Low Carbon Networks Fund
Full Submission Pro-forma
Section 1: Project Summary

1.1 Project Title:

Anglesey Community Energy

1.2 Funding DNO:

Scottish Power Manweb

1.3 Project Summary:

Previous LCNF and EU funded projects have shown that a lack of consumer engagement can significantly undermine the achievement of low carbon goals, particularly with Demand Side Response (DSR) services. Evidence, developed through Scottish Power Energy Networks (SPEN) own Ashton Hayes LCNF Tier 1 project, suggests that a community led initiative displays a higher degree of individual engagement. The proposed project capitalises on this point, but will reverse the premise of customer engagement seen in previous projects i.e. rather than a DNO asking "if we take these actions, how will you react?" encourage the consumer to ask "I want to achieve these outcomes, how can you facilitate this?". Traditionally only Supplier price incentives have been used as a DSR trigger to manage both generation availability and network constraints. This is often in conflict with the actual situation. For example, if cheap wind energy triggers a consumer signal to effectively use as much electricity as they can, the cluster in a street will have excessive demand on their feeder causing a localised network constraint. This project will demonstrate a solution to allow the Supplier to continue to act independently whilst providing a local community response to the constraints this will induce. The community will have the ability to decide how they prioritise their own requirements to meet these challenges. The project will focus on the community in Anglesey, North Wales which has a diversity of social groups, high fuel poverty but also a variety of low carbon generation and increasing load. The use of traditional, DNO-led solutions to address network constraints in this case are prohibitively expensive. The project methods propose the use of independent community engagement partners, behavioural psychology and novel business models to facilitate community energy management. The community engagement partners will be responsible for energy efficiency advice, including demand destruction, and active local energy management. A commercial model will be established to give financial value to energy management which mitigates the need for reinforcement along with the creation of a coordination platform for technology services, focusing on the SME sector as providers. SPEN will look at active network management techniques which not only manage generation assets but can respond to and drive local commercial model triggers to mitigate LV/MV network constraints.

1.4 Funding

1.4.2 LCN Funding Request (£k): £9,242k

1.4.3 DNO Contribution (£k): £0k

1.4.4 External Funding - excluding from NICs (£k): £771k

1.4.5 Total Project cost (£k): £11,125k

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1.5 Cross industry ventures: If your Project is one part of a wider cross industry venture please complete the following section. A cross industry venture consists of two or more Projects which are interlinked with one Project requesting funding from the Low Carbon Networks (LCN) Fund and the other Project(s) applying for funding from the Electricity Network Innovation Competition (NIC) and/or Gas NIC.

1.5.1 Funding requested from the Electricity NIC or Gas NIC (£k, please state which other competition):

1.5.2 Please confirm if the LCN Fund Project could proceed in absence of funding being awarded for the Electricity NIC or Gas NIC Project:

☐ **YES – the Project would proceed in the absence of funding for the interlinked Project**

☐ **NO – the Project would not proceed in the absence of funding for the interlinked Project**

1.6 List of Project Partners, External Funders and Project Supporters:

Project Partners: Menter Mon, University of Durham , University of Bangor, Global Smart Transformation

Project Supporters:, Medwyn Mon, Anglesey Energy Island Programme, Welsh Assembly , Anglesey County Council, Coleg Menai, Tai Eryri

1.7 Timescale

1.7.1 Project Start Date:	1.7.2 Project End Date:
Jan 2014	Dec 2017

1.8 Project Manager Contact Details

1.8.1 Contact Name & Job Title:	1.8.3 Contact Address:
Fiona Fulton Future Networks	Ochil House 10 Technology Avenue Hamilton International Technology Park Blantyre G72 0HT
1.8.2 Email & Telephone Number: ffulton@scottishpower.com 0141 614 6833	

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Section 2: Project Description

This section should be between 8 and 10 pages.

2.1 Project aims and objectives

The overall aim of this project is to define the future role of a Distribution Network Operator (DNO) in providing energy services to customers, as opposed to the historical perspective of providing units of electricity. We view this as being key step that is required for a shift from the DNO being an asset manager to a customer focussed Distribution System Operator.

An active role in managing customer's energy needs, as well as the network, will require extensive engagement in a manner that; creates interest and willingness to participate, maintains contact on an ongoing basis, provides an enduring benefit to all parties. Many previous LCNF and EU funded projects have shown that a lack of consumer engagement can significantly undermine the achievement of low carbon goals, particularly with Demand Side Response (DSR) services. Evidence, developed through SPEN's own LCNF Tier 1 project in Ashton Hayes, suggests that when people are brought together through a community led initiative a higher degree of individual engagement and participation occurs.

The Anglesey Community Energy project aims to will demonstrate:

- an innovative approach using community engagement
- delivery of energy services through a new market intermediary who is a trusted independent partner
- novel business models to facilitate the aspirations of customers as the transition to a low carbon economy occurs, whilst
- managing the network around customer's needs at lowest cost based on the new services available.

The key objectives of the trial are to:

- Understand community dynamics and response to stimulus
- Determine the appropriate community engagement methodologies
- Determine the appropriate stakeholder cultural changes to allow community engagement
- Determine the format and services for a local energy market infrastructure in which communities can engage
- Evaluate a new innovative model that provides no interference with the Supplier. Customer commercial relationships will be through the existing arrangements
    - while engaging the community to maximise the existing capacity of the LV and MV network by using an intermediary to coordinate with the community as a trusted coordinator on the communities behalf.
    - The DNO can use the service provision from the community to combine with their own active network management infrastructure to manage network constraints up to 132KV and maximise network capacity in real time.
- Ensure the solution results in load shifting peak demand in localised areas to allow optimal use of network assets and deferment of reinforcement

Problem to be addressed

Anglesey is an island situated on the North West coast of Wales with a population of approximately 70,000 people. It is located at the extreme edge of the electricity distribution network. The majority of its areas are more deprived than the Welsh average with, for example only 81% of households have central heating compared to the Welsh average of around 93% (http://www.assemblywales.org/anglesey.pdf).
Anglesey has a variety of communities including:

- Extensive fuel poverty and diverse social demographics within a small geographic area
- Concentrated commercial activity around the main transport hubs
- New villages and recreational areas to accommodate workers for the Wylfa Nuclear Power station.

Anglesey Council has stated ambitions to become an Energy-Island that is at the forefront of Research and Development, delivering economic growth, jobs and a thriving community as part of the low carbon transition. To be able to meet this aspiration, the region is expected to undergo a significant change; resulting in changing expectations of the local electricity network.

Anglesey presents a representative, and concentrated case study of the challenges that other regions of Great Britain are also likely to face throughout the low carbon transition, while the proposed methodology offers a novel approach to examine the future business model that may be required by DNOs and communities alike.

Anglesey has a number of challenges from the DNO perspective (see diagram in Appendix 2):

1. Large amounts of low carbon generation coming on line from Wind, Biomass, PV, etc (e.g. variable and more stable forms).
2. A weak distribution system, due to the rural geography.
3. New load centres being developed in previously uninhabited areas.

Traditional DNO-led reinforcement solutions can address some of these issues, but at a high cost. Initial estimates indicate more than £15m being required to reinforce the network on Anglesey just to meet the known challenges that have been actively lodged with the DNO. This excludes the new build for the Wylfa worker homes development and many other 'known' potential projects that will require new network demands. Continuing with a resource and capital intensive approach risks exacerbating fuel poverty issues, whilst it does not necessarily provide the flexibility for the changing needs of the region. A more flexible approach is needed which would require the engagement of the community to help reduce and/or strategically locate demand and smooth peak loading of the network. A problem arises with the difficulty in recruiting participants to DNO led energy schemes. Other projects that have tried and been challenged in this area and seen significant tail off in engagement with purely financial incentives.

This project therefore addresses the key problem: how can a portfolio of differing communities, rather than individuals, be engaged in their own energy management on an ongoing basis to help alleviate DNO network constraints in a mutually beneficial manner.

Methods

Our premise is that technologies have been evaluated but the methods for persistent community engagement and reward through the use of this technology have not been fully addressed. The methods in this trial will therefore focus on understanding how communities behave and therefore examining what technology (home automation and network) is required to create the stimulus they need and what market structure this system needs to operate in to maximise DNO and community benefits.

We have first-hand experience of the benefits of successful community engagement in our LCNF Ashton Hayes project. Global evidence is also available via, for example the EU FP7 ADDRESS project, which we were also involved with via IBERDROLA, and from SSE's NINES project around home automation. We will use this to help formulate our methods and trials.

Trials

An alternative community led and owned approach to meeting both their and the DNO's energy requirements is suggested which has not been extensively trialled by DNOs. This would allow community groups to define their own energy goals via a trusted intermediary whose raison d'être is to ensure these goals are met. This intermediary would manage community energy via a range of home technology and match these goals to the network constraints of the DNO. The goals of community and DNO will not always coincide; hence, this project aims to examine the ability to deliver benefits to the DNO and the customer on an ongoing basis via a coherent market model. The project further aims to clarify the role of the DNO and independent community social enterprises in enabling this to occur.
Extensive analysis of the key aspects of community engagement with energy that have been completed elsewhere, especially in projects like LCNF, NINES and other European and Global projects. The combined learning from these projects has led to the identification and design of the key objectives for this project. The aim of the analysis has been to identify gaps in how new (and existing) technology and business models can be combined with proven capabilities from these previous projects and utilise these combined capabilities to meet the needs of the DNO and the community it serves.

Solution

Solving the stated problem will provide a blueprint for how communities and DNO's can engage on a GB-wide scale to ensure community energy can be co-ordinated to maximise benefits for the DNO without detriment to community goals.

2.2 Technical Description of Project

Methods to be trialled - A community approach

Recurring community goals of energy efficiency, fuel poverty elimination, reduced costs and the application of renewable generation all have a common central theme of more efficient use of electricity which inherently supports the DNO goals of minimising the cost of the networks and enabling faster connection of renewables.

The focus of Anglesey Community Energy is not encouraging individuals within a geographic area to participate, as in the majority previous DSR trials, but the community as a group. This will allow significant demand to be managed as a single entity and the existing trust relationships within the community to be leveraged. The focus is on what is required to ensure communities can participate and remain engaged. In addition, the focus is on the end user energy requirements driving technology, rather than vice versa as is the norm.

The following methods will be trialled to address the problems and deliver the objectives in conjunction with our partners. A full description of project partners and their expertise is given in **Evaluation Criteria (d) Involvement of other partners and external funding.** An overview of partner relationships is shown in figure 2-1.

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Project Description continued

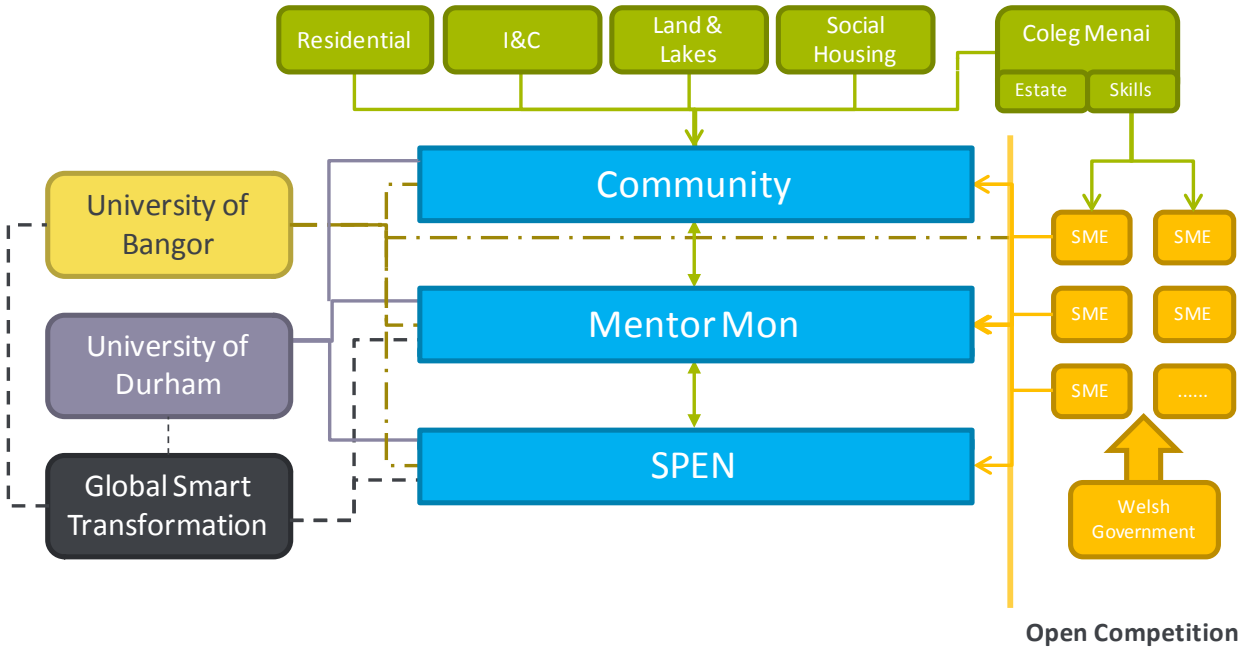

Figure 2-1: Partner Interactions in ACE project

1. Investigate community behavioural change, stimulus and supporting technology that may be required for a successful outcome

Different communities will respond in different ways to different types of stimulus and have different trust relationships. Through a structured analysis and research by Bangor University this project aims to understand community behaviour in detail in the selected representative areas. A successful outcome will mean the appropriate energy efficiency stimulus can be defined for communities. This is an innovative approach as no preconception of the stimulus solution is assumed.

2. Investigate stakeholder behavioural change and stimulus that may be required for a successful outcome

In a uniquely innovative approach, ingrained behaviour both within the DNO and in 3rd sector organisations, such as Menter Mon, that will also need to change to ensure a successful outcome will be examined. Success will mean 3rd sector organisations, like Mentor Mon, and DNO's will understand the way the need to behave to work successfully with each other.

3. Analyse and demonstrate the role of communities and local community engagement partners in community energy projects

The outcome from the community behavioural analysis will be used to shape the format of a community energy engagement platform which will be driven by a local 3rd sector organisation (Menter Mon). The key success factor here is understanding how a portfolio of different 'communities' can be utilised to manage network constraints over different times and situations faced by the local conditions placed upon an increasingly dynamic and

changing network usage. Menter Mon will liaise with these communities (social housing , I&C groups and individuals) to provide energy efficiency advice, technology and active energy management to aid demand destruction. This energy management advice will include innovative services such as advising the location of new demand and generation to minimise possible network constraints and improve connection timescales.

4. Analyse and demonstrate the role of home automation management systems in community energy

This method will demonstrate the requirements which technology will need to fulfil e.g. monitoring and/or control, domestic premises level or community wide management. This method will also demonstrate the ability to train and maintain an ongoing group of SME who can deliver and support this type of solution post-LCNF phase. This method is innovative in that this is not a technology test but defines the application of the technology.

5. Analyse and demonstrate an effective DSO level market for ancillary services which provide financial incentive for all parties

A community-led initiative cannot rely solely on goodwill and for an enduring solution a self-sustaining market needs to be demonstrated. This method will investigate how a community could balance their own energy needs in a self contained market, how they could participate in an ancillary services market with the DNO and how this model could be replicated into an openly competitive GB market place. This work will leverage the work of Durham University which has an established research track record and on-going projects in network regulation, R&D and innovation. This will be highly collaborative with Bangor university's behavioural analysis to uniquely meld these to elements of community stimulus together.

6. Analyse and demonstrate how a DNO can effectively respond to community needs in a manner that improves network operation and connectivity of renewable

The DNO must be able to anticipate and respond to the signals it receives from the community and be able to provide services that make the project financially viable. This may require the use of commercially available solutions (which exist for generation management) and the development of some specific new solutions (for response to localised community network constraints). This linking together of community and network in a near real time market is a truly innovative step which, to our knowledge, has not been explored before.

2.3 Description of Design of Trials

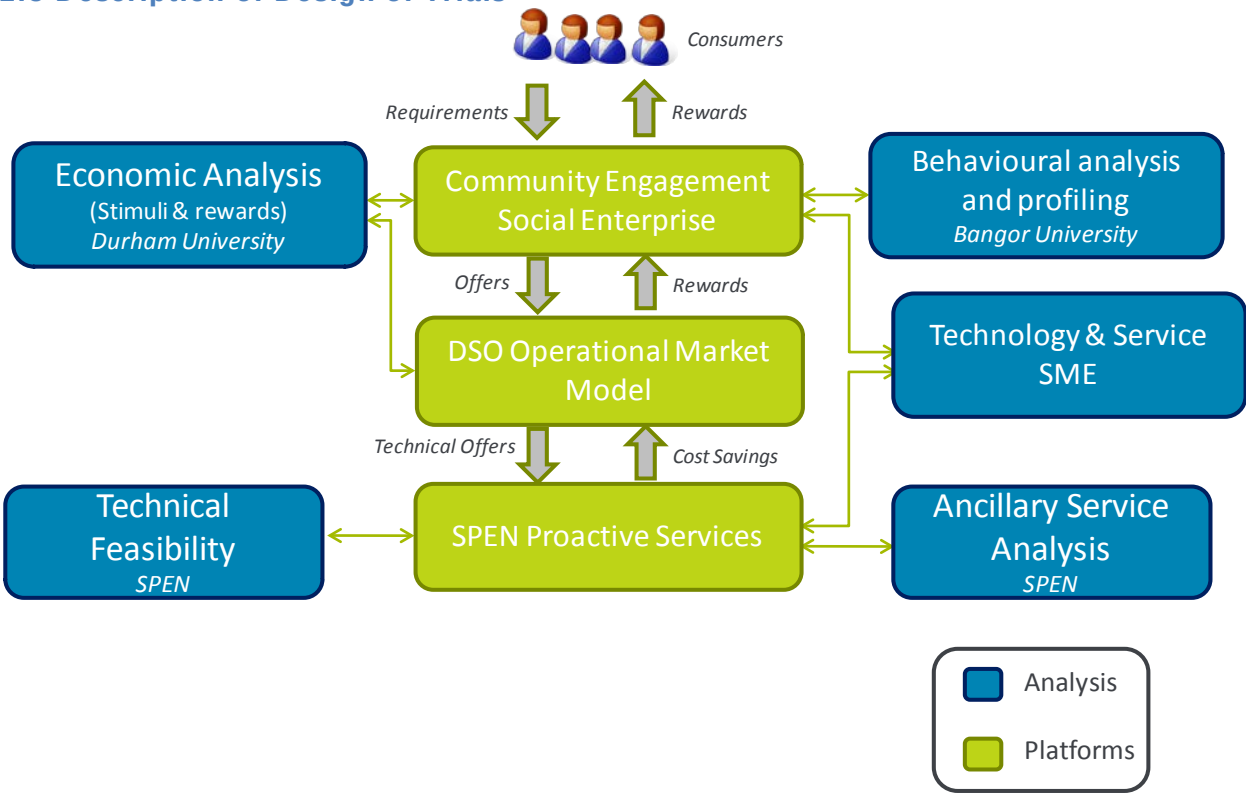

Figure 2-2: Proposed ACE Trial Operation

Figure 2-2 shows the high level operation of the trial. More detailed architecture diagrams are shown in Appendix 2. The project will trial the methods via a series of overlapping workstreams:

Workstream 0: Project kickoff & project management (Lead: SPEN)

This will provide a single point of control during project kick-off ensuring consistent approaches are taken by stakeholders and contractual/infrastructure requirements are in place. Subsequently, this provide the ongoing project management function for the project.

Workstream 1: Identifying community and stakeholder behavioural change stimuli (Lead: Bangor University)

Bangor University has research strengths in behaviour change and consumer psychology through the well-established and highly regarded School of Psychology. It now has increased capacity to undertake work specifically with SMEs through the newly established Wales Centre for Behaviour Change. In addition, through the Welsh Institute for Natural Resources (WINR), the University has taken a very active interest in sustainability and has excellent links with industry and bodies such as Energy Island. WINR is also involved in the WISE Network which is a European funded project tasked with developing collaborative R&D projects with industry (SMEs) in the areas of resource efficiency, alternative materials and sustainable business practice.

Hence, this workstream will undertake research to define and field test community specific

Behavioural Analysis & Profiling (see figure 2-2). The evaluation of these field tests will focus on an analysis of socio-technical factors that determine consumers' behaviour towards and participation in demand response programs. The following are the deliverables from this workstream:

WS1.1 Behavioural market analysis and communication
Initial analysis of communities to identify best means to initially engage and communicate with them
WS1.2 Establish customer perception baseline and placebo groups
Initial analysis and observation of customer perception of electricity services to establish baseline so subsequent behavioural changes can be identified and quantified as part of the successful delivery reward criteria.
WS1.3 Initial Community behavioural analysis, education & design of interventions
This will provide enough information to allow the remit of the community engagement platform to be defined including energy perceptions, stakeholder perceptions and stakeholder and community engagement plans. It will also include education of stakeholder in the "art of the possible" to allow them to extend beyond simple passive solutions of the past e.g. unmanaged PV installations on social housing. This will therefore include the identification at a functional level of some of the technology required to implement the trial.
WS1.4 Iterative evaluation of findings from operational trials
The main ongoing part of this workstream will be to continuously evaluate the effectiveness of interventions, changes in behaviour and any spill over effects into other areas to allow the continuous refinement of the trial.
WS1.5 SME motivation
A local SME base with expertise in the new technologies suggested to implement this trial would be required to maintain the community energy system in the longer term. This workstream will look at how the local SME community can be encouraged to expand into this area.

Workstream 2: Creating a community engagement entity (Lead: Menter Mon supported local 3rd sector organisations)
Menter Mon will use its community knowledge and links to combine with the knowledge of expert partners, such as Global Smart Transformation, to establish a Community Engagement Social Enterprise (see figure 2-2). This will provide a new community focal point for energy advice and coordinated response of services towards the DNO. As a trusted community service seen as not-for-profit and independent of the poor trust relationships with the utility', Menter Mon will develop an approach of an inclusive club of like-minded groups and individuals who wish to act in the best interests of the community they serve. Initial indications from local communities already involved in discussions has led to a high degree of commitment and confirmation that this approach is well respected. The intention is to establish the required organisation as a social enterprise independently from SPEN and ideally for them to continue after project completion. This workstream will also include the installation of any customer premises equipment.

WS2.1 Evaluation of Home Automation Equipment
As the initial stage in upskilling Menter Mon to take on their community energy management role SPEN will assist in shortlisting and evaluating potential equipment to meet community goals identified is WS1. Although for project preparation purposes we are making educated assumptions about the type of home automation Menter Mon would require to provide energy management services e.g. PV, storage/water heating, refrigeration control the final requirements for this technology choice will be driven by WS1.

WS2.2 Community engagement social enterprise start-up
Once a shortlisted of home automation equipment is available it is envisaged this stage will result in a public prototype site e.g. leisure centre, council office. This will allow Menter Mon to develop its energy management systems and skillsets in a controlled environment and will also be used for knowledge dissemination. At this stage Menter Mon will develop its energy efficiency advice and energy management methodology with support from SPEN so that they understand the network impacts, and hence potential financial rewards, of alleviating these issues. With DNO input this advice can be much more specific is targeting network constraints e.g. creating demand via heat sinks where there is excess generation, encouraging I&C customers to locate in stronger grid locations, and with behavioural input it can be target the different types of communities in the appropriate ways.
WS2.3 Home Automation Equipment Procurement
Based on the output from the prototype site a viable shortlist of vendors will be invited to a commercial tender. SPEN will assist Menter Mon in the creation of this tender, however, Menter Mon will be the purchasing party (see figure 2-3).
WS2.4 Install Home Automation Equipment
Given that customer recruitment will be contractual rather than individual e.g. via communities of social housing providers, equipment installation can begin once equipment is available rather than waiting for an extended period of residential customer recruitment. We anticipate deploying equipment to at least 1200 domestic premises with a stretch target of 2000 and 40I&C premises, leveraging existing SME for this task. This will include operational tests to ensure home automation equipment and any central management systems are working together correctly. The customer impact statement in section 8 details the interaction we will have via Menter Mon with customers before installation takes place and the actions that will be taken to minimise disturbance during this process.
WS2.5 Home Automation equipment monitoring
Monitor home electricity use over the course of a calendar year to obtain baseline information to allow changes in electricity usage patterns to be quantified. A subset of participants in the trial will continue to be monitored with no active energy management from Menter Mon to act as a placebo group so that spurious effects can be discounted that are not a direct result of trial activities.
WS 2.6 Menter Mon only market operation
Prior to SPEN having network enhancements in place Menter Mon will operate a local market to determine if local load/demand balancing against network constraints can operate independently at this level and what DNO benefits this provides. This is essentially an initial stage which leads to WS4.4 where DNO interaction will be added to the market and the additional benefits for the DNO assessed.

Workstream 3: Defining operational market structures (Lead: Durham University)
This stage will develop a range of DSO Operational Market Models (see figure 2-2) of how the whole system can work under different situations through scenario analysis. This will include the roles to be played by each of the stakeholders. Some initial research into this DSO market model has already been developed by Durham in collaboration with SPEN, which will be demonstrated as part of the project (see Appendix 7).

WS3.1: Define community economic incentives
In conjunction with WS1.1 determine consumer empowerment for efficient energy management which will drive community participation. This will allow evaluation of feasibility of standalone community energy market.
WS3.2 Iterative market development with DNO participation
Develop feasibility of community and DNO working in open market, without changing the

supplier relationship, via ancillary services, including investigating new ancillary services e.g. load creation during high renewable and regulatory impacts with systems operator services. The iterative nature of this section is due to the input from analysis, baselines and ongoing trials will be used to continually enhance the market model understanding.
Specific deliverables will include:

- Critical survey of international experience on innovation in grid capacity enhancement
- Regulatory challenge of implementing smart solutions as alternative to grid reinforcement workshop on future of distribution network and consumer engagement
- A new market model for grid capacity enhancement using alternative resources: size, coordination, pricing and incentives
- Empirical analysis of demand response
- An extended business model for distribution companies

Workstream 4: Deploying supporting platforms and technology (Lead: SPEN)

The project will initially focus on the optimization of the existing network technology via active network management. This includes developing the interaction between home automation equipment, managed by Menter Mon, and network constraint information in SPEN's energy management systems. As the project develops new technology, both network and in the customer premises, will be deployed to support the evolving operational structures. This workstream will leverage learning from the Flexible Networks and Accelerating Renewable Connections LCNF projects and that required technology will be acquired via commercial tender. Additional learning will be taken from UKPN Flexible Plug and Play LCNF and Orkney Smart Grid IFI projects.

WS4.1 Develop and design network enhancements

This workstream will investigate which services SPEN requires in Anglesey to avoid network constraints and what monitoring do we need to identify when and where we need them. The network technology elements will carry out four key functions:

- monitoring the real-time performance of the distribution network (including the load and generation levels connected to it)
- providing the necessary assessment of network performance and provides suitable instructions to Menter Mon, for them to interpret into appropriate community-side actions
- monitoring the effectiveness of any Menter Mon "intervention"
- providing a "backup" network protection function (e.g. curtails generation) should the network be operating beyond an acceptable overload situation.

The network technology will also include "Smart Grid" elements which are likely to be considered "business as usual" solutions at the time of installation. For example, our own LCNF Tier 2 project , Flexible Networks for a Low Carbon Future, will be completed by the time the ANM system for this project is being procured. Flexible Networks project (along with several other ongoing LCNF projects) has major deliverables in terms of network automation, voltage regulation and dynamic ratings functionality.

WS4.2 Specify, procure and develop additional technology

An open commercial tender will be created for the majority of equipment but some bespoke development is envisaged to respond to market triggers as the community energy market model evolves. This market model interaction will essentially involve developing the methodology that facilitates the end to end system from a home automation device to a DNO network management system so that community actins can drive networks decisions and vice versa. The correct decision to take will be driven by technical constraints and the

value given to services by the market model framework, hence the need to develop a market interaction link.

WS4.3 Installation of network equipment

Install and test selected network equipment at required locations. This will be achieved without interruptions to supply. Ensure communication with the local energy market operates correctly and that information is understood at each end of the system.

WS4.4 Confirm correct interaction with market

Linking into the existing Menter Mon operational market, SPEN will determine how the addition of DNO ancillary service offers will impact community behaviour and network constraints. The viability of any new ancillary services will be determined and the size of the additional benefit in avoiding network constraints by DNO participation in the market will be assessed.

WS4.5 Operational market

In a stable state the market will operate for the remainder of the trial with the results monitored to assess the benefits that are accrued to the community and to the DNO. These results will be shared with the Universities of Durham and Bangor to allow iterative enhancements to be made to the trial as required and to inform their conclusions.

Workstream 5: Knowledge Transfer

Knowledge transfer will be on ongoing aspect of the project with the following activities planned as part of WS5.1. These activities are detailed in section 5.

Stakeholder Engagement Events -Creation of a stakeholder steering group with quarterly meetings to update all stakeholders and confirm actions to be taken

Community Engagement Events - A prototype environment in a public centre will provide a taste of the trial for potential participants and a test bed for home automation equipment capabilities.

Academic Papers - Output of research and trials is intended to form significant academic publications for Durham and Bangor which will be widely distributed. This is a default activity of these academic institutions which the project will actively encourage.

DNO information sharing - SPEN will actively engage in webinars, social media blogging and formal events to ensure information is shared with other DNO.

2.4 Changes since the ISP

Since the creation of the ISP SPEN has engaged with a wider range of partners extending the number of potential Industrial & Commercial supporters and engaging the SME community to determine the breadth of home automation and management systems available.

SPEN has also worked with it research partners (Durham and Bangor Universities) to develop research proposals that are tailored to the needs of the project.

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Section 3: Project Business Case

This section should be between 3 and 6 pages.

Context

The Isle of Anglesey lies at the extremity of the Scottish Power network and as a consequence any conventional network reinforcement will have a relatively high cost. Renewable energy schemes are likely to provide one of the main economic stimulus to the area and this may drive the need for further network investment in the future, potentially making these schemes unviable.

An alternative approach is therefore being considered which enables the local community to work with the DNO to ensure maximum use is made of the existing network assets.

Business As Usual Baseline

Under current demand forecasts, the 33kV network on Anglesey will require conventional reinforcement within the late ED1/earlyED2 period to cope with a growing maximum demand. This reinforcement, in the form of a third 132/33kV Grid transformer and associated 132kV feeder circuit, 132kV and 33kV switchgear, will have costs of approximately £15.52m. Using the energy efficiency, Demand side management and demand-side/generation-side response methods from the ACE proposal it is estimated this reinforcement can be delayed by 9 years. The specific cost breakdown of this traditional re-enforcement is shown in the table below.

Anglesey 132kV Reinforcement	**£M**
Works at New/Existing Grid Site	1.86
Works at GSP (Wylfa or Pentir)	0.63
33KV circuit modifications	4.51
33kV substation modifications	0.51
New 132kV circuit	8.01
Total	**15.52**

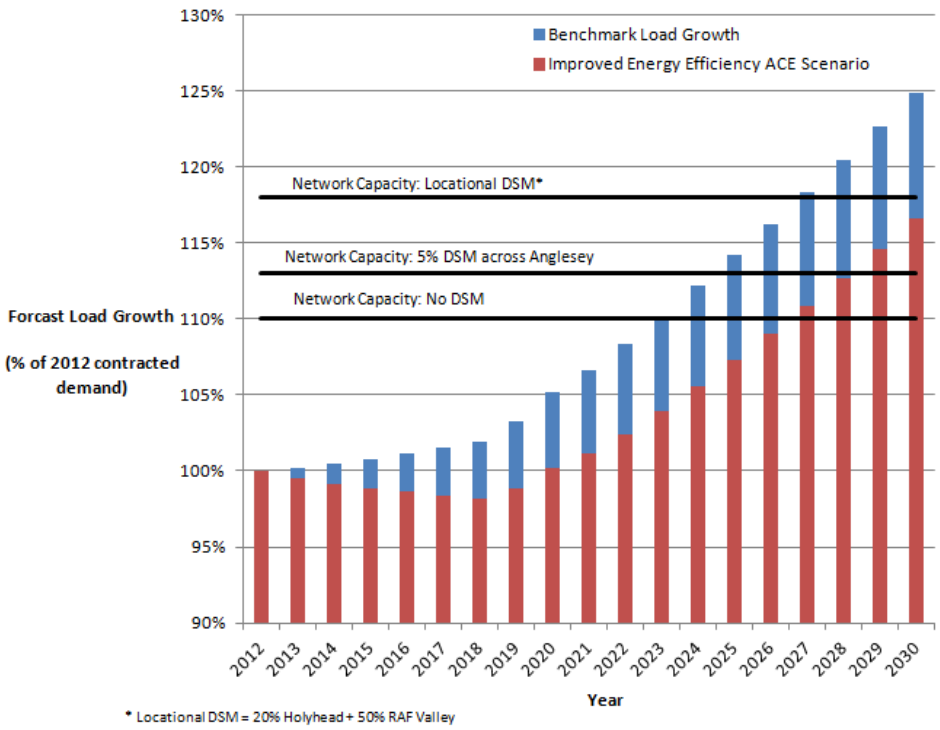

Figure 3-1: Business as Usual versus ACE comparison

In addition, there is a high demand for connection of renewable in Anglesey which could be managed more effectively with help of the community.

Driver For Alternative Solutions

During stakeholder engagement events on 27th March 2013 and 20th June 2013 a clear message was received from the Anglesey community that they wished to be more involved in their energy services and that they understood the previous approach of pushing for continual reinforcement was not sustainable. Information from the stakeholder engagement events can be found in Appendix 6. Given this feedback and the high predicted cost of reinforcement it was evident that an alternative approach which leveraged the community enthusiasm for energy services involvement could be developed which also allowed the DNO to manage local network constraints and hence defer reinforcement.

Project Approach

The project approach is to allow community groups to define their own energy goals via a trusted intermediary whose sole purpose is to ensure these goals are met. This intermediary would match these goals to the needs of the DNO. The goals of community and DNO will not always coincide and hence, this project aims to examine the ability to deliver benefits to the DNO and the customer on an ongoing basis. The project further aims to clarify the role of the DNO and independent community social enterprises in enabling this to occur.

Benefits of the Proposal

The benefits of this proposal with be the greater understanding of the interaction between community energy solutions and the DNO. Given that community energy is predicted to contribute a significant proportion of the UK's energy mix it is essential the DNO understand

and prepare for these interactions.

Trial Project and Method Costs
The method costs for this project are detailed in the submission spreadsheet.

Given that the project itself is part of the business case discovery process it is difficult at this point in time to provide hard evidence that the community energy delivery vehicle will deliver the cost savings and energy efficiency gains that are expected other than by reference to previous demand management trials abeit that they have not taken exactly the same approach. That said, there is strong evidence from the stakeholder meetings already completed that the community on Anglesey wishes to demonstrate that it is up to changing the way that energy on the island is managed and they wish to be heavily involved in delivering that change.

As a starting point for the benefits model using the experience from previus trials and best estimates from industry knowledge the following assumptions have been made:

- That the portfolio of different communities that have expressed agreement to be involved in the project will sign a contract with Menter Mon confirming they are a member of the Community Energy Delivery Centre.
- The community will be able to deliver at least 5% savings of load demand from a baseline figure to be measured at the beginning of the project.
- The community will be able to deliver at least 5% demand response from a winter peak period as defined in the TNEI report (Appendix 2).
- There is a tightly defined relationship between Menter Mon and SPEN to allow the free flow of information between control systems both on the community system and the power network active network management system.
- The key focus on the project is to balance the three key elements:
    - Reduce Network Constraints thereby increasing Network efficiency by balancing and using:
    - Demand Side Flexibility to both increase and decrease demand as required
    - And to optimise Generation integration by use of active network management that is integrated into Community Energy management system

This is fundamentally different from most common DSR systems. By optimising network constraint reduction and increasing network availability rather than trying to optimise cost of generation production there is a distinctly different business model. One that can operate independently of the Supplier business model but can deliver a clear benefit to the consumer and DNO by optimising their different requirements and arbitrating a best fit for each operating condition.

With these high level assumptions combined with the deferred investment strategy based on a £15M network upgrade (that would be needed under business as usual), analysis using the TRANSFORM modelling (as used in RIIO – ED1) combined with SPENs own consultancy analysis resulted in a positive NPV for the ACE scenario as outlined in the TNEI report. The report is attached in Appendix 2.

The project team also believe that this represents a conservative set of targets and that focused activity by Menter Mon will be able to deliver in excess of these.

Net Benefits
The analysis of the net benefits show that, for a reasonable set of assumptions about cost,

performance and volumes, it is possible to construct a business model that provides net benefits to all three of the main parties involved (i.e. the DNO, the Service Provider and the Customer). A simple Cost-Benefit model is shown in Appendix 1. This simple model shows that customers should be able to save typically up to 15% on their electricity bills. The Service Provider is also shown to make a modest profit (5%), but this should improve as equipment costs reduce and improved methods of installation are developed. The DNO can also be shown to reduce capital expenditure, but some change in the regulatory reward mechanism may be required in order to ensure that some of this saving is converted into a benefit for both customers in general (through not increasing DUoS charges) and the DNO. Part of the work undertaken by Durham University will investigate these aspects further.

Note that this is not intended to be the definitive cost-benefit model for the project – one of the objectives of the project is to develop such a cost-benefit model. Rather, the cost-benefit model presented in Appendix 1 provides insights into the areas that will require due consideration. For example, it is important to align the capability of the service with the network requirement. This will require the ability to forecast the requirement with a reasonable accuracy, combined with a flexibility to match the capability to the requirement (e.g. by increasing "number of units" or increasing the capability "per unit"). An important element in the development of the business model will be to ensure that the benefits are shared equitably between the partners in a manner that reflects the relative risks.
An example of the types of payment structure that might be required between the DNO and the service provider is presented in the cost-benefit analysis in Appendix 1.
This structure comprises three elements:

a) A "primer" payment - to begin the process up to 2 years before the service is required
b) A "target" payment – based on the expectation of the ability to provide a level of service (up to one year before the service is required)
c) A "performance" payment – based on performance (during the period of the service)

This payment structure is intended to be illustrative of our present thinking and a primer for the work to be undertaken within the project rather than definitive of the project intentions.

Additional Benefits

Additional benefits are envisaged in the form of greater customer satisfaction as they control their own services and the improvement of the often distant and fraught relationship between the DNO and its customer base. The overall reduction in energy use through both energy efficiency and active management is also envisaged to have an overall carbon benefit.

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Section 4: Evaluation Criteria

This section should be between 8 and 10 pages.

(a) Accelerates the development of a low carbon energy sector & has the potential to deliver net financial benefits to future and/or existing customers

The Carbon plan highlights that: *In 2009, domestic buildings were responsible for 25% of the UK's emissions and just over 40% of its final energy use. As well as improving the fabric of our buildings themselves, it will also be important to minimise the energy we use for our lighting and appliances. Energy-using products in our homes and offices, such as white goods, lighting and televisions, contribute around 14% of the UK's CO2 emissions.*

The objective of ACE is to enable communities to manage their own energy needs, and in the process of doing so, reducing the overall consumption and load profile which drives the requirements of the electricity network.

A number of aspects outlined in The Carbon Plan will be examined within the Anglesey Community Energy Project:

Low Carbon Heating – the number of properties on Anglesey with Central heating is below the national average, with limited access to the gas grid in large areas. A large proportion of the population are reliant on electrical storage heating as the primary source of space heating. We anticipate that the uptake of heat pumps within Anglesey is likely to be faster than other areas as a consequence which will create new pressures on the electricity network, in areas which are likely to be challenging to reinforce due to the geography of the region. The proposed methods which we will deploy in this project will help to manage the existing heating load to balance the needs of customers within the constraints of the network.

Low Carbon Industry – Industry makes up one quarter of the UK's total emissions. Anglesey has thriving industry, particularly within the food processing sector which is a major energy user. Through engagement with I&C customers, we will be encouraging demand response services and energy efficiency as part of the project which will help with energy reduction or a shift in energy patterns to minimise peak demand on the network.

Low Carbon Electricity – Anglesey already has a high penetration of renewable generation on the island, with significant interest in adding to this including tidal schemes as well as further wind generation. Much of the Social housing provision on the island has also invested in Solar PV which is presently unmanaged thus the generation is not linked to the local demand. By closer alignment of demand with sources of local renewable generation, carbon reduction can be achieved as a result of lower losses on the transmission and distribution of electricity in addition to the decarbonisation of the electricity generation.

Financial benefits for existing and future customers - The management of energy services on behalf of customers through demand response and flexibility of demand can provide major benefits in supporting a low carbon economy as well as creating financial savings for customers. *Reference business case for financial benefits*

Network Capacity released - Based on the independent analysis undertaken by TNEI in preparation for the project (Appendix 2), we have shown that network reinforcement on Anglesey can be deferred for up to 9 years by the implementation of the ACE project.

The assumptions behind this benefit are discussed in section 3.

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Evaluation Criteria continued

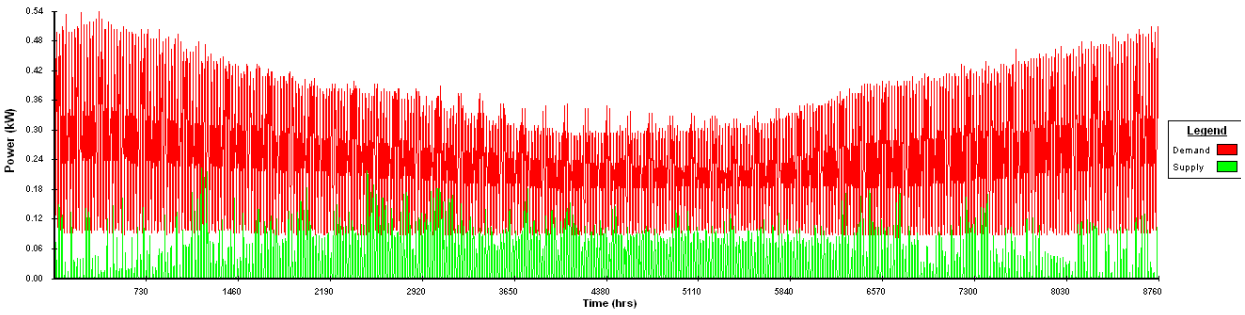
As discussed in the Business Case the comparison between the business as usual case and the ACE methods shows a positive net benefit as shown in Appendix 1. Extrapolated across GB taking these benefits could be significant.

(b) Provides value for money to distribution Customers

Innovation

We believe that this project is truly innovative as although many DSR and monitoring trials have taken place none have looked to link the needs of the community with the network constraints facing the DNO in a near real time, local market environment. The key benefit to the DNO therefore is that by linking community energy requirements directly to an understanding of local network constraints these network constraints can be avoided whilst still meeting community aspirations. Sole reliance on intermediary price signals from retailers is avoided.

Given the predicted growth in community energy projects and the growing availability of stimulus funding in this area we believe there is a large opportunity for DNO to become involved and ensure energy efficiency is managed in line with very localised network constraints so that DNO benefits are maximised. If we look at the simulation results in figure 4-1 as an example of unmanaged domestic PV we see a very low match level between demand and generation. We believe that by actively managing a community's energy resources, such as PV, match rates could be increased to 50% or more significantly reducing loading on the local network as excess PV generation is released to the grid in an unmanaged way. In addition, there will be a direct benefit to the customer in the form of reduced costs as the energy deficit is reduced.



Total Demand	Total Re Supply	Match Rate	Energy Delivered	Energy Surplus	Energy Deficit
2.11MWh	234.94kWh	22.46%	234.94kWh	0 kWh	1.88MWh

Figure 4-1: Example annual 3kW domestic PV simulation

To further support our premise of innovation Figure 4-2 shows where we believe some recent projects sit compared to ACE. We believe we can take learning from these projects but apply it with a different focus.

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Evaluation Criteria continued

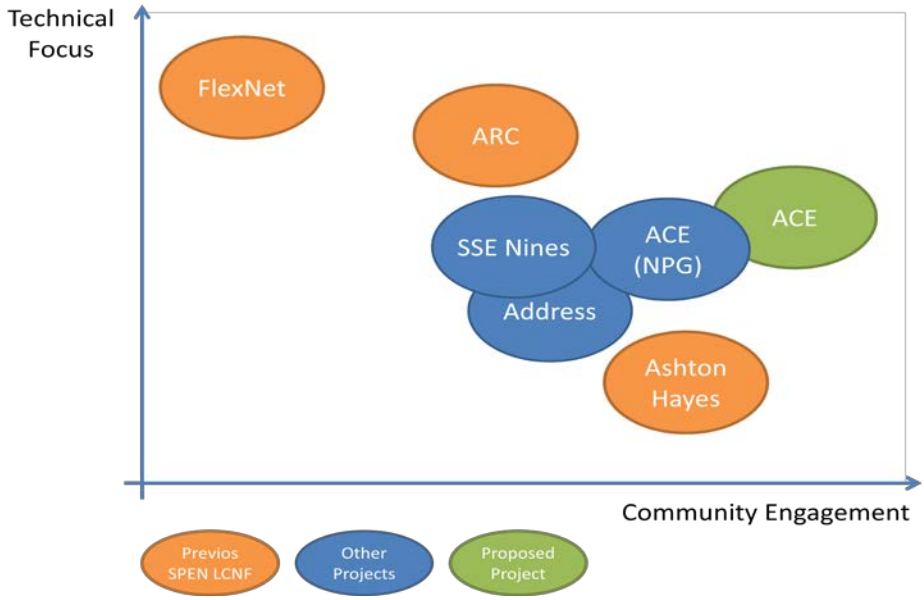

Figure 4-2 : Project Overlaps

As can be seen from Figure 4-2 we believe ACE takes less of a technology development focus but rather focuses on using already evaluated technology to push community engagement to a new level.

Requirement for LCNF funding

As mentioned, the highly innovative nature of this project means that it could not take place without LCNF funding to de-risk the outcomes, particularly given the nature of many of the players in the community energy space e.g. small 3rd sector, not for profit groups. Community behaviour, market models and network technology are all to an extent known quantities but their economic sustainability when combined in this way will be part of the learning of this trial. This project is also about more than just energy efficiency measures that could be supported by other funds such as Green Deal and no funding of PV installation, etc. are included in this project. This project focuses on the management and control of community energy efficiency and how that can link to the DNO. This DNO element indicates that LCNF is the correct funding approach.

Customer Benefits

Direct benefits to the customer will be:

Improved energy efficiency and reduced energy costs

With a community engagement entity whose sole purpose is to ensure customer's have the correct advice, the correct technology and make the best return for their flexibility in demand we believe these benefits will be significant.

Maximising use of available technology to meet needs of DNO & community

With SPEN's assistance Menter Mon will be able to ensure communities are using the best home automation technology to meet their needs. Through a focus on encouraging SME into this market and procuring via open commercial tender customers will also receive the best value for money (see figure 4-3). In addition, for network management the experiences of SPEN's previous LCNF projects will be leveraged and the equipment will also be procured through a competitive tendering process to again ensure the best value for money for customers.

Reduction in network constraints

A reduction in the occurrence of network constraints will allow SPEN to maximise the use of its current assets and defer and/or avoid the need for reinforcement. This ensures customers obtain the best return for the investment in DNO network assets.

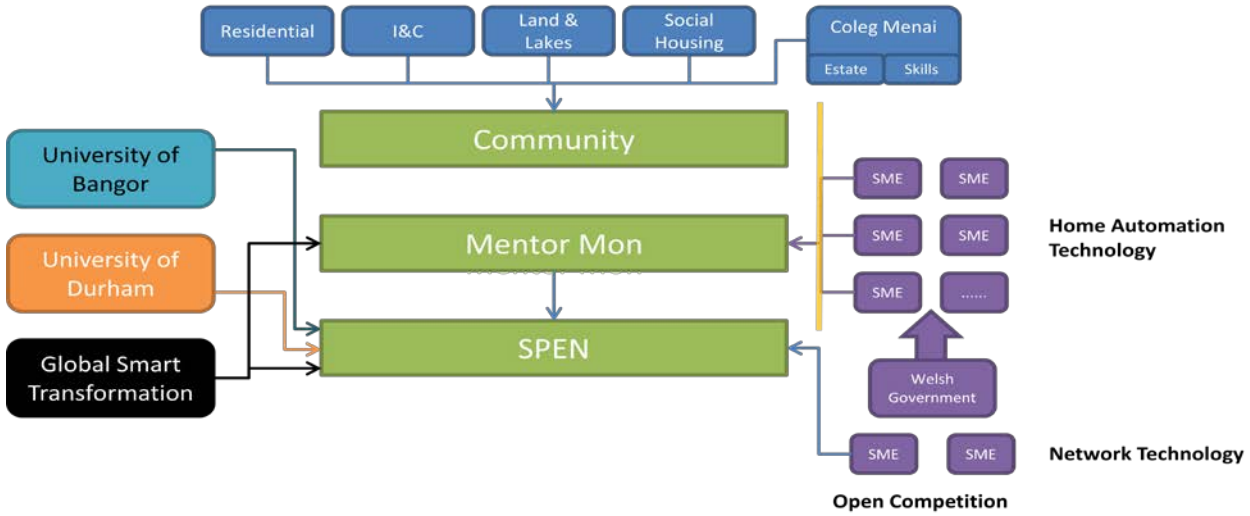

Figure 4-3: ACE structure with contractual relationships

Indirect benefits

Facilitating more renewables including microgeneration

By exploiting network assets via managed community demand network constraints which delay the connection of renewable generation can be avoided. Associated carbon and economic growth elements to this facilitation of renewable will also have an indirect benefit to customers

Determining a via business model for community energy partners

Mentor Mon can participate in this trial supported by LCNF funding to investigate the potential to operate commercially in this area. The risk associated with this would be too great for a 3rd sector organisation to embark on speculatively. Hence, this project will provide a blueprint for other community entities to engage in energy services which will both drive economic and further DNO benefits.

To further illustrate the value for money provided to customers the total man days of effort and day rates for SPEN and its partners are shown in appendix 1.

(c) Generates knowledge that can be shared amongst all DNOs

Although this project focuses on an island community in Anglesey we believe methods being trialled are NOT Anglesey specific and can be applied to any like-minded community throughout GB. We believe the differences between Anglesey, other communities and other DNO network areas will be in some of the technical details i.e. the areas and types of network constraint, the monitoring and control mechanisms which are possible.

Composition of knowledge which can be shared

- Understanding of the potential for community behavioural modification
- Understanding the operation of a local community led ancillary services market
- Understanding the requirements a community engagement partner needs to meet for successful market operation
- Understanding of network management and communications technology required to

inform the local community market of actions to take
- Level of cost saving/constraint deferment that is realistically possible
- Whether this market format is viable in an open & competitive GB environment without stimulus funding

Relevance to other DNO

As mentioned, we believe the learning from this project will be relevant to all other DNO who wish to engage with communities to optimise use of their networks. Given the potential scale of community energy the danger is that DNO do not engage in these developments through lack of understanding in what commercial, social and technical format that engagement should take. This project will provide the template for how that engagement should, and indeed should not, take place. In addition, this learning will be equally important to 3rd sector community groups who are considering entering the energy arena.

How learning can accelerate a low carbon transition plan

The new learning from this project will be a new approach to energy management in communities which will build upon network monitoring and management enhancements already being pursued by DNO. In SPEN's case for example, learnings from this project may drive some changes in internal behaviour, community engagement policies, commercial arrangements and network design options. This will be a key learning point for other DNOs to inform how to integrate the holistic community approach into the larger business model.

Learning if the project is unsuccessful

All of the learning items bulleted we believe with deliver significant insight whether or not the project is successful. Given the recent focus on community energy it will be fundamentally important for example to learn whether or not a DNO can viably engage in this. This project will answer this fundamental question whether or not it is successful.

Treatment of IPR

This project will conform to the default LCNF IPR principals.

Robustness of methodology to capture learning

As will be detailed in section 5 we have a comprehensive knowledge dissemination plan, fuelled in part by the nature of our stakeholders i.e. academic institutions, 3rd sector organisations and public bodies with a inherent focus on knowledge sharing rather than large commercial organisations.

In our methodology we have ensured that base lining and recording of trial results is a fundamental part of the process. Again, our stakeholders have a background in running analysis and trial environments which require this level of data capture.

(d) Involvement of other partners and external funding

Project Partners & Selection Criteria

A clear learning point from the past projects has been that Utility led community engagement has led to poor take-up of participants in a large number of the projects reviewed. Hence, a key aspect of partner selection was to look for those who had community engagement relationships that could be leveraged. The Partners for the project and the reason for their selection is briefly described below along with their funding contribution. A full partner description can be viewed in Appendix 5.

Menter Mon:

Partner Description & Selection Criteria - The Community Energy Delivery champion

selection was key to the project's success. This was clearly identified early on in the learning from other projects from around the world. Early analysis identified these entities do not yet exist in a form the project was looking for either in Anglesey, Wales or the rest of the UK. It was clear that not all the attributes we were looking for existed in one entity and that we would need to select a partner with the following attributes:

- passion and drive to make this a success
- receptive to adding to their portfolio of skills and business offering.
- have the community spirit exhibited in these other projects but also have the ability to flex towards a more structured commercial approach to deliver services back to the DNO that can alleviate some of the congestion and capacity challenges using new innovative business models

These main criteria led us to identify Mentor Mon via an open and transparent process of discovery (open workshops, see Appendix 6), open discussions with local government and councils, etc) It clearly became the natural contender in our search as the only entity that met the criteria we were looking for and willing to enter into this new activity.

Menter Mon have been established for over twenty years. Originally set up by the Welsh Government to provide the ability to secure EU funding and project management capabilities for delivery of the community based projects in North Wales. E.g. such as the roll-out of PV to the public and private social housing sector in Anglesey. Menter Mon have a very close working relationship with the community in Anglesey already,
Partner Contribution - Mentor Mon are providing £75k cash towards this project as well as £36k per annum in kind support (total for 4 years cash + in kind = **£219k**).
Partner Benefit – Mentor Mon anticipate having a viable commercial operation to provide community energy services in Aglesey as a result of this trial.

University of Bangor:
Partner Description & Selection – Understanding the behaviour of the customers was seen as another key element of the project. The selection criteria was defined as:

- An organisation with local community links
- Has the required experience in behavioural analysis
- Enable a new solution to be messaged, organisationally configured for success and delivered to a portfolio of different stakeholders
- Has experience in working on projects targeted at commercial operation rather than theory

A number of academic institutions have been in contact with SPEN in the area of consumer behaviour. The University of Bangor is a leader in the field of Behavioural analysis across a broad range of different disciplines and was an ideal fit for the project in terms of delivering analytical analysis and real informed methodologies. It is less about research and more about practical deployment that Bangor were selected for.
Partner Contribution – the University of Bangor are providing leveraged funding worth **£107.5k** from European Funded projects to assist the SME community within this project.
Partner Benefit – the university are actively engaged in this area of research, including directly for the SME community in the Wales Centre for Behavioural Change. This project will give them valuable learning which they can leverage into their existing projects and new projects in this field.

University of Durham:
Partner Description & Selection Criteria – A viable economic model is a cornerstone to the success of the ACE project. The key selection criteria for a partner in this area was:

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Evaluation Criteria continued

- Experience of analysis of economic models in a similar field and of the DSO concept
- Respect within the energy community for their research and analysis

Durham's Business School was selected from many other interested parties due to innovative thinking, previous engagement with SPEN on this topic and track record of the PI leading this newly formed unit looking at the regulatory, economic and modelling aspects that will be a key element of this projects formation.

- The PI (T. Jamasb) has an established research track record and on-going projects in network regulation, R&D and innovation, quality of service, and network investment issues.

Partner Contribution - The University of Durham is providing approximately **£48k** of in kind funding by providing one PhD studentship from the business school which can be allocated to work on this project.
Partner Benefit – As an academic institution, Durham will extend its learning in this area and be able to contribute to other research projects in this area.

Global Smart Transformation Limited
Partner Description & Evaluation Criteria - SPEN receives LCNF project proposals and suggestions from both internal and external sources. These are evaluated:

- using internal and external independent advice
- against LCNF evaluation criteria to
- the best return for the customer utilising innovative new thinking and service delivery, taking note of the learning already gained from the LCNF projects and other relevant projects.

Global Smart Transformation (GST) was integral in the initial proposal of the ideas around the ACE project and bringing together several strands of ongoing work. Once ACE was selected as our preferred project, GST was selected to assist SPEN in the development, design and implementation of this project due to the unique nature of the experience that they bring to the project. GST brings a wealth of experience in funding, developing and delivering major successful innovation deployment projects both here in the UK, Europe and globally. The key experience of technical, commercial and, above all, stakeholder management to deliver highly complex collaborative innovation projects which is embedded in GST with many years of experience and successful outcomes to the founders credit. Examples such as the EPSRC funded collaboration between EDF, SPEN, ABB and 7 academic institutions to deliver the AURA-NMS project. This has led to the current deployment of the largest battery storage project, connecting offshore wind onto a constrained grid, and autonomous intelligent network controllers (leading to the learning for techniques and knowledge now being deployed in Active Network Management and used by various UK SMEs and DNOs) on UK Power Networks; the European FP7 ADDRESS project that has delivered 3 large scale demonstrations in Spain, France and Italy with end–to-end (TNO to consumer) Smart Grid deployment of both technical (to appliance and EV level) and new market designs demonstrated. ADRRESS collaborators included SPEN as part of the Iberdrola team amongst 25 other collaborators. These are a few examples that have major relevance to the current proposed project.
Partner Contribution - GST is providing in kind support of time worth **£396k** over the four year project.
Partner Benefit – GST will be able to leverage its learning in future commercial endeavours

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Evaluation Criteria continued

Additional Funding to support project aims

Outside of the direct project costs we have looked to secure stimulus funding from the Welsh Assembly to encourage the local SME sector to engage in the technologies we believe will be required for this project(see supporting letter in Appendix 5). In addition, Menter Mon has extensive experience in sourcing funding for activities which would be of benefit to but are not directly funded by this trial e.g. funding for PV installation.

(e) Relevance and timing

Given the increased interest and stimulus funding being applied to the area of community energy we feel the ACE project is very timely. As community energy projects emerge there is a high potential these will do so in an uncoordinated manner which has no wider view of the distribution system to which they are connected and the network issues which they face. This will lead to a lost opportunity to maximise the benefits of these projects to both the community and the DNO. The linkages between these two parties will be investigated by this project and allow this opportunity to be exploited across GB.

Given that SPEN has undertaken LCNF projects to deeply understanding network monitoring and active management (Flexible Networks) and active management of the connections process (ARC) we believe this project will leverage our learning both of these areas and move our LCNF focus from evaluating to doing. Hence, this project does not need to be focused primarily on the technology being deployed, as this has been proven, but can instead look at the use of this technology to support community energy.

If successful, we would look to incorporate these learnings into our operational business processes. Hence, network designers will have an alternative route to consider when planning and prioritising reinforcements in the network. This will allow us to ensure we are maximising the use of our assets within the business plan and that reinforcement takes places only when absolutely necessary.

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Section 5: Knowledge dissemination

This section should be between 3 and 5 pages.

☐ Please cross the box if the Network Licensee does not intend to conform to the default IPR requirements.

5.1 Learning Dissemination

The details of the learning we intend to disseminate are covered in evaluation criteria (c**).**

Building on existing dissemination activities

We are intending to largely build upon the dissemination activity which we are establishing as part of our 2011 project, Flexible Networks for a Low Carbon Future and our 2012 project, Accelerating Renewable Connections. Rather than creating a completely new range of activity we will build on some of these existing platforms including:

- Practical demonstration of any novel equipment at the Power Networks Demonstration Centre developed by the University of Strathclyde, ScottishPower and SSE.
- Academic papers on the outcomes of the project by the University of Durham and University of Bangor
- Potential inclusion of data in a number of PhD research projects
- ☐Updating of the SP EnergyNetworks website which will provide access for any interested party to understand more about the project
- The LCNF and other industry conferences

As mentioned in our workstreams description our aim is to create a prototype test bed in a public building in Anglesey. This will allow us to both test and show case the possibilities available with home automation technology to the general public and trial participants. We will use this as an opportunity to both engage with the community and gain feedback on their perceptions of energy management. We will exploit the experience of similar prototype sites, such as EcoGrid's Villa Smart.

As with the Flexible Networks Project and Accelerating Renewable Connections project, a potential dissemination asset for this project will be the Power Networks Demonstration Centre (PNDC). The PNDC environment will provide the capability for various aspects of the network side equipment to be deployed on a live network to trial the operation.

Our existing dissemination activities also include a focus on sharing information with the other GB DNO. We will expand this existing framework of communications to include the ACE project with dedicated knowledge transfer resource responsible for ensuring timely and relevant communications.

In addition, we will ensure that the GB national supplier community is aware of and has access to the relevant information on the project. This will enable them to prepare their customer services staff in the affected areas should contact be made.

Additional Dissemination

The project also intends to use a number of other means for disseminating learning, including:

Business Process maps

As this project investigates a new business process between communities and DNO's an example business process template will be produced to educate other DNO and 3rd sector

community groups about the linkages and responsibilities taken on by various parties in the project

Influencing the updating of policies

From the experience of undertaking this project, key learning points will be fed into the relevant national policies and standards to ensure all parties can benefit. One of the principal learning points which will help with the dissemination will be the recommendations for how DNO can engage in community energy and any changes to the regulatory regime that may facilitate this in a GB-wide environment. The University of Durham will deliver a detailed analysis on this area which will be shared to inform this discussion.

Partner Dissemination

Another less direct form of dissemination will be through the experience of our project partners; Menter Mon, Global Smart Transformation, University of Durham and University of Bangor. Through their involvement in the project, the partners will be able to transfer the skills and knowledge that they develop to other projects which they are involved in. One of the strengths of the partners that we have selected is their experience in other similar projects. As a result of being involved closely with the project, they will also have the ability to reciprocate this benefit and transfer their learning to activity they undertake with other DNOs, communities and other relevant stakeholders. Specifically:

Bangor University

The Welsh Institute for Natural Resources at Bangor University is already in talks with other housing associations and local authorities in the region regarding ways in which to tackle some of the challenges that this project seeks to address and so there is an existing platform to disseminate knowledge through these established networks. Indeed approval has recently been granted for a Knowledge Transfer Partnership (KTP) with Cartrefi Conwy Housing Association, which will be working to address these challenges. It is envisaged that there will be opportunity to share learning across the projects and potentially to develop the KTP work as a platform for replication in another region served by SP Energy Networks. Many aspects of the project will likely be of interest to the Cabinet Office Behavioural Insights team and we will build on our existing links with this group to both expand on successful work that they have undertaken and at the same time develop a platform for potential dissemination and replication of the model.

Durham University

The Durham Energy Institute and Durham University Business School have a wide marketing and PR reach which can publicise and profile the project. They will also help publicise the findings and research outputs, for example, through posting reports, papers, presentation.

The findings and outputs from the ACE project will also be presented in workshops and conferences in the UK and internationally.

Customer Dissemination

Dissemination to customers to keep them informed of developments is detailed in Section 8 – Customer Impact

Knowledge transfer 'in' to the project

With many LCNF Tier 2 projects now underway as well as a wide variety of LCNF tier 1 and IFI projects, ACE will be looking to build on the learning and experiences of these projects. To ensure we maximise this opportunity, we will be including a project task of knowledge

Knowledge dissemination continued

transfer in to the project to ensure we maximise on the learning of others and avoid unnecessary duplication. One of the roles of the individual responsible for knowledge transfer will be to define the current landscape of projects which complement ACE, as well as keeping an ongoing monitor of other projects as they are developed to ensure that the learning can be complementary. This is a task we carry out for all our LCNF projects and hence, ACE will be added to this process.

Internal Dissemination

Dissemination within ScottishPower is a vital activity for this project to ensure the ongoing engagement of staff and that the outcomes of the project are adopted for future application. We will be using a similar range of techniques which have been successful in previous projects to build awareness and train staff in the new approaches and processes being developed. These methods will include:

- An annual internal technology conference which focuses on LCNF and IFI and is attended by up to 100 staff.
- Using existing internal communications channels to keep the business up to date with LCNF progress
- *Identifying pro*ject champions and points of contact within each business area which can be kept abreast of developments.□
- Training of staff as necessary at the PNDC on the installation and operation of equipment being trialled as part of this project and leveraging the staff training from previous projects
- *Inclusion of our graduate pool in project delivery as part of their accredited training scheme.*

As with the dissemination of learning to external parties, we will also be using the PNDC to demonstrate and assist with the training of staff on the procedures for installing and operating equipment. This will complement our existing training facilities which we have for instructing staff on the safe and efficient methods for installing, operating and maintaining equipment. The roll out of monitoring equipment is likely to require new working procedures to be developed and the training of staff.

As part of our staff development initiatives, we will be using the positions within the project team as a development opportunity to help staff in their development through increasing awareness of innovation projects. We will also be complementing the resourcing of the project with our graduate pool as part of their accredited training programme to maximise their exposure to different activity and bring fresh perspectives to the project.

This project has a strong linkage to a number of business units including Design, Control Room and Field Operations. Principal points of contact will be established within these teams to ensure all information on the project is exchanged to manage the internal process as well as for learning dissemination. As well as a project governance board which is made up of directors and senior managers from across the business, we will also be identifying project champions from each of the other business areas who will act as ambassadors and lead engagement within their business unit. This will involve providing updates and monthly team briefs and making other presentations as appropriate to keep staff informed of developments.

Over the past 3 years we have held an annual technology conference at which almost 100 staff attend to find out about the various developments which are ongoing across the LCNF and IFI initiatives within Scottish Power and at other DNOs. This will build on the presentations made at the LCNF industry conference to inform staff of what else is happening within the sphere of LCNF activity across the industry.

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Knowledge dissemination continued

A broad range of staff will be invited to this from industrial staff through to managers. We believe that this broad range of activities will provide comprehensive dissemination of the learning from this project, and that the learning will be embedded into day to day practices. Many of these processes for internal dissemination are building upon existing activities and experiences from Flexible Networks and ARC, such as team briefs, while others will require additional funding which we have accounted for within the funding request.

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Section 6: Project Readiness

This section should be between 5 and 8 pages.

Requested level of protection require against cost over-runs (%): 0%

Requested level of protection against Direct Benefits that they wish to apply for (%): 0%

The project is ready to mobilise in January 2014 having had extensive planning discussions, workshops and bilateral meetings with partners and stakeholders. The project has been designed to build on these activities to enable a well-defined and structured start to the project. The detailed project plans and risk registers can be found in appendix 3.

Progress to Date

The project has been designed to allow an orderly and structured approach, learning from previous LCNF projects already under way, to the start-up phase. This has built on the excellent pre-work completed by the partners and stakeholders in developing the project proposal. There have been workshops, meetings and phone conferences between the various partners and stakeholders to establish and understand the core activities that are required to deliver the project. Importantly, a core team has been assembled to drive the project both internally and externally to ensure buy-in from across the broad range of stakeholders that this project requires. Governance and operational aspects have been discussed and internal and external buy-in has been confirmed. This has driven an approach to reduce risks and increase the likelihood of a successful deployment.

Partners – The **partners** in this project are confirmed as; Menter Mon, University of Durham, University of Bangor and Global Smart Transformation Ltd. These core partners represent key experience / stakeholders that have been specifically selected via a process that SPEN has completed in an open and pragmatic manner. This involved various open meetings where interested parties were invited to attend and discuss possible contributions. SPEN also carried out an in-depth search to find the right mix of experience, connectivity and innovation for the project with an emphasis on finding those that had not been involved in LCNF projects before to bring new thinking and businesses into the process.

Supporters - The **supporters** in this project are confirmed as: Welsh Government, Anglesey Council, Anglesey Energy Island, Menter Mon, Medwrn Mon, Tai Eryri, Land & Lakes, and Coleg Menai. These represent key stakeholders who have shown a keen interest in supporting the aims of the project by offering their support in various ways:

- Leveraged funding that can be used indirectly (e.g. Welsh Government via grants to SMEs selected via open competition for supplying the project and financial support to the skills agenda establishments in North Wales),
- Public (Anglesey Council) and Private (Tai Eryri) social housing that already has PV installed with no monitoring or controls that have agreed to supplying their whole portfolio to be involved with the project
- New developers building over 600 new homes complex (Land & Lakes)
- 3rd sector groups with special relationships with large and different portfolios of communities on Anglesey (Medwrn Mon)
- Large estates and skills providers on Anglesey (Menai Colleg – who have both agreed to provide their built environment as part of the projects demand and generation portfolio as well as a provider of skills training as part of the project upskilling requirements). Other supporters have tentatively agreed to support the project

pending final clearance from their organisational governance procedures; RAF Valley

Customer Engagement – Customer engagement is at the core of this project with the focus on communities rather than individuals as the customer. The supporters on the project represent the many different sections of the communities we intend to engage with on Anglesey. With the engagement meetings thus far completed there is a real sense that the communities see this as a chance to shape their future energy requirements.

Equipment Selection – As the project is demonstrating deployment and not research in the technology area we have analysed the needs of the project and concluded most, if not all, equipment for this project is commercially available and requires configuring to our needs. It is therefore proposed to gain the most cost effective solution by using an open competition by Mentor Mon (home automation) and Scottish Power Energy Networks (ANM) to procure the equipment needed from the open market. The project team have analysed the various products that are on the market and evaluated the suitability to meet the demands of the project and have also been able to acquire a good knowledge of the cost of the various products to obtain an averaged value to allow for this equipment to be procured within the project budget.

Equipment Installation – significant analysis has been undertaken to understand the possibility of leveraging the local SME community to deliver into this project. It has been decided to run an open competition to obtain the most cost effective partners to deliver the technology requirements for the project. In the main, the products and services we are looking to procure are available commercially. The key to the innovation from a technology perspective is the way in which we will integrate these products and services into a new application. We expect that the criteria for procurement will be much more interesting to smaller SME's than the usual corporate entities due to the volume and specialist areas we are proposing. The project has an even handed approach between technology that is required on the power network versus that which will be required to establish the services from Menter Mon.

Project Delivery

Following Contract Award in November/December 2013, project preparation will begin in earnest with the Project Team ready to commence following the Christmas break, in January 2014. We have recognised some of the learning from previous LCNF Tier 2 projects and have factored in sufficient time at the start of the project to finalise equipment specification and contractual agreements. Hence, following funding award, there will be a short initial period of contractual negotiations with Partners. This activity should be brief as there has already been a preliminary agreement of project contributions in kind with Partners. It will be possible to begin engineering design and internal/external stakeholder engagement processes while contracts are being finalised.

A detailed project plan is provided in Appendix 3 and indicates key milestones and the critical path. The total duration of the project is 4 years including dissemination of learning to other DNOs and interested stakeholders.

As products and solutions are being procured in a normal competitive manner Intellectual Property Rights are not seen as an issue in this project as any IPR generated will belong to those selected in the normal course of events. Know-how on the other hand will be the key learning attribute that the project team and those associated with it will generate. This will be shared with other DNO's and interested parties at events.

For work packages 1 and 3 the University partners will be encouraged to share and disseminate their learning through their normal journals, seminars and conference activity.

Project resourcing – A core SPEN project team has been established who have developed the project and will be central to its delivery which includes the project manager, design engineer and commercial consultant. Additional head count has also been secured for technical leads and a knowledge transfer lead to be seconded into the project and assist with the delivery. These staff will be seconded so that staff can be rotated as necessary to disseminate the learning internally and also for staff development. The project organogram is provided in figure 6-1 and indicates key individuals from SPEN who will be involved in delivering this project and links to key partner resource. These individuals are ready to commence immediately upon award of funding.

Partner resources have also been identified in their detailed proposals and should funding be awarded we will be able to proceed with fulfilling these roles. Further details of partner resource breakdowns are contained in Appendix 3. After discussions with stakeholders a key request was for an external professional project director to be secured due to the level of external content and liaison required between the various parties. The costs to secure this resource have been included in the project and the required professional capabilities have been identified.

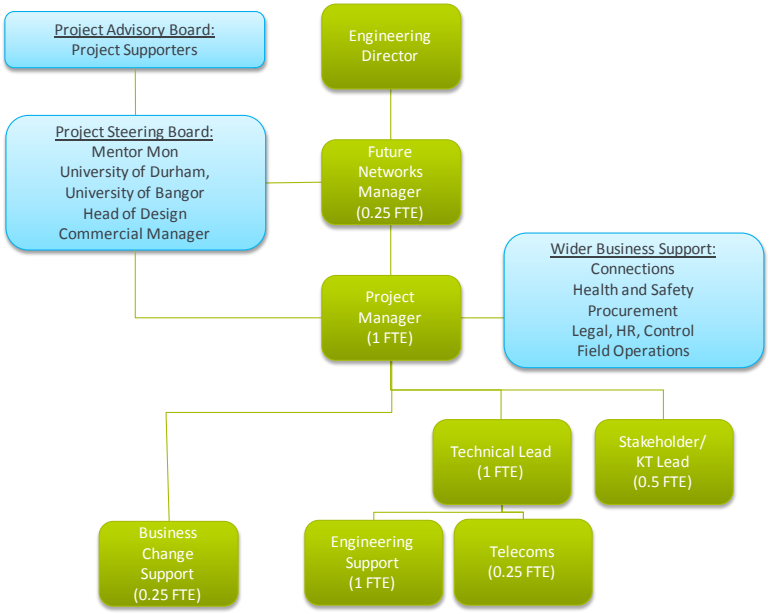

Figure 6-1: Project Organisation Chart

Project Governance - The Steering Board will have the organisational authority to oversee the project and ensure that appropriate action can be taken to rectify any problems which arise. The steering board will meet bi-monthly ensure successful establishment ongoing success of the project. Each partner will be responsible for managing their own resource but the project director will ensure the direction agreed by the steering board is implemented.

The project also has an executive sponsor who will review on a fortnightly basis:
- Project milestone progress (baseline against actual);
- Monitoring of key risks and issues, including mitigating actions and the effectiveness of their application;

- Financial reporting, including value of work against forecast and budget;
- The effectiveness of communications and stakeholder management plans; and
- Monitoring of resource utilisation, including both internal and external parties.

The steering board will have the power to stop the project or take the most appropriate action and identify critical points at which the project should be referred to Ofgem if necessary. An advisory board made up of project supporters will have the power to advise the steering board.

Project Milestones

Key project milestones are listed below and are shown on the project plan in Appendix 3. These are the project "Go/No Go" decision gates.

Key Project Milestones

- Completion of start-up phase across all workstreams
- Establishment of a Community Energy Delivery Centre in Anglesey
- Completion of Prototype testing stage
- Delivery of portfolio of communities signed up to project
- Completion of core communities installation and configuration devices
- Completion of new ANM system on Power network
- Integration between both Community Energy system and ANM system on power network
- Completion of Market Operation data collection and analysis
- Results of trial and dissemination process completed

Detailed milestones for each work package have been identified and are listed in Appendix 3. These show the key sub-tasks we anticipate in the project and have shaped out cost and timing estimates for the project.

Costing Details

Detailed costings have been developed for each work package. The community energy elements have been costed based on open market pricing and indicative installation costs provided by local stakeholders for similar work. The range of equipment in this area is vast and an average price has been assumed based on the analysis undertaken of market offerings. In the sphere of Active Network Management for the power network the DNO has based the figures on current knowledge in this area. More rigorous analysis will be part of the project start-up process to ensure that the differing costs and functionality are well understood for evaluation against the criteria defined for the system functionality. Each work stream has been costed and validated separately but challenged by the project team to ensure cost effectiveness.

Labour costs (Internal) - This includes engineering design and analysis, development of new tools and processes, technology assessment and cost-benefit analysis, and costs for equipment installation for network trials. Costs for project management, staff and external stakeholder engagement and training are also included. Costs are based on estimated scope of work and timescales from the proposed work package methodology and are consistent with the resourcing reserved for this project. All staff costs are based on standard costs.

Equipment costs - These have been estimated through discussion with Partners providing technology as well as engagement with other technology providers and specialists in this field of work. The TRANSFORM model has provided indicative costs for the ANM integration and has been verified against the RIIO-ED1 costs in this area. Independent consultants have also been engaged to verify costs from the open market.

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Project Readiness continued

Contractor costs - This includes provision of engineering design, installation and configuration, analysis services and development of new tools and processes. All contractor costs are based on current representative daily rates for each contractor and allocated contractor days for each work package task. Legal costs for setting up contractual arrangements with project partners and procurement costs if outsourced, are also included here.

IT - IT costs relate to ihost system which we already have access to and costs are for the system development. Costs for changes to our Network control system have also been factored. This system is already in use at SPEN and these costs are purely for upgrading the functionality to incorporate the technology which will be trialled.

IPR - We do not anticipate any IPR costs as any IPR development will be undertaken by the partner at their own cost which is their contribution to the project. The project is not funding the development of any technology which should create foreground IPR.

Travel and Expenses - Travel expenses have been allocated for additional travel between Scottish Power Energy Network Offices in Glasgow and Prenton for the purposes of this project, which would not be required for "business as usual". Also included is the cost of travel and expenses to present at key industry conferences and seminars as part of learning dissemination. There are no significant travel and expenses costs for international travel or travel to remote locations.

Payment to Users – The project activity is to ascertain the market value of the network constraint, energy efficiency measures and the ability of the 3rd sector intermediary to coordinate these activities that can provide a sustainable commercial model going forward. Payments will therefore not come from the DNO to the end-user but will be assessed by Mentor Mon in combination with the University of Durham and Bangor to define the most appropriate payments for the project. SPEN will make payments to Menter Mon as part of the operational market trial. As for both these payments values will be determined by the project, placeholder amounts have been included in the project costings.

Contingency - A risk register with risk ratings, mitigation and contingency plans has been developed for this project and is provided in Appendix 3. This will be maintained and updated throughout the duration of the project. This was used to provide an indication of the level of cost contingency that will be required for each work package, broken down by cost items such as labour, equipment, contractor etc. Equipment costs were allocated a higher level of contingency due to possible prices variations in raw materials and manufacturing, an increased level of contingency was also attached to contractor costs which may be subject to change. The average overall contingency applied to the project was 4%.

Decommissioning - A nominal cost for the decommissioning of equipment has been estimated for the project although it is unlikely that monitoring equipment will need to be removed.

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Section 7: Regulatory issues

This section should be between 1 and 3 pages.

☐ Please cross the box if the Project may require any derogations, consents or changes to the regulatory arrangements.

Regulatory impact during the project

As a result of developing this project and its implementation during the trial period, we do not anticipate that any derogations, licence consent, licence exemptions or changes to the current regulatory requirements will be required.

Longer term regulatory impact

Part of the remit of the project is to explore the longer term and GB-wide impacts of a local market model which supports community energy. As part of the knowledge dissemination and learnings from this project we therefore anticipate recommendations for any regulatory enhancements to allow DNO to engage with community energy systems in a future GB-wide scenario.

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Section 8: Customer impacts

This section should be between 2 and 4 pages.

Communication with directly affected community groups

Community engagement and communication will be facilitated by Mentor Mon rather than directly by SPEN. Although Menter Mon will liaise directly with Social Housing and I&C supporters initially, rather than with individuals, they will have responsibility for ensuring that every individual affected by the trial obtains the appropriate information. There will be an initial stage raising general awareness of the project. Mentor Mon (and our initial supporters in the Social housing and I&C sectors) will actively engage with affected individuals to ensure they have a clear understanding of potential impacts of the trial. This initial engagement will highlight the following:

- As this trial is facilitated by community groups there will be no requirement for a change of Supplier.
- SPEN do not envisage any disruption to supply as part of these trials. Hence, we will not be requesting protection from any incentive penalties as part of this trial.
- There will most likely be a requirement for the installation of home automation equipment on premise. Hence, there is a possibility that installation of this equipment at participant premises may require some domestic systems to temporarily power down e.g. immersion or storage heaters. SPEN and Menter Mon will make it a requirement of the commercial tender for this equipment that installation is straightforward and the need to power down domestic systems is minimised.
- SPEN and Menter Mon are aware that the detailed monitoring of customer energy consumption is considered sensitive personal information. Therefore, we will assure trial participants that they can opt-out of this information being collected, it will only be used by Menter Mon for energy management purposes and compliance with the Data Protection Act will be maintained at all times. Mentor Mon will provide a data privacy statement before commencing collection of any sensitive data.
- SPEN and Mentor Mon will assure participants that they will suffer no financial loss as part of this trial. For the start-up period of the trial it is possible that participants will be paid a small fee by Mentor Mon to compensate for disruption caused by installation processes and as future financial benefits of the scheme have not been proven. The size and type of any payments will be defined in the project by the work of Durham and Bangor universities. Costs have been allocated for this payment should it be required. All trial participants should experience significant cost savings through energy efficiency, however we will explicitly guarantee no financial loss through contractual agreements with Menter Mon.

  The eventual operational business model will be developed as part of the trial but initial assumptions are that participants would transition to be charged some form of subscription to be part of the energy community and that this subscription would be less than the share of community energy savings and ancillary service payments they receive. Hence, we envisage that all participants will make energy and cost savings as part of the eventual solution. Bangor University's work will include determining the best transition process from the initial participant arrangements to the operational ones.
- All equipment installed will remain the property of Menter Mon and will be returned to them should a trial participant leave.
- SPEN commits to providing OFGEM with a customer engagement plan, in co-operation with Menter Mon, prior to any engagement commencing

Customer impacts continued

- On trial completion if the trial has been successful participants will be allowed to keep the installed equipment if they chose to sign-up to the operational commercial agreements with Mentor Mon. Should they not chose to do so, or if the trial has proven unsuccessful, all equipment will be removed from premises at no cost and minimum disruption to the participant

Given that we are leveraging existing community relationships we anticipate this initial awareness raising stage will not be a simple pack delivered through the door. We will use existing community relationships to provide a much more interactive, Q&A based approach with people on the ground, in the community able to deal with any concerns.
Part of the remit of this project is to develop and design the appropriate community engagement methodologies. Hence, after this initial awareness raising we expect communities to have a high level of interaction with the development of engagement and communication preferences. Hence, we anticipate that participants will have a very high likelihood of obtaining the information they require, at the right time and via the right medium.
The community engagement entity provided by Menter Mon will have community engagement, communication and dispute resolution as a fundamental and key part of its remit. Being independent from SPEN this entity will solely have the communities concerns and welfare as a consideration.

Communication with Social Housing and Industrial & Commercial Supporters

Menter Mon will again have the responsibility for liaising directly with these supporters. As representatives of significant community groups these supporters will be closely involved in the design of engagement methodologies and dissemination of information as described in Workstreams 1 and 5.

Wider Stakeholder Engagement

The dissemination activities of the project partners and supporters is detailed in section 5, which includes local government and regional development agencies. In addition section 5 also explains our plans to disseminate information to the wider GB DNO community.
Although we require no change of supplier for this trial National Energy Supply Organisations will also be made aware of this project. The nature of competition in the GB electricity supply market implies that customers located within the locations where the project will be undertaken will have supply contracts with different GB energy suppliers. We recognise existing initiatives/obligations being undertaken by supply businesses in respect of facilitating energy efficiency through initiatives such as Green Deal. We hope that by making Energy Suppliers aware of this project they will be interested in investing in Energy efficiency measures as part of existing obligations.

To ensure a positive customer experience, we will undertake awareness workshops with all GB suppliers to inform on the development of our project to enable them to brief back office and customer facing staff should there be any occasions when customers make contact with their energy supplier or have concerns in respect of events associated with the development of our project.

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Section 9: Successful Delivery Reward Criteria

This section should be between 2 and 5 pages.

9.1 Project Budget

Criterion

The project will be delivered to budget in accordance with the Tier 2 full submission. A 5% variance will be acceptable between work packages but the overall project will be delivered in line with this submission in order to demonstrate effective cost control.

Evidence

Ongoing cost reporting to monitor progress and publication of a final report to Ofgem will identify costs incurred per work package to assess compliance with the Tier 2 submission. Project completion date of December 2017.

9.2 Project Timeline Delivery

Criterion

The project will be delivered in accordance with the timelines outlined in the Tier 2 submission. Delivery in accordance with these timelines, and in line with budget as per criterion 1 will demonstrate effective project management.

Evidence

Ongoing project reporting and formal reports to Ofgem will identify the how well the project is being delivered in accordance with the time lines set out within this submission. Should individual work package time lines deviate from plan, a lower reward weighting may be appropriate as long as the overall project is delivered on time. Completion date December 2017.

9.3 Demonstration of higher level of community engagement

Criterion

From within the communities engaged we would expect to see 70% remain engaged with the trial to completion as a proof point of successful community engagement and the successful achievement of the stated project objectives of :

- Understand community dynamics and response to stimulus
- Determine the appropriate community engagement methodologies
- Determine the appropriate stakeholder cultural changes to allow community engagement

Evidence

Evidence will be the publication of results which show active community engagement levels and the comparative cost of maintaining that engagement with other approaches i.e. where there is no dedicated community energy management entity. Completion date December 2017.

9.4 Demonstration of DNO benefits of a standalone community energy system

Criterion

Implementation, operation and monitoring of the community engagement platform and initial market model, as described in workstream 2.6 to a level which allows DNO benefits to be quantified and shows the successful achievement of the stated project objectives of :

- Evaluate a new innovative model that provides no interference with the Supplier.
- Ensure the solution results in load shifting peak demand in localised areas to allow optimal use of network assets and deferment of reinforcement

Evidence
Evidence will be the publication of results which show demand reduction and energy efficiency measures deliver balancing against network constraints compared to the baseline case. This will detail cost, time and operational benefits. Learning and details of the processes and technology involved to achieve an local community energy market will be included within this publication. Completion date December 2017.

9.5 Demonstration of DNO benefits of the trial with DNO engagement

Criterion
Implementation, operation and monitoring of the link between the community energy market model and the DNO network management systems, allowing the DNO to send market signals to drive community behaviour, to an extent which allows additional DNO benefits to be quantified.

Evidence
Evidence will be the publication of results which show controlled load shifting and demand destruction to avoid local network constraints compared to the baseline case. This will detail cost, time and operational benefits. Learning and details of the processes and technology involved to achieve DNO engagement with community energy will be included within this publication. Completion date December 2017

9.6 Demonstration of economic and network benefits of the local energy market model

Criterion
A local energy market based on providing services to the DNO at a localised network level should be operated to an extent that it can prove itself to be economically viable, or not, within the current regulatory regime

Evidence
Evidence will be the publication of results which show the economic performance of the key market participants and this performance against a business as usual baseline. The results will show if the market could persist without LCNF funding in an open competitive market and if regulatory enhancements may be required for this. Completion December 2017

9.7 Detailed publication and dissemination of learning from project

Criterion
Effective dissemination of project learning, technology developments and business processes to a level that other DNO are in a position to re-use this learning if required.

Evidence
Publication and dissemination of project learning including:
- detailed business process maps for the alternative approaches adopted in the project;
- proposals for structure of future community energy incentives and regulatory framework;
- evaluation of incentives for community engagement
- Learning and technical documentation to support the technology demonstrated and how this is reflected in design policies.

This task is detailed in section 5. A questionnaire will be used to assess the learning obtained by DNO. Completion December 2017

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Successful Delivery Reward Criteria continued

9.8 Partner Deliverables Achieved

Criterion

Each project partner has submitted a proposal with deliverables to be achieved (see Appendix 5). The partner must demonstrate that they have met these milestones.

Evidence

Publication of the final leaerning from the project will be matched against th partner deliverables to ensure that these have been met.

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Section 10: List of Appendices

Appendix 1: Budget Spreadsheet

Appendix 2: Technical Assessment of Network Trial Area & Network Diagrams

Appendix 3: Risk Register & Project Plan

Appendix 4: Ofgem Questions

Appendix 5: Project Partner Proposals & Supporting Letters

Appendix 6: Stakeholder Engagement Workshops

Appendix 7: Durham University DSO Research Paper

Appendix 8: Resubmission Clarifications

Appendix 1: Budget Spreadsheet

Refer to the attached spreadsheet for the full details of project cost and requested Tier 2 funding.

DNO and Partner Day Rates & Man Days for complete project

Partner	Average Day Rate	Man Days for Project
Global Smart Transformation	£913	784
Bangor University	£320	2800
Durham University	£316	3000
Menter Mon	£246	3893
SPEN	£491	2645

Note: that partner days rates are inclusive of overheads. SPEN's day rates are exclusive of overheads.

Benefits Business Model

SPEN Model
DSR Value
£2.00 per kW

Customer Economic Model	-	-	-
Annual		£	
Electricity Bill		1,200.00	
Energy Efficiency Savings	10%	-120.00	
Time of Use Savings	10%	-120.00	
Network DSR Utilisation Payments		-40.00	
Energy Club Membership		99.00	
Total Costs		1,019.00	
Total Savings		181.00	15.08%

Mentor Mon Business Model	**£**	-	-
3-year model			
DNO Annual Contract	25,000.00		
Energy Club Membership Fees	178,200.00		
DNO Availability Payment	72,000.00	40	/customer
DNO Utilisation Payment	129,600.00		Paid on 100 days per year
Installation Costs (spread over 3 years)	-120,000.00	200	per install
Equipment Costs (Spread over 3 years)	-150,000.00	250	per install
Operating Costs	-115,000.00		
Operating Profit	19,800.00	5.14%	

Results		
Traditional Reinforcement	£15,400,000	
Cost to SPEN	£226,600	
Savings	£385,000	
NPV	2.50%	
Net Savings	£158,400	Note loss of DUoS income not accounted for

Technical Assumptions

Customer ADMD	1.2	kW	
EE Savings	0.12	kW/customer	
ToS Savings	0.12	kW/customer	
DSR - average 20%/customer	0.24	kW/customer	
Customers in Group	60,000	Anglesey	
Level of Penetration	3%		
Customer Base	1800		
Load in Group	72000	kW	
Amount of load reduction due to EE	216	kW	
Amount of load reduction due to ToS	216	kW	
due to DSR	216	kW	50% effectiveness
load reduction	0.90%		

Appendix 2: Technical Assessment of Network Trial Area & Network Diagrams

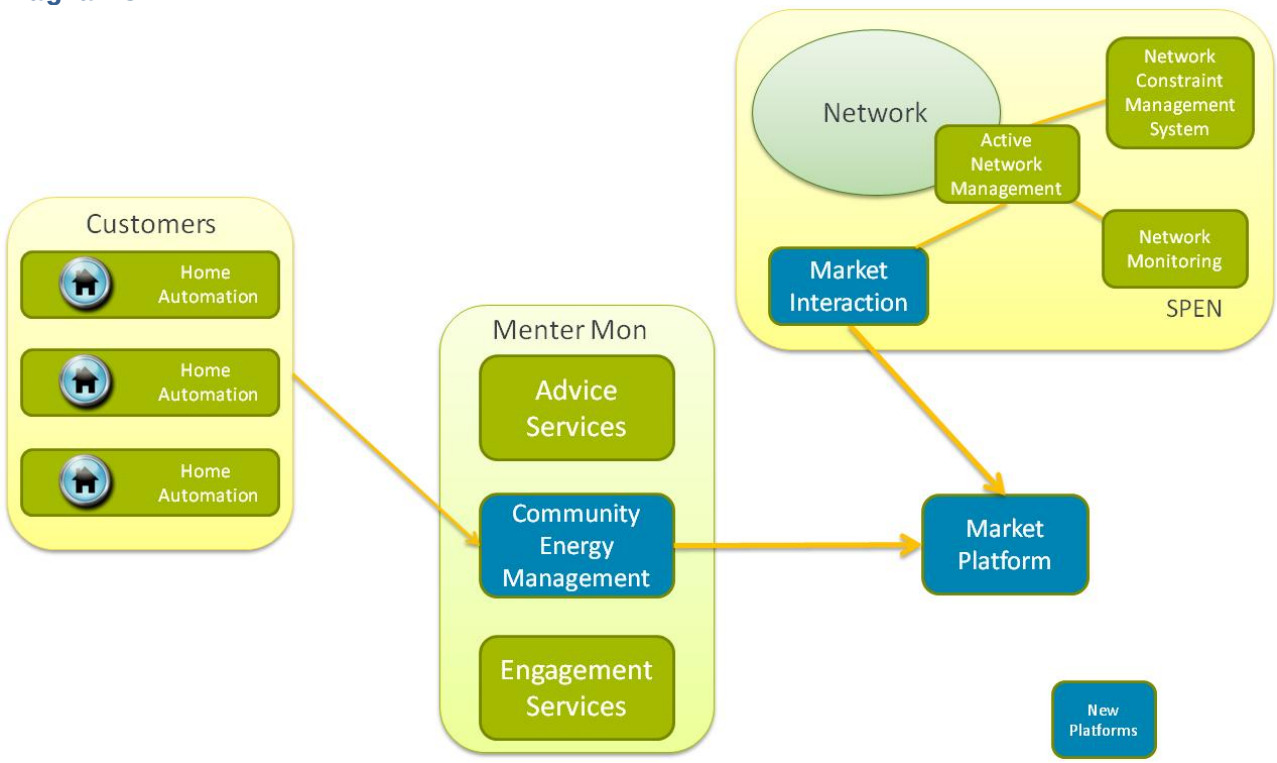


Figure A2-1: ACE Architecture Overview

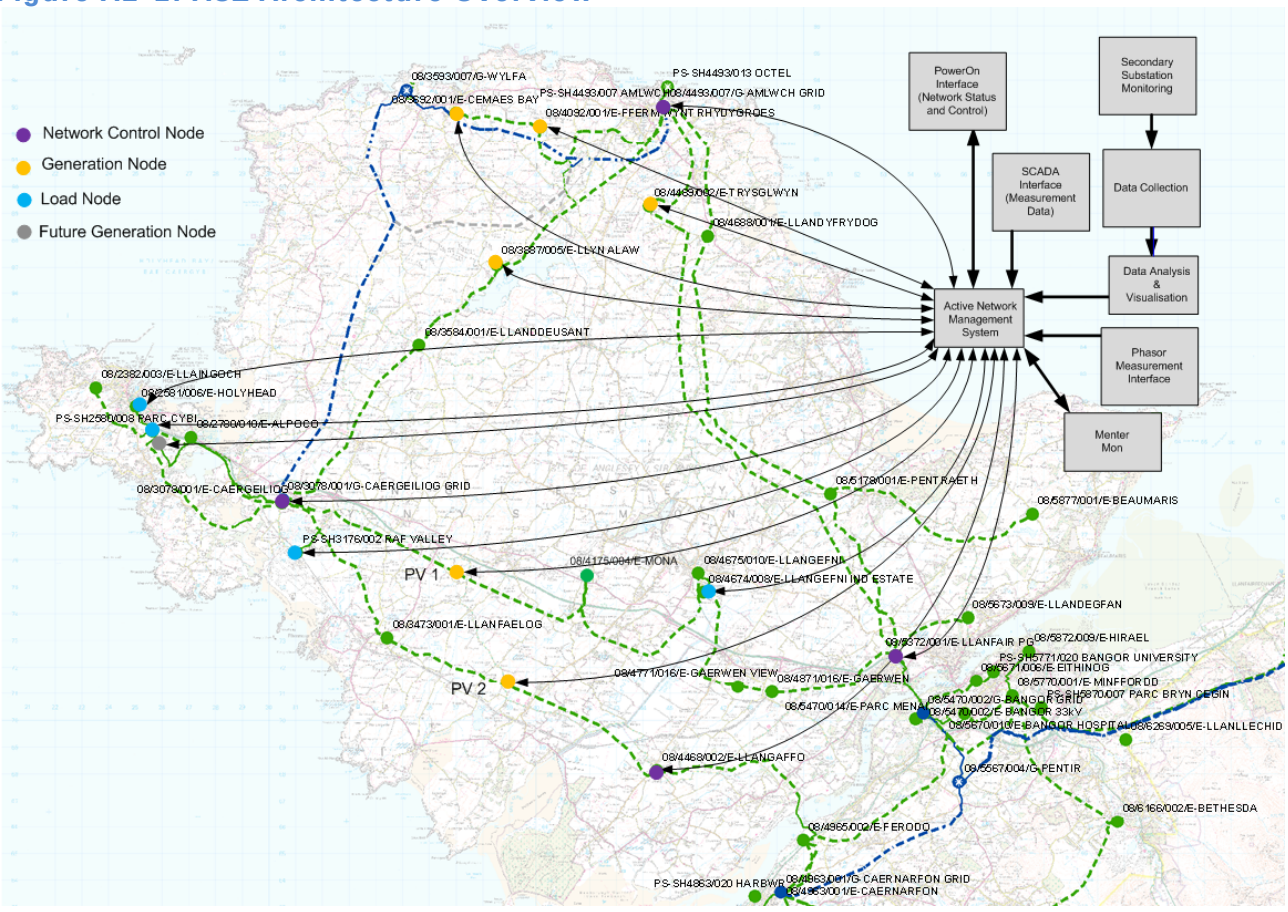


Figure A2-2: ACE Architecture & Network Diagram

1 Executive Summary

Under current demand forecasts, the 33kV network on Anglesey will require conventional reinforcement within ED1 and ED2 to cope with a growing maximum demand. Provisional studies have been undertaken to demonstrate the impact of a higher energy efficiency scenario and varying levels of demand side management (DSM) to defer the reinforcement.

The table below shows that in comparison with the benchmark scenario, an increased energy efficiency scenario would postpone the conventional reinforcement (third Grid transformer on Anglesey) by approximately 4 years, and demand side management/demand-side response in key areas could postpone the reinforcement by another 5 years.

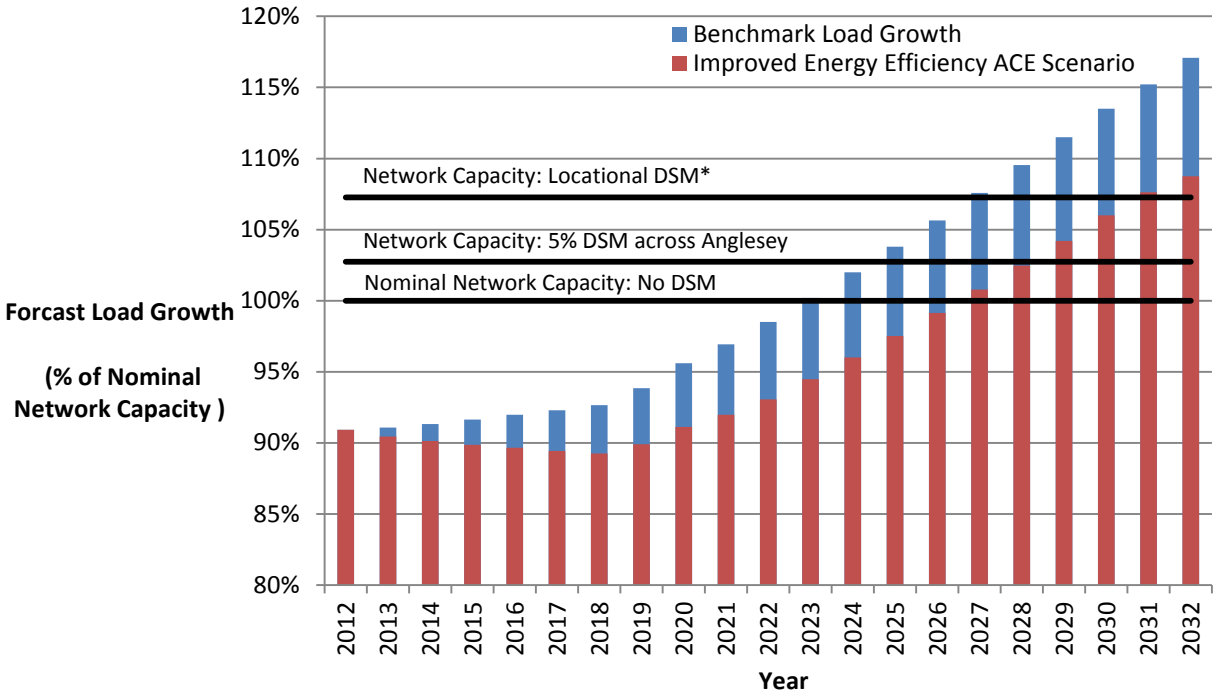


Figure 1-1 Impact of DSM on Reinforcement Timescales on Anglesey

In summary the higher energy efficiency scenario 'ACE', combined with targeted DSM/DSR at Holyhead and RAF Valley could delay the 3rd Grid transformer reinforcement by 9 years, from 2018/19 to 2027/28.

2 Introduction

The island of Anglesey in the SP Manweb distribution network has been identified by SP Energy Networks as a potential trial site for a novel demand side management (including energy efficiency and demand-side response) scheme, under the Low Carbon Network Fund initiative.

TNEI have provided technical and analytical support for this LCNF bid, helping to quantify the gains in network capacity and identify locations where demand side management potential is greatest.

This report outlines the methodology that was used to model the impact of demand side management on the Anglesey network. These studies are conceptual in their nature and it is anticipated that this analysis work will be repeated in greater detail as a part of the ACE project.

3 Anglesey Network

Anglesey is an island with only two 33kV interconnectors to the Welsh mainland. There is a National Grid 400/132kV GSP on the island (whose primary function is to provide a connection for the nuclear power station at Wylfa), and this supplies the 132kV network on Anglesey. There is no interconnection with the mainland at 132kV.

There has been a steady growth in EHV connected generation on the island for many years, resulting in three wind farms connected to the 33kV network today, and two solar parks and a tidal energy scheme in the process of being connected.

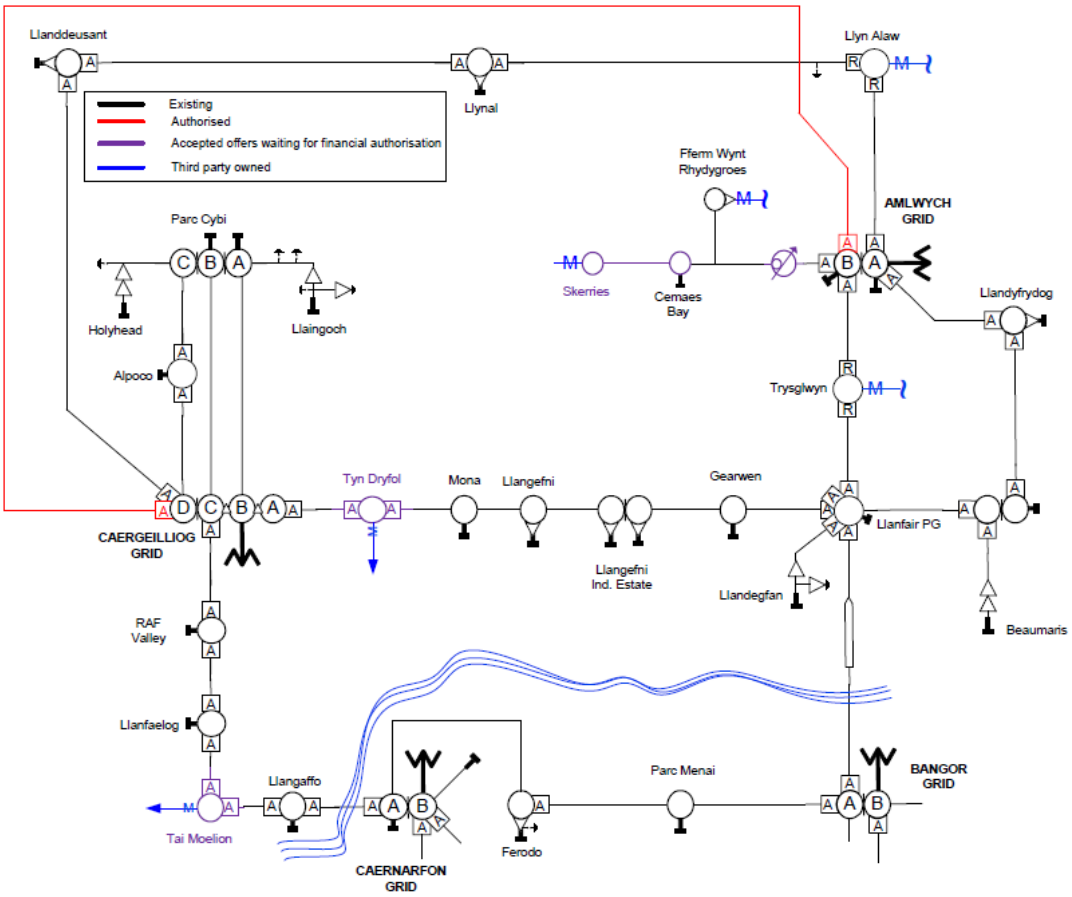


Figure 3-1 Existing 33kV Anglesey Network

Demand Profile on Anglesey

The demand on Anglesey is mainly domestic, with light industrial loads. The domestic load profile has a tea time peak, which sees maximum demand occur between 17.30 and 18.30. This peak can be seen in Figure 3-2, which shows the maximum demand profile for the whole of Anglesey on 23rd January 2013.

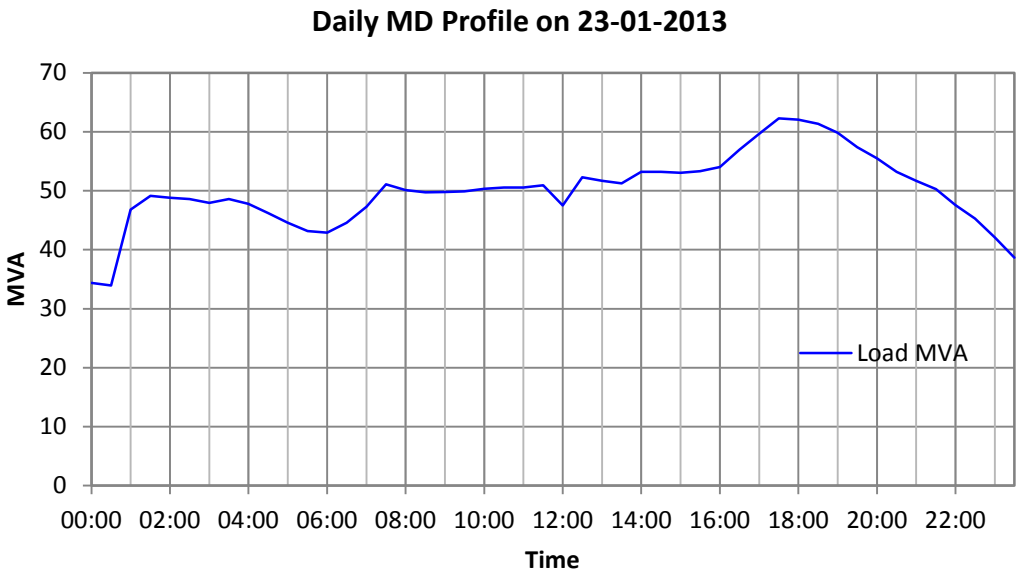


Figure 3-2 Winter Maximum Demand Profile for Anglesey Total Demand

Figure 3-2 also shows a significant demand in the night time period from 01.00 – 04.00, demonstrating the presence of significant electric storage heating on the island. A study of demand profiles at each of the primary substations across the island suggests that most of the island displays a significant night time load, in keeping with the use of storage heaters. It is believed that significant areas of Anglesey are not connected to mains gas, and so Economy 7 tariff storage heating is a common heating alternative. An exception to this is Holyhead, which does not display a night time peak and is believed to have mainly gas fired heating.

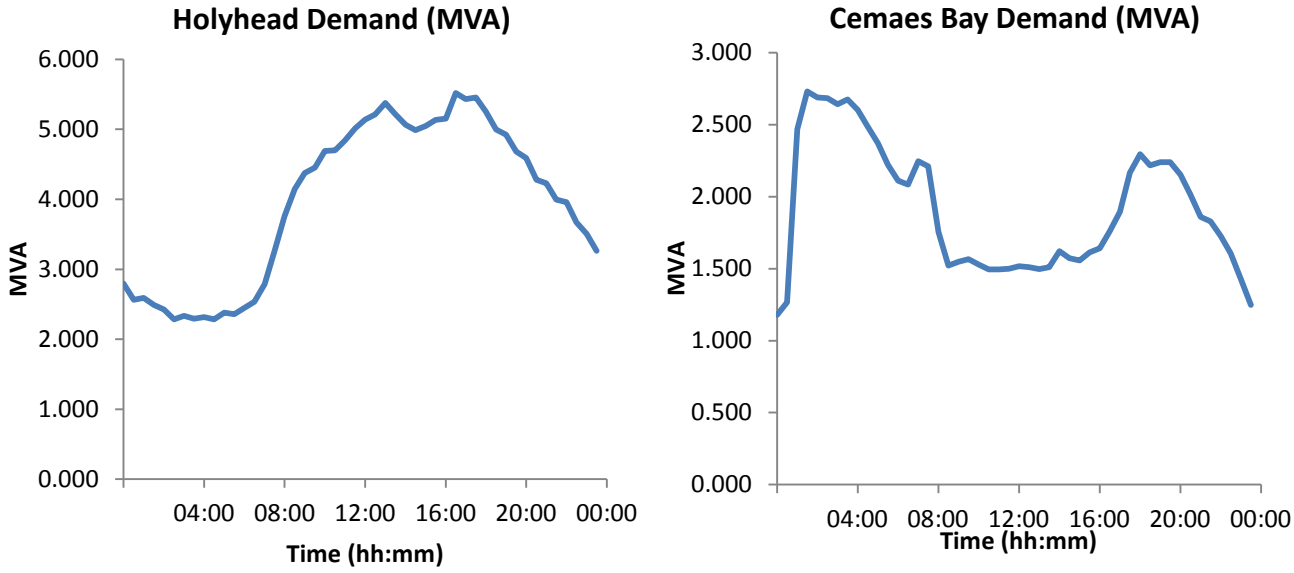


Figure 3-3 Winter Maximum Demand Profile for Holyhead (left) and Cemaes Bay (right)

The maximum night time demand at each primary was compared with the average load across the day to determine the areas where storage heating is most predominant.

$$\text{Night/Day Ratio} = \frac{\text{Max demand from 01.00 – 04.00}}{\text{Average Demand from 00:00 – 23:59}}$$

Table 3-1 Primary substations in order of predominant heating mode

Substation	Night / Day Ratio	Gas Supply	Dominant heating mode
Cemaes Bay	1.44	None	Storage Heating
Llandyfrydog	1.35	Unknown	Storage Heating
Llanfaelog	1.3	Unknown	Storage Heating
Parc Cybi	1.25	Unknown	Non-Domestic Loads
Pentraeth	1.22	None	Storage Heating
Llangaffo	1.16	Unknown	Storage Heating
Beaumaris	1.14	Yes	Storage Heating
Parc Cybi	1.08	Unknown	Non-Domestic Loads
Gaerwen View	1.05	None	Storage Heating
Llanddeusant	1.04	Unknown	Storage Heating
Caergeiliog	1.01	Unknown	Storage Heating
Mona	1.01	Unknown	Mixed load type – some storage heating.
Amlwch	0.99	Yes	Mixed load type – some storage heating.
Alpoco	0.98	Unknown	Mixed load type – some storage heating.
Llangefni Ind Est T1	0.87	Yes	Non-Domestic Loads
Llanfair PG	0.86	Yes	Mixed load type – some storage heating.
Llangefni Ind Est T2	0.82	Yes	Non-Domestic Loads
Llandegfan	0.81	Unknown	Mixed load type – some storage heating.
Llaingoch	0.79	Unknown	Gas heating
Llangefni	0.73	Yes	Gas heating
Holyhead	0.65	Yes	Gas heating

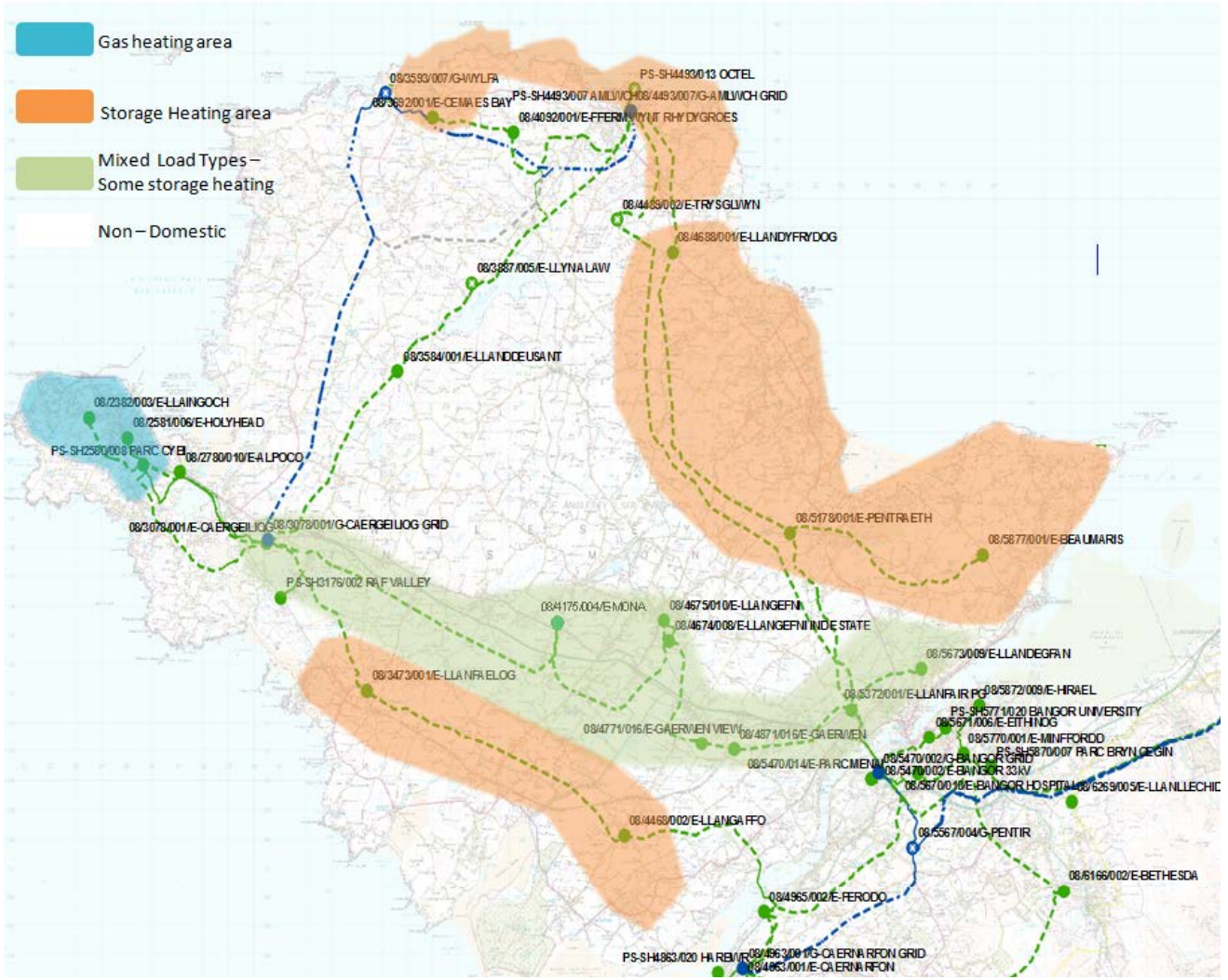


Figure 3-4 Heating modes across Anglesey – as suggested by substation maximum demand profiles

Contracted Demand

Anglesey has a maximum winter demand of approximately 76 MVA, and a summer minimum demand of 38 MVA.
There is 8.5 MW of demand at Parc Cybi that has been contracted by the Welsh Development Agency. This is included in the load flow studies although the demand has not yet been allocated to actual customers. This site has particular potential for demand side response as it represents a significant load which is yet to be connected, and therefore could include provision for DSM/DSR, if advantageous to the customer.

Generation on Anglesey

The isle of Anglesey is currently operating at thermal and voltage limits and consequently it is becoming problematic to accommodate any further generation or demand.
Table 3-2 lists the EHV connected and accepted generation on Anglesey at present.

Table 3-2 33kV Connected Generation on Anglesey

Name	Capacity (MW)	Type	Status
Rhyd WF	10	Onshore Wind	Operational
Trysglwyn	6.5	Onshore wind	Operational
Llynal	20	Onshore wind	Operational
Tai Moelion	15	PV	Offer accepted
Tyn Dryfol	15	PV	Offer accepted
Skerries	10	Tidal	Offer accepted
TOTAL	76.5		

4 Methodology

The IPSA+ model of the Manweb EHV network developed by SP Energy Networks used for planning studies was used to carry out the demand side response analysis.

Figure 4-1 shows the Anglesey group, modelled with all connected and contracted (i.e., accepted) generation as of July 2013. Future speculative (i.e. uncontracted) generation has not been taken into account.

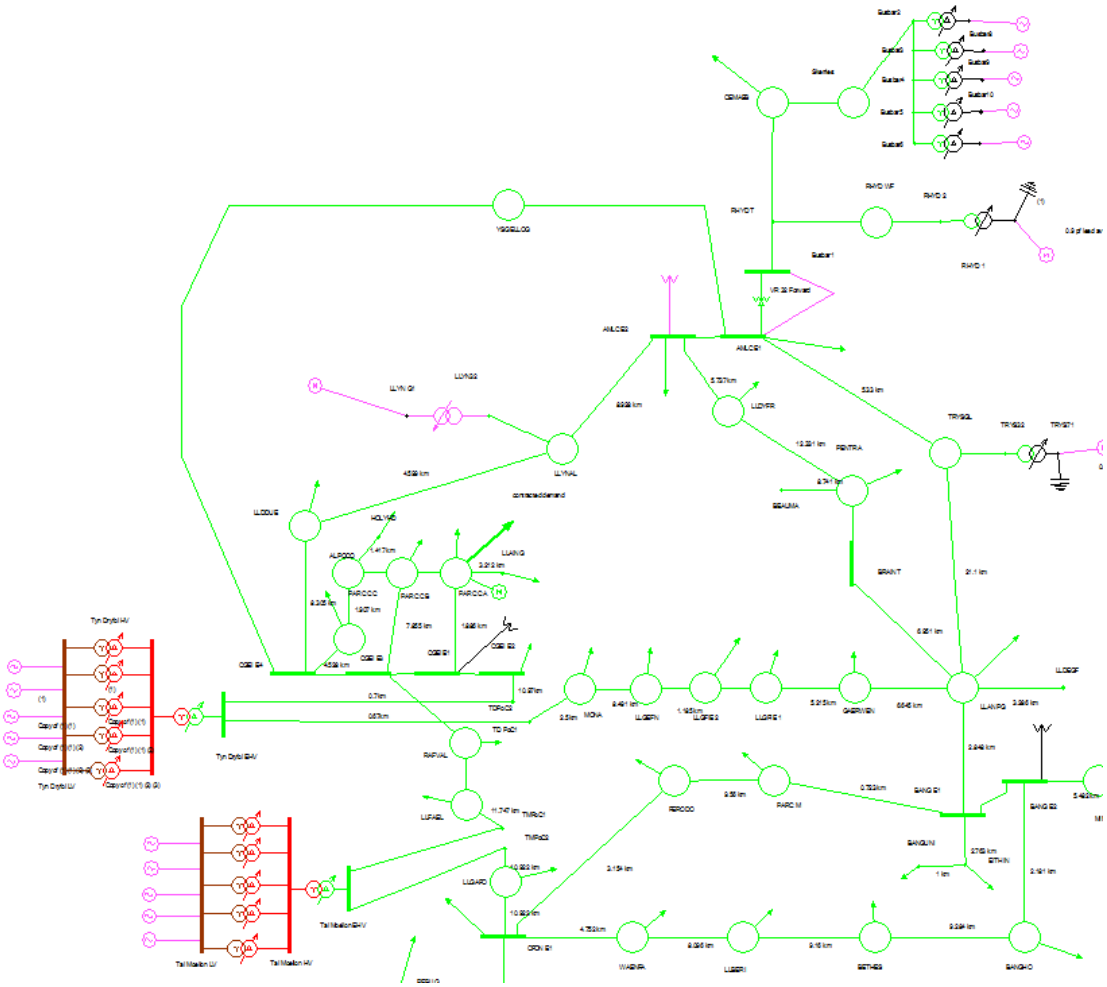


Figure 4-1 IPSA+ planning model of the Anglesey 33kV Network

The HV and LV network are modelled as point loads at each primary substation.

The network was considered under intact and N-1 conditions under both summer and winter loading. As with typical network studies, the most arduous conditions considered were as follows:

- Winter Max Demand – 0% Generation (Intact & N-1)
- Summer Min Demand – 100% Generation (Intact & N-1)

Under Winter Max Demand the 2013 Anglesey Winter Maximum Transdat used to determine the loads at each primary substation. This is a snapshot of the simultaneous loads that occur at the maximum demand peak for Anglesey. This is determined by the annual review of PI data for substations across the Anglesey group, and for 2013 this maximum peak occurred on January 23rd at 1800.

Under Summer Min demand, the 2012 Anglesey Smax trandat was used, with the loading conditions at each substation taken from PI data for 1730 on the 1st May 2012.

The critical N-1 conditions for the Anglesey group were determined by investigation and are as follows:

1) Outage of Amlwch Grid Transformer
2) Outage of Llanfair PG - Bangor circuit

Both of these scenarios result in the overloading of the Caergeilliog transformer as demand increases.

Network Scenarios

Two load growth scenarios were considered, **Benchmark** and **ACE** based on the output of the TRANSFORM[1] model.

Benchmark: This scenario assumes some modest increases in energy efficiency from the present day, and has been derived using the *Flat* and *Reference* profiles from the TRANSFORM model.

Improved Energy Efficiency Scenario (ACE): This scenario assumes significant increases in energy efficiency from today's standards and represents a halfway measure between *Best Available Technology* and *Policy* profiles from the TRANSFORM model.

The load growth over ED1 and ED2 under these two scenarios is shown in Figure 4-2.

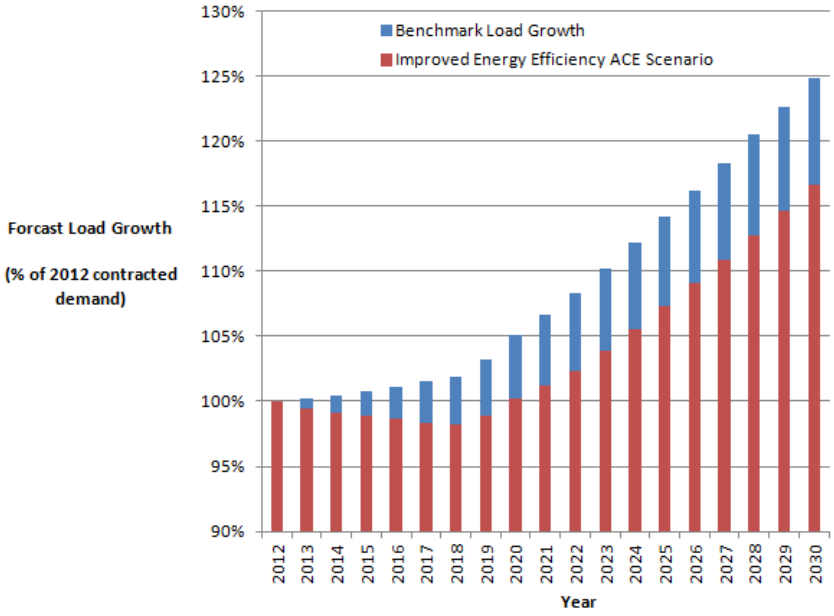


Figure 4-2 Load Growth projections for different Energy Efficiency Scenarios

Demand Side Management

Demand side response and demand side management are defined as follows in the scope of this project.

Demand Side Management

The ability to incentivise customers to switch controllable loads on or off in response to the level of demand across the network. This would normally be required at times of maximum demand, minimum generation or minimum demand with lots of generation on line.

Demand Side Response

[1] The TRANSFORM™ model is owned, developed and licensed by EA Technology. All GB DNOs, Ofgem and DECC have a royalty-free licence to use the software.

The ability to switch loads in or out at individual customer sites in response to network issues, typically faults or outages on the network, but also extreme network loading conditions.
Both behaviours can be modelled as a peak load reduction, and this is the approach taken in this study. For example; 5% demand side management/response across Anglesey assumes that a reduction in max demand of 5% is achievable at all primary substations across Anglesey at winter maximum demand.

Embedded Generation Management

Embedded Generation Management is the ability to influence the location and connection voltage of future generation to match local demand in order to counteract the impact of load growth.

Connection Voltage

The effect of the connection voltage of Embedded Generation was examined at Parc Cybi on Anglesey. Using the summer minimum load, maximum generation scenario, generation was modelled connected at the 33kV and 11kV busbars in turn and the impact on the network was observed. Connection at the 11kV busbar was be modelled as a reduction in load, as generation connected to the 11kV network can be assumed to supply the minimum demand first. Connection at the 33kV busbar was modelled as a universal generator.

Generation Location

The locational element was also investigated, using the summer minimum load, maximum generation model to determine the maximum generation capacity which could be connected at the 11kV busbar of any single primary substation. The results of this study are given in Appendix 2, and it is noted that while this provides helpful geographical signals as to where future generation could be located, all generation connections will still be subject to a full connection assessment and individual connections may still cause voltage or thermal issues.

Generation Controllability

It is proposed that the level of generation installed can be increased further if generation export is restricted at times of low load, typically 10pm to 7am or 10pm to 1am where storage heating is used. The benefit of embedded generation can be further increased, if directly linked to the local demand (i.e. local load following), however this has not been studied within the scope of this report.

5 Results

The load flow analysis showed that the Grid Transformer at Caergeiliog will overload under N-1 contingencies when the load grows by 3% above existing demand levels.
Under the benchmark scenario this occurs in 2019.
Under the Increased energy efficiency (ACE) scenario, this occurs in 2023.
DSM/DSR has the ability to further delay this overload, by decreasing load at times of peak demand. 5% DSM was considered across the whole island and compared to 20% DSM in each of the key population centres. The values of 5% and 20% have not been analytically determined, but are used to demonstrate the concept.

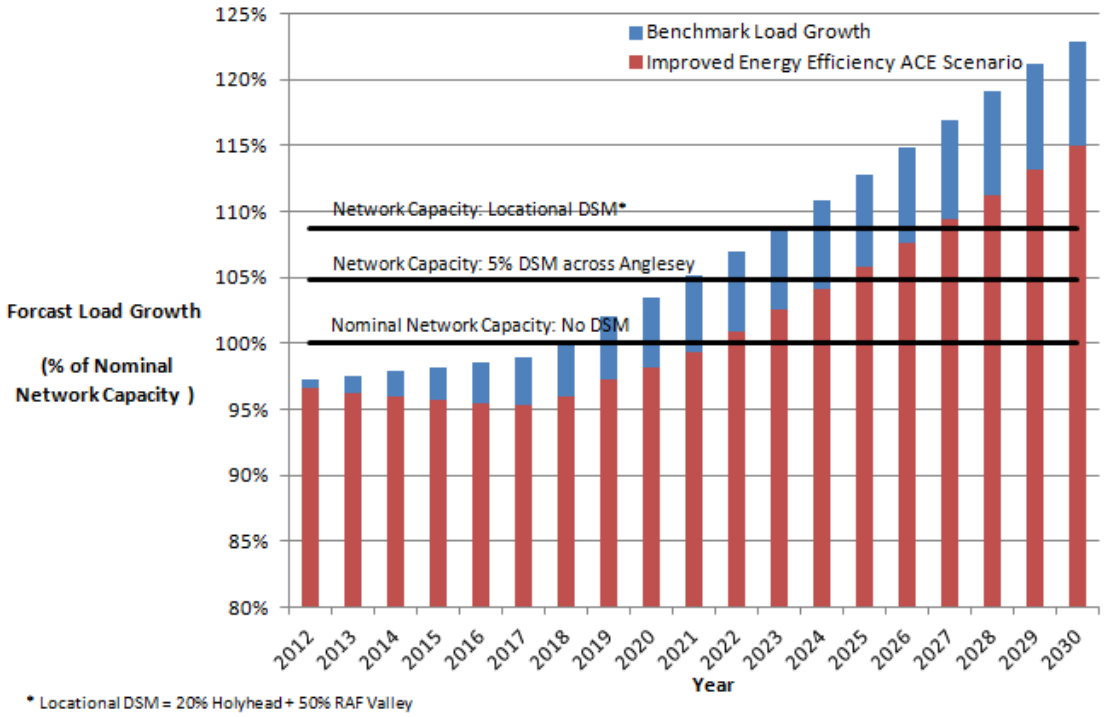


Figure 5-1 Impact of DSM on Network Capacity

Figure 5-2 shows that 5% DSM across the entire island will delay reinforcement until 2026 (adding another 3 years to ACE scenario). In comparison 20% DSM targeted in individual towns will only postpone reinforcement until 2024, except for Holyhead, which offers the greatest benefit from locational Demand Side Management as 20% DSM here could postpone reinforcement on Anglesey until 2027.
A higher level of demand side management could be considered for HV connected customers who have significant load, some of which will be controllable. For this reason a much higher level of DSM was considered at RAF Valley. If combined with targeted DSM at Holyhead, this could delay the Caergeiliog transformer reinforcement by **9 years.**

Generation Capacity Results

Embedded generation was identified as an issue on Anglesey. At present, there is significant interest in generation connections at 33 kV; however connection studies have shown that additional generation at 33 kV would cause voltage limits and reverse power limits at the grid transformers to be exceeded.
Studies at Parc Cybi suggest that it would be possible to connect 3.5 MW of generation at the 11kV busbar of Parc Cybi A, before the reverse

power limit of the Amlwch Grid transformer is exceeded under N-1 conditions. Generation connected directly to the 33kV Parc Cybi A busbar would be limited to 3.0 MW by this reverse power limit.

This short study supports the general theory that connection to the 11kV network in areas of significant demand is a more efficient use of network capacity; however the benefit on Anglesey is limited, as generation has already exceeded minimum demand.

Appendix 2 shows the approximate generation capacity at the 11kV busbar of each primary substation on Anglesey. As expected, more generation can be connected in areas of higher demand, such as Holyhead and Parc Cybi, than across the north east of the island.

Demand Side Management	Benchmark Energy Efficiency	Increased Energy Efficiency - ACE Scenario									
	No DSM	No DSM	5% DSM across Anglesey	20% DSM in Holyhead Group	20% DSM in Llanfair PG group	20% DSM in Amlwch Group	20% DSM in Llangefni Group	20% DSM in Beaumaris Group	50 % DSM at RAF Valley	DSM at Holyhead & RAF Valley	
2014											ED1
2015											
2016											
2017											
2018											
2019	Caergeiliog GTx overloaded.										
2020											
2021											
2022											
2023		Caergeiliog GTx overloaded.							Caergeiliog GTx overloaded.		ED2
2024					Caergeiliog GTx overloaded.	Caergeiliog GTx overloaded.	Caergeiliog GTx overloaded.	Caergeiliog GTx overloaded.			
2025											
2026			Caergeiliog GTx overloaded.								
2027				Caergeiliog GTx overloaded.							
2028										Caergeiliog GTx overloaded.	
2029											
2030											

Figure 5-2 Comparison of reinforcement timescales with DSM across various locations

6 Conclusions

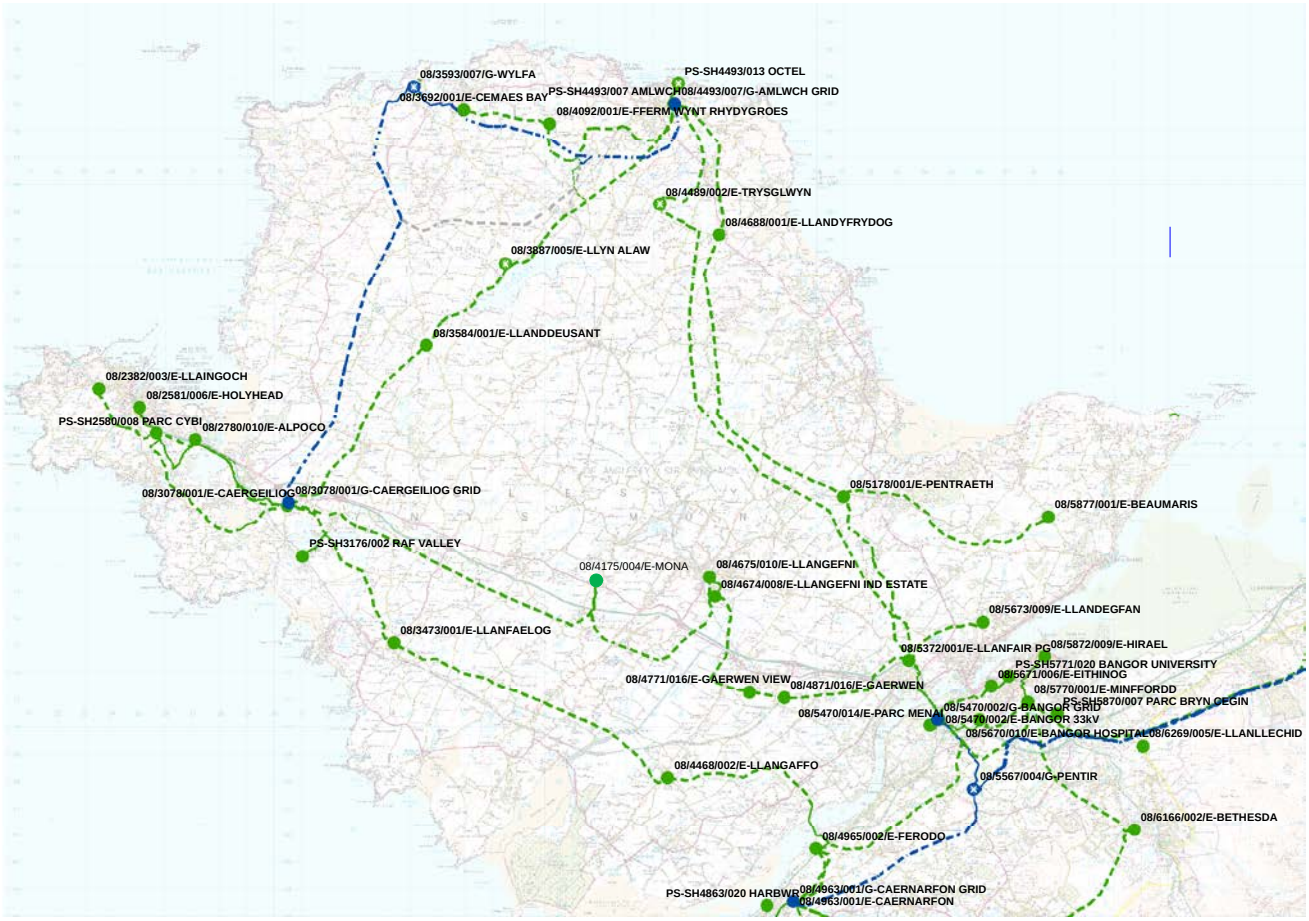
There are clear benefits in targeting specific areas with DSM/DSR technologies:

- A 20% reduction in MD at the Holyhead & Parc Cybi group releases twice as much capacity as a 5% reduction across Anglesey. This is equivalent to a 4.5 MVA increase in capacity.
- There is 9 MVA of contracted demand at Parc Cybi; most of which has yet to be connected and this could be a good opportunity to introduce DSM technologies.
- RAF Valley was also considered as a good candidate for DSM as it has a single 2 MVA demand customer. This adds almost a year to the postponement of the reinforcement.

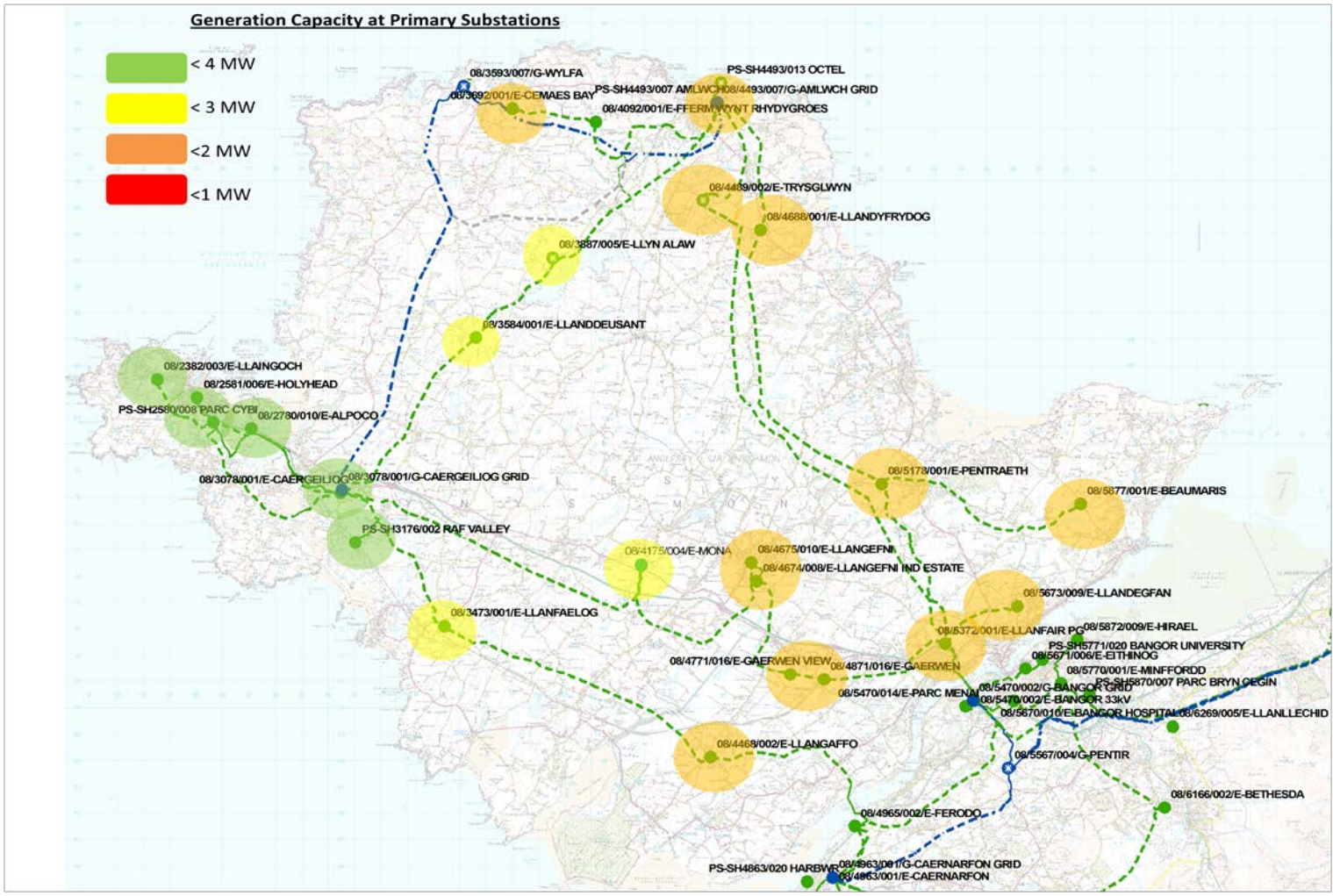
In summary the higher energy efficiency scenario 'ACE', combined with targeted DSM/DSR at Holyhead and RAF Valley could delay the conventional Grid transformer reinforcement by 9 years.

There would also be benefits from embedded generation management, by encouraging connection to the 11kV network in areas of significant demand. This has been shown to be a more efficient use of network capacity. Areas where generation connection opportunities are better include Holyhead and Parc Cybi.

Appendix A – Anglesey Network



Appendix B – Generation Opportunities on Anglesey



Appendix 3: Risk Register & Project Plan Details

Risk Register & Project Plan

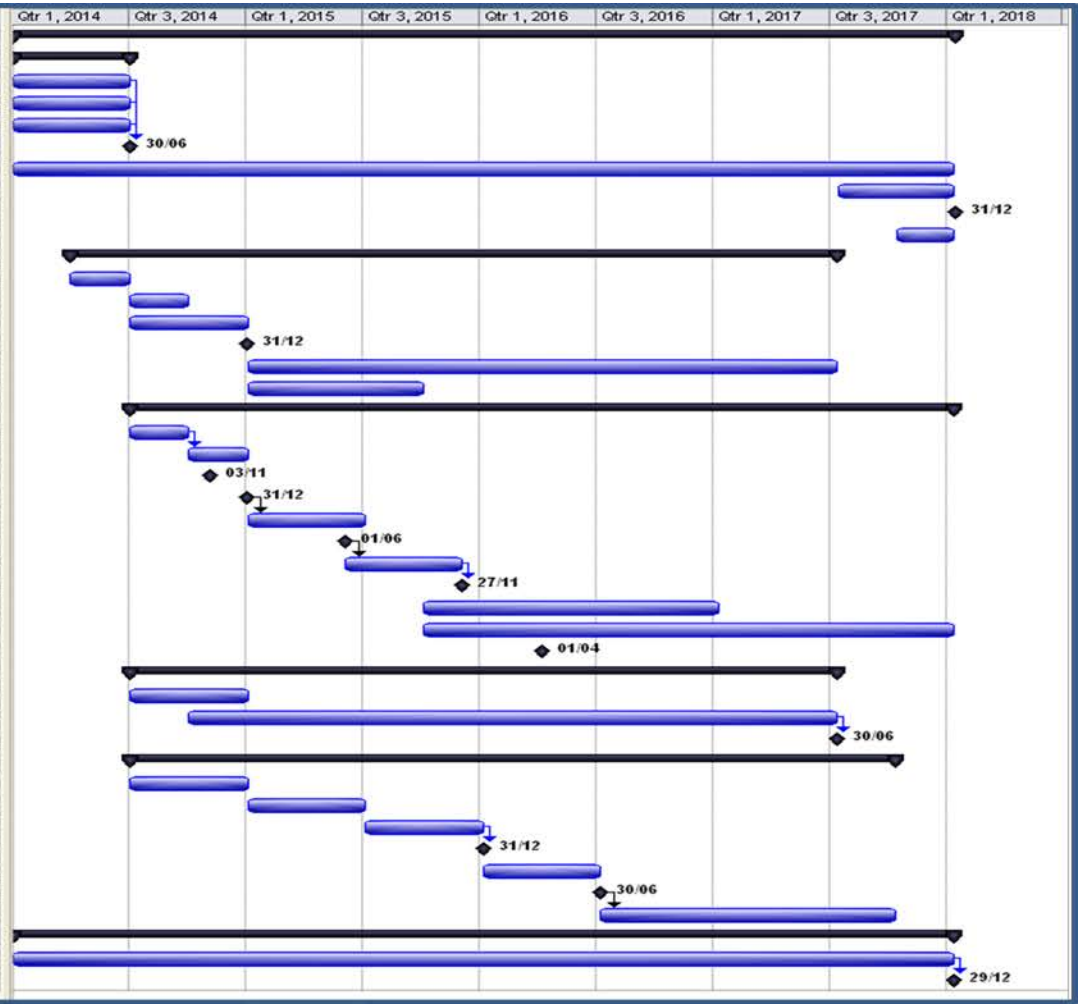
No.	WS	Risk Description	P	C	RR	Mitigation	Contingency Plan
1	1.1	Data on customers perception/behaviour provides no clear outcome to move forward	1	2	3	Ensure that analysis is carried out on a wide cross section of the community and stakeholders	Utilise knowledge in this area from other LCNF projects and academia
	1.3	Customers/Stakeholders/Community groups unwilling to engage with project. Difficulty in gaining willing volunteers	1	3	4	Utilise Mentor Mon's reputation in the community to provide leverage to gain support from the local community. Volunteers through organisations rather than individuals Much of the commitment has already been given.	Approach welsh and local government to gain assistance with engaging local community groups
2	2.2	Community energy delivery entity does not have sufficient influence within the community to carry out role.	1	2	3	Utilise Mentor Mon's reputation and local government support	Publicise benefits of project to community through mechanisms identified by Bangor University.
	2.2	Community does not buy-in to proposals made by Menter Mon.	2	1	3	Much of the interaction can be maintained at group level e.g. housing association, until communities are fully engaged	Project can take a larger focus on I&C communities initially.
	2.2	Community entity independence from DNO	1	2	3	Ensure independence from initiation of project – contractual and governance	Bangor University can investigate reasons for lack of trust
	2.3	There is a risk that procurement of technology and software tools to facilitate trials could hold project back	2	2	4	Ensure wide dissemination of this information SPEN will assist Mentor Mon in procurement process.	Leverage any existing SME relationships
	2.4		3	2	6	Prototyping stage will provide procurement preparation	

		Installation of home automation equipment proves problematic				University of Bangor work should identify optimal approach to installation Leverage existing maintenance practices with supporters e.g. social housing assoc	Focus on I&C customers initially
3	3.1	Development of new tools and processes involves some complexity and time/cost risk	2	2	4	SPEN has engaged technology partners to assist with development of solutions	Utilise internal knowledge and resources
	3.1	Market Models prohibitively expensive	2	2	4	SPEN has requested funding that will enable sufficient trials to be carried out and ensure no customer financial loss	BAU alternatives
	3.1	Combined market and technology solution does not enable improved energy efficiency for the customer	2	2	4	SPEN will utilise technology approaches and new market models that will provide net benefits to customers	Provision of BAU alternatives
4	4.1	There are communication issues with telecom platform meaning that some	2	2	4	SPEN will carry out site surveys and specify telecoms that will meet the needs of the trial area	Resort to BAU e.g. laying fibre cable
	4.2	areas cannot be covered by ANM	2	2	4	SPEN has experience with the procurement process for a technology providers	Utilise existing agreements with technology providers
	4.5	There is a risk that procurement of technology and software tools to facilitate trials could hold project back	2	1	2	A valid learning from the project. Decommissioning has been included as an option.	
	4.5	Model is not appropriate and will not be workable	1	2	3	Bangor University analysis will ensure that the trial requirements	Reduce DSM requirements in specific

		Customers unwilling to be placed under energy efficiency/load control conditions				will be viable options for the local community Utilise Mentor Mon to experience to ensure that customers are happy	cases

A risk rating (**RR**) has been calculated for each risk item by allocating a probability (**P**) and a consequence (**C**) rating, where 1 is low, 2 is medium and 3 is high, and multiplying to get the overall risk rating. This enables identification of significant risk items and development of suitable mitigation and contingency plans

	Task Name	Start	Finish
1	**WS0 - Project Management**	**01/01/14 08:00**	**31/12/17 08:00**
2	**0.1 - Project Kick-off**	**01/01/14 08:00**	**30/06/14 17:00**
3	Formalising Contracts/Resourcing	01/01/14 08:00	30/06/14 17:00
4	Stakeholder Meetings & Steering Group formation	01/01/14 08:00	30/06/14 17:00
5	Project Infrastructure Design	01/01/14 08:00	30/06/14 17:00
6	MS0.1 - Completion of start-up phase	30/06/14 17:00	30/06/14 17:00
7	0.2 - Ongoing Project Management	01/01/14 08:00	29/12/17 17:00
8	0.3 - Results wrap-up & project closedown	03/07/17 08:00	29/12/17 17:00
9	MS0.2 - Results	31/12/17 08:00	31/12/17 08:00
10	0.4 Decomissioning	02/10/17 08:00	29/12/17 17:00
11	**WS1 - Identifying community and stakeholder behavioural change**	**01/04/14 08:00**	**30/06/17 17:00**
12	1.1 - Behavioural market analysis & communications	01/04/14 08:00	30/06/14 17:00
13	1.2 - Establish Customer Perception Baseline & Placebo Groups	01/07/14 08:00	30/09/14 17:00
14	1.3 - Behaviour Analysis, Education, Design of Intervention	01/07/14 08:00	31/12/14 17:00
15	MS1.1 Viable linterventions and Stimulus Defined	31/12/14 08:00	31/12/14 08:00
16	1.4 - Iterative-Monitor, Evaulate, Enhance on Interventions, Behaviour Analysis, Education	01/01/15 08:00	30/06/17 17:00
17	1.5 - SME Behavioural Change	01/01/15 08:00	30/09/15 17:00
18	**WS2 - Creating a community engagement entity**	**01/07/14 08:00**	**29/12/17 17:00**
19	2.1 - Evaluation of shortlisted Home automation devices	01/07/14 08:00	30/09/14 17:00
20	2.2 - Community Engagement Entity Start-up (with prototype home automation test bed)	01/10/14 08:00	31/12/14 17:00
21	MS2.1 Creation of community energy delivery entity	03/11/14 08:00	03/11/14 08:00
22	MS2.2 Completion of home automation equipment prototype testing	31/12/14 08:00	31/12/14 08:00
23	2.3 - Procure Home Automation Equipment	01/01/15 08:00	30/06/15 17:00
24	MS2.3 Delivery of portfolio of community particpants	01/06/15 08:00	01/06/15 08:00
25	2.4 - Install Home Automation Equipment	01/06/15 08:00	27/11/15 17:00
26	MS2.4 Core community equipment installation/config complete	27/11/15 17:00	27/11/15 17:00
27	2.5 - Monitor Home Automation Equipment (baseline measurements)	01/10/15 08:00	30/12/16 17:00
28	2.6 - Community Enagegment Entity in Operational Local Market	01/10/15 08:00	29/12/17 17:00
29	MS2.3 Assessment of Local Energy Market Viablity	01/04/16 08:00	01/04/16 08:00
30	**WS3 - Defining operational market structures**	**01/07/14 08:00**	**30/06/17 17:00**
31	3.1 -Define community economic incentives	01/07/14 08:00	31/12/14 17:00
32	3.2 - Iterative Market Evaluation & Development	01/10/14 08:00	30/06/17 17:00
33	MS3.1 Completion of market operation data collection/analysis	30/06/17 17:00	30/06/17 17:00
34	**WS4 - Deploying supporting network platforms and technology**	**01/07/14 08:00**	**29/09/17 17:00**
35	4.1 - Develop & Design Network Enhancements e.g. ANM	01/07/14 08:00	31/12/14 17:00
36	4.2 -Specify, Procure & Develop Network Equipment	01/01/15 08:00	30/06/15 17:00
37	4.3 -Install network Equipment	01/07/15 08:00	31/12/15 17:00
38	MS4.1 Completion of ANM system on network	31/12/15 17:00	31/12/15 17:00
39	4.4 - Proving of Market Interactation Capability	01/01/16 08:00	30/06/16 17:00
40	MS4.2 Integration between community and ANM systems complete	30/06/16 08:00	30/06/16 08:00
41	4.5 - SPEN Active Market Participation	01/07/16 08:00	29/09/17 17:00
42	**WS5 - Knowledge Dissemination**	**01/01/14 08:00**	**29/12/17 17:00**
43	5.1 Collation of results and structured disemmination following communication plan	01/01/14 08:00	29/12/17 17:00
44	MS5.1 Results of trial and dissemination complete	29/12/17 17:00	29/12/17 17:00



Partner Resources

Menter Mon	1 x Project Director, 3 x Project Delivery Officer , 1x ICT officer
Durham University	0.2 x PI, 2 X Research Assistants, 1 x PhD
Bangor University	0.1 x Project Director, PI , ad-hoc Senior Behavioural Analyst, 1 x Post Doc Researcher , 1 x PhD
GST	1 x technical adviser, 1 x project director

Detailed Project Milestones

This section shows the subtask milestones we expect for the project in more detail relative to the overall project plan.

Workstream 0: Project kickoff & project management (Lead: SPEN)

- Completion of detailed Work Plan for contracts and resourcing
- Feedback from stakeholder meetings to inform design detail
- Completion of contractual agreements between partners
- Monthly reviews of progress with steering group – supplemented with individual partner project management team meetings every two weeks

Workstream 1: Identifying community and stakeholder behavioural change stimuli (Lead: Bangor University)

Benchmarking of attitudes and behaviours with mid-term and project end follow up to provide key measures of project impact. Research to define and field test community specific incentives. The evaluation of these field tests will focus on an analysis of socio-technical factors that determine consumers' behaviour towards and participation in demand response programs.

WS1.1 Establish a baseline

Literature review of 'state of the art' in community engagement projects

- Reporting of key success factors and recommendations as to how these can be built into the communications strategy and customer acquisition strategy for the local network model.
- Report on attitude and perception factors amongst the project 'publics'
- Recommendations as to how these can be addressed in the communication and implementation of the new market model

WS1.2 Initial Community behavioural analysis, education & design of interventions

Development of a co-designed behavioural research project with a sub-set of the population.

- Development of communications strategy and messaging for the project resulting from the initial work.
- Training for Menter Môn staff in techniques relating to social cognition and persuasion to encourage stakeholder engagement in and adoption of, the project.

WS1.3 Iterative evaluation of findings from operational trials

Development and testing of specific behavioural/communications interventions to maximize the impact of the technology platforms (automation and control) used in the project.

Workstream 2: Creating a community engagement entity (Lead: Menter Mon supported local 3rd sector organisations)

WS2.1 Evaluation of Home Automation Equipment

- Review landscape of possible providers to ensure included on the RFP, focus on SME level innovation and capabilities.
- Functional specification for solution

- Procurement of prototype equipment
- Set-up demonstration suite and controlled test environment with integrated solution to evaluate products, services and solutions
- Test configured solution to identify integration issues, gaps in functionality that are still required
- Develop new algorithms required and resolve integration issues
- Test end-to-end solution ready for limited roll-out to controlled environment

WS2.2 Create "Community engagement" entity

- Set-up contractual relationships and define structure of business model
- Recruit 'members' of new collaboration and agree extent and scope of each installation
- Procure and install equipment required to meet the specific installation requirements
- Integrate extended solution into the Menter Mon control environment
- Test extended solution to limited roll-out and resolve any issues based on this extension
- Develop skills of Mentor Mon to be able to manage and control the whole system to provide the desired services to SPEN
- Develop the Energy Efficiency structure to deliver demand destruction and demand increase on demand in areas pertinent to the power system constraints
- Evaluate equipment for above purpose
- Combined development of interaction between SPEN new Active Network Management and Demand Side Participation (in near real-time) using Mentor Mon's system in a two-way collaboration

WS2.3 Home Automation Equipment Procurement

- Prepare larger Tender documentation for equipment and installation for roll-out to all community groups and to scale. E.g. all social housing, residential, I&C, retail, Coleg Menai, etc
- Define selection criteria
- Publish tender for open competition
- Select best value solution providers
- Place orders

WS2.4 Install Home Automation Equipment

- Plan installation visits and ensure process agreed with installers to test and validate each installation
- Agree installation process with contractual stakeholders
- Check if energy efficiency measures are being deployed at the same time ensure compatibility of installation and automation solution
- One visit ethos "right first time" for complete installation and testing
- Oversee installation is in line with already tested solutions to ensure quality control
- Confirm each installation has explanation to end-users where to get help if required

WS2.5 Home Automation equipment monitoring

- Collect data to populate base case (e.g. pure monitoring of system as is before any intervention)
- Analyse data with SPEN, University of Bangor and the University of Durham to establish opportunities for how to design effective business model, behavioural changes and network constraint alleviation
- Implement modified algorithms if required

WS 2.6 Mentor Mon only market operation

- Demonstration of Menter Mon's capability to operate and optimise a local portfolio of market options
- Evaluation of stand-alone operation and available service provision that is available for providing to SPEN prior to integrated market approach
- Feedback into market model optimisation to University of Durham

Workstream 3: Defining operational market structures (Lead: Durham University)

WS3.1: Define community economic incentives

- Contribute to design and development of a DSO operational market model that is able to deliver the network service cost efficiently.
- Investigate current and alternative regulatory models pertaining to the market and business models of DNO and consumer/community engagement. This includes examining the policy and regulatory framework and economic incentives.
- Document the lessons of experience and state-of-the-art advances in electricity market and designs and economic incentives for cluster specific demand response. Case studies of relevant projects and survey of best practices nationally and internationally to inform the models being developed.
- Evaluate responsiveness of consumers' to economic incentives and instruments. This includes assessment of consumer response to and effectiveness of combinations of incentives/instruments, technology options and interfaces, and provision of information.
- Support Bangor to conduct pre-field study surveys in order to inform the design of experiments and incentives of consumer attitudes and preferences.

WS3.2 Iterative market development with DNO participation

- Explore consumer/community engagement models. This task will focus on ownership, organisational and economic incentives (subsidies, compensations, etc.) aspects of user participation.
- Using quantitative (e.g., econometric, agent based simulation) and qualitative approaches to analyse the data generated from the field trials. This includes assessment of consumer response to and effectiveness of different combinations of incentives and instruments, technology options/interfaces, and provision of information.
- Analyse the data in order to develop tailored interventions for targeting specific consumer segments (e.g., fuel poor users) based on criteria and profiles. Analysis of data on reference/control consumer groups and compare with those of field trial.

Workstream 4: Deploying supporting platforms and technology (Lead: SPEN)

The project will initially focus on the optimization of existing appliances and network technology for demand response. This includes the interaction between the energy management system (EMS) and the end user. As the project develops new technology, both network and in the customer premises, will be deployed to support the evolving operational structures. This workstream will also include the overall project management, additional resources and reporting of the trial.

WS4.1 Develop and design network enhancements

- Completion of design for ANM system components
- Agree integration of ANM with the control room

WS4.2 Spec, procure and develop additional technology

- Specify functionality for the new ANM system
- Develop testing strategy
- An open commercial tender for the majority of equipment but some bespoke development is envisaged to deliver the new functionality required to include the demand side feedback from Menter Môn.

WS4.3 Installation of network equipment

- Install and test individually selected equipment at required locations

WS4.4 Confirm correct interaction with market

- Successful test completion with the various components in 'isolated mode' to be able to create interaction without affecting customers

WS4.5 Operational market

- Complete period of iterative optimisation of complete solution

Workstream 5: Knowledge Transfer

Knowledge transfer will be an on on-going aspect of the project with the following activities planned:

Stakeholder Engagement Events

- Workshops with appropriate stakeholders
- Quarterly meetings to update all stakeholders

Community Engagement Events

- Prototype environment in a public centre (will provide a taste of the trial for potential participants.
- Create feedback communications on social media, drop-in events, community dashboards and formal “town hall” meetings on regular basis

Academic Papers

- Output of research and trials is intended to form significant academic publications for Durham and Bangor which will be widely distributed. This is a default activity of these academic institutions which the project will actively encourage.
- DNO info sharing
  SPEN will actively engage in webinars, social media blogging and formal events to ensure information is shared with other DNO.

Appendix 4: OFGEM Questions

Responses to OFGEM feedback letter on ACE screening submission 11th June 2013

Q1. Provide more detailed evidence against Evaluation criterion (b, specifically the requirement a Project to provide "value for money to distribution Customers", particularly the need to explain the benefits to the distribution system versus elsewhere in detail.

In the evaluation criteria section we have highlighted how the combination of:

- a high level of community understanding
- energy efficiency
- the optimal use of technology
- consideration of community operation within network constraints

will provide direct financial benefits to customers and indirect economic and renewable connection capability benefits. Ofgem stated we should clarify the benefits to the distribution system specifically so we have pointed out that:

- The needs of the community and the DNO coincide in that both aim for energy efficiency and cost reduction. Hence, even if a community energy scheme were to progress without DNO involvement we would expect to see some uncoordinated benefits in constraint reduction. The increased benefit to the DNO is that by linking community energy requirements directly to an understanding of local network constraints the community and the DNO can work together to achieve an outcome that meets community aspirations but also targets localised network constraints. As we will benchmark the operation of an actively managed community energy solution both with and without the DNO we will be able to quantify the additional benefits to the DNO via participation in this market. Our estimations for the size of this benefit are discussed in the business case.
- Should significant DNO benefits be observed we believe this solution can be rolled out across GB and hence provide a significant level of DNO benefit

Q2. Provide more detailed evidence against Evaluation criterion (b, specifically the requirement a Project to provide "Justification that the Project can only be undertaken with the support of the LCN Fund" particularly explain how the methods trialled by your Project can only be funded by the LCN Fund and not other sources of funding for energy efficiency measures.

The ACE project does stipulate a likely requirement for some home automation technology to manage a customer's daily electricity use. However, this is only a small part of the project and it is focused on energy management. There is no funding for items such as PV or insulation installation.

The main focus is the management of these systems at a community level and the community's interaction with the DNO. There are no alternative funding sources to trial this form of technology and as mentioned in the submission, with the relatively high risk of unknown commercial outcomes this is not a project which could take place as business as usual. One of the benefits of the ACE trial, however, is that Mentor Mon in its community energy advisory role will have in its remit the need to direct communities towards appropriate energy efficiency funding such as Green Deal for items such as PV, insulation etc.

Q3. Provide more detailed evidence against Evaluation criterion (c, specifically the requirement that requires a Project "generates knowledge that can be shared amongst all DNOs" particularly need to explain in detail how this Project develops new learning and its applicability to the distribution system.

As mentioned in the submission section 4 (c) we believe the ACE project will show the methodology for DNO to engage with community energy. Given the expected growth in community energy the alternative is that this opportunity will evolve in a way that is uncoordinated with the distribution networks to which communities must connect.

We are investigating a new method of connecting communities with their serving DNO which allows the needs of one to feed the needs of the other. We believe this learning is both unique and innovative and is directly applicable to other GB DNO.

Appendix 5: Project Partner Proposals & Supporting Letters

Each partner has supplied a detailed proposal for their participation in the project which has been explained throughout the submission. For brevity their key deliverables as part of the project are listed here rather than entire proposals.

Menter Mon

Partner Description & Selection Criteria - The Community Energy Delivery champion selection was key to the project's success. This was clearly identified early on in the learning from other projects from around the world. Early analysis identified these entities do not yet exist in a form the project was looking for either in Anglesey, Wales or the rest of the UK. It was clear that not all the attributes we were looking for existed in one entity and that we would need to select a partner with the following attributes:

- passion and drive to make this a success
- receptive to adding to their portfolio of skills and business offering.
- have the community spirit exhibited in these other projects but also have the ability to flex towards a more structured commercial approach to deliver services back to the DNO that can alleviate some of the congestion and capacity challenges using new innovative business models

These main criteria led us to identify Mentor Mon via an open and transparent process of discovery (open workshops, see Appendix 6), open discussions with local government and councils, etc) It clearly became the natural contender in our search as the only entity that met the criteria we were looking for and willing to enter into this new activity.

Menter Mon have been established for over twenty years. Originally set up by the Welsh Government to provide the ability to secure EU funding and project management capabilities for delivery of the community based projects in North Wales. E.g. such as the roll-out of PV to the public and private social housing sector in Anglesey. Menter Mon have a very close working relationship with the community in Anglesey already, and are well known to many of the stakeholders that have been engaged in the process of developing the ACE project proposal. Another requirement was that the organisation would be open to developing the skill sets and competencies to run and implement a new business model of the type proposed here. These specific attributes are difficult to find in a community like Anglesey and for this reason Menter Mon was a unique fit as a key partner in this project. It is expected that in the future for other deployments, if successful, it would be possible to find competitive ways of identifying these types of providers to deliver the holistic service provision described in the above sections to both the community and the DNO. This would in most part be due to being able to point to a successful implementation for others to follow.

<u>Project Outcomes/deliverables</u>

- Deliver a new dedicated Community Energy Delivery Centre in Llangefni
- Deliver a demonstration suite for public engagement in the project
- Deliver staff, resources and commitment to run the project as proposed
- Deliver workshops with all stakeholders to engage, inform and agree project detail
- Work with specialists to design, implement and run the new facility
- Work closely with SPEN to build a mutually beneficial service relationship
- Demonstrate the viability of the approach as proposed and optimise as we learn
- Share the results with a wide audience and especially the other DNOs and 3rd sector organisations that wish to replicate the project

University of Bangor

Partner Description & Selection – Understanding the behaviour of the customers was seen as another key element of the project. The selection criteria were defined as:

- An organisation with local community links
- Has the required experience in behavioural analysis

- Enable a new solution to be messaged, organisationally configured for success and delivered to a portfolio of different stakeholders
- Has experience in working on projects targeted at commercial operation rather than theory

A number of academic institutions have been in contact with SPEN in the area of consumer behaviour. The University of Bangor is a leader in the field of Behavioural analysis across a broad range of different disciplines and was an ideal fit for the project in terms of delivering analytical analysis and real informed methodologies. It is less about research and more about practical deployment that Bangor was selected for.

Through implementing a locally managed network with a new, community-led business model and technology platforms to facilitate this project represents a significant opportunity to move away from the traditional 'command and control' approach to network management to a model designed to meet the aspirations of the community it serves. Whilst community engagement and adoption of the project is critical to its success there also exists an opportunity to utilize behaviour change techniques to build on the impact of localized network management. An understanding of the behaviour and motivations of the community, coupled with a technological platform to collect community usage data provides an excellent opportunity to explore ways in which behavioural change can be encouraged to maximize the effect of the local network management. In order to ensure that the local network, market and technology are appropriate and effective there will be a need to understand current behaviour at a granular level. The types of technological solutions that will be implemented as part of this project will provide an opportunity to respond to and/or initiate behaviour within the population. An area of particular interest is the 'spillover' effect from a work to home environment and vice versa. There is evidence for example that when people receive an appeal (which is congruent with their beliefs) to undertake a particular action for example recycling, their intentions have been shown to spillover into other non-targeted sustainable behaviours such as low energy light bulb purchases. Through this project we will be able to investigate whether this spillover effect can be used to promote change in energy consumption but also to see whether spillover takes place between the workplace and the home. The proposed behavioural benchmarking exercise will also provide one of the metrics against which the success of the project can be measured.

<u>Project Outcomes/deliverables</u>

- Literature review of 'state of the art' in community engagement projects
- Reporting of key success factors and recommendations as to how these can be built into the communications strategy and customer acquisition strategy for the local network model.
- Report on attitude and perception factors amongst the project 'publics'
- Recommendations as to how these can be addressed in the communication and implementation of the new market model
- Development of a co-designed behavioural research project with a sub-set of the population.
- Development of communications strategy and messaging for the project resulting from the above work.
- Training for Menter Mon staff in techniques relating to social cognition and persuasion to encourage stakeholder engagement in and adoption of, the project.
- Development and testing of specific behavioural/communications interventions to maximize the impact of the technology platforms (automation and control) used in the project.
- Benchmarking of attitudes and behaviours with mid-term and project end follow up to provide key measures of project impact.

University of Durham

Partner Description & Selection Criteria – A viable economic model is a cornerstone to the success of the ACE project. The key selection criteria for a partner in this area were:

- Experience of analysis of economic models in a similar field and of the DSO concept
- Respect within the energy community for their research and analysis

Durham's Business School was selected from many other interested parties due to innovative thinking, previous engagement with SPEN on this topic and track record of the PI leading this newly formed unit looking at the regulatory, economic and modelling aspects that will be a key element of this projects formation.

- The PI (T. Jamasb) has an established research track record and on-going projects in network regulation, R&D and innovation, quality of service, and network investment issues.
- In particular, the economic component of the ACE project will benefit from synergies from the SusGrid project (Sustainable Grid Development) funded by the Research Council of Norway which studies public engagement with network development and extension. In this project innovative solutions, through community engagement, are explored to reduce public opposition to physical development of grid. Thus, this project, in principle, shares the same concept with LCNF project which seeks innovative solution to avoid "costly" physical expansion of grid.
- In addition, The FP7 project SESAME (Securing the Securing the European Electricity Supply *against Malicious and accidental thrEats) studies regulation and economic approaches to improving the security of electricity networks.*
- *Among the main* objectives of the ACE project is to provide efficient and innovative delivery of network services using local supply and demand as resource. The aim of this work package is to support this objective by providing sound economic input and analysis to the project. This work includes design and development of feasible economic and conceptual models and frameworks. These in turn will inform the implementation and evaluation of the proposed use cases.
- More specifically, the activities of the University of Durham will contribute to: (i) the design and development of economically-informed and workable business, market, regulatory, and consumer/community engagement models, (ii) conducting background studies and analysis of Anglesey area as well as relevant experience from elsewhere, (iii) design and implementation of the use cases, (iv) economic analysis of the data generated and results of the project, and (v) communicating the lessons and findings of the project.

<u>Project Outcomes/deliverables</u>

Critical survey of international experience on innovation in grid capacity enhancement

- Consumer empowerment for efficient energy management
- Regulatory challenge of implementing smart solutions as alternative to grid reinforcement
- Workshop on future of distribution network and consumer engagement
- A new market model for grid capacity enhancement using alternative resources: size, coordination, pricing and incentives
- Empirical analysis of demand response
- An extended business model for distribution companies

Global Smart Transformation

Partner Description & Evaluation Criteria - SPEN receives LCNF project proposals and suggestions from both internal and external sources. These are evaluated:

- using internal and external independent advice

- against LCNF evaluation criteria to
- the best return for the customer utilising innovative new thinking and service delivery, taking note of the learning already gained from the LCNF projects and other relevant projects.

Global Smart Transformation (GST) was integral in the initial proposal of the ideas around the ACE project and bringing together several strands of ongoing work. Once ACE was selected as our preferred project, GST was selected to assist SPEN in the development, design and implementation of this project due to the unique nature of the experience that they bring to the project. GST brings a wealth of experience in funding, developing and delivering major successful innovation deployment projects both here in the UK, Europe and globally. The key experience of technical, commercial and, above all, stakeholder management to deliver highly complex collaborative innovation projects which is embedded in GST with many years of experience and successful outcomes to the founders credit. Examples such as the EPSRC funded collaboration between EDF, SPEN, ABB and 7 academic institutions to deliver the AURA-NMS project. This has led to the current deployment of the largest battery storage project, connecting offshore wind onto a constrained grid, and autonomous intelligent network controllers (leading to the learning for techniques and knowledge now being deployed in Active Network Management and used by various UK SMEs and DNOs) on UK Power Networks; the European FP7 ADDRESS project that has delivered 3 large scale demonstrations in Spain, France and Italy with end–to-end (TNO to consumer) Smart Grid deployment of both technical (to appliance and EV level) and new market designs demonstrated. ADRRESS collaborators included SPEN as part of the Iberdrola team amongst 25 other collaborators. These are a few examples that have major relevance to the current proposed project.

<u>Project Outcomes/deliverables</u>

- Menter Mon have the skills to operate a community energy management system independently
- Stakeholders remain engaged with the project

Project Supporters

The following are project supporters:

Welsh Government

- Key stakeholder in the overall Community Energy Delivery approach to allow Mentor Mon to work closely with them to coordinate the various different activities in this area to ensure joined up delivery.

Anglesey Council

- Has already installed 123 Social Housing PV installations with a combined output of 182kW

Anglesey Energy Island:

- The Anglesey Energy Island™ Programme is a collective effort between several stakeholders within the public and private sector working in partnership to put Anglesey at the forefront of energy research and development, production and servicing, bringing with it potentially huge economic rewards.
- AEI is a key supporter due to the unique position they have in the community and the local government in terms of Energy coordination projects.

Tai Eryri:

- Private Social Enterprise: The following attributes identify the unique role that this organisation plays in the community and the estate of different built environment, load and generation this group can deliver to the project as well as close community understanding of the fuel poor.
    - 77 PV installations across Anglesey with a combined output of 181kW
    - Providing affordable and specialist housing and accommodation for a range of client groups

    - Facilitating and supporting a number of community regeneration initiatives;
    - Managing the local Care & Repair agencies which assist older people and people *with disabilities;*
    - Close collaboration with the local authorities, other social enterprise organisations, community groups, the private sector and Welsh Assembly Government.
- Land & Lakes – Developers of a large new build holiday home complex that will initially be used to house the workforce for Wylfa Nuclear new build:
    - This developer is delivering three new sites during the course of our project timescale:
        - Penrhos – 500 new lodges and cottages
        - Cae Glas – 315 lodges, central hub facilities, outdoor sports and 75 bed hotel
        - Kingsland – 360 house development will initially be used by the Wylfa workers but subsequently will create modern energy efficient homes for open market sale with 50% affordable housing provision.
- Coleg Menai – Big estate owners all over Anglesey with both large demand built environment and distributed generation:
    - The collaboration will also look to provide training opportunities within the project to upskill students to help deliver the solutions selected.
- Identifying the most appropriate project partners, suppliers and customer groups has been a major focus in the preparation of this bid. Figure 2-1 in the main submission text identifies the various stakeholders in a graphic that attempts to demonstrate the important relationships that need to exist to deliver this project (note: for clarity not all supporters are shown).

Supporting Letters:

Sample supporting letters are shown here from Tai Eryi, Anglesey County Council, Anglesey Energy Island, Land & Lakes and Coleg Menai.

Additional letters of support were also received from Medwyn Mon, the Welsh Government and Anglesey Economic Regeneration Partnership.

CYNGOR SIR
YNYS MÔN
ISLE OF ANGLESEY
COUNTY COUNCIL

RICHARD PARRY JONES, M.A.
Prif Weithredwr
Chief Executive

CYNGOR SIR YNYS MÔN
ISLE OF ANGLESEY COUNTY COUNCIL
Swyddfa'r Sir
LLANGEFNI
Ynys Môn - Anglesey
LL77 7TW

Gofynnwch am - Please ask for: Carol Roberts

☎ (01248) 752102 📠(01248)750839

E-Bost-E-mail: richardparryjones@anglesey.gov.uk

Ein Cyf - Our Ref. RPJ/CR
Eich Cyf - Your Ref.

Mr Alan Collinson
SP Energy Networks
North Cheshire Trading Estate
PRENTON
CH13 3ET

24 July 2013

Dear Mr Collinson,

SPEN ANGLESEY COMMUNITY ENERGY PROJECT

The Isle of Anglesey County Council fully supports the application by Scottish Power Electricity Networks to Low Carbon Networks Fund for their Anglesey Community Energy project and their engagement with ourselves is very much welcomed.

In 2010 the authority established the Anglesey Energy Island Programme which is a collective effort between several stakeholders within the public and private sector working in partnership to put Anglesey at the forefront of energy research and development, production and servicing, bringing with it potentially huge economic rewards.

Harnessing a rich mix of energy streams, including nuclear, wind, tidal, biomass and solar; together with associated servicing projects provides major potential to achieve economic, social and environmental gains for Anglesey and the wider North Wales region.

The modernisation of infrastructure, such as electricity networks is a vital enabler to allow these low carbon energy developments to progress, bringing with them opportunities for local businesses and employment to sustain our communities.

The County Council is very supportive of work being done to change the behaviours of consumers and this helps them also to contribute towards securing a more economic use of electricity.

The authority, via its Social Housing Scheme, the Energy Island Programme and other means fully support the project.

Yours sincerely,

Richard Parry Jones

Richard Parry Jones
Chief Executive

CYMDEITHAS TAI ERYRI

2nd August 2013

Duncan Botting
Managing Director
Global Smart Transformation Limited
Cardrum Steading
Inverurie
AB51 0BT

Dear Duncan

RE: Low Carbon Network Fund for Anglesey

On behalf of Cymdeithas Tai Eryri, I write in support of SPEN's Low Carbon Network Fund application for Anglesey.

Cymdeithas Tai Eryri is a Housing Association covering North West Wales, and our corporate aims are to; improve lives, develop sustainable communities and promote the welsh language.

Energy matters are of an increasing concern to our tenants, and understanding energy use and associated behaviour is a field that Cymdeithas Tai Eryri are increasingly looking into, in order to reduce the impact of fuel poverty amongst our tenants.

Also, Cymdeithas Tai Eryri is actively trying to reduce carbon emissions from its housing stock and other activities for the benefit of the wider community. We see the chance of being part of this innovative project an unmissable opportunity of advancing our work in this field, thus offering even greater benefits to our tenants and their communities.

We look forward to working with SPEN and other partners on this unique opportunity for Anglesey.

Yours sincerely

pp. Walis George
Chief Executive

Tŷ Siryn | Penygroes | Caernarfon | Gwynedd LL54 6LY
0300 1234 224 | www.taieryri.co.uk

LAND &LAKES
Environments for life

Duncan Botting
Managing Director
Global Smart Transformation Limited
Cardrum Steading
Inverurie
AB51 0BT

5th August 2013

Dear Duncan,

Re: Anglesey Community Energy LCNF Proposal

I am writing to offer our support to the Anglesey Community Energy LCNF bid proposal. As you know we have taken a keen interest in being involved with this proposal for the last 5 months and would like to formally register our support for the proposal.
We have a large scale development project planned for Anglesey and see a real benefit to understanding and being involved in the project going forward.

Yours Sincerely

Richard Sidi
Chief Executive

Coleg Menai

www.gllm.ac.uk

Mr Duncan Botting
Managing Director
Global Smart Transformation Ltd
Cadrum Steading
Inverurie
AB51 0BT

08 August 2013

RE Anglesey SMART Grid Project

I write to confirm the support of Grwp Llandrillo Menai, the largest Further Education College in Wales, in respect of this project.

In particular the College supports :-

- The innovative approach this project is showing to Community Engagement on Energy usage;
- The lasting effect this project can potentially have, on skills and competences that will be needed in the locality during and after the project;

In addition, the College is to an extent able to participate in assisting the community in demand side management network constraints, as well as, potentially as an aggregator.

Should there be a good business case for doing so, then in addition, the College could potentially look at building-in some of the key assistive aspects into new building developments on its Anglesey sites.

I do hope that the above is helpful;

Yours Sincerely;

p.p. D. Evans

Dafydd Evans
Executive Director and Principal of Coleg Menai

Pennaeth / Principal Coleg Menai: **Dafydd Evans BSc, CIPFA**
Pennaeth a Phrif Weithredwr y Grŵp / Group Principal & Chief Executive Officer: **Glyn Jones OBE, MAdd / MEd, BA (Anrh / Hons), TAR / PGCE**
Coleg Menai
Ffordd Penmynydd / Penmynydd Road,
Llangefni, Ynys Môn / Anglesey LL77 7HY
Ffôn / Phone: 01248 383 348 **Ffacs / Fax:** 01248 722 097
Grŵp Llandrillo Menai

DR JOHN IDRIS JONES BSc, MCMI, MInstP, CPHys
Cyfarwyddwr Rhaglen – Programme Director

CYNGOR SIR YNYS MÔN
ISLE OF ANGLESEY COUNTY COUNCIL
Canolfan Fusnes Môn • Anglesey Business Centre
Parc Busnes Bryn Cefni • Bryn Cefni Business Park
LLANGEFNI
Ynys Môn • Isle of Anglesey
LL77 7XA

ffôn / tel: (01248) 752431/2435 ffacs / fax: (01248) 752192

Gofynnwch am / Please ask for: John Idris Jones
E-bost / Email: dateecon@ynysmon.gov.uk
econdev@anglesey.gov.uk
Ein Cyf / Our Ref: EIPoffice\LETTERS(General)\2013
Eich Cyf / Your Ref:

Dyddiad / Date: 24 Gorffennaf / July 2013

Alan Collinson
SP Energy Networks
North Cheshire Trading Estate
Prenton
CH13 3ET

Dear Alan

SPEN Anglesey Community Energy Project

I refer to the application by SPEN to Low Carbon Networks Fund for their Anglesey Community Energy Project, which is very much welcomed by the Energy Island Programme.

The Energy Island Programme was set up by the Isle of Anglesey County Council, a partnership between public and private sector organisations, putting Anglesey at the forefront of energy research and development, production and servicing. Our vision is to ensure, by de-risking, low carbon energy developments come to Anglesey & North West Wales enabling job opportunities for local people and local companies so as to sustain our communities.

Our objectives are to:

- **Support low carbon energy developments** – helping to modernise infrastructure, such as broadband, mobile phone coverage, housing, transport links and roads, industrial units and utilities e.g. electricity and water supplies.

- **Enhance employment growth** - raising awareness to attract people back to Anglesey, and ensuring the local workforce and young people have the appropriate skills and abilities to take maximum advantage of future quality employment opportunities within the low carbon energy sector, and support services.

- **Prepare local businesses** - to make the most of the opportunities that will come with major developments, through effective business support and creating the ability to compete.

- **Sustain communities** - providing a quality of life where job opportunities are created, worklessness is reduced, young people are developed, culture is respected and behaviours align with a reduced carbon footprint for individuals.

SPEN's Anglesey Community Energy Project is a unique opportunity for the public and private sector in Anglesey to work with SPEN to develop a step change in behaviours associated with the use of electricity on the Island. At the same time the project will bring benefits to consumers and also the local economy by helping increase the resilience of the local electricity network and community electricity generation schemes.

As Programme Director for the Energy Island Programme I am fully supportive of this electricity and look forward to working with SPEN and local partners on its implementation.

Yours sincerely,

J. J. Jones

John Idris Jones
Cyfarwyddwr Rhaglen Ynys Ynni Môn / Anglesey Energy Island Programme Director

Appendix 6: Stakeholder Engagement Workshops

Stakeholder Engagement Workshop 1

Meeting Notes: LCNF Project Proposal

Workshop 27th March 2013

Attendees

Ian Forrester Mowatt – Anglesey Energy Island – representing John R Jones (+ 6 local auth working together, supply change level, lot of interest in low carbon generally)
Sian Purcell – Medwyn Mon (Deputy Chief Officer - Third Sector - Local Council support)
Gerallt Jones – Mentor Mon (start up support, getting structural funds, 65 staff, economic development, project management)
Chris Hillier – Bangor University (natural resources management, self funding & outward facing, resource efficiency, food security, sustainable behaviour, Chris's background in marketing)
Alwyn Cadwaladr – Anglesy Council (business grants, local business support, works with business Wales, Mentor Mon etc.)
Wallace George – Tai Eryn (housing assoc, cost of energy, fuel poverty, support of local supply chains in renewable)
David ? - Coleg Menai – representing Dafydd Evans (training centre to support development of energy project, interested in skills delivery and also as a large energy user/producer on campus)
David Menichino – Bangor University (behavioural modification, sustainability, team of psychologists, scientists to develop solutions for businesses)
Alison Chapel –Welsh Government - on secondment from RWE (involved with economic stimulus from energy, also representing innovation team as Rod Webster unable to make it to meeting due to injury. Other hat experience:- knowledge exchange with German smart grid/VPP, Horizon project, Exec Director of Elexon)
Dafyddd Rowlands – Anglesey Council (housing services, county council, tech management 3.8k houses, warmth, fuel poverty, energy efficiency)
Richard Sidi – Land and Lakes (CEO, large scale leisure village, Holyhead, accom workers for nuclear)
Brian Scowcroft – Land and Lakes (Chairman of Board)
Martin Hill – Scottish Power Energy Networks (SPEN) (Manager Future Networks)
Fiona Fulton – SPEN (Future Networks)
Alan Collinson – SPEN (Future Networks)
Duncan Botting – Global Smart Transformation Ltd (Managing Director – working with SPEN to define LCNF proposal)

Summary

3 potential projects, prove the concept locally rather than doing whole island:

1. Housing – Fuel Poor
    - Leverage existing investment.
    - Fuel poor (social housing) vs affluent (private stock)
    - Might be better to have a mix of above
2. Private development (New Housing)
    - Starting from scratch – blueprint for best practice
3. Business model
    - Might fit with potential new science centre. More energy savvy larger I&C or communities.
    - Poss business contacts:Fed small business, CBI, Anglesey tourism, Farmers well organised
    - Weak chambers of commerce due to recession, InstWelsh Affairs

Energy Island doesn't have resource to lead per se, but comes under their brand.
Medwyn Mon

potential leader but need external project management resource.Welsh gov may be able to provide
some resource for energy island.

Key Stakeholder Meeting 2, June 20th 2013, Bangor
Meeting Notes: LCNF Project Proposal
Workshop 20th June 2013

Overview

It was discussed and agreed the initial phase of the project would focus on social housing (potentially several geographic areas) and Coleg Menai (as an I&C load). Land and Lakes remain committed to take part as their timescales allow. It is anticipated further communities would be added to the project via an open engagement process. The requirements on each stakeholder are as discussed below.

Menter Mon (by 12th July)

Menter Mon have agreed to take on the key facilitator role as below:

- To engage with communities and with Bangor university to ensure engagement and sense of ownership of energy issues within targeted communities
- To facilitate aggregation of community energy requirements and flexibility to allow engagement in local energy market, which will include managing deployment of in-home monitoring where appropriate
- To ensure redistribution of benefits to communities
- Work with Medwyn Mon to identify potential 3rd sector groups who can engage

Mentor Mon to evaluate the costs and resources required with the assistance of GST to meet these requirements

Land and Lakes (by 8th July)

Believe may have housing operational during 2017
Can be stakeholder during latter stages of project or engage with the persisting community energy environment once the LCNF phase is complete
Will provide a breakdown of their current best estimate power requirements, base load and what is interruptible.

Welsh Government (by 8th July)

Supply of £2m grant to encourage SME participation and up-skilling
Will confirm how can move forward on this

Bangor University (by July 8th):

Bangor will provide resource and cost estimates to fulfil the following

- Culture analysis of SPEN/Mentor Mon
- Understand perceptions of communities to stakeholders and energy in general
- Development of appropriate interventions & feedback mechanisms
- SME motivation (to engage in new areas)

SPEN (by 5th July)

Details of what a £15-20m network investment in Anglesey would provide (AC)
Cost estimates for providing/responding to some of expected ancillary services in projects (AC)
Cost estimates for home automation/SME systems (DB)
Determine if can make estimation of potential consumer costs savings – FIT versus retail energy costs (FF)
Framework description of project as agreed at meeting (FF)

Appendix 7: Durham University DSO Research Paper

Abstract from Durham DSO research paper

Distributed Generation, Demand Response, and Storage as Alternatives to Distribution Network Enhancement

Rahmatallah Poudineh
Tooraj Jamasb1
Durham University Business School, Durham, UK
4 July 2013

Abstract

A major advantage of distributed (generation) resources is their potential for deferring demand driven investments in distribution networks. However, utilizing the full benefits of these resources requires dealing with several technical, economic and regulatory challenges. This paper explores the important prerequisites in terms of operational and organisational paradigm as well as regulatory framework and incentives for distribution network utilities to innovate and overcome some of these challenges. We propose a market-oriented approach “contract for deferral scheme” (CDS) in order to adopt an economically efficient portfolio of distributed generation, storage technologies and demand response as resources that provide the required network capacity and defer demand driven investments. Moreover, we discuss potential incentive mechanisms to address the issue of commitment as reserve capacity and resource providers for delivery upon the request of network operator.

Appendix 8: Resubmission Clarifications

Panel Clarifications

The panel has asked for clarification around the following areas:

1. The panel remained unconvinced that the approach developed to date would deliver learning that is significantly different from other projects.
2. The panel remained concerned that, given the constraints that are imposed on the project sample set (e.g. that you are not charging initial members of the energy club), it could be difficult for the project to produce learning that would support a wider roll out of this method.
3. The panel remain concerned at the lack of clarity on the benefits of the project and the lack of clarity on the business model and your approach to testing it.
4. The panel remained concerned at the lack of clarity regarding the detail around the costing of:
   (1) the equipment (homes and I&C); and

   (2) the equipment (network).

5. The panel remained sceptical about how representative the portfolio of customers would be for other replicated sites (e.g. dependence on the social housing sector for a large proportion of installations).

Replication and Uniqueness

Figure A8-1 clarifies the high level process flow for the project linked to the areas where we believe we provide unique insight and can replicate learning across GB. This is intended to help answer questions 1 and 2 above and provides an introduction to clarity on the business model requested in question 3.

To answer question 5 it is important to understand that we do not have an over dependence of any one section of the community as the portfolio of different communities has been targeted with geospatial importance related to the distribution network. We have included private residential (300), public and private social sector (300 + 300), new development (300 low cost starter homes + a possible hotel + 600 holiday homes) + 40 I&C + expansion into the agriculture / farming sector if time and funds permit. Given that the mix of portfolio from private/public residential, I&C that covers public buildings, MOD sites, Retail, agriculture and commercial industry we believe this to be very representative of all UK regions, cities, towns and urban areas.

One of the key distinctions in this project is the fact that we DO cater for the social housing sector unlike most projects that use aggregators who will not touch the social sector as it is in the 'too difficult' arena. Another key distinction of the project is the targeting of existing inefficient implementations of technology. An example being the vast deployment of solar PV using European grants has been installed without any controls and wired purely to the meter. The majority of generation is adding to network constraint issues rather than helping to solve them. Finally, the community engagement from Welsh Government, Council, NGOs, public and private sector is fully behind this proposal and evidenced by the very strong support to roll this out across the region, if successful.

Figure A8-1: ACE process, unique aspects and replication

The specific areas of crossover from previous LCNF and other international projects, mentioned in Figure A8-1, are detailed in the answer to Question 12.

As can be seen from Figure A8-1 during the latter stages of the trial we will be evaluating the applicability of various business models to achieve the goals of the trial and to allow commercial sustainability beyond trial funding. Some aspects of this will be specific to the Anglesey community but we anticipate a large proportion of the learning will be applicable to other similar community groups. The key to the trial is the network constraint management that can be achieved by utilising the portfolio of communities in the right locations AND have the ability to respond with the desired creation/destruction of demand. This integrated with the Active Network Management for generation connected at 33KV on the network side provides a unique project not seen elsewhere in the UK. The final element will be the use of innovative home and commercial technology to improve the energy efficiency of the electricity usage thereby saving cost for the consumer, cutting demand for SPEN and releasing capacity. The business model will be optimised around these attributes. We believe this to be a totally new approach to the problem and therefore will deliver major new learning for all DNOs in all areas of GB.

The basic structure for iterating the business model to find sustainable variants is shown in Figure A8-2.

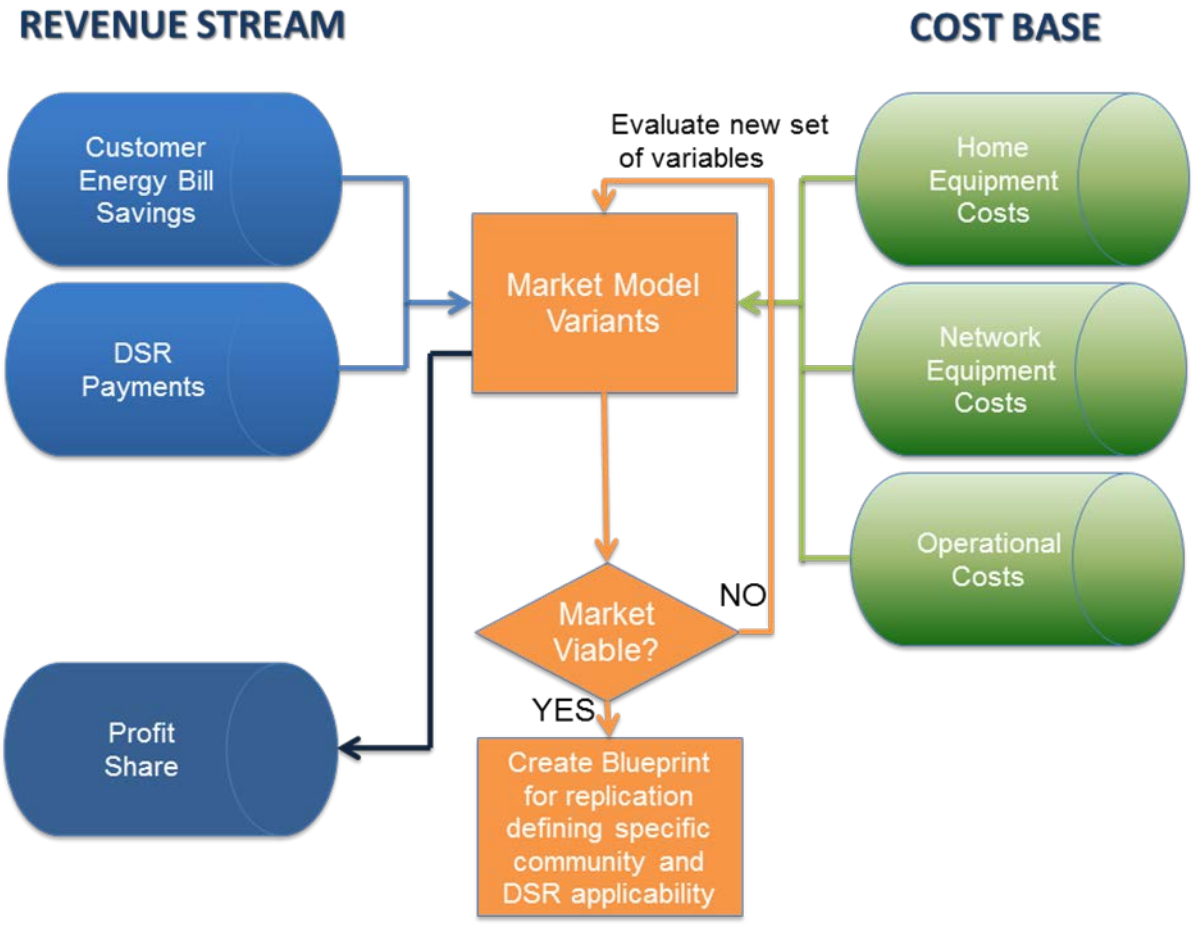


Figure A8-2: ACE business model validation

We have identified a number of possible viable business models around the framework shown in Figure A8-2 and used sensitivity analysis to test the various scenarios we can

foresee. This will be optimised with real data and analysis during the project to ensure a sustainable model is selected. It should also be noted that in Figure A8-2 we have shown a profit share rather than membership fees. This more closely reflects the trial aim of achieving the model which will work with different communities i.e. it is the profitability of the market operator (Menter Mon in the trial) and community acceptability which will drive the level of fees or payments and the timing at which they occur.

Trial Business Model

For the ACE submission we started with a simple business model assumption and checked to see if there was a reasonable financial basis on which to pursue the trial. This model is shown in Appendix 1. This original business model assessed only residential customers with a willingness to pay a membership fee. We believe this may have caused confusion as to the viability of the model in a wider market so we have included here a fuller version of the initial business model in Figure A8-3 and Figure A8-4. Figure A8-3 shows:

- The contributions from the I&C participants as well as the domestic customers
- Repayment of equipment over the first 3 years of the trial
- The “£99 Energy Club Fee” has been replaced with a “Profit Share” approach, where Mentor Mon profits are shared with the end users of the system

Figure A8-4 shows the technical assumptions assumed in the business model.

In addition, the base model shows a pessimistic scenario where

- the ACE service is “free” upfront,
- customers receive payment for their participation
- it has assumed a lower rate of return on investment than the original submission
- the number of customers recruited is low (i.e. 1200)

	Customer Share				
Profit Share (Year 1-3)	60%				
Profit Share (Year 4-9)	78%				

Customer Economic Model Annual		£			
Electricity Bill		-1200		-1200	
Energy Efficiency Savings	10%	120.00		120	
Time of Use Savings	10%	120.00		120	
Network DSR Utilisation Payments		40.00		40	
Energy Club Savings Share		-112.00		-61.60	
Total Costs		-1,032.00		-981.60	
Total Savings		£168	14.00%	£218.40	18.20%

I&C Economic Model Annual		£	
Electricity Bill		-5,000.00	
Energy Efficiency Savings	7%	350.00	
Time of Use Savings	7%	350.00	
Network DSR Utilisation Payments		200.00	
Energy Club Savings Share 66%		-300.00	
Total Costs		-4,400.00	
Total Savings		£600	12.00%

	Menter Mon Share
	40%
	22%

Mentor Mon Business Model 3-year model	£			
			DSR Value	
DNO Annual Contract	25,000.00			
			2.25	per kW
Energy Club Savings - Dom	134,400.00			
Energy Club Savings - Com	12,000.00			
DNO Availability Payment -Dom	48,000.00	40	/customer	
DNO Availability Payment -Com	12,000.00	300	/customer	
DNO Utilisation Payment - Dom	87,480.00	90	Days per year	
DNO Utilisation Payment -Com	48,600.00	90	Days per year	
Dom Inst Costs (spread over 3 years)	-80,000.00	200	per install	
Com Inst Costs Com (spread over 3 years	-6,666.67	500	per install	
Dom Equipt Costs (Spread over 3 years)	-100,000.00	250	per install	
Com Equipt Costs (Spread over 3 years)	-13,333.33	1000	per install	
Operating Costs	-115,000.00			
Network DSR Util Payments (Dom)	-48,000.00			
Network DSR Util Payments (Com)	-8,000.00			
Income from Energy Audit Consultancy	25000	6.82%		
Operating Profit	£21,480			

Mentor Mon Business Model 4th-year and beyond model model			
DNO Annual Contract	25,000.00		
Energy Club Savings N/C	73,920.00		
Energy Club Savings Com	12,000.00	40	/customer
DNO Availability Payment non-commerc	24,000.00	40	/customer
DNO Availability Payment commercial	6,000.00		Paid on 100 days/yr
DNO Utilisation Payment - Dom	43,740.00		
DNO Utilisation Payment -Com	24,300.00	200	per install
Installation Costs (spread over 3 years)	0.00	500	per install
Installation Costs Com (spread over 3 yea	0.00	250	per install
Equipment Costs (Spread over 3 years)	0.00	1000	per install
Equipment Costs Com (Spread over 3 yea	0.00		Increase staff * 2
Operating Costs	-215,000.00		
Income from Energy Audit Consultancy	25000	9.98%	
Operating Profit	18960		

SPEN Model		
	Cost to SPEN	
	-221,080.00	
	Savings	
	£308,000.000	£15,400,000
	Global NPV	2.00%
	Net Savings	
	£86,920	Note loss of DUoS income
		not accounted for

	Cost to SPEN after 3 years	
	123,040.00	
	Savings	
	£308,000.000	
	Net Savingings	
	£184,960	

Figure A8-3: Trial Business Model – Base Case Model

Technical Assumptions										
Domestic						**Commercial**				
Customer ADMD	1.2	kW								
EE Savings	0.12	kW/customer				Commercial ADMD		25	kW	
ToS Savings	0.12	kW/customer				EE Savings		1.75	kW/customer	
DSR - average 20%/customer	0.24	kW/customer				ToS Savings		1.75	kW/customer	
						DSR - average 20%/customer		5	kW/customer	
Customers in Group	60,000	Anglesey								
Level of Penetration	2.00%									
Customer Base	1200									
Load in Group	72000	kW				Customer Base		40		
Amount of load reduction due to EE	144	kW								
Amount of load reduction due to ToS	144	kW				Amount of load reduction due to EE		70	kW	
due to DSR	144	kW	50% effectiveness			Amount of load reduction due to ToS		70	kW	
						due to DSR		100	kW	**Total Load Reduction**
Load reduction	0.60%					Load reduction		0.33%		**0.93%**

Figure A8-4: Trial Business Model – Technical Assumptions

Business Model Sensitivity Analysis

Further to our original submission, our sensitivity analysis is presented, covering the three main points raised by the expert panel:

a. Original NPV was overly optimistic
b. Energy Efficiency Gains by Customers were over-optimistic
c. What is the effect of recruiting fewer customers

In addition, we have included a fourth sensitivity, to illustrate the variability between individual customers – looking at customers with smaller electricity bills.

The sensitivity Analysis is Illustrated in the Table A8-1 and Table A8-2. The analysis is split across years 1-3 where equipment costs are repaid and years 4-9 out to when reinforcement is expected. The sensitivity analysis was carried out using the "low" figure for domestic customer recruitment of 1200 (e.g we do not recruit as many participants as targeted).

"Low NPV" Sensitivity - We have used the shorthand term "NPV" to represent an assumed value for the deferral of reinforcement. We believe the "low NPV" rate is very pessimistic and has a large impact on the potential savings for SPEN. However, as can be seen, even in this case, a saving results for SPEN and the Mentor Mon entity can still operate at a profit. More importantly, though, it can be seen that after the initial investment phase (Year 1-3), where the benefits to SPEN are small, in the following years 4-9 the benefits are significant.

"Energy Efficiency" Sensitivity – This sensitivity aims to illustrate the "risk-reward" balance in that the SPEN benefits are not significantly adversely affected, but the profitability for both Customer and Meneter Mon, whilst still positive, has been reduced. Thus, both Menter Mon and the Customer should be motivated to improve the energy efficiency of the Customer.

"Electricity Bill" Sensitivity - This sensitivity simply aims to illustrate that not all customers are the same and in fact there is merit in identifying and targeting those customers with higher than average electricity bills.

	Number of Domestic Customers	Annual Domestic Bill	Domestic Energy Efficiency	Domestic Time of Use	Cost Share Cust:Menter Mon	Domestic Savings	Menter Mon Profit	Assumed Value of Deferral (NPV)	SPEN Savings	Value of DSR (£/kW)	Domestic Availability Payment (£/customer)	Commercial Availability Payment (£/customer)
Years 1-3												
Baseline	1200	£1,200	10%	10%	60%	14.00%	6.82%	2.00%	£86,920	£2.25	40	300
Low NPV	1200	£1,200	10%	10%	50%	11.67%	4.19%	1.50%	£54,208	£1.65	35	250
Energy Efficiency	1200	£1,200	5%	5%	45%	6.00%	2.75%	2.00%	£70,936	£3.20	40	300
Bill	1200	£600	10%	10%	40%	10.67%	0.72%	2.00%	£86,920	£2.25	40	300
Years 4-9												
Baseline	1200	£1,200	10%	10%	78%	18.20%	9.98%	2.00%	£184,960	£2.25	40	300
Low NPV	1200	£1,200	10%	10%	75%	17.50%	4.89%	1.50%	£130,104	£1.65	35	250
Energy Efficiency	1200	£1,200	5%	5%	70%	9.33%	5.60%	2.00%	£176,968	£3.20	40	300
Bill	1200	£600	10%	10%	65%	17.33%	6.44%	2.00%	£184,960	£2.25	40	300

Table A8-1: Sensitivity Analysis on Business Model

Baseline - This scenario gives the baseline for the following sensitivity analysis, looking at NPV, customer energy efficiency, customer bill size and number of customers.

Low NPV Assumption - This analysis shows for a lower assumed value to SPEN for the project, it is still possible for Customers and Menter Mon to make a (reduced) profit

Reduced Energy Efficiency Gains - If customers fail to make the target energy efficiency gains, it is both the customers and Menter Mon whose profits reduce. This illustrates the importance of the market model to incentivise energy efficiency improvements

Size of Customer Annual Electricity Bill - This illustrates the benefit reduces for customers with lower electricity bills and hence the benefit of targeting customers who have above average annual electricity bills, as these customers have the potential for the greatest savings

Replication Business Model

The trial will look at the sensitivity of the model to its various revenue streams and costs, as in the example shown in Table A8-1. The output from the trial will therefore be a set of economically viable models which, crucially, have been tested for their acceptability to different community groups and hence their real word viability.

Hence, we are not looking solely for an Anglesey solution which will address the £15m Anglesey reinforcement issue. We are looking for a model of operation which can be applied as another option for deferment of reinforcement and gives a financial basis on which to make these choices of where an “ACE-like” solution would be appropriate. In Table A8-3 we show some specific reinforcement examples from the Scottish Power network where we believe the ACE solution would be another alternative solution to be considered. We have already provided external examples where we believe the model would also work across other DNO areas in answer to Q13.

Location	Conventional solution	Alternative Solution Considered To Date	Commentary
Crewe (SPM ED1)	New 132kV circuit to resolve thermal capacity issue	Phase Shifting Transformer	The application of a phase shifting transformer is currently the favoured smart solution option, but an ACE-style DSR/DSM solution could be applicable if the ACE trial is successful.
Chester (SPM ED1)	RMU Replacement to resolve fault level issues stemming from new Grid Transformer	Active Network Management - Dynamic Network Reconfiguration	The application of Active Network Management & Dynamic Network Reconfiguration is currently the favoured smart solution option, but an ACE-style DSR/DSM solution could be applicable if the ACE trial is successful.
Norham GSP (Berwick_Eccles) (SPD-ED1)	New 132/33kV GSP to enhance network capacity for both demand and generation development.	Smart Enabling of new substation	The application of Smart Enabling of the new substation is currently the favoured smart solution option, but an ACE-style DSR/DSM solution could be applicable if the ACE trial is successful.
Ecclefechan (SPD-ED1)	New 132/33kV GSP to enhance network capacity for both demand and generation development.	Smart Enabling of new substation	The application of Smart Enabling of the new substation is currently the favoured smart solution option, but an ACE-style DSR/DSM solution could be applicable if the ACE trial is successful.
Berwick (North Road_Loaning Relief) (SPD-ED1)	New 33/11kV substation to resolve capacity issue	Smart Enabling of new substation	The application of Smart Enabling of the new substation is currently the favoured smart solution option, but an ACE-style DSR/DSM solution could be applicable if the ACE trial is successful.
Aberystwyth/ Rhydllydan (SPM - ED2)	Various 33kV system reinforcement and new BSP options to resolve general capacity issues	Not yet defined	
Bangor/ Caernarfon 33kV Group (SPEN ED2)	Various 33kV system reinforcement and new BSP options to resolve general capacity issues.	Not yet defined	
Four Crosses/ Maentwrog 33kV Group (SPEN ED2)	Various 33kV system reinforcement and new BSP options to resolve general capacity issues.	Not yet defined	

Table A8-3: Potential areas for ACE deployment

Equipment Costs

In answer to question 4 from the panel we provided a detailed breakdown of equipment costs in the answer to question 27. We would point out that we have revised these costs in the resubmission spreadsheet, significantly reducing the installation and operations costs. Specifically, household equipment costs reduce from £500 to £400, domestic installation from £700 to £250 and operational staff cost reduces by 25%.

As we will be commercially procuring the home automation equipment based on the initial trial findings we have based costs on the mid-range prices of available monitoring and management equipment. We anticipate that the commercial pressures of the tender process may improve this cost base.

Network equipment costs are based on previous experience with ANM technology (including within our own LCNF ARC project). As such, we feel they are a realistic representation of costs.