Show and Listen:

Sharing Ideas for the Constraints Collaboration Project

9 February 2024

ESO

Introduction

Introduction: Agenda

Contents	Duration
Introduction	5 mins
Amp Clean Energy Presentation by Niall Stuart and Stuart Reid	5 mins
Eneus Energy Presentation by Dominic Serpe and Alan Mortimer	5 mins
Discussion	15 mins
Scottish Renewables Presentation (supported by The Energy Landscape) by Simon Gill	5 mins
Discussion	15 mins
AOB	5 mins

Introduction: Objective

Objective of today's show and listen

1. To give an overview of the market-based solutions proposed by the industry so far

2. To provide industry the opportunities to have their say and ask questions

Industry Solutions for Thermal Constraints

Summary of market-based solutions submitted by Industry

Project Name	Organisation	Overview of Solution	Solution is intended to	Page
Increasing demand for power in constrained areas	**Amp Clean Energy**	**Amp Clean Energy proposed a model whereby ESO would contract with flexible demand to import power for a certain number of hours each year at a certain price**. This would support the shift to electrification in areas of constraint and save money to consumers, through providing a revenue floor to flexible demand. This could also be banded, eg 1,000 hours @ £x, next thousand hours @ £y etc to improve VfM	• Reduce overall volume of ESO actions • Reduce overall costs to consumers	7
Flex PtX in Scotland	**Eneus Energy**	**Eneus Energy stated new flexible PtX production projects north of B6 will utilise large volumes of otherwise curtailed energy to produce green hydrogen** and related derivatives such as ammonia and sustainable fuels	• Reduce overall volume of ESO actions • Reduce overall costs to consumers	8
Constraints management markets (CMMs)	**Scottish Renewables (supported by The Energy Landscape)**	**Proposed Constraint Management Markets, consisting development of short term (day ahead / intra day) and long term (months / years) constraint management markets.** Constraint management markets (CMMs) could be for turn-down and actions behind a constraint and turn-up actions in front	• Reduce overall costs to consumers	10

1. Increasing demand for power in constrained areas

Date: 29/01/2024
Organisation: Amp Clean Energy

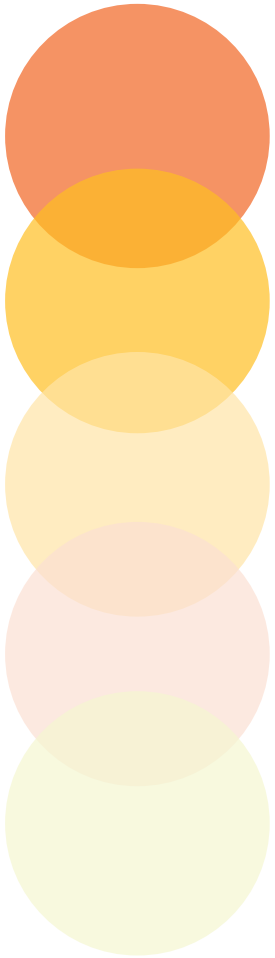
Areas of Discussion	Feedback
Overview	• *Amp Clean Energy proposed a model whereby ESO would contract with flexible demand to import power for a certain number of hours each year at a certain price. This would support the shift to electrification in areas of constraint and save money to consumers, through providing a revenue floor to flexible demand. This could also be banded, e.g. 1,000 hours @ £x, next thousand hours @ £y etc to improve value for money* • *The rationale is that there is around 1GW of manufacturing heat demand currently being met through fossil fuels which could be electrified* • *This proposed solution aims to: reduce overall volume of ESO actions and reduce overall costs to consumers*
Value to ESO Market Design Framework	• ***Value to the consumer (Value for Money):*** • *Lower cost than status quo (e.g. constraining off wind)* • *Lower levels of investment in transmission infrastructure as a result of increased 'local' demand reducing need for greater 'export' capacity* • *Optimised usage of existing grid infrastructure* • *Greater use of renewable generation capacity* • ***Value to the control room (Efficient Dispatch):*** *Increased suite of options when it comes to balancing network in constrained areas, both in terms of geography but also in terms of technology* • ***Value to the provider (Efficient Investment):*** *Lower decarbonisation cost* • ***Carbon saving value*** **(helps 2035 target)*:*** *Reduced carbon emissions from industry, at lower cost than alternatives such as hydrogen and CCUS. Amp Clean Energy calculated that 1GW of flexible industrial demand would save 185 tCO2 per hr in which renewable displaces fossil fuel*
Impact and Implementation	• *This proposed solution provides long duration demand than that provided by BESS* • *Potential challenges include grid costs for electrification projects which are significantly greater than staying on gas as a result of DUoS and TNUoS residual amongst other things, and connection costs.* • *In addition, projects importing power have to pay Final Consumption Levies to meet the costs of support for renewables through CfD, RO and FiT (around £45 per MWh). Lastly, the costs of power per unit compared to gas are around 5x – these all make electrification challenging* • *Ideal contract timeline is T-2, with tenor that would depend on the price per MWh and numbers of hour contracted per year* • *Proposed price to be set on a quarterly or six-monthly tender* • *Lead time is as soon as now. Amp Clean Energy have financed and are constructing one project which is underpinned by use of biomass and the RHI at Simpsons in Berwick*

2. Flex PtX in Scotland

Date: 05/02/2024
Organisation: Eneus Energy

Areas of Discussion	Feedback
Overview	• *New flexible demand in Scotland could ease constraints however current mechanisms do not provide strong enough locational signals for such demand to be investable* • *Facilitating investment in new flexible PtX production projects north of B6 will utilise large volumes of otherwise curtailed energy to produce green hydrogen and related derivatives such as ammonia and sustainable fuels. These production merits particular focus for ESO due to strict additionality requirements which require hourly matching of H2 production with renewable power production thereby directly addressing imbalance issues which in Scotland are very largely driven by variations in wind output. Such projects also provide benefits in terms of scale, rate of growth, savings for ESO and consumers, and alignment with 2035 grid decarbonisation and 2050 net zero objectives* • *This proposed solution aims to: reduce overall volume of ESO actions and reduce overall costs to consumers*
Value to ESO Market Design Framework	• ***Value to the consumer (Value for Money):*** *The energy is purchased at a low enough price to enable investment in production of hydrogen and ammonia in Scotland, whilst reducing costs for the ESO to balance the network thus lessening the impact of BSUoS charges. Eneus Energy studies suggest that these cost savings could be around £100m pa. per 1GWe of production, based on current curtailment volumes, rising further by 2030* • ***Value to the control room (Efficient Dispatch):*** *P2X plant will follow wind production profiles on an hourly matching basis. The latest generation of electrolyser technology also has the ability to ramp up & down on shorter timeframes to help with system stabilisation* • ***Value to the provider (Efficient Investment):*** *Provide long term investment signals of sufficient robustness and magnitude to facilitate funding, construction and operation of new flexible P2X plant at locations north of the B6 boundary. Each 1GWe plant will create capital investment of some £2bn-£3bn along with in excess of 100 long term jobs (plant lifetime is 30years+)* • ***Carbon saving value*** **(helps 2035 target)*:*** *1GWe green hydrogen and/or ammonia plant will reduce global carbon emissions by over 1 Mtpa*
Impact and Implementation	• *This project could provide other value to the system, supporting the control room with system stabilisation and dealing with unplanned outage issues and stress events. Droop control is possible and reactive power services can be provided* • *Potential challenges with implementation include the interface between this scheme and the existing RO and CfD regimes. This will need to be carefully considered to ensure workability for wind generators and that the benefits for consumers are fully maximised* • *Ideal contract timeline is T-2 ahead of earliest COD with a possible extension of up to 4 years. The ideal tenor is 10 - 15 years as per investor requirements given alignment with debt repayment terms* • *Prices could be set either through bilateral negotiations, or by tendering. Equally important to price is the volume of discounted energy available.* • *Early visibility of product structure in 2024 and the contract needs to be ready for signing at FID as part of the process where all parties, including funders, commit to the construction of the project. This means contract awards from 2025 onwards*

Discussion



How can we make sure that this is value for money for the consumer?

How can we make sure that this is technology neutral, promoting competition and accessible to as many customers as possible?

How will this make it easier for the ESO to efficiently plan and operate the system?

What changes are required to deliver this solution?

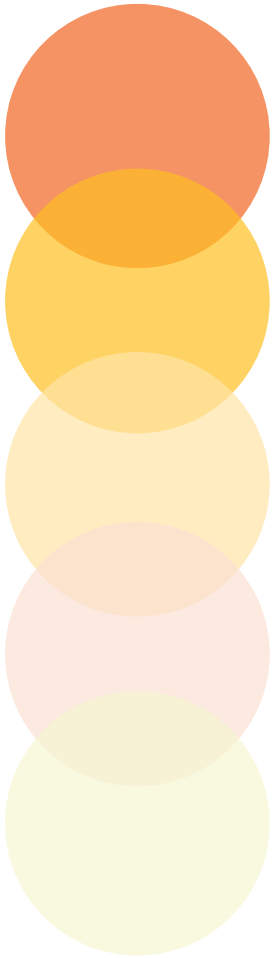
Pros/Cons

3. Constraints management markets (CMMs)

Date: 30/01/2024
Organisation: Scottish Renewables (supported by The Energy Landscape)

Areas of Discussion	Feedback
Overview	• *The proposal is to develop a constraint management portfolio which would include a number of tools available to the ESO over a range of timescales from decade ahead up to gate closure. Specifically, it would include (a) long term CMMs or contracting over timescales of a few months to several years and (b) short term CMMs at day ahead and intra-day timescales. CMMs could be for turn-down and actions behind a constraint and turn-up actions in front. They could draw a greater number of participants into the provision of constraint management and provide more flexibility to the ESO through the use of availability / utilisation contracting* • *This proposed solution aims to: reduce overall costs to consumers*
Value to ESO Market Design Framework	• ***Value to the consumer (Value for Money):*** *The potential to reduce the price and the possibility to better manage constraint risk. For example, the portfolio and constraint management markets can draw in a greater number of cheaper providers. The use of availability / utilisation payments in both short and long term CMM can provide a hedge for consumers against price uncertainty on certain volumes of constraints* • ***Value to the control room (Efficient Dispatch):*** *The short term CMM can help build confidence of dispatch or of availability with pre-defined prices for utilisation for particular assets from day-ahead onwards. This gives the control room visibility earlier in the run in to gate closure and a pre-defined set of constraint management actions (with prices) ready to dispatch* • ***Value to the provider (Efficient Investment):*** *It will create the first real clearly defined 'constraint' revenue stream for developers capable of relieving constraints, with the appropriate locational signal to invest in the right location in order to access the revenue stream. The long-term constraint management contracting element of the portfolio can provide a clear revenue stream, or cost-fixing mechanism for developers of flexible demand or energy storage* • ***Carbon saving value*** **(helps 2035 target)*:*** *The mechanism is expected to support the development of energy storage (potentially longer duration than currently supported by ancillary service markets), and new forms of electrified demand such as hydrogen electrolysis. Both of these will lead to carbon savings across the energy system*
Impact and Implementation	• *Many assets supported would likely be capable of providing other ancillary services* • *Potential challenges with implementation include forecasting constraints effectively, gaming risks between a CMM, the wholesale market and the BM, and additional challenge involving interconnectors* • *Ideal contract timeline is day ahead and intraday contracting for short term CMM and potentially from month ahead to multiple years ahead for long term CMM. Tenor is still yet to be determined* • *Prices could be set through competitive tendering or auctions* • *Lead time is still yet to be determined and the report for CMM can be found here*

Discussion



How can we make sure that this is value for money for the consumer?

How can we make sure that this is technology neutral, promoting competition and accessible to as many customers as possible?

How will this make it easier for the ESO to efficiently plan and operate the system?

What changes are required to deliver this solution?

Pros/Cons

AOB

ESO