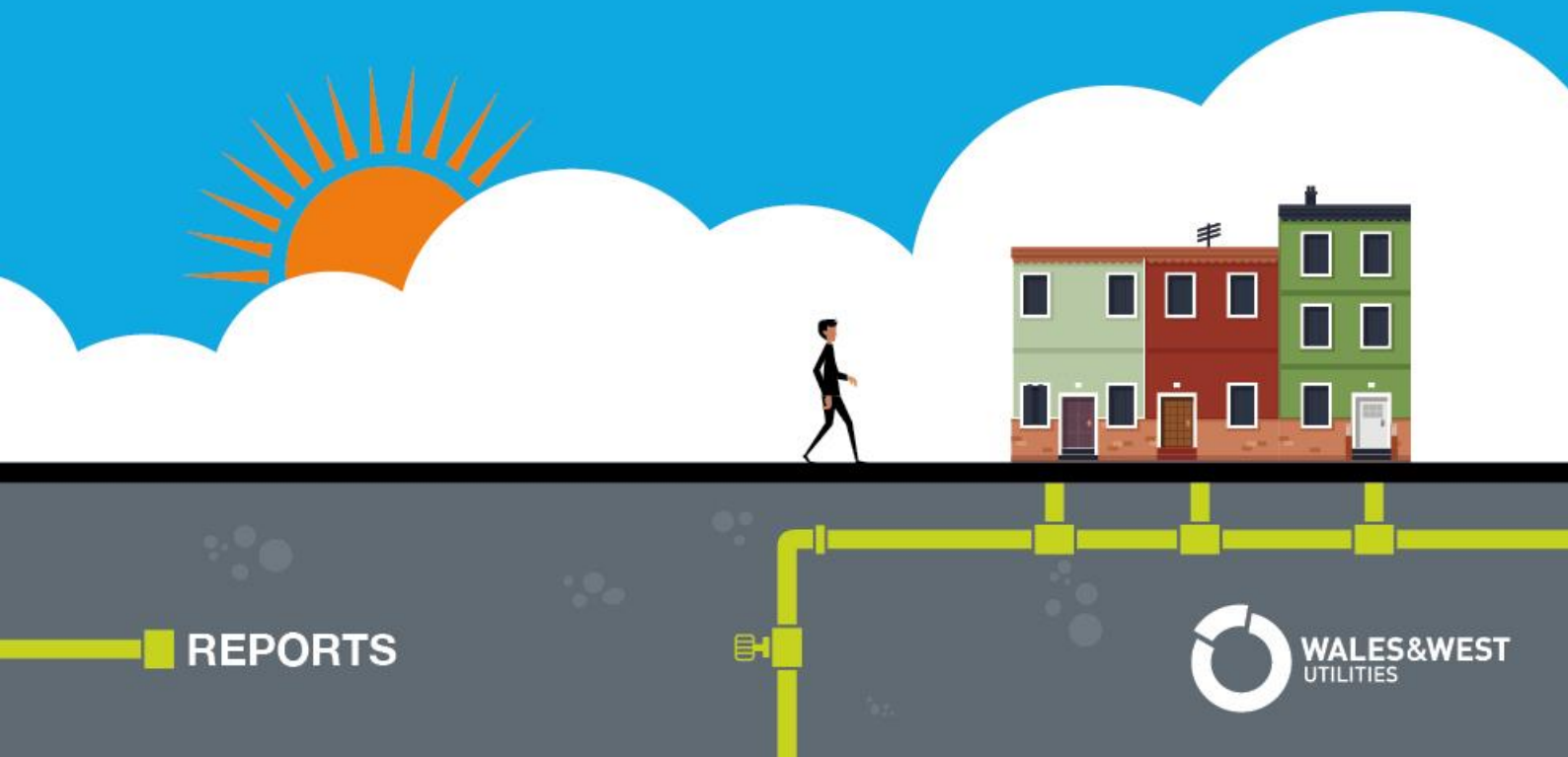


Consumer Value Proposition 2C19: Whole system data and pathfinder model

August 2020 update



REPORTS



WALES&WEST
UTILITIES

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Overview of Consumer Value Proposition

Commitment name

Data Sharing: Sharing of network data and Pathfinder model

This document provides an update to the Appendix 2C19 submitted as part of our Business Plan in December 2019 and seeks to provide further detail and updates to the costs, stakeholder support for these services, and their value to stakeholders.

Executive summary

WWU request funding during RIIO GD2 of £3.2m to establish a new team to resources the roll out of the Pathfinder+ over the period.

Pathfinder+ is a whole energy system simulator developed by WWU over four years to evaluate decarbonisation options for heat, power and transport in a specified geographic area. It provides the basis of the energy system design incorporating energy generation, use, distribution and storage. The output includes the cost, carbon and supply security of options and hence, via simple iteration, can provide an optimal solution incorporating local parameters defined by stakeholders.

1. Pathfinder developed mostly using company resources, both extensive use of internal resources over four years in addition to external support. Around 10% of costs were covered by NIA (to develop Pathfinder+ from Pathfinder).
2. Cost of development and use to date – supporting local communities – Swansea; Zero West; Cornwall has been £880k
 - a. Limited number of LAEPs to date to develop process – engaged with ESC/CSE over four years of development
3. Use of Pathfinder in future
 - a. Upgrading and maintaining model and data to ESC/CSE best practice
 Pathfinder plus meets many of the technical recommendations made in the paper ‘Local Area Energy Planning: The Method’ (August 2020).
 - The development of sensitivity analysis
 - Development of standard inputs
 - b. Improving wider aspects of system change to align with ESC/CSE guidance
 - i. Quality Assurance
 Pathfinder has unprecedented visibility to users by design and has been externally validated during its development. However, the ESC/CSE guidance requires ongoing quality assurance to demonstrate to each user that the results can be treated with confidence by stakeholders.
 - ii. Derive standard set of assumptions
 To avoid repetition, ESC/CSE recommend the formulation of a standard set of assumptions to act as a starting point for local analysis.
 - c. Implement a revised ‘social’ process to include:
 - i. Identifying and mapping local stakeholders
 - ii. Facilitated engagement with stakeholders
 - iii. Wider public engagement

- d. Scaling up use to larger numbers of LA's; CA's; Community Energy Groups
Over 40 local authorities and many community groups, town and parish councils in WWU's area have declared climate emergencies and WWU propose to offer a Pathfinder+ licence at no cost, in addition to support in its use.
 - e. Support Welsh Government and wider regional bodies
Devolved government have expressed their desire for support as well as combined authority groups and Local Enterprise Partnerships. Whilst smaller in number, more significant support is envisaged and requested.
- 4. Local Stakeholder guide to whole energy systems engineering
 - a. Develop whole energy systems engineering guide (for dummies type book)
Recent stakeholder engagement with six local authorities has identified the need for a guide to whole energy systems engineering. WWU propose to provide such a guide to our local groups and share nationally in this 'first of its kind' publication.
 - b. Develop simplified Pathfinder simulation tool to assist learning
Pathfinder and Pathfinder+ are complex models aimed at the expert user. WWU is developing a simplified tool to complement the whole energy system engineering guide to assist 'learning by doing'.
 - c. Work with LA etc to support understanding and use of whole energy system engineering 'Tool Kit'
- 5. Sharing Pathfinder with GDNs and DNOs
 - a. ENA standard set of assumptions and 2050 scenario
WWU propose working with ENA to develop a standard set of assumptions and a baseline 2050 scenario to provide a trusted starting point for regional/local planning.
 - b. Regional versions to add up to national scenario
WWU have offered to develop the national Pathfinder+ simulation into regional versions to ensure no gap between the two develops.
 - c. Roll out to GDNs/DNOs who want it
 - i. Provide free of charge licencing
 - ii. Offer training and coaching
 - iii. Upgrade the model over time – shared to maintain common approach
 - iv. Update standard assumptions with evolution
- 6. Value to consumers and society
 - a. A whole energy system study by consultants (using a model provided) costs in the region of £70k
 - b. Newcastle University independently valued Pathfinder and the whole systems data to organisations
 - c. Over 40 LA's in WWU area have declared climate emergencies to date
 - d. Dozens of Community Energy Groups and town/parish councils have also declared climate emergencies
 - e. Larger areas seeking support – LEPs; Welsh Government; Combined Authorities
 - f. The use of the whole energy system toolkit within Wales and the SW of England with support from WWU Pathfinder would save local groups an estimated £4.2m (assuming 60 organisations take up the tool kit and subsequent pathfinder use)
 - g. Nationally, 277 District, County, Unitary & Metropolitan Councils and 8 Combined Authorities/City regions had declared climate emergencies as of February 2020.
 - h. The value of WWU work could be estimated at £20m in avoided costs. (assuming 277 national organisations use the facility offered)

7. Stakeholder Support

WWU has developed Pathfinder with the support of local stakeholders such as Swindon Borough Council; the Swansea Bay region from a concept derived with Cornwall County Council. A number of specific local stakeholders are listed below to indicate the increasing surge of support being requested from WWUs Pathfinder simulator:

- a. IWA – the Institute of Welsh Affairs (2018). Pathfinder supported their work, Re-energising Wales, and the project director was complimentary of the Pathfinder model and WWUs role in explaining whole energy system interaction by use of the simulator.
- b. Devon County Council (2020-2022)
Draft climate emergency plan: Top three action – “Develop a holistic energy strategy for Devon”
- c. Welsh Government/Mid Wales (2020) – seeking support for the energy system elements of a proposed growth deal.
- d. Innovate UK project - BankEnergi (2020-2021) – Seeking support to test peer to peer trading against a whole system scenario
- e. Innovate UK project - Milford Haven: Energy Kingdom/Pembroke Council (2020 – 2022) WWU requested to support project using Pathfinder to assess the impact of the project on a wider energy system.
- f. ENA Networks (2020-2021) – As a spin off from the DNOs Open Networks project, WWU have been requested to support a 2050 Pathfinder baseline scenario to assess future strategies and sensitivities.
- g. Local DNO – Western Power Distribution – support for Bristol whole energy system project with West of England Combined Authorities (2020-2021)

Whole Systems Charter

To further demonstrate our commitment, we propose a whole systems charter which underpins our approach. The charter will commit us to work with all stakeholders to create customer focussed, least cost and joined up solutions to deliver net zero:

1. **Stakeholder engagement**
 Identifying stakeholders and partners in developing local and regional approaches. Understanding their needs and contribution. Acting as a bridge between local and national requirements, therefore engaging with National Grid as part of this process.
2. **Data and information sharing and innovative solution proposals**
 WWU commits to sharing available data with our partners to assist in designing whole system solutions. In GD1 we piloted this for the Swansea City Area project led by The Institute of Wales. Very positive feedback was provided by the project lead, and we plan to develop this approach in GD2 across all parts of our network. Of particular value was the derivation of heat demand, from street corner level to large regions.
3. **Whole system local area energy plans development**
 We have trialled licensing Pathfinder free of charge for non-commercial use in GD1 and will provide licenses to use it to develop Local Area Energy Plans. In GD1 we found significant support was needed to develop such plans and we propose offering this in GD2.
4. **Understand the customer value or 'business case'**
 WWU has evaluated the business case for its proposals using the Customer Value Proposition methodology described in the CVP chapter and appendices. The methodology developed compares different proposals that can provide the same whole system outcome. Proposed solutions can be evaluated on cost, carbon value or both. WWU will continue to develop this methodology and will offer to work with the electricity networks in our region to explore a common methodology to ensure investments proposed in GD2 cannot be achieved in a better way in ED2, or visa-versa. Work has begun with WPD on scoping such an approach to develop Local Area Energy Plans.
5. **Open the proposals to competition, including market solutions.**
 For the GD2 business plan WWU opened up the predicted shortfall in storage and capacity to the market by running an interruptions auction in the areas where decarbonisation investment was needed. WWU will continue to use this option to derive the best value solutions for consumers, noting that market solution may be better in the short term whilst decarbonisation solutions are developed. WWU have noted that electricity DNOs have started similar market options such as flexibility tenders. WWU will explore how these independent activities could dovetail to ensure a coordinated strategy.

It is also noted that Suppliers could have a valuable role in this market by incentivising consumers and energy suppliers to take a wider role in keeping network costs and investment down. We will engage with suppliers in GD2 in the same way we have maintained close links with projects that have started in GD1, such as Centrica's Local Market Initiative.

We propose to ask the Consumer Engagement Group to review our proposals and monitor progress against the charter on an annual basis.

In December, we also highlighted pilot work we had done and the evolution of the Pathfinder model.

- Pathfinder Simulator – A whole system simulation model - 2018
The Pathfinder simulator has been upgraded to Pathfinder Plus, which will be licenced at no cost to local organisations to develop agreed whole system solutions.
- Cornwall Energy Island – 2016
The first attempt to model a whole system, this project demonstrated how storage could enable a decarbonised county, but also how this could be unaffordable. It pointed the way to a balance of generation and demand, enabled by flexibility, which would include storage. In GD2, it enables the value of each element of a whole system, rather than cost.

Summary of CVP

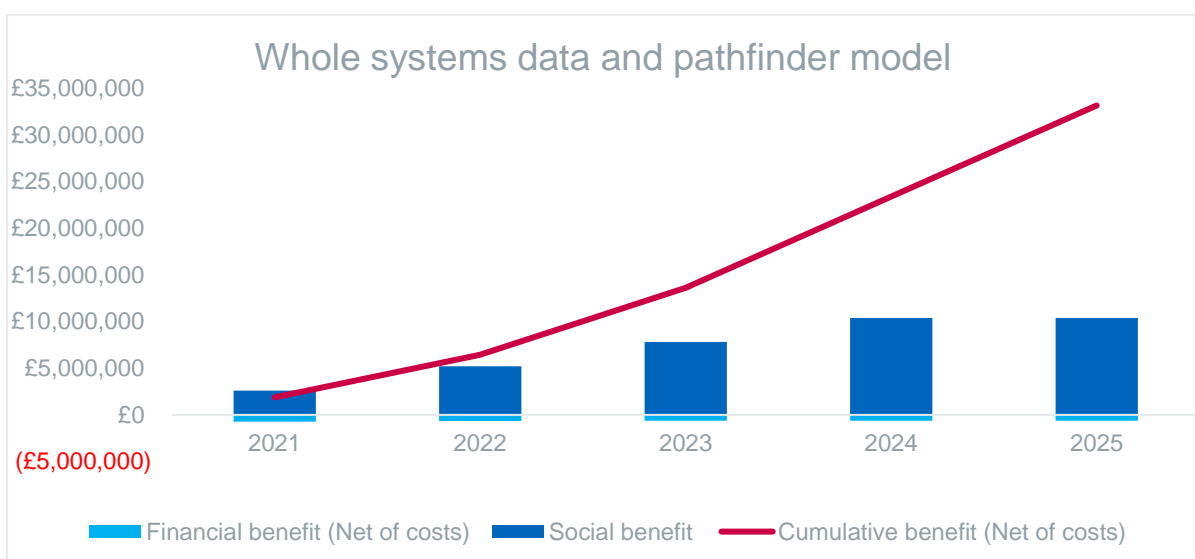
Costs and Benefits over RIIO-GD2

Commitment	Cost	Financial Benefit	Social Benefit	Net Present Value	Net Benefit per £ spent
2C20: Whole systems data and pathfinder model	£3,263,046	£0	£36,400,000	£26,493,017	£9.13

Net present value of costs and benefits over RIIO-GD3

Commitment	Net Present Value
Whole systems data and pathfinder model	£11,190,338

Cashflow over RIIO-GD2



Cost Benefit Analysis details

Costs

	Name	2021	2022	2023	2024	2025	Total
Financial costs	Cost of WWU experts' time including travel and accommodation	£595,000	£595,000	£595,000	£595,000	£595,000	£2,973,000
	Third party costs to develop and verify the Pathfinder model	£130,000	£50k	£30k	£0K	£0	£210,000
Costs per annum		£725,000	£645,000	£625,000	£595,000	£595,000	£3,183,000

- WWU will provide
 - Free of charge licencing of pathfinder model
 - Free training and coaching to organisations on using the model
 - Provision of guides on how to use the model
 - Upgrade the model over time to simplify use and ensure standard assumptions remain valid
- Over the course of GD2, the cost to WWU of providing over 5,170 hours to maintain and develop the Pathfinder model and to support organisations in using it on their projects is forecast to be £
- New guidance and best practice on Local Area Development plans how now been issued. We therefore expect that in order to ensure we continue to provide a model that meets the best practice guidance, and has the correct drivers, that we will continue to need an annual third party independent validation of the Pathfinder model and how it is used by third parties
- Costs over GD2 are estimated at £210,000
- A full breakdown of activity and costs is shown below. The table at above shows the expected phasing of these costs

Pathfinder roll out costs		2018/19 prices					Total GD1
		2022	2023	2024	2025	2026	
<i>Headcount</i>	FTE						
SM	1	119,446	119,446	119,446	119,446	119,446	597,230
G6 Specialist	2	189,582	189,582	189,582	189,582	189,582	947,908
G6 Engagement	2	189,582	189,582	189,582	189,582	189,582	947,908
<i>Travel and expenses - assumed UK roll out</i>		96,000	96,000	96,000	96,000	96,000	480,000
Total staff costs		594,609	594,609	594,609	594,609	594,609	2,973,046
<i>External expenses</i>							
A whole energy system study by consultants (using a model provided)		70,000					70,000
Upgrading model		100,000					100,000
Improving wider aspects of system change to align with ESC/CSE guidance		30,000					30,000
Develop whole energy systems engineering guide (for dummies type book)			50,000				50,000
Upgrade the model over time – shared to maintain common approach				30,000			30,000
Total external costs		200,000	50,000	30,000	-	-	280,000
Total Pathfinder roll out costs		794,609	644,609	624,609	594,609	594,609	3,253,046

Breakdown of costs

	Senior Manager (hours)	FOE Specialist (hours)	FOE Community Engagement (hours)	Outsource costs
Ensure Pathfinder plus meets many of the technical recommendations made in the paper 'Local Area Energy Planning: The Method' (August 2020). RIIO GD2 year 1	30	90		£100,000
Improving wider aspects of system change to align with ESC/CSE guidance RIIO GD2 Year 1	30	90		£30,000
Pathfinder has unprecedented visibility to users by design and has been externally validated during its development. However, the ESC/CSE guidance requires ongoing quality assurance to demonstrate to each user that the results can be treated with confidence by stakeholders.	20	100		

Identifying and mapping local stakeholders	30	60	300	
Facilitated engagement with stakeholders	20	40	185	
Wider public engagement	20	40	185	
Scaling up use to larger numbers of LA's; CA's; Community Energy Groups	96		720	
Support Welsh Government and wider regional bodies	75	300	300	
Develop whole energy systems engineering guide (for dummies type book) RIIO GD2 Year 2	25	300	100	£50,000
Develop simplified Pathfinder simulation tool to assist learning	10	100	25	
Work with LA etc to support understanding and use of whole energy system engineering 'Tool Kit'		300	300	
Sharing Pathfinder with GDNs and DNOs		180	180	
ENA standard set of assumptions and 2050 scenario	20	130		
WWU propose working with ENA to develop a standard set of assumptions and a baseline 2050 scenario to provide a trusted starting point for regional/local planning.	20	150		
Offer training and coaching to GDNs and DNOs		70	130	
Upgrade the model over time – shared to maintain common approach RIIO GD2 Year 3		200		£30,000
Update standard assumptions with evolution	50	150		
Total (hours)	446	2300	2425	
Costs				£210,000

Benefits

	Name	2021	2022	2023	2024	2025	2026	2027	2028
Social	Valuation of sharing whole systems data free of charge	£1,400,000	£2,800,000	£4,200,000	£5,600,000	£5,600,000	£4,200,000	£2,800,000	£1,400,000
	Valuation of sharing Pathfinder model free of charge	£1,200,000	£2,400,000	£3,600,000	£4,800,000	£4,800,000	£3,600,000	£2,400,000	£1,200,000
Social benefits per annum		£2,600,000	£5,200,000	£7,800,000	£10,400,000	£10,400,000	£7,800,000	£5,200,000	£2,600,000

- Over GD1, the estimated value of shared information, support and modelling provided to the Supergen Hub by WWU was estimated by Newcastle University to be £1.9 million¹ over a four-year period. This is broken down as follows:
 - Data (estimated value of £700k over the lifetime of the hub or £175k per year)
 - WWU has detailed temporal and spacial heat demand data aggregated from residential and commercial properties derived from gas demand data.
 - Geospatial data within our region of the gas supply network.
 - Current diurnal storage data related to gas usage.
 - Industrial demand data.
 - Provision of models (estimated value of £1.2m over the lifetime of the hub or 300k per year)
 - The WWU 2050 Energy Pathfinder Tool – a power, heat and transport integrated energy simulator.
 - Gas network design models (Synergy)
 - An investment model that determines how renewable energy can be supported using the existing gas network.
 - A whole energy system study by consultants costs in the region of £70.
- WWU estimates that it will deliver 40 similar data sharing projects over GD2, 8 per year on average. It is assumed that 8 of the projects per year will involve data sharing only and 4 projects per year will involve both data sharing and provision of models.
- We have assumed that on average the projects will be delivered over a four-year period and the benefits will be evenly distributed across each year. For data sharing projects this equates to £175k * 8 = £1400k per year and for the data sharing + model provision projects, this equates to £475k * 4 = £1.9 million per year.

¹ These figures have been provided by Chris Clarke, Director of Asset Management, Safety and Environment at Wales & West Utilities based upon work done by Newcastle University

- All of the projects will be set up over the course of GD2, however, as the benefits are realised over a four year period, a portion of the benefit will only be realised in the early part of GD3 (e.g. projects starting in 2025 will deliver benefits through 2028).
- We have assumed that the benefit of providing data sharing initiatives at no cost will be to the advantage of wider society and not only WWU customers, as such this has been classified as a social benefit.

Sharing the learning

WWU have a track record of sharing the learning from projects under the NIA, and also promoting its work towards net zero.

We propose to share out experience and learning from using the Pathfinder model and sharing whole systems data in a number of ways:

- Annual RRP reports
- Via WWU stakeholder network
- National forums
- Welsh Government forums
- Webinars