Appendix 13C: Net Zero Consumer Value Proposition

December 2019

REPORTS

WALES&WEST UTILITIES

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Overview of Consumer Value Proposition

Commitment name

Delivering a net zero ready network by 2035

Description

Wales & West Utilities have valued the Consumer Value proposition for a number of elements of the Business Plan which are above Minimum Requirements.

We have separated the Future of Energy CVP as the investment proposed is associated with an uncertainty mechanism and the investment is not in our base costs.

We have produced three models which are detailed in this appendix. They are:

- Supporting Renewable Power Generation
- Supporting Green Gas entry and decarbonisation of heat
- Supporting the decarbonisation of transport

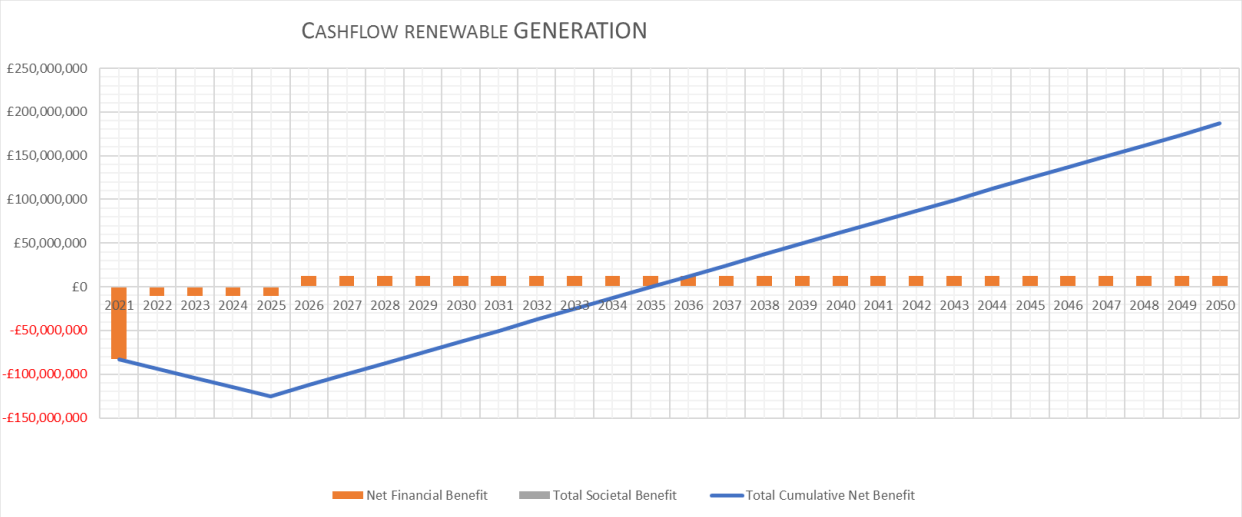
For each model, we describe the financial assumptions we have made, and the social proxies.

1. Renewable Power Generation

Costs and Benefits to 2050

Commitment	Cost	Financial Benefit	Social Benefit	Net Present Value	Net Benefit per £ spent
Flexible Generation	£114.8m	£40.5m	£0	£40.5m	£0.40

Cashflow profile



Summary of CBA inputs

	Name	Description	Value (£)	Source[1]	Probability	Source for probability
Costs						
Cost	Investment in network	WWU will invest an additional £114m in GD2 to reinforce the transmission and distribution pipelines and upgrade Pressure Reduction Installations	£114m	WWU estimate	N/A	N/A
Cost	System Operability	Smarter controls and dynamic operation	£0.8m	WWU estimate	NA	NA
Benefits						
Financial	Battery Costs	The cost of batteries to support 12GWH of flexible generation with replacement cycle of 15 years	£3.6bn	WWU estimate	N/A	UKPN Leighton Buzzard project
Financial	Cost of building gas fired power generation sites	Cost of building the gas fired power generation sites and replacement of engines every 22 years	£2.25bn	WWU estimate	N/A	Engagement with developers including Green Frog, Welsh Power
Financial	Net Benefit	The cost of batteries less the cost of the gas fired power generation sites	£1.35bn	UK Power[2]	N/A	N/A

[1] Further information on sources is provided in the Cost Benefit Analysis details section
[2] https://www.ukpower.co.uk/business-energy/average-business-energy-bills

Cost Benefit Analysis details

Costs

We propose investing (via an uncertainty mechanism to protect consumers) to enable 1.5GW of gas engine flexibility. Assuming that runs for 8 hours during stress periods (current practice is 10 hours), that's 12GWh of flexibility (that compares with WWU linepack of 58GWh).

An alternative that many advocate is the use of batteries, so to understand the value of the WWU investment, battery storage has been used. Previous investment cost for grid scale batteries from UKPN (Leighton Buzzard) were £1.0m/MWh, which give us a value of £12bn. Assuming batteries costs plummet to 1/10th of that, the value of our investment in flex is £1.2bn. This kind of investment would have to be repeated say every 15 years as the batteries decay. So over 45 years (the life of the WWU investment), that's an investment of £3.6bn. We have therefore modelled £1.2bn of battery investment in GD2 and replacement of those batteries in a five year period from 2036 at another £1.2bn.

Set against this will be the cost of a developer constructing the generation plant. Due to decreasing load factor, and short operating periods, this is likely to be provided via reciprocating engines, typical of the recent connections to the WWU network. These internal combustion engines are estimated to cost £1.013m/MW (https://www.eia.gov/outlooks/aeo/assumptions/pdf/table_8.2.pdf). For 1.5GW, the capital cost is £1.5bn. We have modelled this investment of £1.5bn in GD2 with a replacement of the engines after 22 years at a cost of £750m.

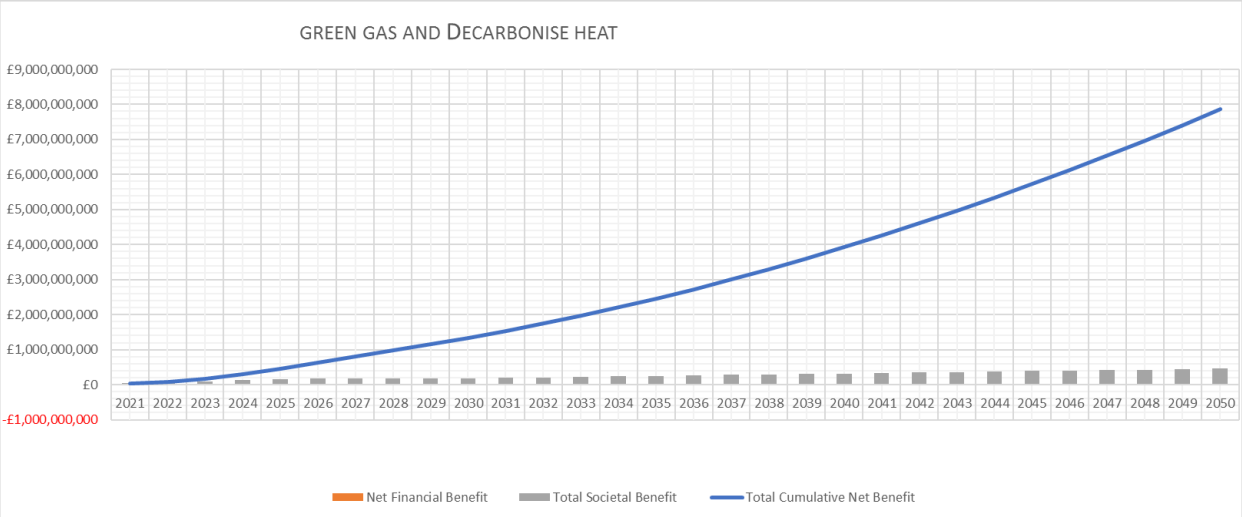
We are forecasting continuation of the growth in flexible power generation in our network throughout GD2

2. Summary of Green gas and decarbonisation of heat

Costs and Benefits to 2050

Commitment	Cost	Financial Benefit	Social Benefit	Net Present Value	Net Benefit per £ spent
Green Gas and decarbonisation of heat	£19m	£438m	£3.706bn	£4.161bn	£246

Cashflow profile



Summary of CBA inputs

	Name	Description	Value (£)	Source[3]	Probability	Source for probability
Costs						
Cost	Investment in network	WWU will invest an additional £18.2m in GD2 in Compressors and Smart Systems	£18.2m	WWU estimate	N/A	N/A
Cost	System Operability	Smarter controls and dynamic operation	£0.8m	WWU estimate	NA	NA
Benefits						
Financial	Customer bills	Additional costs to customer annual energy bills for other technologies. Based upon 480,000 homes benefiting from our GD2 investment.	£480		N/A	NA
Societal	Cost of Carbon	The cost of carbon of the green gas entry we will enable through our GD2 investment of 9.54TWH	BEIS price of carbon used in Ofgem CBA models £73 in 2021	BEIS	100%	Ofgem CBA models

[3] Further information on sources is provided in the Cost Benefit Analysis details section

Cost Benefit Analysis details

Costs

The savings per annum to the consumer of following a regional approach advocated in WWU vision and business plan has been calculated as £480/annum (http://www.energynetworks.org/gas/futures/gas-decarbonisation-pathways/pathways-to-net-zero-report.html). The investment in GD2 will enable 480,000 consumers to decarbonise their heating system.

Multiple parties are required to deliver the overall vision and whilst WWU investment will be central to the vision, we have identified the following who this value should be attributed to:

1. WWU as gas transporter, connecting, storing and distributing green gas such as biomethane and hydrogen.
2. Green gas plant produces – they will need to invest in production facilities
3. Renewable electricity generators – they will invest in wind turbines
4. DNOs, for example WPD, who will facilitate the connection and distribution of renewable electricity
5. Consumers – will need to install low carbon hybrid heating technology
6. Passiv Systems – who have developed the smart software that enable hybrid heating systems
7. Innovation investment – has and will continue to facilitate

The role each party plays in this transformation may vary, but for the purposes of this analysis, WWU have allocated equal shares to each party. We have therefore valued 1 / 7th of the benefit of the financial savings to customers.

There are also carbon savings associated with the green gas. The carbon cost savings have been calculated using the BEIS non-traded cost of carbon starting at £73 in 2021. UKCCC have recently valued carbon in much higher terms to deliver Net Zero, but we have maintained the BEIS figure.

In terms of timing, the benefits for customers will start in 2023

Innovation – decarbonisation of heat

We have used the same model as for heat but just valued the 1/7th of financial benefits for customers out to 2050.

Innovation investment on decarbonisation of heat £10m in GD2.

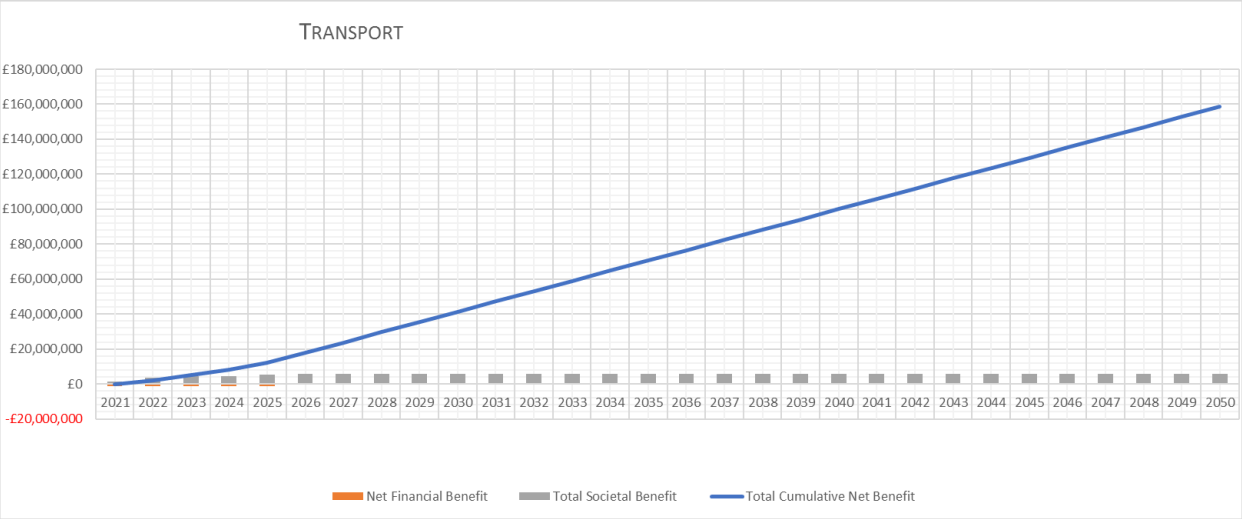
This delivers a NPV benefit of £39m in GD2 and of £446m out to 2050.

3. Summary of Transport

Costs and Benefits to 2050

Commitment	Cost	Financial Benefit	Social Benefit	Net Present Value	Net Benefit per £ spent
Transport	£7.1m	£0	£92m	£92m	£14.60

Cashflow profile



Summary of CBA inputs

	Name	Description	Value (£)	Source[4]	Probability	Source for probability
Costs						
Cost	Investment in network	WWU will invest an additional £6.3m reinforcing the gas network	£6.3m	WWU estimate	N/A	N/A
Cost	System Operability	Smarter controls and dynamic operation	£0.8m	WWU estimate	NA	NA
Benefits						
Societal	Cost of carbon	Cost of avoided carbon emissions from vehicles	£73 / tonne in 2021	BEIS	N/A	Ofgem CBA models
Societal	Nitrous oxide reduction	Avoided costs associated with NOx emissions from vehicles	£1000 / tonne	Sia partners modelling	N/A	NA

[4] Further information on sources is provided in the Cost Benefit Analysis details section

Cost Benefit Analysis details

The investment proposed is to facilitate the connection of compressed methane gas (CMG) filling stations. It is not though there is significant cost benefit associated with the work but is driven by carbon and clean air strategies.

It is forecast that 7,500 large vehicles (buses and tracks) will be operated on CMG by the end of 2026. The carbon cost savings have been calculated using the BEIS non-traded cost of carbon starting at £73 in 2021. UKCCC have recently valued carbon in much higher terms to deliver Net Zero, but we have maintained the BEIS figure.

The move to CMG vehicles also reduces the Nitrous Oxide emissions from vehicles which are valued at £1/kg or £1,000 tonne.

In the case of transport, other parties are required to achieve these results and the following have been identified to attribute the value:

1. WWU as gas transporter, below 7 bar reinforcement
2. Filling station Operators – who will invest in the filling stations and operate them
3. Bus/Truck operators – who will buy and operate CMG vehicles.

The role each party plays in this transformation may vary, but for the purposes of this analysis, WWU have allocated equal shares to each of the three parties.

We are forecasting to see a steady role our of CMG filling stations and a growth of vehicles throughout GD2.