

ELECTRICITY NETWORK INNOVATION COMPETITION 2022
REPORT AND RECOMMENDATIONS

Prepared for
THE GAS & ELECTRICITY MARKETS AUTHORITY

By
THE ELECTRICITY NETWORK INNOVATION COMPETITION EXPERT PANEL

November 2022

1 INTRODUCTION

This report, prepared by the Electricity Network Innovation Competition (NIC) Expert Panel, sets out the Panel's recommendations to the Gas and Electricity Markets Authority on the portfolio of projects to be funded in the 2022 Electricity NIC funding round.

Panel Membership

Members of the Electricity NIC 2022 Expert Panel (the Panel) are:

- Maxine Frerk (Chair)
- Mike Kay
- Jiggy Lloyd
- Stuart Bailey
- David Newbery

Electricity NIC 2022 proposals

There were three submissions made to the 2022 Electricity NIC which, collectively, bid for £38 million of the £40 million available NIC funding. Full details of each submission will be available on the Ofgem website.

The names of the Funding Licensee, titles of the submissions, the total project costs and the amount requested from the NIC Fund are as follows:

Project	Licensee	Project Cost (£m)	NIC Request (£m)
CommuniPower	UK Power Networks (UKPN)	14.62	11.88
Community DSO	Northern Powergrid (NPg)	14.57	12.45
Net Zero Island	Scottish Hydro Electric Power Distribution (SSEN)	16.49	14.27

Evaluation methodology

The Panel followed the evaluation process set out in the Electricity Network Innovation Competition Governance Document (v3.0, 2017). Initial submissions were received by Ofgem and were screened by Ofgem staff for compliance with the requirements set out for the Initial Screening Process.

Consultants (Jacobs) were appointed by Ofgem to assist in the review process. The Panel and the Consultants met the Funding Licensees early in the evaluation process to allow the project teams to present their submissions. The Panel and the Consultants met the Funding Licensees a second time to allow them to clarify points and address matters of concern to the Panel. Throughout the process the Consultants and the Panel sent each of the Funding Licensees a significant number of supplementary questions (SQs) with the purpose of clarifying the submissions and highlighting areas of concern.

Following these meetings, the Panel met to review each of the submissions in the context of the criteria set out in the Governance Document. In evaluating the submissions, the Panel took into account all of the documents that had been made available: the submissions, their appendices, responses to the SQs, the Consultants' advice as well as any additional information that had been submitted via Ofgem or the Consultants from the Funding Licensees. The Panel also took account of information from meetings that were held with the Funding Licensees and any material provided during those meetings. Finally, the Panel reviewed resubmitted bids that updated the originals by providing points of clarification raised at the bilateral sessions as well as correcting any factual errors (note: no material changes to the proposals can be included in these resubmissions). Based on this evaluation, the Panel reviewed the projects against the criteria in the Governance Document. This report sets out the Panel's recommendations to the Authority.

The evaluation criteria used by the Panel to review each submission are as follows (see the Governance Document for details):

- (a) Accelerates the development of a low carbon energy sector and/or delivers environmental benefits whilst having the potential to deliver net financial benefits to future and/or existing customers
- (b) Provides value for money to electricity customers
- (c) Generates knowledge that can be shared amongst all relevant Network Licensees
- (d) Is innovative (i.e. not business as usual) and has an unproven business case where the innovation risk warrants a limited Development and/or Demonstration Project to demonstrate its effectiveness

- (e) Involvement of other Project Partners and External Funding
- (f) Relevance and timing
- (g) Demonstration of a robust methodology and that the Project is ready to implement

This report should be read together with the Funding Licensees' submissions and the other information that is published concurrently with these on the Ofgem website. This report sets out the results of the Panel's deliberations and its recommendations to the Authority. As such it is primarily concerned with the views of the Panel. All the details of the projects are contained in the other published documents.

2 EVALUATION OF SUBMISSIONS

The following section provides the Panel's assessment of the factors that underpin its recommendations.

2.1 CommuniPower

Licensee	UK Power Networks
Total Project Cost	£14.62m
NIC Requested	£11.88m

The proposal

CommuniPower aims to address the barriers to rural decarbonisation. These barriers are mostly in the form of the costs, time and complexity of moving to low carbon heating, improving energy efficiency and installing domestic low carbon technologies (LCTs). CommuniPower looks to address these by demonstrating novel approaches to community-led decarbonisation.

In Method 1 the project will develop software tools for customers collectively to plan their decarbonisation journey and optimise domestic heat decarbonisation and other domestic low carbon technologies, with community owned LCTs, potential flexibility solutions and network connections and reinforcement at a community level. It relies on community engagement and the use of novel financing methods to accelerate heat decarbonisation and enable a co-ordinated approach to reinforcement, touching the network once.

Method 2 would make this sustainable by demonstrating a local, community-owned and managed balancing system. This reduces energy costs and network power flows by optimising local energy consumption through the use of domestic and commercial (potentially community-owned) assets. This will be done by implementing two trials; one at Barcombe (building on work already done through the NIA project CommuniHeat) and one in a new community. The project will look to engage with 30 communities with detailed roadmaps developed for six (including the two trial sites).

Panel's Assessment against the criteria

- (a) Accelerates the development of a low carbon energy sector and/or delivers environmental benefits whilst having the potential to deliver net financial benefits to future and/or existing customers

Accelerates the development of a low carbon energy sector

A core strand of the CommuniPower proposal is that through community engagement and novel financing methods it will be possible to accelerate the transition to low carbon heat in rural areas. The engagement and modelling work done in CommuniHeat demonstrates the benefits of a community-led approach and UKPN is now looking to test that approach in practice.

While the Panel strongly supports the aim of accelerating heat decarbonisation – and agrees that institutional solutions are needed to engage households and drive heat decarbonisation at scale – the Panel is concerned that this key aspect of the project falls outside the remit of the DNO. Indeed, UKPN was clear that they would not envisage this being an enduring role for them and that they were effectively “filling a gap” that currently exists. Furthermore, while there are benefits to network customers from a more co-ordinated and hence lower cost approach to heat decarbonisation, the Panel is of the view that these could be achieved to a large degree through the more strategic approach to investment that is now being allowed under ED2. For example, Ofgem has said it is minded to provide funding for UKPN’s Off Gas Grid Heat CVP project that takes a strategic approach to reinforcement.

Capacity and Carbon

UKPN estimates that a coordinated approach, if CommuniPower were applied across all GB rural communities, could generate a capacity saving of 3.27GVA by 2042. The acceleration effect (combining accelerated uptake of LCTs and greater energy efficiency) is forecast to be 7 years (the target of Net Zero would be met in 2040 instead of 2047), which would represent GB-wide carbon saving of 5.25 MtCO₂e by 2050. A further 0.25MtCO₂e of savings are expected because a coordinated approach will replace repeated reinforcement efforts with a “touch the network once” approach. In making these estimates, UKPN has recognised that the acceleration effect will be less than that expected with CommuniHeat (where the target community Barcombe is already subject to a high level of energy awareness). Nevertheless, the Panel has difficulty in accepting, in the current energy climate, that it is reasonable to forecast benefits on this scale and attribute them to rollout of CommuniPower. For instance, current fuel price differentials and volatility, plus inflationary pressures, seem likely to deter and/or delay adoption of low carbon heat solutions that require a substantial capital investment while householders’ stand-alone energy efficiency efforts (usually lower-cost) may be further stimulated regardless of CommuniPower engagement. Underlying data from Barcombe regarding communities’ decarbonisation intentions was gathered in the period 2020-21, i.e. in a

different economic climate and the Panel has additional concerns about the replicability of householders' responses across the whole range of rural communities in GB. Furthermore, some of the potential savings are attributed to CommuniPower's ability to persuade householders to invest in low-temperature heat pumps (rather than high-temperature models). CommuniPower is not the only means of doing this.

The forecast carbon savings arising from network efficiencies seem more credible but even they are subject to assumptions about the level of flexibility that would be possible in the counterfactual. UKPN's forecast savings are modest. Moreover, most of these savings can only be realised if the coordinated approach to community decarbonisation is successful in the first place.

To some extent the Panel's concerns are offset by the fact that UKPN's forecast benefits exclude the scope for on-gas households to be encouraged to decarbonise their heating and by the sensitivity analysis, which suggests there may be some carbon savings even without the acceleration effect.

The Panel regards the intention to foster a community-led approach to decarbonisation in which "no-one is left behind" as admirable and accepts that community engagement has a part to play in stimulating decarbonisation efforts. But the overall degree of uncertainty about potential capacity and carbon savings attributable to the project remains very high.

Potential financial benefits

UKPN projects that at a GB level by 2050 customers would save £6.8bn of which £0.71bn would be network efficiency.

In the Panel's view the potential consumer benefits, which were reduced significantly in the final submission, are over-stated. As noted above these benefits reflect an assumption of a 7-year acceleration, which the Panel considers optimistic. Barcombe is atypical in having an already active community energy group and the savings that are cited are based on the expressed intention of Barcombe residents – more time is needed to see whether these intentions turn into actions on the ground.

The Panel also has a concern that at GB level the NPV reflects the benefits from the accelerated rollout of LCTs but understates the costs of achieving it (with the costs of GB implementation put at £29.6m). In particular, how the enduring costs of any community engagement would be funded is unclear with the assumption seemingly being that this would be standardised and automated. UKPN

has also been explicit that the costs of the LCTs themselves (costs which would now be incurred earlier) are not included in the cost-benefit, although the benefits they deliver are.

The network savings come from lower reinforcement costs as a result of fabric-first energy efficiency measures reducing demand, co-ordinated works that touch the network once and network benefits from local balancing. As noted above these are more credible but could in some cases be delivered anyway through strategic investment.

(b) Provides value for money to electricity customers

UKPN has confirmed that the costs of the LCTs themselves would not be funded through the project and are not part of the NIC funding request, which is in line with past NIC decisions on value for money. The largest element of the budget is for EA Technology who would be developing modelling and operational tools.

UKPN projects £117m of network benefits in their licence area by 2050 with payback in 2030. The benefits to network customers account for a relatively limited part of the overall benefits and would be reduced if a different view was taken on the counterfactual in the light of the ED2 acceptance of a more strategic approach to investment. While there is value in upfront planning at a local area level this could be delivered more holistically (e.g. including transport) by building, for example, on Energy Systems Catapult work on Local Area Energy Plans. The Panel is not convinced that there are benefits to network customers in driving earlier heat decarbonisation per se.

Overall the Panel is not persuaded that the project represents value for money for electricity customers.

(c) Generates knowledge that can be shared amongst all relevant Network Licensees

The Panel considers that CommuniPower could be a route to valuable new knowledge in relation to the significant challenge of heat decarbonisation and how improved data could help with achieving more efficient use of the network at the LV level where there has been less focus to date. The Panel recognises that the learning would also be relevant to policy makers, local authorities and others.

However, the Panel has a concern that one of the two trials is based on Barcombe, which is atypical as it has an existing energy community group and has already been through an earlier engagement cycle. This limits the replicability of any learning. Also, the Panel has the same concerns with this proposal that it does with many NIC projects as to how readily other DNOs would take up tools and models developed as part of the project given the costs involved with integrating into company-specific network planning systems.

- (d) Is innovative (i.e. not business as usual) and has an unproven business case where the innovation risk warrants a limited Development and/or Demonstration Project to demonstrate its effectiveness

UKPN argues that the project is innovative because it is involving the DNO in a community led process, is integrated and automated, and takes a unique optimisation approach. While the Panel accepts this is true it is unclear whether the extent of innovation is sufficient to justify NIC funding. In particular:

- The community engagement aspect of the project does not seem innovative and similar efforts at this style of engagement have been undertaken before (largely just showing that it is hard and resource intensive). UKPN seem unlikely to pursue this as BAU largely because it is outside its remit and the network benefits are relatively limited.
- The introduction of self-serve connections is not now considered innovative.
- The Panel considered whether the software tool (which gathers consumer level data and works out the network impacts) is innovative. However, the Panel believes that this sort of interaction and data sharing with customers and relevant third parties is a key part of the DSO system planning role already proposed for ED2.
- The development of local balancing is more innovative although UKPN's argument that the software, APIs and interfaces can be bought off the shelf raises questions again about how innovative this is.

Overall the Panel's view is that while there are innovative elements these are not sufficient to justify a project on this scale given the developments that can be expected anyway in ED2.

- (e) Involvement of other Partners and external funding

The project has a broad set of project partners bringing different skills (from community organisations to EA Technology on IT). It also has a very extensive range of project supporters across local authorities and other community level organisations. This wide stakeholder support reinforces the point that tackling the issues around engagement on heat is one of the key missing pieces of the jigsaw on heat decarbonisation. UKPN has confirmed that it has the support of NPG (and vice versa), which should help with cross DNO learning.

Working with at least one energy supplier would help in determining how the network benefits can be stacked alongside other considerations such as wholesale energy costs. E.ON are listed as a project supporter but it is not clear how actively they would be involved.

(f) Relevance and Timing

Given the significant challenge that GB faces with heat decarbonisation, including on consumer engagement, this project is highly relevant. From a networks perspective the challenges that will be faced on the LV network are becoming increasingly clear and local balancing options need to be explored.

However, the Panel is concerned about the impact of the current energy crisis on this proposal. While the implications of the price escalation on the economics of moving to heat pumps can be viewed either way, the huge uncertainty around energy prices is likely to deter people from making major investments in new heat technologies at this time (but may make the case for insulation and installing solar PV panels stronger). At best it would make it harder to interpret findings and raises questions about how relevant the learnings around engagement would be to the longer term BAU implementation. The Panel's view is that while the proposal might have been timely when it was submitted, the current energy crisis creates significant drawbacks in terms of the timing.

The final project report is due in 2026 which is too late to influence ED3 Business Plans although interim findings will be available earlier.

(g) Robustness of Methodology and ready to implement

In terms of being ready to implement the project is well placed as it builds on CommuniHeat. However, the Panel has some material concerns with the robustness of the methodology as presented:

- For a coordinated local plan that looks at the cumulative impact on reinforcement the impact of electric vehicles (EVs) needs to be considered as well as heat. While the proposal makes brief reference to considering heat, energy and transport, it does not address transport or domestic PV in any detail and the community partners appear to be almost exclusively concerned with heat.
- It is unclear exactly how LCTs would be funded, in particular for households who cannot afford the upfront costs (noting the aim that “no one is left behind”). The proposal talks about developing novel financing approaches based on international best practice but this is an area that has proved intractable to date (despite extensive work by, among others, the Green Finance Institute and the Pathways for Local Heat Delivery project). The proposal includes no details on what is envisaged. Given that cost is identified as a key customer barrier it is a concern that the thinking in this area is so under-developed.
- The proposal acknowledges that the commercial models being considered are likely to require regulatory changes (e.g. on DUOS charging). However, there is no explicit work-stream dealing with these regulatory barriers.

Conclusion

The Panel considers that the CommuniPower proposal has much to commend it and is looking to tackle a central issue in terms of heat decarbonisation, building on UKPN’s position as a leader in developing the role of the DSO and its earlier CommuniHeat project. However, despite two bilaterals and significant SQs, the Panel is still left with significant questions as to the replicability of the solution in different sorts of communities; the extent to which the local planning would include transport not just heat; how the LCTs would be financed and how the engagement would be funded in a BAU situation. Ultimately the Panel is not persuaded that key elements of the proposal around community engagement are appropriate for the DNO to undertake and hence for NIC funding. The Panel recognises the benefits in terms of network costs from a more strategic approach to investment (“touch the network once”) but considers the ED2 funding that has provisionally been awarded demonstrates that a strategic approach to investment can be taken without necessarily co-ordinating the demand in the way CommuniPower envisages.

The Panel is therefore not recommending CommuniPower to be funded by the Authority.

However, the Panel would be keen to see more funding (probably through BEIS) to explore community engagement as a way to address the advice gap that is regularly cited as barrier to heat decarbonisation. We also remain keen to see DNOs working more closely with local authorities using the ED2 funding that has been allowed as a way to examine, on an integrated basis, how to develop more informed local area energy plans.

Finally, regarding Method 2, the Panel recognises the potential benefits from local balancing and the need for further exploration of the options in this space. The Panel notes that Community DSO is intending to explore similar (albeit distinct) issues and would be keen to see UKPN participating actively as a part of that project.

While UKPN has argued that there is benefit in bringing all these strands together into an over-arching NIC project, the Panel can also see benefit in a more incremental approach to learning in what is an evolving area.

2.2 Community DSO

Licensee	Northern PowerGrid (NPg)
Total Project Cost	£14.57m
NIC Requested	£12.45m

The proposal

For DSOs, coordinated energy flexibility (of demand, generation and storage) will be a key enabler of the energy transition as this allows deferral or avoidance of infrastructure investment. On distribution networks, in particular at LV level, there are limitations in terms of the number of potential market participants given the need to be very specific about location. This points to the need for a different approach to be taken to flexibility at the LV level compared to higher voltage networks. Smart Local Energy Systems (SLES) are a way to mobilise this flexibility but are currently bespoke and costly to implement. Community DSO responds by developing and trialling standard approaches enabling communities and local stakeholders to work with their DNO to deploy SLES.

Community DSO will look to create energy communities who will be responsible for managing flows at their level and location on the network. The aim is to develop a cellular approach (based around an LV feeder).

Community DSO will then consider three levels of participation by consumers: Managed – active prosumers with some measure of control influenced directly by NPg; Monitored – limited physical assets such as solar PV alone, passively monitored by NPg; and Modelled – where consumers' behaviour is assumed. How the benefits are shared among these different customer groups will, under NPg's proposal, be determined by the community. Trials will be carried out for two new-build archetype networks (one including communally owned assets). A small retrofit scheme may also be considered as well as one covering multiple substations.

NPg is also looking to develop an interface that would allow a range of different sorts of players to take on the role of community co-ordinator.

Panel's Assessment against the criteria

- (a) Accelerates the development of a low carbon energy sector and/or delivers environmental benefits whilst having the potential to deliver net financial benefits to future and/or existing customers

Accelerates the development of a low carbon energy sector

In order to be able to connect significant levels of LCTs the challenge of how to manage the LV network has to be addressed. While there are emerging flexibility solutions at higher voltages the Panel is aware that at LV level there has been much less progress. Without an LV solution the networks risk being a barrier to the development of a low carbon energy sector. The project is looking to address this by leveraging existing third-party energy management systems and integrating them into DNOs' LV management approach. This should help accelerate the connection of community renewables and other LCTs.

While the proposal anticipates reasonable cost savings and some carbon benefits the Panel's view is that much of the benefit will come from the learning, allowing further evolution of the approach at LV level.

Capacity and carbon

Community DSO is expected to generate capacity and carbon savings directly because stimulating and coordinating flexibility at a local level will reduce peak demands on the network and avoid the need for network reinforcement. It is also expected to generate much wider and potentially more significant indirect carbon benefits by encouraging and accelerating the uptake of LCTs, stimulating

demand management and reducing network losses (as a result of energy balancing). NPg estimates that the projected 5,446 deployments GB-wide will create 971 MVA additional capacity and save 71,311 ktCO₂e by 2050. No attempt has been made to quantify the expected indirect benefits.

The forecast direct benefits do not amount to large savings in relation to the decarbonisation challenge and are also subject to the uncertainties (discussed below) about the actual level of impact that is achievable. Nevertheless, the Panel accepts that it is reasonable to argue that capacity and carbon can be saved and that NPg's approach to quantifying this is appropriate.

The indirect benefits are of much greater interest but very uncertain and not directly attributable to the project. The Panel does not challenge NPg's assertion that indirect benefits are likely to be orders of magnitude greater than the direct benefits.

Financial benefits

NPg estimates that at a GB level the project could deliver £175m benefit by 2050. The proposal assumes deployments on 5% of the country's low voltage network, corresponding to ~700 deployments within NPg's area, and ~5,500 nationally. The breakeven is 372 deployments.

The benefits are essentially dependent on the assumed additional uptake in flexibility participation that is achieved as a result of the community focus. While the Panel has concerns about how robust some of these assumptions are, it recognises that this is one of the key learnings that the project is intended to explore.

Whilst the potential benefit of the DNO managing thousands of community DSOs rather than millions of individual customers is clear, the Panel had questions about the number of deployments that could be expected beyond already active communities (noting as well that community geographies may not always map onto network topology). However, the limited number of existing community groups is not seen by NPg as a barrier to wider implementation and it is acknowledged that new clusters would need to be formed for implementation at scale. The Panel accepts that this is an important element of what is being tested and expects that the project will deliver learning that will allow models involving less active community participation to be identified if the need for active engagement proves to be a barrier.

The Panel considers that the Project's chosen counterfactual of conventional reinforcement (with a certain base level of time-of-use tariffs / flexibility built in) is reasonable.

The project is well targeted on those parts of the network where these solutions are needed the most.

Overall, notwithstanding the uncertainties in the business case, the Panel is satisfied that there is a strong case for Community DSO in terms of accelerating the development of a low carbon energy sector and the potential capacity, carbon and financial savings.

(b) Provides value for money to electricity customers

The Panel is satisfied that in general, the costs associated with the project appear proportionate. The project is being delivered at day rates that appear to be typical of those for services of the type envisaged here.

There is a cost of £2,300 per small customer. This is for the in-home hardware that the project may have to procure, install and commission (but which it is assumed would not form part of future rollout costs) and customer support. It is not yet clear what equipment, if any, might be needed but it is envisaged it could include:

- remote control systems and interfaces (e.g. for a heat pump)
- optimisation devices (e.g. HEMS)
- data capture equipment, etc.

In BAU these costs would be absorbed by the third party providing the equipment / service (or may not be needed).

Although there is no formal restriction, the Panel and Ofgem have consistently taken the view that it does not represent value for money for customers to fund in home equipment like new heating systems or batteries. In contrast the communication and control devices that are specific to the trial are reasonable to fund. We would expect NPg to be mindful of that distinction when it tenders for subcontractors to run the trials.

The Panel also has some questions around how far the benefits of the project would accrue to network customers. NPg has left it intentionally open as to how the benefits flow to consumers with communities deciding how they then share benefits among themselves. The Panel sees a risk that creation of Community DSO groups imposes a need for management that may well fall to specialist

third parties created for this purpose who then take the benefit. For example, there could be a risk to customers in new builds that they get locked into a Community DSO arrangement and the benefits flow primarily to the manager of the group rather than to customers themselves. The Panel hopes that understanding these risks and how best to manage them will be something that comes out as learning from the project.

Overall the Panel is satisfied that the project delivers value for money to electricity customers.

(c) Generates knowledge that can be shared amongst all relevant Network Licensees

The Panel considers that Community DSO will generate knowledge that will be of value to all DNOs as they are all facing the challenge of how to optimise use of the LV network. In their ED2 plans all DNOs have slightly different visions of the DSO role and while Ofgem chose not to provide a stronger steer at this stage, it will through the course of ED2 need to reach a firmer view on the DSO role and specific issues around DSO governance. This proposal should provide evidence that will help all DNOs and Ofgem as they look to take these debates forward.

As with all NIC projects the Panel is concerned that without a full DNO partner there is a risk that the solutions developed do not adequately take account of the differences between networks; this reduces the scope for replication. Having UKPN as a project supporter should help mitigate this to some extent.

Overall the Panel is satisfied that the project delivers knowledge that is highly relevant to all network licensees and that there are mechanisms for that to be shared with them.

(d) Is innovative (i.e. not business as usual) and has an unproven business case where the innovation risk warrants a limited Development and/or Demonstration Project to demonstrate its effectiveness

The Panel's view is that this is a true innovation. Managing flexibility locally on the LV networks is a different approach to the more traditional one of central management, and that merits exploration. While there have been other projects like Local Energy Oxfordshire (LEO) that have started to explore a Smart Local Energy System model, NPg is taking this forward in a material way by looking to standardise the interface with the DNO. Using different subcontractors for each trial – but working to a common high-level set of requirements - is positive in that it allows testing of different approaches,

which will maximise learning. This also highlights the risk inherent in the project as not all these approaches will necessarily succeed.

The learnings of value that are not available from previous projects are expected to be around behaviour of the market and individual customers of various types in relation to this style of demand management, as well as the technical solutions that will need to be developed to allow node coordination.

Given the significant uncertainties associated with the way the market will develop and where the benefits will accrue, the Panel does not consider that the project would be taken forward without innovation funding.

(e) Involvement of other Partners and external funding

The proposal was put forward by Project partners TNEI and Delta-EE who are experienced in their relevant areas and should contribute significantly to the project. However, the Panel has some concern that they do not have significant hands-on experience working with communities; it will be important that this is addressed in the choice of subcontractors for the trials.

The Panel also noted that there is currently no supplier involvement. Given the importance of ensuring the solution does work alongside the current retail market (noting that the main value for customers is likely to be in the wholesale energy market), the Panel hopes NPg will find a way to address this. In particular, by running open competitions for subcontractors for each of the trials the Panel expects that NPg will bring in some of the additional expertise they need.

The involvement of UKPN as a project supporter is welcome as it increases the likelihood of learning being taken on board beyond NPg.

Overall the Panel considers that the range of project partners / supporters is reasonable at this stage and can be expected to broaden as the project proceeds.

(f) Relevance and Timing

Given the widespread acceptance that flexibility will be a key tool in achieving net zero at least cost, finding ways to achieve this at the LV level is key, making the project highly relevant.

In terms of timing, clustering of LCTs means that individual feeders could become constrained even within the ED2 timeframe (based on the planning scenarios DNOs were required to use) and this problem is only set to grow.

The Panel notes that the timescales for the project mean it will not be completed in time to inform ED3 business plans. It is important that, as envisaged, interim learning is captured and shared to address this.

(g) Robustness of Methodology and ready to implement

The Panel is generally comfortable with NPg's implementation plans for Community DSO. There is a risk around the time required to get subcontractors on board for each of the trials but the Panel is content this can be managed provided the competitive process together with the community engagement are given an early focus. Overall the Panel is satisfied that the project is ready to implement, building as it does on the Community DSO NIA project.

In terms of robustness of methodology, the Panel is pleased that the evolution of the regulatory framework is being addressed as a specific workstream. Clearly there are risks that the regulatory framework will not develop in the way that is needed but the project should help by providing evidence to inform the debate.

The Panel is also concerned that waiting five years to get results is too slow and encourages NPg to ensure it gives adequate attention to the interim learning outputs it has identified. The Panel also encourages NPg to look at how to flex the later trials to take account of developments on the evolving DSO role.

Conclusion

The Panel considers that Community DSO is looking to tackle one of the critical issues around facilitating flexibility on the LV network with the expectation that a cellular structure could help unlock flexibility and hence accelerate the move to a low carbon energy sector. The problems and constraints at an LV level are set to increase significantly and this project is timely in looking at ways

to address the issue. Community DSO would make the task manageable for the DSO who would only need to interface with the community clusters. The Panel welcomes the way that NPg is keeping open the form of the community groups / clusters; this creates scope to learn what arrangements would work best. The project is innovative and would deliver learning that could benefit all network licensees and should ultimately deliver significant benefits to customers in terms of cost and acceleration of a low carbon energy sector.

The Panel is therefore recommending Community DSO to be funded by the Authority.

The Panel would be keen for NPg to consider whether it is possible to incorporate the UKPN approach to local balancing proposed in CommuniPower as one of the examples for this project.

The Panel would also like to see at least one supplier involved early on to make sure the interactions with the wholesale energy market are worked through.

2.3 Net Zero Island

Licensee	Scottish Hydro Electric Power Distribution (SSEN)
Total Project Cost	£16.49m
NIC Requested	£14.27m

The proposal

Island communities in SSEN's Scottish licence area rely on carbon-intensive diesel generation as a back-up in the event of an extended subsea cable fault (recognising that such cables can take months to repair). These diesel generators are aging and expensive to maintain, have a high carbon footprint and may become unnecessary in the modern context where many of the islands now have significant renewable generation. However, when the diesel generators are running, renewables are currently constrained to 10% of demand to maintain grid stability.

SSEN propose to demonstrate additional network control systems including the integration of long duration energy storage as part of a local energy market using third party assets to allow the network to operate in islanded mode using low carbon resources during periods in which the subsea cable is out of service.

The project will consider the range of alternative long-duration storage solutions and other technologies needed for system stability with high wind penetration when in islanded mode. It will develop the roles of market participants and the technical and operational arrangements needed to ensure resilience. The proposal involves performing simulation and testing before installing and operating the Net Zero Island solution in an island environment to test its suitability.

The project looks to move away from using aging, costly and environmentally damaging assets that are required purely for resilience, to a flexible and sustainable whole system solution which is always usefully employed and would enable a higher volume of renewable generation.

Panel's Assessment against the criteria

- (a) Accelerates the development of a low carbon energy sector and/or delivers environmental benefits whilst having the potential to deliver net financial benefits to future and/or existing customers

Accelerates the development of a low carbon energy sector

While the project is expected to lead to an increase in output from wind generation on the Scottish islands, the primary benefit that SSEN has highlighted is avoiding the use of diesel in the specific context of these islands. As such it is not clear that this helps accelerate the development of a low carbon energy sector beyond the relatively small number of Scottish island communities.

While long duration storage is a key technology for reaching net zero – and this project might help build understanding around the grid integration issues involved – this is not envisaged as being a major element of the learning. Moreover, the Panel is not convinced that an isolated island setting would necessarily be the best location in which to test its potential wider benefits.

Capacity and carbon

Net Zero Island is expected to generate carbon savings because it will replace existing diesel generators with arrangements in which long duration energy storage (LDES) technologies are used in combination with renewable sources of energy. The arrangements are also expected to release capacity allowing a higher level of renewable generation both in normal operation and when the cable link fails.

Other environmental benefits would include avoiding other emissions from diesel generation and those associated with transport of diesel from the mainland.

The carbon benefit of replacing the 33 diesel engines involved is estimated by SSEN to be 43kt CO₂e by 2050 and relates to the Scottish islands only. Capacity release by the same date is forecast to be 1,732GWh. In estimating the carbon benefit SSEN assumes that the counterfactual is to replace the generators with modern diesel engines, with diesel usage continuing to 2050. However, the Panel notes that Hydrogenated Vegetable Oil is identified in the proposal as a “drop-in solution” that has significantly lower environmental impacts and is safer than conventional diesel. The Panel would have expected this to be considered as an obvious counterfactual to deal with carbon emissions and even absent this project would not expect diesel to continue in use through to 2050.

Longer term, as the generators need replacing, the appropriate solution will depend, among other things, on the population of the island and on the growth in on-island wind generation, which might require additional subsea cable links, as part of the ‘Pathway to 2030’, for example. Identifying the appropriate counterfactual is therefore difficult and there are clear interactions with wider RIIO funding decisions.

There are potential wider capacity and carbon benefits of the project which include facilitating the uptake of LCTs, reducing outages experienced by renewable generators and increasing renewable generation overall. These are not all quantified by SSEN and in many respects will depend on the eventual choice of LDES technology.

SSEN has not anticipated any wider GB carbon and capacity benefits, reflecting the fact that the project’s primary focus is on addressing the specific problems faced by the Scottish islands.

The Panel acknowledges SSEN’s desire to reduce its carbon footprint and meet its own greenhouse gas reduction targets. We recognise that, from this point of view, replacing the diesel generators serving the Scottish islands is highly desirable. However, from a wider GB perspective, the carbon and capacity benefits are not convincing.

Potential financial benefits

SSEN is projecting network customer benefits of £37m in the Scottish islands by 2050 as well as wider societal benefits of over £82m (against a NIC funding request of £14m).

The savings are based on an assumption of three 6-month cable outages for the illustrative island over a 20-year period from 2030-2050. While this extended outage period reflects a recent case, the number of outages is based on engineering judgment and the Panel feels this is at the pessimistic end of the range (based on wider evidence of cable failure rates). The Panel also questions validity of the assumption that when operating in islanded mode renewable generation would continue to be limited to 10% through to 2050 as technology evolves.

As noted above, the business case is based on a counterfactual of continuing with diesel generation through to 2050 and the Panel would have liked to see a wider set of counterfactuals considered. Moreover, as SSEN notes, the issue of how best to connect the islands to the mainland is very complex with several inter-related uncertainties that may fundamentally change the volume of renewable generation on the islands and the arrangements for connecting them to the mainland (including potentially through extensions to the transmission network). SSEN has therefore put forward, and Ofgem has accepted in its Draft Determination, the Hebrides and Orkney Whole System Uncertainty Mechanism. The interplay between this and the Net Zero Island project is unclear but could clearly change the counterfactual.

More generally there are potential interplays here with the funding requested in ED2 including investment in subsea cables (£114M) and distributed embedded generation (£42.5M) which the Panel has not been able to work through.

SSEN has not provided a cost-benefit assessment for a GB-wide rollout, reflecting the fact that the original focus of the project was very much on finding a solution to the unique issues of the Scottish islands. While the Panel does believe there will be learning from this project for GB DNOs, the fact that there is not the opportunity for a scaling up of the benefits through a GB rollout limits the financial case for this project.

In summary, the Panel does not consider that there is a sufficient environmental or financial case for pursuing this project. The level of benefits is highly dependent on the counterfactual assumed which may in turn depend on other regulatory decisions and there is no assessment of benefits beyond SSEN's own licence area.

(b) Provides value for money to electricity customers

The project is technically agnostic and the intention is to use a market arrangement to find the most cost-effective solution. There may also be scope to leverage additional funding from other sources of support to the island or innovation funding around LDES to improve value for money, which the Panel welcomes.

However, the Panel remains concerned that the project is relatively high cost compared to past NIC projects and given the narrow focus on the Scottish islands problem does not evidently represent value for money.

(c) Generates knowledge that can be shared amongst all relevant Network Licensees

The original motivation for this project was to find a solution to the problem of the Scottish islands that are reliant on diesel generation during periods of infrequent but long duration cable faults. Apart from the Isles of Scilly, which face different issues, no other DNO has this problem and hence the direct learning is not of wider benefit to other licensees. The Panel sees this as fundamentally counter to the purpose of the NIC (which is funded by all GB customers).

Through the discussions the Panel has been persuaded that there will be some learning for other DNOs and the ESO, for example around the options for long duration storage on the distribution network and opportunities to run networks in islanded mode. SSEN has referenced these opportunities in their updated submission. However, the Panel's view is that, given this was not the primary focus of the project, these wider learning opportunities have not been properly scoped within the project and as a result the benefits to other networks will be limited.

(d) Is innovative (i.e. not business as usual) and has an unproven business case where the innovation risk warrants a limited Development and/or Demonstration Project to demonstrate its effectiveness

The Panel recognises that there are innovative elements within the Proposal but also that much builds on other innovation projects. As such the Panel is not persuaded that a project on this scale is warranted. In particular:

- The Panel is aware that other work is being taken forward on how to run networks in islanded mode (e.g. the ESO work on alternatives to Black Start).

- The Panel notes SSE's experience that only 10% of renewable generation can operate when in islanded mode. However given the systematic increase in the percentages of renewables allowed in established island systems such as Ireland and Hawaii, the Panel is not convinced that SSE will not be able to find other ways to overcome the existing limit.
- While integration of long duration storage into the grid has not been done before, the Panel is unconvinced how different the commercial and technical network challenges are compared to integrating conventional battery storage (where already different solutions have different capabilities on ramp rate etc.).
- The Panel also notes that in terms of the commercial model this project builds on some of the ideas in the recently funded Resilience as a Service (RaaS) project. SSEN has suggested that there are significant differences in terms of the duration of outages being considered and the commercial models (with NZI looking to provide value to communities at all times not just during outages). The Panel accepts this but still sees addressing these differences as an incremental step.

In conclusion, the Panel recognises that there are innovative elements in this proposal but does not consider these are sufficient to justify the scale of investment proposed. The Panel would be keen to see smaller projects taken forward through NIA or SIF that would allow for more incremental learning in what is an evolving space.

(e) Involvement of other Partners and external funding

SSEN is expecting to be able to make use of long duration storage that is being funded through other UKRI funding streams. Although the details are not yet confirmed the Panel is persuaded that there are mutual benefits through this sort of partnering and is pleased to see the letters of support from interested parties.

The Panel is also pleased that SSEN Transmission are included as project partners but note the absence of any discussion in the proposal around the interplay with the development of the transmission network as part of the Holistic Network Design (which could provide another counterfactual solution for some islands).

The Panel is pleased that the ESO and NPg have been added as members of the Stakeholder Advisory Group to help increase the potential for wider learning. However, as late additions their views will not have shaped the project design to maximise that wider learning.

(f) Relevance and Timing

Given the need to replace some of the aging diesel generators on the islands the Panel can understand why this is seen as a time critical project by SSEN. However, the Panel is concerned that the range of long duration electricity storage solutions, which are key to this proposal, will not be available and tested in a timeframe that is useful for this project. The Longer Duration Energy Storage (LODES) Demonstration Competition run by BEIS continues through to 2024/5 and the Panel is of the view that there would be more value (from a wider energy system perspective) in taking time to consider the initial learning from LODES before attempting to explore its use in whole systems solutions (in a way that would more obviously provide learning of wider applicability).

(g) Robustness of Methodology and ready to implement

A reasonably detailed programme is provided. Within this the biggest concern is risk management on the large unknowns, particularly the equipment that will have to be procured. There is very little technical information about the system that will be built, reflecting the clear ambition to remain technically agnostic through the project. However, only approximately 9 months have been allowed to develop and procure the overall solution which is seen as a significant risk.

As noted above, the Panel remains concerned that at this stage the LODES solutions are still some way from being scalable and there is a risk that SSEN falls back on readily available solutions, limiting the learning opportunity. Stage gate arrangements are in place so that the project will not proceed if the procurement is unsuccessful. However, this does not address the Panel's fundamental concern about deliverability.

Conclusion

The Panel recognises the important challenge that the Net Zero Island proposal is seeking to address. However, the Panel considers that, although there will be some learning that may be of benefit to other DNOs, the project has not been designed with that goal in mind. In the Panel's view, this means the project is not suitable for NIC funding (which is paid for by all GB customers).

In the Panel's view funding for addressing the resilience and environmental issues on the Scottish islands should be provided through ED2 - and the HOWS Uncertainty Mechanism provides a possible route. This would also allow the interactions with ED2, Pathway to 2030 and other funding streams to be more holistically assessed to ensure value for money for customers. In particular, it would allow exploration of other counterfactuals which would need funding, but which the Panel would have expected to see considered.

As such the Panel is not recommending that Net Zero Island be funded by the Authority.

The Panel does recognise that there are elements of the proposal that could deliver wider learning and encourages SSEN to continue to look at alternative sources of innovation funding to take them forward.

3 RECOMMENDATIONS FOR FUNDING

In summary, based on these evaluations the Panel makes the following funding recommendations to the Authority, subject to the various conditions outlined above:

Recommended for funding

Project	Licensee	NIC Request (£m)
Community DSO	Northern PowerGrid	12.45

Unable to recommend funding

Project	Licensee	NIC Request (£m)
CommuniPower	UK Power Networks	11.88
Net Zero Island	Scottish Hydro Electricity Power Distribution	14.27

4 ACKNOWLEDGEMENTS AND REFLECTIONS

As in previous years, the Panel fully recognises the amount of work required to make NIC bids, including the time and effort expended to provide the Panel with answers to over 100 detailed questions posed through the SQ process. Consequently, the Panel would like to thank all the companies for their active engagement both in their written answers and at the bilateral meetings.

The Panel is also particularly grateful to the Ofgem team that provided support to the Expert Panel. Their technical and administrative input along with the technical support of the Consultants (Jacobs) ensured the Panel was able to undertake full and effective scrutiny of the NIC proposals.

The Panel is aware that this is the final year of the NIC process. In considering this year's applications the Panel noted on several occasions that concerns they had with the proposals would be alleviated under the new SIF process and hence see this as a positive development. In particular given the pace of change that there now is in the sector around the evolution of the DSO role, data and digitalisation and the development of flexibility services (to name but a few), a four or five-year timeframe - which has become the norm for NIC projects - feels too slow and too inflexible. Rather than major projects incorporating a number of different aspects the Panel would like to see a more agile approach – but without this meaning writing a blank cheque for undefined future stages. The SIF process addresses these concerns.

As set out above the Panel hopes that for both proposals where the Panel recommendation was not to fund them, the companies will nevertheless find ways to take forward elements of the proposal either through BAU or using the other innovation funding streams that are available.