide enhanced voltage control</p> <p>£60k (equipment for ANM controllers in existing wind farms as part of inter-trip upgrades.</p> <p>£130k Contractors for SGS implementation. Include £50k BIK from SGS for development of ANM to include the complex nature of the ANM in the trial area.</p>	<p>400MD (Tech)</p> <p>Resource for design, implementation and installation.</p>
4.3 – Community level connections	<ul style="list-style-type: none"> •Development of a community led solution to smaller scale generation. •Use of Community level storage and other end point technology to maximise output of generators. •Engagement with communities to explore demand led solutions such as contracting with load to off-take excess generation. •Use of conversion of excess power to heat as off-take solution. 	<ul style="list-style-type: none"> •Develop a number of Community level models which demonstrate solutions to expensive or infeasible small scale generation. •Use of Community storage and other end point technology. 	<p>£2,000k</p> <p>Energy Storage device and integration with network (£650k for equipment, £100k for systems integration and inclusion into ANM, £200k for contractors to assist with installation, design and operation of device). Based a 100kW/200kWh device including housing and integration with the network as necessary.</p> <p>Other End point technology (£450k) for wind to heat system which will demonstrate how load can be balanced against intermittent generation to manage overall export.</p> <p>CLO Full time (£229k contractor) provided by Community Energy Scotland</p> <p>UoS (£162k) based on 15 man months of assistance in developing options, concept development and demonstration.</p> <p>SGS (£50k) assistance in integrating model with ANM scheme.</p> <p>Commercial arrangements and assistance from CES (BIK TBC)</p> <p>£180k for contingency where necessary.</p>	<p>400MD (Tech)</p> <p>80MD (SM)</p> <p>Technical resource for design, implementation and installation. Stakeholder manager involvement to assist with community engagement during the development phase.</p>

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5.1 – Organisational change	<ul style="list-style-type: none"> •Understanding and detailing organisational changes that are required to adopt the project learning •Mapping of business processes for dissemination 	•How other organisations can utilise the learning from this project.	£50k External assistance to document and publish change processes for other DNOs to utilise	80MD (Reg) 80MD (Tech) 160 MD (BC)
5.2 – Evaluation of network	<ul style="list-style-type: none"> •Identification of triggers based on generation installed and constraints for network upgrades •Analysis of how solutions being deployed can be used in BAU 	<ul style="list-style-type: none"> •Proposals for structure of future DG incentive •Decision based analysis when DNOs invest in network to maximise existing generation 	£150k UoS Assistance for independent evaluation, 14 man months of assistance	160 MD(Tech) 160MD (Reg)
6.1 – Knowledge Import	•Ensure learning from other projects is adopted in this project and updating of policies as required	•How do apply learning from other projects to maximum effect	£10k £5k for developing training material based on learning from other projects to internally disseminate learning £5k for travel and expenses to visit other DNOs where necessary.	80 MD(Tech) 80 MD (SM)
6.2 – Knowledge Export	•Dissemination of learning to other DNOs and interested parties	•Dissemination	£85k Creation of dedicated Website (£15k contractors) Other dissemination inc LCNF Conference (£70k contractors for facilities and assistance)	160MD(SM) 80MD (Tech)
6.3 – PNDC demonstration	•Demonstration of key network technology components at the PNDC	•Practical demonstration of technology	£50k - estimated costs for accessing site for demonstration.	40MD (Tech)