SIF Beta Round 2 Project Registration

Date of Submission

Dec 2024

Project Reference Number

10121485

Initial Project Details

Project Title

Powering Wales Renewably (PWR) - Beta

Project Contact

Joshua Visser

Challenge Area

Preparing for a net zero power system

Strategy Theme

Data and digitalisation

Lead Sector

Electricity Transmission

Project Start Date

01/01/2025

Project Duration (Months)

48

Lead Funding Licensee

NESO - National Energy System Operator

Funding Mechanism

SIF Beta - Round 2

Collaborating Networks

Wales & West Utilities

National Grid Electricity Transmission

SP Energy Networks Distribution

SP Energy Networks Transmission

National Grid Electricity Distribution

National Gas Transmission PLC

Technology Areas

Modelling

Project Summary

Pweru Cymru yn adnewyddol (Powering Wales Renewably, PWR) brings together the Welsh Government, whole energy system users and network operators who collectively span the energy system value-chain. Collaboratively, they identified the priorities required to support the delivery of the Welsh Government's decarbonisation plans, prepare for a net zero power system and deliver net benefits to Wales's citizens and communities.

Through delivery of a digital twin of the whole Welsh energy transmission and distribution systems, PWR will provide a digital common interface to accelerate the integration of renewable generation, by enhancing locational visibility of system challenges and whole energy system status.

Add Preceding Project(s)

10060474 - Powering Wales Renewably

10078792 - Powering Wales Renewably - Alpha

Add Third Party Collaborator(s)

Cenin Renewables Limited

CGI

Project Budget

£12,195,722.00

SIF Funding

£10,361,756.00

Project Approaches and Desired Outcomes

Solution statement and solution focus

1. Whole System Visibility.

Problem Definition:

The lack of locational visibility of system challenges and collective stakeholder understanding of the whole energy system network status, including accepted connections.

User Needs:

- Renewable Distributed Energy Resource connections & hosting.
- Decarbonisation demand hosting.
- Network constraint relief.
- Enhanced Connection targeting.
- Community energy/SLES enablement.

PWR Delivers:

- Better matching of connection to network site.
- Enhanced location choice for connections.
- System capacity release enabled by whole system visibility.

2. Flexibility Coordination, ANM and offsetting.

Problem Definition:

Flexibility is not treated as a whole system resource and fully coordinated between transmission and distribution networks.

User Needs:

- Access to response revenue streams.
- Reduced renewable DER curtailment.
- Reduced overall cost of procured flex.
- Informed choice re ANM vs procured flex, Opportunities to off-set constraints.
- More equitable curtailment limits.

PWR delivers:

- Coordinating all network operator Welsh flex requirements.
- Accessing all DER response availability.
- Enhancing DER response site selection.
- Quantifying interaction between ANM, procured flex, curtailment, off-setting, and storage potential.

3. Integrated Planning/Energy System Transition

Problem Definition:

Local area energy plans, network development plans, and the connections queue lack alignment, leading to net-zero delivery and place-based approach uncertainties.

User Needs:

· Realisation/tracking of Welsh energy plans.

· Energy plan, queue/network coordination.

· Delivering local needs, resilience, energy price stability.

PWR delivers:

· Locational comparison of top down and bottom-up plans.

· Informed basis for whole system investment decision making that is adaptive to change.

· Net Zero progress tracking against on-the-ground deployments.

Problem Perception Evolution and Previous Projects

We have previously completed PWR SIF Discovery and Alpha, developing the following insights that we have been adopted into this Beta application:

· Transmission/Distribution connection queue scale requires attrition uncertainty modelling.

· IDNO EHV line proposals need whole system planning coordination.

· Mid-Wales has significant network interconnection, as a legacy of T/D 132 kV asset transfer, warranting whole system planning.

· Procured flexibility, DER curtailment limit setting, and interaction with ANM within the same network requires coordination/advancement.

· Generation curtailment is seen as a lost opportunity to introduce “off-setting” of decarbonisation demand. Opportunities exist to improve local balancing, smart local energy systems, and local supply initiatives.

· Informed whole system decision making requires PWR to be multi-energy vector.

· Future proactive connection dialogue could include the locational suitability of specific generation technologies considering network, and potential “connection queue shaping” incentives.

· Correlation of top down and bottom-up energy plans needs a PWR hierarchical spatial aggregation method, to integrate SSEP, CSNP, Wales RESP, LAEPs, network operator plans and locational connections queues.

· Meeting local needs, at the least cost, is a key tenet of the Welsh energy plans.

In addition, learning has been brought forward on intelligent network models from the WPD CIM project, and subsequent implementations.

Innovation justification

Preceding Project Learnings

PWR leverages investments in the NGED and SPEN integrated distribution network models, projects FALCON, WPD CIM, DINO, TRANSITION and TraDER, and the NESO Virtual Energy System. Learnings and findings from previous projects taken forward for Beta adoption include, intelligent network models, the need for multi-energy vector, constraint off-setting, mid-Wales SPEN/NGED interconnection, and tertiary SGT connections. PWR will stimulate digital innovation and create additional value by linking and collaborating with other digital twins.

Open and Transparent Working

PWR goes beyond incremental innovation. Holistic by design, the project engaged with the full stakeholder chain to identify whole system blockers to successful energy system transition. Through working openly with stakeholders, their perspectives and critical challenge has enabled us to refine the project to be ambitious, beyond incremental, and require multiple stakeholder collaboration. The line of sight as to how the resultant use cases deliver the required benefits is in the appendix to this answer.

Based on insights and consensus achieved, the Beta Phase will deliver a novel ICT asset that uniquely integrates, for the first time, datasets, and digital technologies to create a digital twin of the T&D energy networks across Wales.

Innovation and Scale

PWR is ambitious and innovative. The innovative aspects of our project are, national Welsh scale, multi-energy vector, full value chain engagement, and an intelligent energy networks digital twin, all of which define a transformative delivery approach. Critically, project innovation scope is firmly focused on delivering whole system, benefit driven, novel solutions to three core blockers to Welsh energy system transition, namely:

1. The first Welsh whole energy system intelligent network status model, correlated to multiple industry and external datasets.

2. The first whole-system, near-real-time representation of, flexibility requirements, DER site availability and dispatch.

3. The first top-down and bottom-up comparison of Local Area Energy Plan's, energy network development plans, and locational connection queues, for alignment and delivery tracking.

State of the Art Technical Innovation

The key innovation advancement, beyond the current state of the art, demonstrated by our pilot system, is the ability to locationally correlate multiple separate datasets indexed against a fully connected intelligent energy network model. This advance will enable use cases analysis data requirements, and combined transmission and distribution network models. This innovation supersedes previously available map overlays and generalised heat maps.

SIF Justification

PWR is aligned to SIF Funding as it enables stakeholders from across the energy system value-chain to engage in whole system collaboration, beyond individual organisational responsibilities, and newly emerging industry roles, to remove specific blockers to Welsh decarbonisation.

Readiness Levels

TRL:

· Alpha: 3->5.

· Beta: 8 targeted: integration of multiple systems and data sources demonstrated at scale.

IRL:

· Alpha: 3->4.

· Beta: 7 targeted: prove the integration between systems and interoperability.

CRL:

· Alpha: 4->5.

· Beta: 8 targeted: agreement of commercialisation strategy, scale-up approach and business model.

PWR is designed to scale for business-as-usual at the end of Beta and by targeting benefit delivery for Wales, we will ensure lessons learnt are available to benefit to the whole of the British system.

Counterfactual

Counterfactual solution designs for the digital twin were considered and discounted in favour of that proposed on the grounds of:

· Data retrieval latency.

· Alignment of data and quality.

· User interactivity.

· Complexity.

· Model reusability.

Impacts and benefits selection (not scored)

Financial - future reductions in the cost of operating the network

Financial - cost savings per annum on energy bills for consumers

Financial - cost savings per annum for users of network services

Environmental - carbon reduction – direct CO2 savings per annum

Impacts and benefits description

Powering Wales Renewably is designed to deliver both quantitative and qualitative benefits across the range of the listed SIF specific benefits areas. For transparency to the CBA and the SIF Benefit Map Template, PWR benefits are listed against the SIF defined benefits areas below.

Financial - cost savings per annum on energy bills for consumers

1. Increased renewable generation.

PWR targets delivery of this benefit based on the incremental increase in renewable generation enabled by increasing the proportion of successful connection applications. In doing so, PWR will contribute to the innovation required to achieve the challenging decarbonisation targets set by the Welsh Government.

By satisfying a greater proportion of Welsh electricity demand from lower cost renewables, the average electricity cost per unit will be reduced. In a well-functioning market, these savings will flow to consumers via their bills.

One of the key elements in the Welsh energy plans is to increase Welsh ownership of renewable generation including community energy, and smart local energy systems. The existing renewable generation trajectory has significant challenges due to network constraints, low application acceptance ratios, and subsequent attrition of accepted applications in the connections queue.

Financial - future reductions in the cost of operating the network

2. Flexibility Cost Reduction.

Greater coordination through visibility of all network operator requirements for energy and capacity flexibility, and that available, at a portfolio level is targeted by PWR to yield cost reduction and efficiencies. Flexibility coordination will rationalise overlapping transmission and distribution flex requirements and enable the selection of the most suitable DER response site considering location, characteristics, and track-record of dispatch delivery.

3. Value of Avoided Curtailment

PWR is aiming to reduce curtailment and realise curtailment cost reductions through developing constraint off-setting, storage location selection, and the interaction between procured flex, ANM, and curtailment limits.

In addition, a secondary, consequential benefit is a greater contribution from renewable generation output contribution to meeting Welsh electricity demand, through the extra renewable generation enabled; this benefit has not been financially quantified within the CBA.

Environmental - carbon reduction – direct COI savings per annum

4. Demand Decarbonisation CO2 Savings

PWR will enhance COI savings through the additional renewable generation achieved due to the project replacing fossil fuel generation. The carbon intensity of existing electricity generation in South Wales is frequently relatively high, offering scope for COI reduction.

Financial - cost savings per annum for users of network services

5. Enhanced Network Capacity Utilisation

PWR targets enhanced utilisation of existing and new network capacity. The benefit delivered by PWR is expressed as a financial saving against projected business plan load related network expenditure. The projected load related expenditure is based on the RIIO-ED2 values increasing based on FES 2022 lower growth scenarios. PWR delivers this benefit through developing constraint off-setting, storage location selection, and the interaction between procured flex, ANM, and curtailment limits.

Others that are not SIF specific - Welsh Energy Plan Target Achievement

6. Achievement of Welsh 2035 Electricity Decarbonisation Target.

Wales's decarbonisation trajectory requires innovation to achieve its 2035 target. Present progress is being hindered by network capacity availability and poor alignment of top down and bottom-up plans with the network work development and connection queue.

Not achieving the 2035 target will lead to negative climate impacts, additional post deadline costs, and the potential for litigation from environmental pressure groups / individuals and associated penalties.

Avoidance of these consequences can be seen as a qualitative benefit of PWR.

Teams and resources

Resources

Partners and Stakeholders will need to increase their levels of involvement (over Alpha) as we proceed through Beta delivery.

No additional equipment and facilities are required over and above additional cloud hosting (utilising NESO's current Azure solution).

Project Team

For Beta, the Project team will retain a similar structure to Alpha with partners and stakeholders as identified below performing the following roles. New partners are highlighted in the text, we are pleased that partners from Alpha remain:

NESO

Main problem owner. The project sponsor is the Head of Regional Energy System Planning (RESP), [RK(1] [MS2] NESO will therefore provide strategic leadership, along with:

· Ensuring the project delivers on its outcomes and objectives of RESP insights, Connections visibility and insights into the potential for Flexibility Coordination.

· Provision of NESO industry expertise to steer PWR development of Beta use cases and workshop participation.

· Strategic alignment with NESO's Virtual Energy System.

· Project Management, governance and reporting.

· Stakeholder management and engagement.

SPEN, NGED and NGET

As operators of the Electricity Distribution and Transmission networks in Wales they will:

· Consult on available and planned-to-be-available datasets.

· Provide sectoral (DNO/DSO/TNO) expertise to steer PWR.

· Provide expertise to develop of Beta use cases and workshop participation.

· Provide Network specific data.

National Gas and Wales & West Utilities

As the operators of the Gas Distribution and Transmission networks in Wales, they are new to PWR and they will:

· Consult on available and planned-to-be-available datasets.

· Provide sectoral (GDN, GTN) expertise to steer PWR.

· Provide expertise to develop of Beta use cases and workshop participation.

· Provide Network specific data.

Cenin Renewables

Cenin own wind, solar and anaerobic generation plant in South Wales and are an asset owner. They will provide:

· Industry expertise and experience of getting connected to the network.

· Participation in Workshops and use case definition and feedback on the solution as it moves through the development lifecycle.

CGI

A worldwide IT and Consultancy business with experience in the UK energy industry. Design and IT development of foundation twin technology solution.

Design and development of up to three products aligned to identified stakeholder priorities:

· Interoperability of PWR Digital Twin.

· Visualisation of the Whole Electricity System for Wales.

· Simplified interaction with the twin for non-expert users through the adoption of Natural Language Processing and other advanced techniques.

· Use case development plan for BAU, including cost-benefit analysis.

· Support stakeholder management, workshop facilitation and alignment with partners.

Stakeholder Engagement

In addition to the Project partners, we will engage with the following external stakeholders throughout the project to ensure a fit-for-purpose solution. All have been identified as potential network users of the PWR solution in the development of a low carbon Wales, whether as asset owners, consumers or other interested local parties:

· Tupa Energy

- Statkraft
- RWE Pembroke Net Zero Centre (PNZC)
- Ynni Cymru
- Community Energy Wales
- Farmers Union of Wales
- Baileys and Partners
- Energy Local
- Sero

Beta will also leverage the collaboration and progress made during Alpha and Discovery Phases to grow the digital community around the project, ensuring inclusivity by engaging all interested participants.

It remains possible that additional stakeholders may be identified during the project, and we will remain cognizant of this throughout to ensure the optimum levels of engagement.

Subcontractors

Welsh Government

The Welsh Government has a challenging decarbonisation plan and will be involved in the project by:

- Consulting on alignment with policy, communities, and industry priorities.
- Providing access to expert resource from across the Welsh Government itself and from their stakeholders to steer PWR development of Beta use cases via workshop participation.

Create Innovative Solutions

CGI will work with a CIS (an SME) to provide industry leading expertise.

Project Plans and Milestones

Project management and delivery

The project consists of six main work packages aligned to the Use Cases Foundation (1), Flexibility Coordination (2) and Strategic Planning (3). Each work package will be delivered in parallel. There is also a package for combined run and refinement (Devops), to evaluate and optimise the outputs.

Approach

Employing an Agile methodology, a core team is maintained throughout the programme. A series of programme increments, and iterative developments will refine the Minimal Viable Product for each use case.

The product development will contain a design and build work package for each Use Case, evolving the core Twin Model, with specific user products per Use Case, each with several work packages. Continual improvement and operation of the product continues for 3 years.
There is a separate work package for Governance, Project Management and Stakeholder Engagement for the duration of the project. Finally, a work package for BAU Transition and closedown.

WP1 Project Management and Governance

This will cover Project Governance and Stakeholder Engagement.

Agile Project Management employing fortnightly updates, will assess progress and define the backlog for future sprints, while keeping aligned to the required outputs.

WP2-7 Solution Design and UX & Data Solution Engineering

All these WP's will follow the same process of addressing each Use Case.

In this manner, we will ensure that learning will be shared across WP's and Use Cases especially relating to data sharing, frameworks and technology.

WP2, WP3 and WP4 will use workshops and structured interviews to obtain information resulting in the evolution of the specification and CBA for PWR Beta.

Success will be measured by delivering working solutions into WP8.

WP8 Solution Operation & Continuous Improvement

This will be the general operation of the PWR solution throughout the project and a period of continuous improvement based on stakeholder and user feedback.

Success will be measured by the provision of user feedback and benefits realisation.

WP9 BaU Transition and Closedown

This will cover Closedown, BaU transition planning, commercial roadmap.

Success will be measured by providing an accepted business case for PWR to transition into BaU and post-Beta expansion.

Key Milestones

- WP1.M1: Project Kick off (Feb 25)
- WP2.M1: Foundation Designs (Feb 25)
- WP3.M1: Flexibility Coordination Designs (Jun 25)
- WP4.M1: Planning & Connections Designs (Jun 25)

- WP2.M3: MVP shared with NESO for Foundation (May 25)
- WP3.M2: MVP shared with NESO for Flexibility Coordination (Jan 27)
- WP4.M2: MVP shared with NESO for Planning & Connections (May 26)

Stage Gates:

- Use Case 1a and 1b approval to deliver into Operation [Aug 25]
- Use Case 3a and 3b approval to deliver into Operation [Aug 26]
- Use Case 2a and 2b approval to deliver into Operation [Dec 27]

Risk Management Strategy

Risk Management will be a continuous process, monitored and actively maintained by the PM using an Identify, Assess, Control, Record approach. Risks will be a standing item at regular progress meetings and by the Project Steering Group. Mitigation activities, owner assignment and progress will be discussed. Escalation to the steering group as required.

Key risks:

- Data Acquisition (R4, R5, R9)
- Data Cleansing (R5)
- Maintaining stakeholder collaboration (R1, R8)
- Digital twin user adoption (R6, R7, R12)
- Unintended consequences of the digital twin (R2, R6, R13)

See PM workbook for detailed risk table.

Supply Interruptions

Supply interruptions (planned or unplanned) are not required.

Access to Energy Services

The Project is designed to ensure that consumers have access to the energy services and connections they require through the provision of the digital twin. We have expanded the stakeholder group to include wider representation of energy consumers and have ongoing support of other consumer groups, e.g. Energy Local, Sero Group and EDF Renewables.

Key outputs and dissemination

The overall aim of PWR is to deliver a digital twin of the energy system in Wales to accelerate and support the Welsh Government's decarbonisation plans.

In Alpha, we actively collaborated with our project stakeholders and partners through the development of PoC. This helped create a shared vision of PWR through stakeholder working groups, aligned to diverse stakeholder requirements for each use case. Transparency through Discovery and Alpha was embedded in the engagement model, with progression through bi-lateral and multilateral workshops. In Beta, we will continue to be collaborative and transparent. A key feature of this project is the breadth and diversity of Stakeholder community in PWR. Encompassing the Welsh government, Ynni Cymru other Digital Twin projects, community energy groups, renewable developers/operators and Gas Networks.

Our outputs throughout the lifecycle of the project are aligned to Work Packages (WP). Our outputs have been scheduled and focused on demonstrable outcomes that can be shared with stakeholders including network/system operators.

Except where noted, all outputs will be made available on the ENA Smarter Networks Portal. We will continue our open and transparent ethos that was established in our previous phases (all past reports have been made available in the same way).

WP1: Project Governance and Management

(NESO lead)

Aims:

To orchestrate and manage the successful delivery of the project, stakeholders and dissemination of findings and outputs.

Key dissemination outputs showing [responsible party] and (Target audience):

· CBA updated in line with each MVP milestone and during operation [NESO/CGI] (Ofgem).

· Learning Reports including results from the various analyses [All] (Public).

· Industry and Public Dissemination Events - E.g., Show-and-Tell, Demos [All] (All (Public)).

WP 2, 3 & 4: Solution Design and UX

(CGI lead)

Aims:

These work packages will focus on the technical design and realisation of the PWR platform with all project partners.

Throughout this phase we will be sharing our outputs including our MVPs for each Use Case with our industry stakeholders to ensure that all identified parties are informed of progress along the way. We will utilise various media throughout including open webinars and will socialise outputs with the wider industry.

Key outputs:

· Detailed Designs for Foundation, Use Cases Flexibility Coordination (2a/2b) and Use Cases Planning and Connections (3a/3b) [CGI] (All (Public)).

· Beta Applications aligned to Use Cases [CGI] (Partners/All (Public)).

· MVP Deliveries [CGI] (Partners) + Demos [Partners] (All (Public).

WP 5, 6 & 7: Data Solution Engineering

(CGI lead)

Aims:

These work packages will deliver the data solution build and analysis to support and align to the project milestone and MVP Deliveries.

· Establish industry datasets for all partners will be shared at the end of each Use Case design to project stakeholders.

· Pilot Data Sharing Infrastructure.

· Share learning with all stakeholders on industry data sharing and best practice.

This will align with the previous work packages to deliver demonstratable digital products. We will be sharing progress via Minimal Viable Product demonstrations to partners and sharing learning with the public (ENA portal).

WP8: Continuous Improvement, UAT and Transition into BAU

(CGI lead)

Aims:

Refinement and evolution of MVP through Beta phases to deliver a working solution ready for transition into BAU. Planning and set-up associated with BAU transition at project close.

Key Outputs:

· Working and demonstrable PWR Beta iterations [CGI] (All (Partners)).

· BAU Transition Plan including a shareable design for other DNO's [CGI/NESO] (All (Partners)).

· Commercialisation Roadmap [CGI/NESO] (All (Partners).

WP9: Findings, Learning and Closedown

(NESO lead)

This workstream which will focus on project closedown will deliver the following key outputs at the end of the project in December 2028:

· Closedown Report [NESO/CGI] – (All (Partners)).

· Final Report [NESO/CGI] – (All (Public)).

Commercials

Intellectual Property Rights, Procurement and Contracting (not scored)

Intellectual Property Rights

As with the Discovery and Alpha project submissions, the Powering Wales Renewably (PWR) project will utilise the default IPR conditions set out in Chapter 9 of the SIF Governance Document. During Alpha, Partners identified and agreed background IP that they expect to use in the Beta phase. They established mechanisms to capture Foreground IP, maintaining an IP Log for the programme, and we will continue this approach as IP requirements emerge through Beta.

The ownership model laid out in the Discovery & Alpha contracts will be reviewed and agreed before the Beta project commences and will form part of the mobilisation phase between award and project Kick off. It will comply with relevant clauses in the SIF Governance Document regarding IPR. These output findings will be included in the published final report.

Network partners have confirmed that they do not anticipate any IP related constraints or concerns with the PWR project. This will be reflected in a legal agreement amongst the project partners prior to beginning the Beta project. The NESO will commence discussions around the Data Sharing provisions required after submission and before any award decision and the intention is to incorporate these sharing provisions within the collaboration agreement.

The lead partner, NESO, will publish project reports on the Energy Networks Association's Smarter Networks Portal. Commercially sensitive market information and Critical National Infrastructure sensitive operational information will not be included in these reports. Following appropriate and proportional data assessment, and agreement amongst the project partners, reports will be publicly accessible to share learnings widely. The intention is to use already available datasets or prospective data sets scheduled to become available during Beta.

The foreground IP generated will be software, methods and processes. Existing background IPR mainly resides with CGI IT UK Ltd in the reuse of the Integrated Network Model CIM compliant data structures that serve Wales and were made available to industry following the Western Power Distribution (now NGED) Common Information Model (CIM) project, also implemented at SPEN. This is a key accelerator for the creation of the Whole System Foundation model. INM enhancements created from CGI investment, such as a Dynamic Network Model will be made available to project partners. Foreground IP to be developed in the Beta Phase has been identified and IP Ownership will be captured in the project IP register with IP following the originator. Output findings will be included in the published report.

Where findings in the report are derived from project partner's Background IP (e.g., models, data or technologies), this Background IP will not be included in the report nor made publicly available without the agreement of the IP Owner. This is to protect the IP rights of project partners, as set out in Chapter 9 of SIF governance. The project will demonstrate innovative software and techniques developed during the Beta phase to stakeholders and fellow innovators through dissemination events.

Procurement/Contracting

For the Beta phase, the project does not anticipate running any procurement events. Project Partners Publicly available compute and tooling will be utilised by the project, using commercially available tools, leveraging existing enterprise agreements from the partners.

Note that CGI will work with Create Innovative Solutions, a UK Based SME consultancy through a sub-contract arrangement as part of the BETA phase. However, this arrangement will be in place prior to the commencement of Beta and so will not be subject to in-project tendering.

Commercialisation, route to market and business as usual

Three commercialisation pathways were identified in Alpha:

- Service Model
- Product Model

- Digital Common Model

We have decided to use the Digital Common Model, funded from regulatory allowance, informed by feedback from a range of system stakeholder groups supporting NESO's future role.

Route to Market/BAU deployment

PWR Beta will deliver a Public Interest Digital Asset (PIDA). We will work with the regulator (Ofgem), Welsh Government, DESNZ and stakeholders to agree an appropriate funding model and identify the suitable delivery body for operationalising this digital common. Through the BETA phase, we have adopted a process of Continuous Improvement. We will build an Initial Minimum Viable Product, to be enhanced through incremental deliveries, based on user feedback and create an evidence base for Regulatory funding post BETA.

Partner Readiness

The Distribution partners have existing commercial data preparation solutions that will accelerate the foundation stage and are a catalyst for future enduring data preparation activities for partner organisations. PWR partners have the experience, capacity and scale to support commercialisation of the PWR solution. No further investment will be required during Beta; BAU requirements will be finalised by project end.

Senior Sponsorship

The business sponsor is Bridget Hartley, Head of RESP. Bridget has been guiding the design and ensuring it addresses business needs. Bridget will own the vision and direction for PWR and is responsible for a successful Beta implementation.

Previous sponsor, Matt Magill (now NESO Director of Resilience & Emergency Management), remains closely involved.

Key teams

NESO's Data, Digitalisation & Technology (DD&T) has engaged with the project extensively regarding Beta and subsequent BAU Integration. In addition, partner engagement with Connections, Forecasting and System Planning & Operations, legal and commercial departments have been consistent through Alpha, and is planned for Beta.

Integration Strategy

PWR is aligned with the Virtual Energy System programme.

Our integration strategy, defined during Alpha is manifested in the High-Level Design. Key principles of re-use, user centricity and interoperability through a common ontology aligned to the CIM model are included.

VirtualES integration, as well as initiatives such as Ofgem's work on the Flexibility Digital Infrastructure and the ENA's API work, are included. Integration barriers will be resolved with the partners through the application of our intelligent network model, combined with strong governance.

Scaling up

Scaling data volumes and processing capacity to meet a growing analytical demand is facilitated by using NESO's Azure Cloud-based architecture and is a key element of BAU planning. We will deliver:

- Scaled, data ingestion, and user requirement coverage.
- Open interfaces.
- APIs.
- Advanced analytics.
- Security and data sharing model.

We will deliver an integrated foundation data model in Year 1, followed by MVPs for Use Case 2 & 3 in Year 2. The final 2 years of the project are dedicated to Continuous Improvement through a quarterly release cycle scaling the product(s) and progressing the commercialisation arrangements.

See PMB Gantt.

Change Management

Change Management is inherent in the Agile delivery methodology we have adopted to positively meet requirements. We are developing a Digital solution and will encompass user-group feedback into improvements. This will be reviewed in the project Architecture Review Board. NESO will be responsible for BAU adoption, including identifying training and communication requirements, so that NESO teams (RESP, Connections, Markets) are able to adapt processes.

NESO will work closely with project partners to ensure they are able to plan their own implementations and realise value from their investment in PWR.

Market Development

PWR is designed as an enabler of increased market competition, rather than to undermine it. it addresses market issues identified by Ofgem (namely imperfect information and market coordination) by providing greater system status visibility.

Policy, standards and regulations (not scored)

Reviews in Discovery and Alpha did not identify any policy or regulatory barriers (be they within Ofgem's remit or outside of it) that would require derogations, changes or exemptions to successfully complete the project. This will therefore not be required for PWR Beta to proceed.

During the Discovery and Alpha Phases, the project conducted a series of workshops with system actors from across the electricity system value chain. Through these workshops, stakeholders began to identify several areas of regulation or industry codes that might benefit from modifications that could accelerate/facilitate the realisation of the benefits targeted by PWR in business-as-usual. These potential changes helped inform the expected learning outcomes from the Alpha Phase. These outcomes were achieved and have been used to develop this Beta submission.

In the intervening period there has been a decision on the Regional Energy Strategic Planning role, with this being assigned to the NESO. While there remains some uncertainty about the definition and detail of the role, the consortia strongly believes that PWR can add significantly to this ongoing discussion about the breadth and depth of the RESP role and its responsibilities, and this is now strengthened by the inclusion of data from Wales and West Utilities & National Gas, providing gas network data to the PWR solution.

The project will maintain a watching brief, with ongoing discussions (initiated in Discovery and Alpha phases) on policy, regulation and standards. Relevant stakeholders will be engaged as part of the Project Management and Governance work package.

Below we detail some potential considerations in the policy area that may impact on the transition into BaU. The project will continue to monitor these throughout its lifecycle.

Barriers

PWR will leverage existing data standards and existing accessible datasets made available by actors from across the system value chain but also leverage the learning from relevant recent projects. While no barriers are foreseen, PWR will enable the testing of these standards and the integration of inter-system actor datasets in a demonstration environment. It will therefore provide feedback on any issues that current open data and data integration approaches may raise when applied to electricity data sets. Hence, it will identify areas where greater policy and regulatory clarity could accelerate progress and where barriers become apparent, including:

· Evolution of standards to facilitate data interoperability between energy system actors. This will build on the work of the project itself and the various groups that have looked at data and will reporting back and feeding our findings to any groups that are pertinent or any that emerge. This work is included within Work Package 3 of our plan.

· Development of market structure/architecture and mechanisms to facilitate data access by system actors. Development of roles and obligations of energy system actors will build on the output from relevant industry initiatives, which include the NESO's initiative on connection queue reform (First Ready, First Connected), Ofgem's future reform to the electricity connections process, Ofgem's Call for Input on the Future of Flexibility and the relevant Department for Energy Security and Net Zero Flexibility Innovation Programme projects. It will also provide invaluable learning around the development of Regional Energy Strategic Planning.

Policy considerations

The funding of future data services remains an open question. PWR will inform the approach to commercialisation of solutions into business-as-usual. We have included within our plan an end of phase learning point (WP8-D2 BAU Transition) that will feed directly into the development of BaU transition plans; the primary focus of PWR is on realising the value for stakeholders.

Consumer impact and engagement

The Welsh Government represents the interests of the Welsh citizens and will continue to provide access to consumer representative groups included in our stakeholder engagement process (WP1). This engagement has enabled us to identify and prioritise each stakeholder group's interests.

The benefits targeted by PWR will flow through to end consumers as lower bills, accruing from:

1. integrated system planning,
2. improved whole system optimisation,
3. access to correlated system information, enabling informed decisions, and
4. accelerated integration of cheaper renewable generation and reduced TNUoS costs through local energy schemes.

Consumers will also experience the benefits of PWR through the continued reliability of supply as operational optimisation becomes more challenging as the energy system decarbonises.

According to Ofgem's Consultation on the Future of Local Energy Institutions and Governance, better system planning coordination could result in savings to GB customers of £0.9bn-£3.2bn pa over 25-years.

Stakeholder Engagement in the Design, Development and Implementation

The Welsh Government has represented the interests of the Welsh citizens and has provided PWR with access to a variety of consumer representative groups as part of our stakeholder engagement process, which has been integral to the development of this Beta proposal and will continue to be throughout delivery.

Consumer Communications

In Work Package 1 we will develop a detailed stakeholder engagement plan, including a communications strategy for appropriate consumer engagement. Touchpoints will include consumer-facing dissemination, such as the Show-and-Tell and other media, e.g., webinars and presentations at relevant events and forums.

The involvement of the Welsh Government in PWR and the access that they provide to consumer representatives, provides PWR with a vital pathway for citizen and consumer dissemination.

Direct and Indirect Benefits

Expect benefits of £58.5m between 2030 & 2035 directly attributable to PWR, that accrue to consumers through reductions in their bills.

PWR delivers direct benefits to consumers:

1. PWR enables improved strategic planning, better network utilisation and reduced costs of operating the networks from greater integration of low-cost renewable generation, better flexibility coordination and reduced curtailment. These deliver cost savings that will flow through to consumers' bills in a well-regulated and well-functioning market.

PWR also delivers indirect benefits to consumers by:

2. ensuring consumers continue to benefit from the levels of supply reliability they have come to expect. The transition to a more dynamic, decarbonised energy system creates new challenges to consistently delivering supply reliability, requiring access to data to inform operational decision making.

3. Improved coordination of flexibility reduces the costs of operating the system and enables new products and services to be

brought to market, enhancing consumer choice and experience.

Diverse customer requirements

PWR's 'whole system' approach to providing access to the diverse range of data sets, including gas, required to inform strategic investment planning and operational system optimisation ensures all consumers benefit from the cost-effective reliability they have come to expect when it comes to energy supply.

Welsh Government (and the engagement they enable) will ensure that PWR reflects the concerns and needs of Low Income and Vulnerable consumers.

Equitable Distribution of benefits

Because the project is focussed on the whole of Wales, benefits accrue equitably to all consumers, and proactive stakeholder engagement will ensure that all customers categories are included steering project benefits across environmental, financial and societal co-benefits.

PWR will deliver additional societal co-benefits equitably distributed including,

- Equality and Social Cohesion through community energy
- Improved air quality health benefits
- Economic growth/green jobs and skills to service the renewable generation uplift.

The long-term goal is to extend the PWR approach taken to the whole of GB, to improve understanding of local and regional energy infrastructure needs.

Value for money

Total project costs: £12,195,722.19

Funding requested: £10,361,756.07(85%)

Total contribution: £1,833,966.12(15%)

Balance of costs:

Lead Partner- NESO

· Total cost: £4,499,463

· Contribution: £930,611 (20.7%)

· Funding requested: £3,568,852 (79.3%)

Partner 1- CGI

· Total cost: £ 6,621,814

· Contribution: £798,370 (12.1%)

· Funding requested: £5,823,444 (87.9%)

Partner 2- National Grid Electricity Distribution

· Total cost: £184,275

· Contribution: £18,428, (10%)

- Funding requested: £165,847 (90%)

Partner 3- National Grid Electricity Transmission

- Total cost: £157,538
- Contribution: £15,754 (10%)
- Funding requested: £141,784 (90%)

Partner 4- SP Energy Networks

- Total cost: £324,535
- Contribution: £32,534 (10%)
- Funding requested: £292,081 (90%)

Partner 5- Cenin Renewables

- Total cost: £13,300
- Contribution: £1,300 (10%)
- Funding requested: £11,970 (90%)

Partner 7- Wales and West Utilities

- Total cost: £162,474
- Contribution: £16,247 (10%)
- Funding requested: £146,227 (90%)

Partner 6 National Gas Transmission

- Total cost: £226,032
- Contribution: £22,604 (10%)
- Funding requested: £203,428 (90%)

Subcontractors, their costs and why they are critical to the project:

NESO will subcontract the Welsh Government owing to the nature of this organisation:

- Total cost: £38,400 (<1% of total)
- Contribution-in-kind: £38,400 (100%)

CGI will subcontract Cliff Walton via Specialist Industry Consulting from an existing arrangement with the SME Create Innovation Solutions. For 12 years Cliff has been a visiting professor at UCL, and previously Head of Strategic Development for EDF, and Energy Networks and Innovation lead for London Electricity.

All partners are making at least a 10% contribution. These contributions will be funded by:

- NESO and DSOs through their network innovation budgets. Welsh Gov will be contribution-in-kind.
- CGI through Benefit-in—Kind, including software licences.
- Cenin through re-investing profits gained from commercial work.

The costs compare favourably to normal industry rates. Commercial Partner rates are competitive with other innovative businesses and have provided a reduction on commercial rates for innovation work; the NESO and Networks have benchmarked

pay approved by Ofgem.

Value for money for the consumer

The project delivers value for money by focusing on consumer-driven use cases linked to the delivery of specific benefits that significantly outweigh costs. Primary benefits targeted include utilisation of existing and new network capacity, reduced customer connection contributions, CO2 and cost reduction through fossil fuel generation replacement with renewables, and reductions in flexibility cost and constraint payments.

This project will deliver additional value by enabling linkages to other projects that will accelerate the industry's digitalisation initiatives. The project will leverage existing open datasets provided by the Gas and Electricity Network Operators and gather expanded stakeholder feedback through development of the innovative product that will be developed in Beta.

Additional Funding

No additional funding from other innovation funds has been sought. However, previous projects funded under NIA and NIC will inform Alpha. These include the WPD CIM project, SPEN DINO and SSEN TRANSITION; but to confirm: these are independent projects from PWR.

Existing Assets

Background IP in enhancements to the Integrated Network Model (INM) will be utilised in the foundation Digital Twin model. The original Integrated Network Model was developed by CGI on the WPD CIM NIA project. The enhanced Integrated Network Model (INM) application, a component within the OpenGrid360suite of products, will be made available to the project at no cost. This contribution is valued at £200,000 for a commercial licence.

Associated Innovation Projects

- (•) Yes (please remember to upload all required documentation)
- ( ) No (please upload your approved ANIP form as an appendix)

Supporting documents

File Upload

NESO_ SIF Beta Powering Wales Renewably - Feb 26.pdf - 1.5 MB
SIF Beta Round 2 Project Registration 2024-12-04 12_08 - 124.0 KB

Documents uploaded where applicable?

☑