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BiTraDER Workshop
9th February 2023
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Agenda

ENWL Innovation 10.05 – 10:15	Flexibility and BiTraDER 10.15 – 10.30	Trading Rules 10.30 – 12.30	Lunch 12:30 – 13.45
Control Room Tour 12:30 – 13.45	Trading Rules (cont'd) 13:45 – 14.30	Platform Functionality 14.30 – 15.15	Wrap up & next steps 15:15 – 16.00

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Meet the Team

electricity north west Bringing energy to your door	ELECTRON	AFRY	LCPDelta
Project lead, integration with real time systems and trial management	Development of the market trading platform and trial management	Development of the market trading rules and assessment of the business case	Management of the customer engagement
Geraldine Paterson Liz Pattison Keith Evans Ben Ingham	Emilis Srage Nicola Waters	Stephen Woodhouse Simon Bradbury Gauthier LeTraon Katie Potter	Oliver McHugh Alice Cheetham Laurence Robinson

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Innovation at ENWL

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Who are Electricity North West?

Operate and maintain over 56,000km of network

2.4 million connections

Supply around 5 million customers

Diverse geographical area

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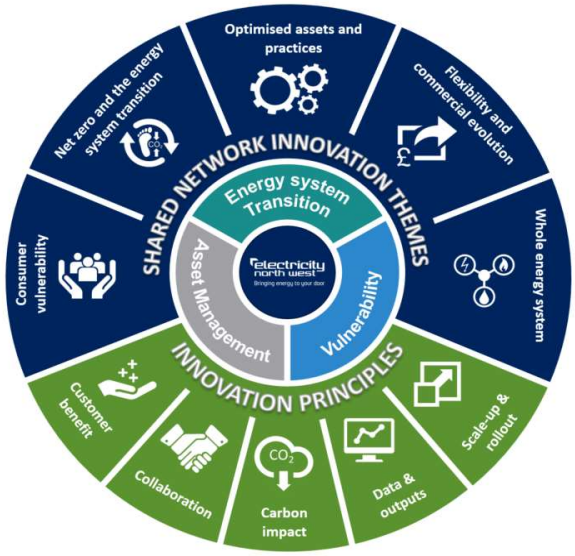
Innovation Strategy



Innovation funding

RIIO-ED1 (2015 – 2023)		RIIO-ED2 (2023 – 2028)	
Network Innovation Allowance	Network Innovation Competition	Network Innovation Allowance	Strategic Innovation Fund
Annual “use it or lose it” allowance	Central fund for big projects Annual Competition	3 year “use it or lost it” allowance Focus on DSO transition and customer vulnerability	Challenges to be set by Ofgem Bids to be submitted to address challenge

Second Tier LCN Fund/NIC projects

Business as usual	C2C, CLASS, SMART STREET
Complete and transitioning to business as usual	Celsius, RESPOND
In-flight	QUEST (Overarching Control System), BiTraDER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Flexibility – The Big Picture
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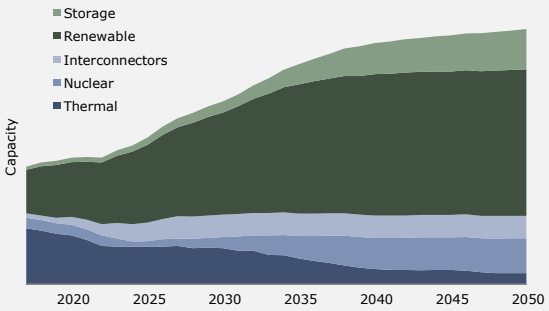
EVOLUTION OF GENERATION MIX

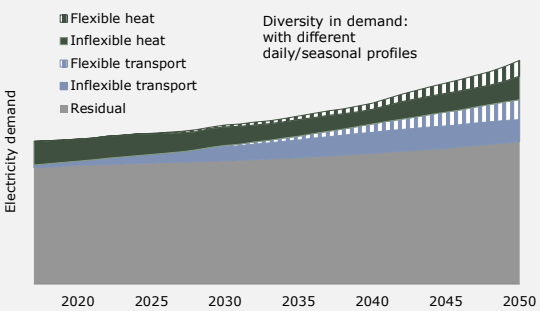
Energy market paradigm is changing due to economy-wide decarbonisation using electrification, renewable resources and other new technologies

The decarbonisation targets will lead to an increase of renewables and a phase-out of conventional flexible generators

The demand for flexibility will grow

More of this flexibility will be located at lower voltage levels

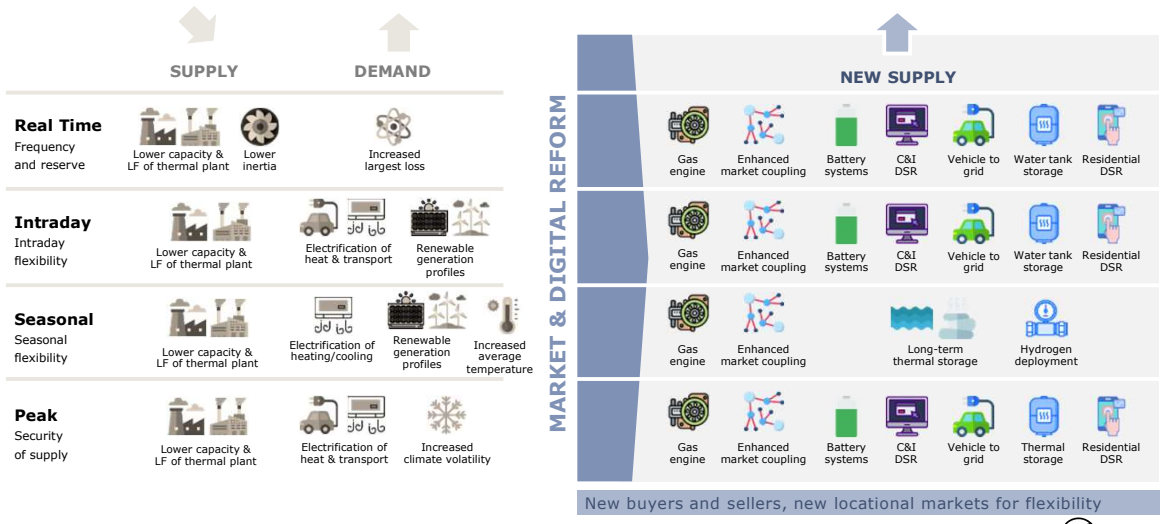




Source: AFRY analysis, Fully decarbonising Europe's energy system by 2050

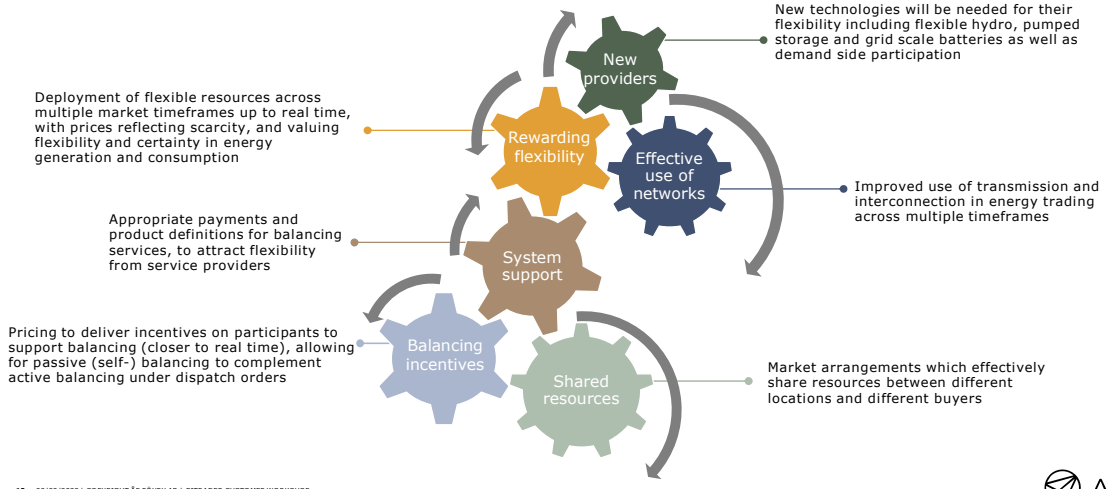
BUILDING THE FUTURE ENERGY SYSTEM

Flexibility will be the key attribute of the future electricity system



FUTURE MARKET DESIGN

Renewable grid integration will require flexibility from a range of actors over various timeframes and locations



New technologies will be needed for their flexibility including flexible hydro, pumped storage and grid scale batteries as well as demand side participation

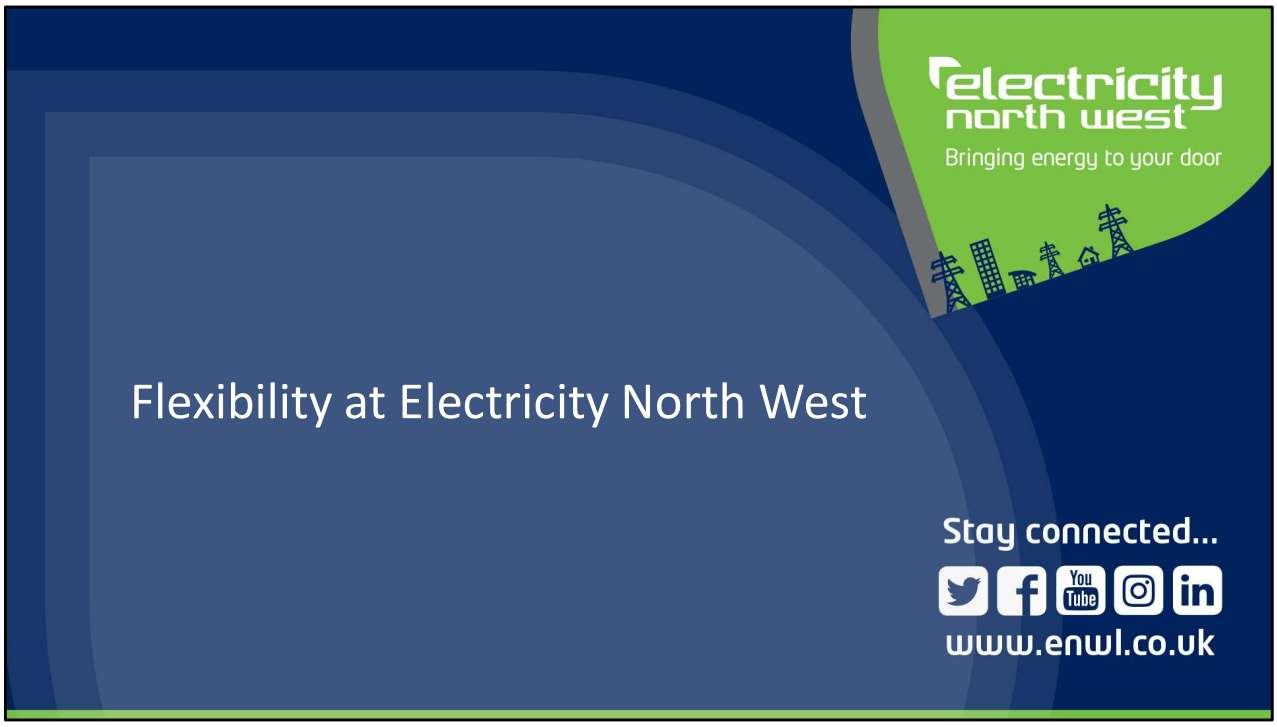
Deployment of flexible resources across multiple market timeframes up to real time, with prices reflecting scarcity, and valuing flexibility and certainty in energy generation and consumption

Improved use of transmission and interconnection in energy trading across multiple timeframes

Appropriate payments and product definitions for balancing services, to attract flexibility from service providers

Pricing to deliver incentives on participants to support balancing (closer to real time), allowing for passive (self-) balancing to complement active balancing under dispatch orders

Market arrangements which effectively share resources between different locations and different buyers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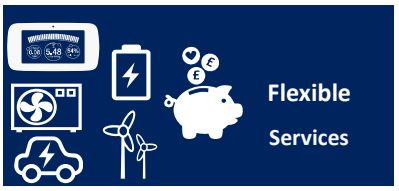
Flexibility Definitions

There are three types of Flexibility which ENWL use:

Flexible Connections

Contractual arrangements are established as part of the customers connection agreement that allow ENWL to signal a curtailment of demand or generation to resolve network constraints. Customers will generally be given a flexible connection where: offering a non-curtailable connection would require network reinforcement; which has cost and time implications on them being connected.



Flexible Services

ENWL purchased demand side response services from distributed energy resources to provide services for demand turn down, and demand turn up to alleviate network constraints. These services are used to defer and avoid reinforcement, as well as to allow other customers to connect faster and cheaper to the network. These services can be provided from Demand, Generation, and Energy Efficiency measures

Flexible Assets

These are ENWL owned and operated assets which can be controlled e.g. tap changers, capacitors, circuit breakers, switches. By changing the network topology we can alter power flows alleviating constraints.

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Flexible Connections

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Flexible Connections

Curtailable (under system normal conditions)	System Normal	Export Limiting	Import Limiting	Timed
A connection which can be disconnected or constrained when there are network overloads or restrictions affecting the network supplying the customer whilst the network is operating in an intact, system normal state.	A system normal connection can be disconnected or constrained when there is an abnormal network operating condition affecting the network supplying the customer e.g. circuits, switchgear etc..	A connection where the installed generation equipment has a greater export capability than that which has been agreed to be exported onto the Electricity North West distribution system. It is the responsibility of the customer to limit their export (EREC G100)	A connection where the installed equipment has a greater import capability than that which has been agreed to be imported from the Electricity North West distribution system. It is the responsibility of the customer to limit their import (EREC G100)	A connection arrangement where connection capacity is subject to restrictions within specific time periods. It is the responsibility of the customer to limit their import/export during these period.

Flexible connections controllable by ENWL

- All connections to the network ultimately will have a level where they may be curtailed or disconnected from the network.
- The requirements for curtailment can be cause by a number of factors: Faults, Maintenance, Transmission Constraints, thermal overloads, voltage issues, high fault levels, safety requirement etc….
- A customers level of risk to curtailment is generally defined by the “security of supply” they have agreed to.

Within BiTrader we refer to connections being:

Curtailable - under system normal conditions:

A connection where the agreement is that the sites import or export can be reduced even when the network is operating within its normal running state/healthy operating conditions. Generally constraints will occur during peak generation or peak demand periods. These connections will also be curtailed under system abnormal conditions.

These have a high likelihood and frequency of being curtailed multiple times per year; especially within peak demand and generation periods.

Non-curtailable - under system normal conditions

These connections will not be curtailed in the event that the network is operating within its normal running state/healthy operating conditions. These connections however could be curtailed/disconnected in the event of abnormal running conditions.

These connections have a lower likelihood of being curtailed

MOM

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MOM & ANM

ANM

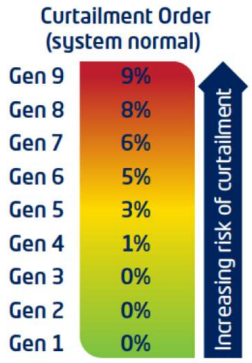
- ENWL are implementing an Active Network Management System (ANM) in order to automate some network control aspects of operating the network – Akin to autopilot on an aeroplane.
- Active Network Management (ANM) connects separate components of a smart grid such as generators, storage devices, controllable demands etc., by implementing software to monitor and control the operation of these devices.

MOM

- An external component to the ENWL Active Network Management system is the Merit Order Management (MOM) system.
- This system holds contractual data for all flexible connections and flexibility services, which the ANM system can send dispatch signals to request a change in the site's import or export.
- The MOM system will send a merit order list to the ANM system on a regular basis which determines the order in which flexible resources are to be dispatched when the ANM system has detected a network constraint.
- When we implement ANM; we will publish a methodology statement describing how the ANM system executes the merit order, dictated by the MOM system. In RIIO-ED2 this statement will be reviewed annually with stakeholders and updated as required.
- A customer has to be registered in MOM and appear on the Merit Order list, to be controllable by ANM

Merit order list creation

Curtailment Index stacking for flexible connections



Category	Network status	Flexible resources within the merit order list
1	System normal	Unfirm and constrained connections for normal running arrangements (N-0) Pre-fault flexible services (Sustain, and Secure)
2	System abnormal, N-1	N-1 Unfirm connections for any abnormal running conditions Post fault services for N-1 conditions (Dynamic, Restore)
3	System abnormal, N-2	Firm connections for first abnormal running condition (N-2) Post fault services for N-2 conditions (Dynamic, Restore)
4	System abnormal, N-3	Firm connections for second abnormal running condition (N-3) Post fault services for N-3 conditions (Dynamic, Restore)

Dispatch Order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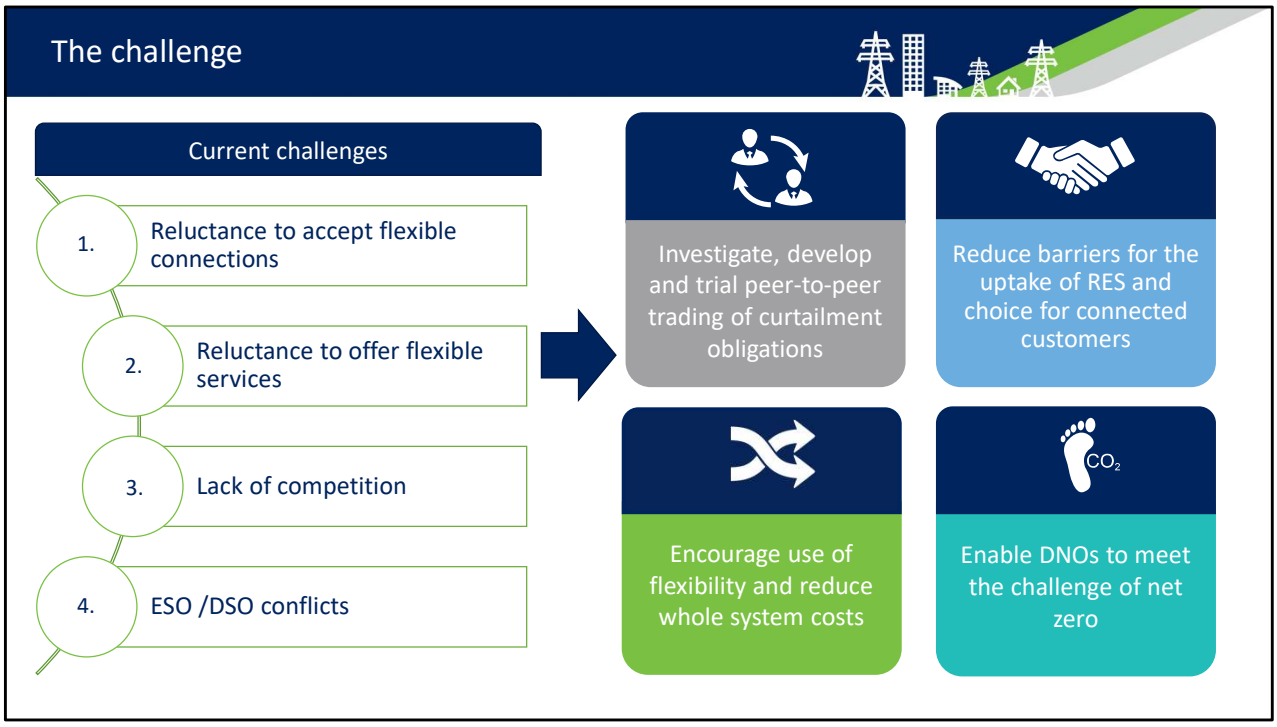


Today the challenges were facing/seeing are

- customers are reluctant to accept a non-firm or flexible connection because the risk of curtailment can undermine the business case for the connected asset
- Existing "firm" customers are also reluctant to offer flexible services due to long-term commitment required and may prefer arrangements where they can participate on an 'ad hoc' basis
- Lack of competition and market liquidity means there are higher costs for flexible services - which everyone pays for
- Because of the current approach to flexibility, we've seen some operational and contractual conflicts between DSO and ESO, where we could be working better together
- There's also no current method to optimize the stack dynamically

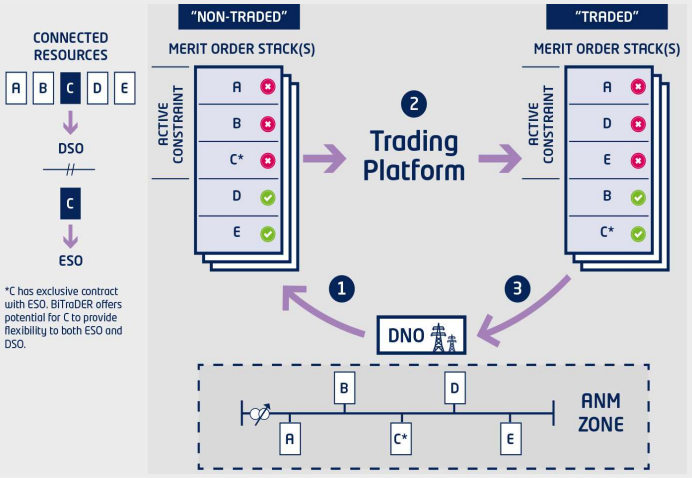
BiTraDER's aims are to:

- Investigate, develop and trial an innovative method enabling peer-to-peer trading of curtailment obligations
- Reduce barriers for the uptake of RES and choice for connected customers (to de-risk their connection and opportunity for new revenue streams)
- Introduce new sources of flexibility and Encourage use of flexibility, promoting an increasingly important feature of network operations and reduce whole system costs -– projects like BiTraDER are important to develop liquid flexibility market
- Enable DNOs to meet the challenge of net zero, making flexible connections more attractive by offering more choice, and therefore avoiding carbon intensive reinforcement associated with traditional firm connections

*Access SCR – everyone will have either an interim or permanent flexible connection/ non-firm connection therefore we don't see the decision having a material impact on the project and that there is still a place for this in the smart flexible network of the future. – even with the decision on the Access Significant Code Review, we still anticipate customers taking on flexible or non-firm connections as the low cost choice, or even on an interim basis as traditional reinforcement can take many years to complete.

The Solution

Deliver a functional specification detailing the requirements for facilitating bilateral trading, including platform, market model, data requirements and interface.



Why is it innovative?

BiTraDER contains highly innovative, and as yet untested, aspects

For the first time ever, connected resources can trade their curtailment obligation bilaterally, in a transparent market independent of the DNO

Ability to trade in near real time will improve the timeliness and scale of response, as well as addressing long term capacity and investment challenges

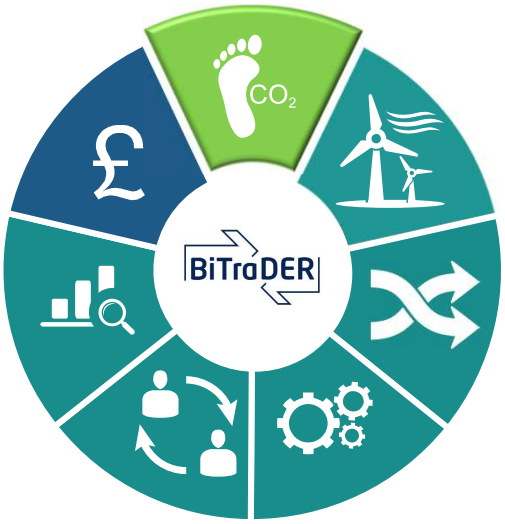
By resolving operational conflicts, BiTraDER will boost the value proposition for connected resources allowing them to provide services to both ESO and DNO

BiTraDER will demonstrate how access to a neutral market allows connected resources to trade their obligations bilaterally, encouraging more of them to offer flexible services, increasing availability of flexibility and thereby reducing whole system costs.

BiTraDER – benefits

Non-quantified benefits
Financial benefits
Carbon benefits

Carbon savings of 7,649tCO_2e across ENWL by 2050, and 92,114tCO_2e across GB by 2050



Financial benefit of £35.5m across ENWL and £581m across GB by 2050.

Enables increased competition through a transparent, neutral market

Enables reallocation of curtailment to participants with lower costs (i.e. RES) leading to socio-economic efficiency gains

Encourages connection of low carbon generation and demand by increasing value proposition

Increases the amount of flexibility available to system operators

Provides more effective management of transmission and distribution networks removing uncertainty for flexibility providers

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BiTraDER – AFRY Management Consulting

Trading Rules

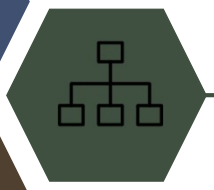
FEBRUARY 2023

OVERVIEW – OBJECTIVES FOR TODAY

Objectives today are to present broader context of this project, summarise current choices of market design and show examples of how the trading could work

- Present the context for need for flexibility and what the BiTraDER project could bring

- Provide examples high level examples how this could work from buyer/seller perspective
- Open questions on the example and feedback for next steps



- Overview of the market design and the choice for building blocks
- Details of how the trading could work and timeframe

Agenda Trading Rules

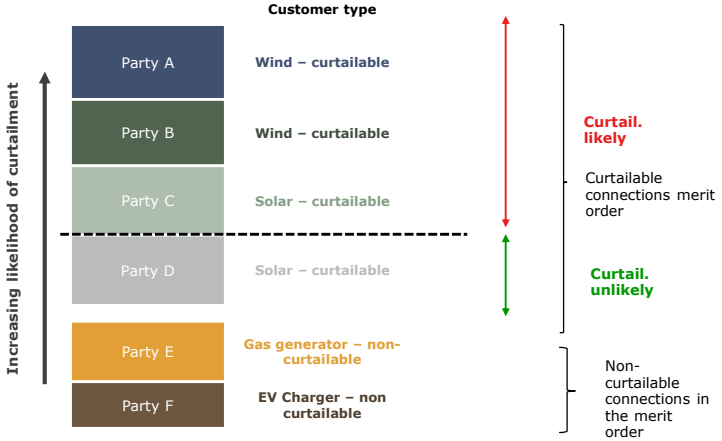
- **Context**
- Market design blocks
- Example for the trade
- Questions and next steps

DRAFT

STATUS QUO SUMMARY

To solve network constraints, parties are curtailed based on merit order which reflects firmness of connections

EXAMPLE MERIT ORDER IN CASE OF EXCESS GENERATION



1. The height of each box represents the MEC for that party

MERIT ORDER CONSTRUCTION

- In this example, the constraint is a system normal scenario where there is excess generation.
- The hierarchy for curtailment can be thought of as two tranches:
  - Curtailable connections, who are the ones to be curtailable first
  - Non-curtailable customers, who sit outside the merit order
- To resolve the constraint, generation export must be reduced. Based on the administered merit order, curtailing Parties A, B and C should be enough to resolve the constraint. Under normal circumstances, Parties E and F will not be involved as they are non-curtailable customers but Party D could be curtailed if the constraint is worse than expected.

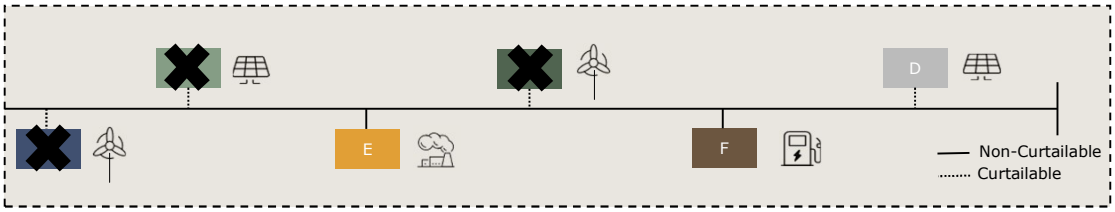
AFRY ÅF PÖYRY

- Looking from the network point of view, there are different types of connection with a simplification between curtailable and non-curtailable
- All the connections are being registered in what we call a merit order list where the curtailable connection would sit at the top and non curtailable at the bottom
- Here is an example with relatively few parties for simplicity but it would normally include much more parties
- Lookahead on the ahead network, we can foresee that there would be potentially a constraint on the network
- This merit order list is then used to understand who would be curtailed to resolve that constraint
- In that example of an excess generation on the net work, we can anticipate that some parties might be curtailed, in that example A, B and C
- To resolve the constraint, generation export must be reduced. Based on the administered merit order, curtailing Parties A, B and C should be enough to resolve the constraint. Under normal circumstances, Parties E and F will not be involved as they are non-curtailable customers but Party D could be curtailed if the constraint is worse than expected

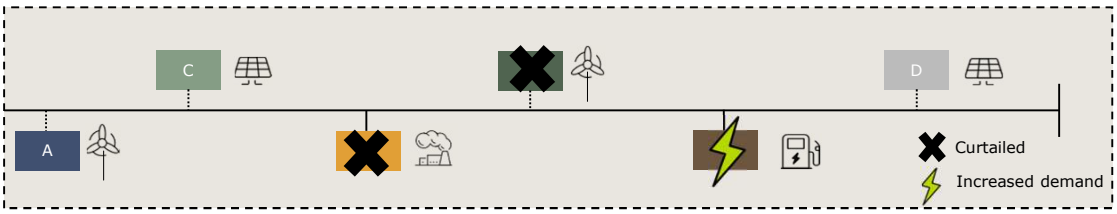
STATUS QUO SUMMARY

The status quo for solving a network constraint may not be optimal for affected parties or society – a better solution may be reached via trading

STATUS QUO CONSTRAINTS



ALTERNATIVE CONSTRAINTS WITH TRADE



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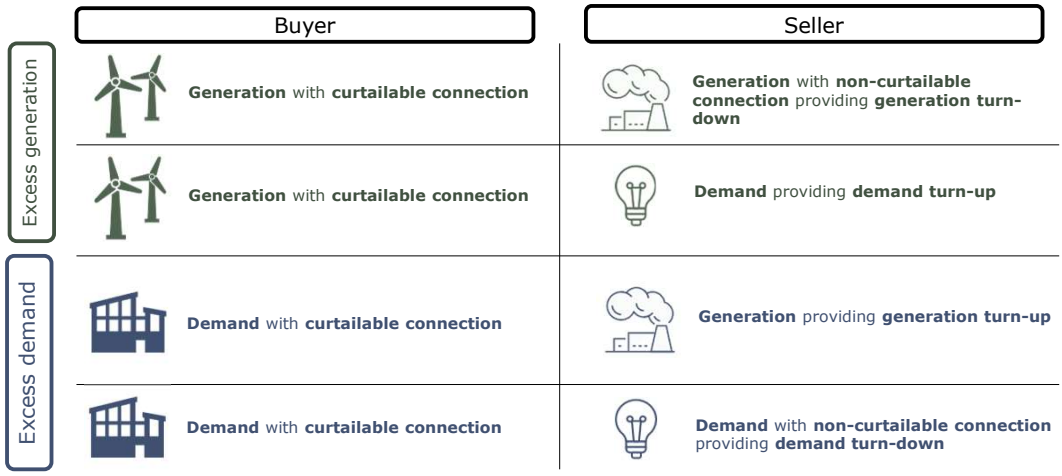
- Taking the previous example we can see that we currently curtail in priority the generation with curtailable connection which is in this case renewables
- With the BiTrader, platform, we could change the outcome; instead of party A and C curtailed, you could have party E a gas generator curtailed, and party F a EV demand turn up increasing its demand
- Different benefits Better use of the low carbon resources, avoided carbon emissions from the gas generator, used energy that would be waster to charge EV for instance
    - Makes it more attractive for everyone
        - Non curtailable: extra money and potentially complement their supply
        - Curtailable: Avoid curtailment and make the curtailable connection more attractive
    - Overall, that also creates much more flexibility and less need of infrastructure

Agenda Trading Rules

- Context
- **Market design blocks**
- Example for the trade
- Questions and next steps

TRADING RULES PARTICIPANTS

In the initial phase of the trading rules, there are four different use cases for trading we are including



In case of excess generation, we expect the buyer to main being the curtailable connection, from the seller point of view for the moment, we include parties that will actually be able to help

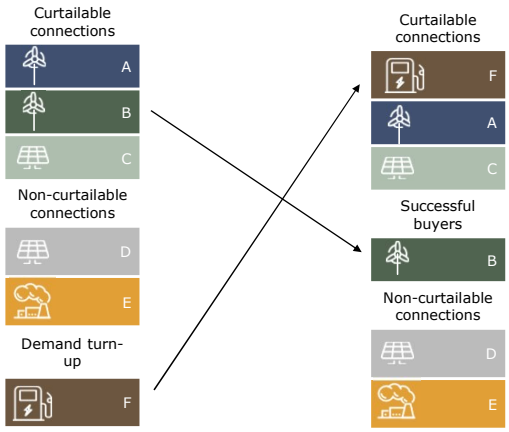
Two sorts: the generation with non-curtailable connection like the gas generator in our example, or the other category is someone providing demand turn up

In case of excess demand, similar picture with the buyer being demand with curtailable connection and from the seller point of view, generator that can increase their generation or demand with a non-curtailable connection that can reduce their demand.

POSSIBLE MODELS

BiTraDER enables trading to change the order of the Merit Order used to action curtailment by ENW

MERIT ORDER TRADING EXAMPLE



MERIT ORDER POSITION TRADING

- B is willing to trade off its curtailment obligation (Buyer)
- F is willing to get paid to be curtailed (Seller)
- F goes to the top of the curtailable parties and becomes effectively the first in line to become curtailable
- B goes at the bottom of the curtailable connections in the "last resort" zone

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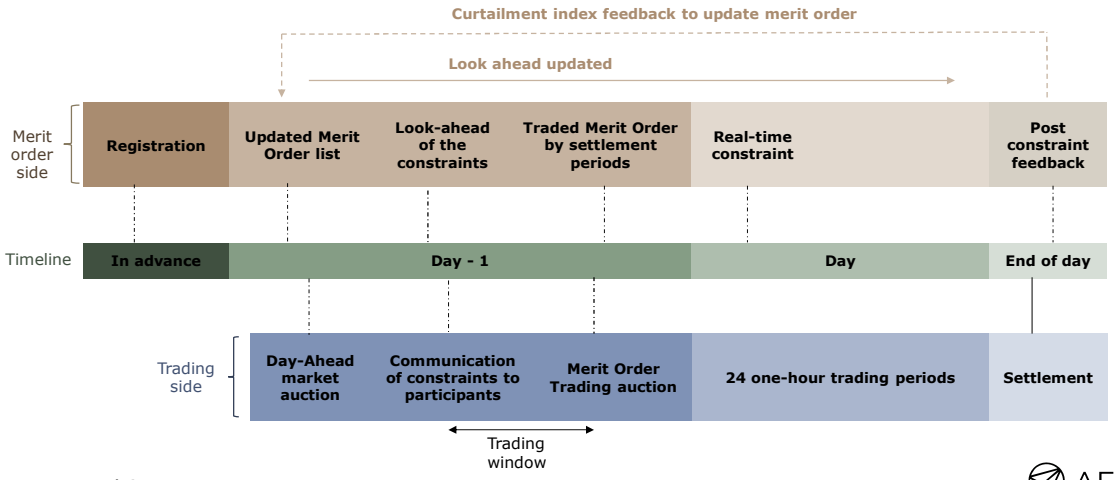
In terms of the actual trade, this includes changing position in the merit order
In that example we have B that is willing to trade off his curtailment obligation as it's a wind generator that doesn't want to get curtailed tomorrow
From the seller point of view, there is F that is willing to get paid to increase its demand
What happens here is a reshuffle of the merit order, our current choice of design is that the seller goes to the top so it would be the first one in line
The buyer goes at the bottom of the curtailable connection just above the non curtailable connection in what we call the last resort zone
Effectively after the trade if there is need to be three parties to be curtailed, it would have been initially A, B and C but now it's F, A and C and B is effectively of the hook

TRADING TIMELINE

The trading rule design is one component of a wider, interlinked constraints and curtailment process



Looking from the timing perspective, we can distinguish two main categories, what happens from the merit order side in brown and from a trading side in blue at the bottom; in green in the middle is the timeline to indicate the potential.
Example of a trade for tomorrow Friday;

First there would be a registration process in advance to be sure that you are eligible and registered in the merit order.
In the Day-1, let's say Thursday, first there would be an update of the merit order based on what happened the previous day, then there would a look ahead performed for tomorrow Friday to understand what could be the potential constraints,
This would then be communicated to participants after they already participated in the day ahead auction

Based on the information of the constraints, the participants would decide or not to participate in the BiTrader; there would be collection of the bids and offers of the participants here depicted as a trading window where they can decide for the 24 of tomorrow Friday their different bids and offer

After collecting all the information, a single trading auction would happen which would decide who trade with who for the different trading periods, this would then feed in the

merit order which would be reshuffled based on the trade.

When comes the day Friday then and if a real time constraint, the DNO would act based on the new merit order where typically the sellers would be at the top of the merit order and curtailed in priority,
Then comes the end of the day where we can understand who has been curtailed for how long to understand for the payment etc and update the curtailment index of the different parties which feeds into the merit order,
The key steps:
- Look ahead of the constraints
- Communication to the participants
- Decisions of participating in the auction after the day ahead, bids and offer with a single auction
- New merit order based on the trade which is the one use for the constraints happening on the day
- Settlement at the end of the day

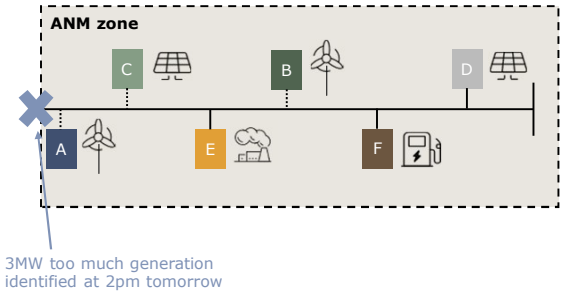
Agenda Trading Rules

- Context
- Market design blocks
- **Example for the trade**
- Questions and next steps

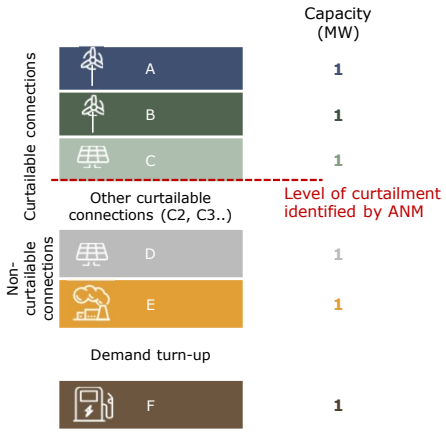
WORKED EXAMPLE

Day ahead – a 3MW constraint is identified on the network and the initial merit order is provided by ENW

1. A POTENTIAL 3MW CONSTRAINT IS IDENTIFIED ON THE NETWORK



2. THE ANM PROVIDES AN INITIAL MERIT ORDER



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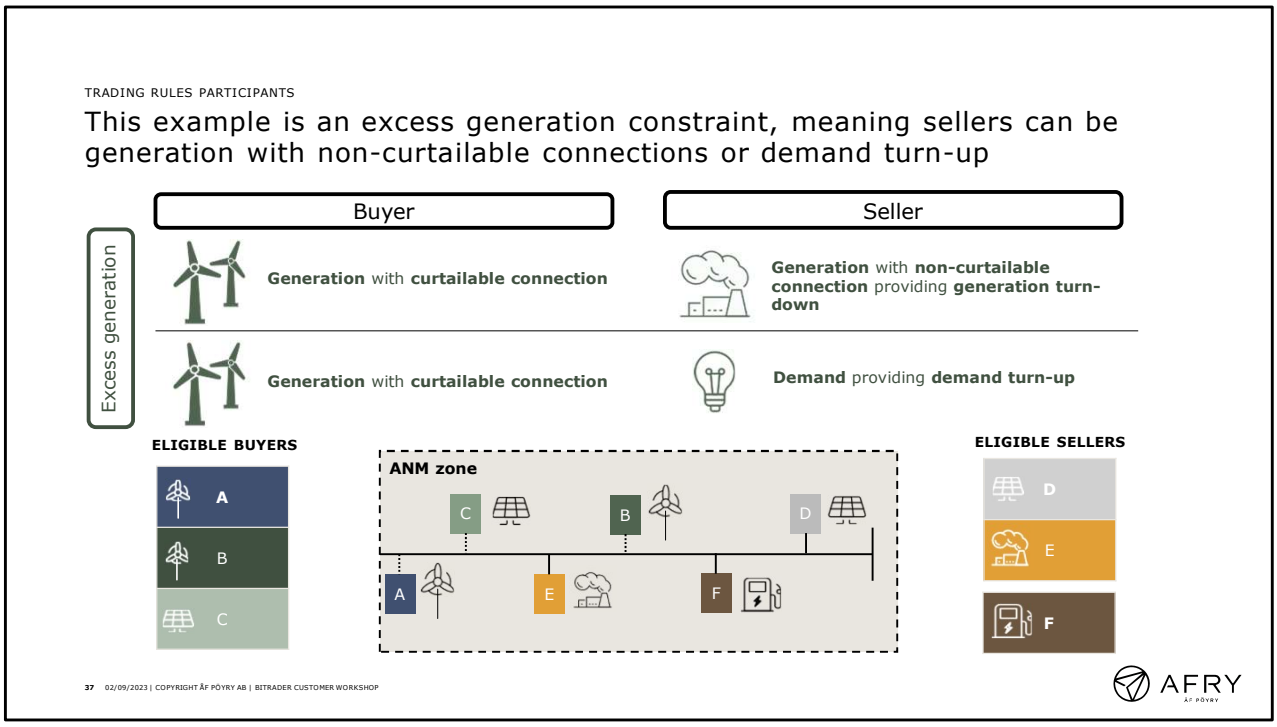
Worked example background

- The left-hand side shows a constrained part of the network
  - A, B and C have curtailable export connections and so will be first on the 'merit order' to be curtailed
  - D and E have non-curtailable export connections and so will be below A, B and C in the 'merit order'
  - F is flexible demand that can turn demand up when a constraint occurs
- The ANM system identifies a constraint of 3MW at the day ahead stage on this part of the network
- Under the status quo, this would mean that A, B and C would be curtailed



This example is an excess generation constraint:

- Eligible buyers are those with a curtailable connection:
    - A, B and C
- Eligible sellers are:
    - Generation with a non-curtailable connection or;
        - D and E
    - Demand turn-up
        - F

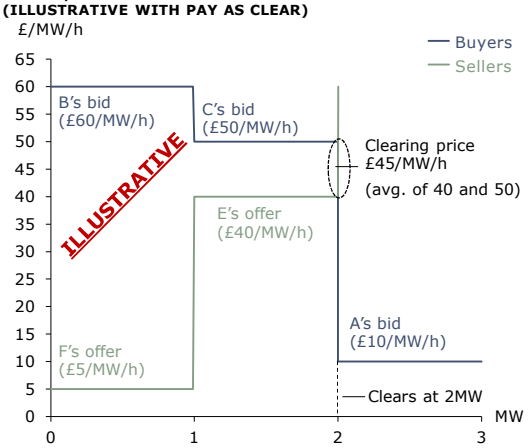
WORKED EXAMPLE

Day ahead – Trading is allowed between curtailable connections and non-curtailable connections

3. BUYERS & SELLERS SUBMIT BIDS/OFFERS (UTILISATION PRICE)

Customer	Connection type	Eligible buyer / seller?	Bid (£/MW/h)
A	Curtailable	Buyer	10
B	Curtailable	Buyer	60
C	Curtailable	Buyer	50
Customer	**Connection type**	**Eligible buyer / seller?**	**Offer (£/MW/h)**
D	Non-curtailable	Seller	No offer
E	Non-curtailable	Seller	40
F	Demand turn-up	Seller	5

4. BIDS/OFFERS ARE MATCHED AND CLEARING PRICE IDENTIFIED (ILLUSTRATIVE WITH PAY AS CLEAR)



Current thinking:

- Market will be based on utilisation payments
- Settlement will be based on a pay as cleared market
- Bids and offers will be anonymous, and clearing will occur via a day ahead auction

In this example:

- At the day-ahead stage, eligible buyers and sellers can submit utilisation bids and offers to participate in BiTrader
- In this example, 3 Buyers have submitted bids:
    - A enters a bid of £10/MW/h
    - B enters a bid of £60/MW/h
    - C enters a bid of £50/MW/h
- 2 sellers have submitted bids:
    - D has chosen not to bid (and therefore not participate in the market)
    - E enters an offer of £40/MW/h
    - F enters an offer of £5/MW/h

Trade clearing (RHS graph):

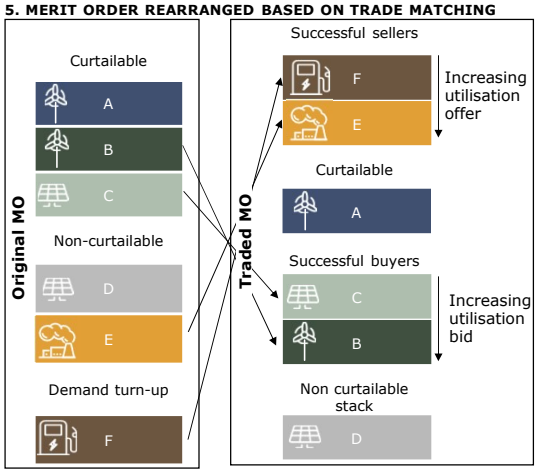
- To create a demand curve, the buyer's bids are stacked from high to low
- To create a supply curve, the seller's offers are stacked from low to high

- Where the supply and demand curve cross is the clearing for the market.
- In terms of capacity, this occurs at 2MW:
    - Buyers: B and C clear, whereas A does not
    - Sellers: E & F clear
- Because of the discrete nature of the bids, the settlement price could be anywhere between 40 and 50 £/MW/h
    - Here we have assumed an average of 40 and 50 (£45/MW/h) but this is arbitrary
- As the market is a pay as clear market, this clearing price is used in settlement for all participants

WORKED EXAMPLE

Day ahead – Merit order re-arranged based on trading, successful sellers go the top and successful buyers below all other curtailable customers

5. MERIT ORDER REARRANGED BASED ON TRADE MATCHING



SUCCESSFUL TRADES

Buyer	Buyer submitted bid (£/MW/h)	Seller	Seller submitted offer (£/MW/h)
B	60	F	5
C	50	E	40

Current thinking:

- Successful sellers will go to the top of the merit order, ordered by utilisation bid (lowest first)
- Successful buyers will move below all other curtailable connections but above non-curtailable connections, ordered by utilisation bid (lowest first)

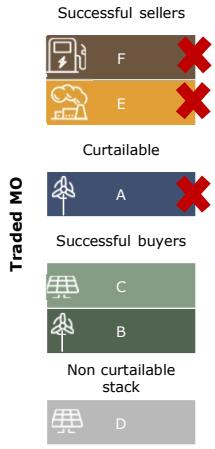
In this example:

- E & F were both successful buyers so will move to the top of the merit order
    - F will be ahead of E (i.e. first to be curtailed) as it submitted the lower utilisation bid
- C & B were both successful sellers so will move below all other curtailable connections in the merit order
    - These customers shouldn't get curtailed unless the parties above in the merit order are ineligible for curtailment
    - B will be below C as it submitted the higher bid
- A was not successful in trading, so remains in between the sellers and the buyers, and may still be curtailed
- D is non curtailable, and did not participate in the market so will remain at the bottom of the merit order

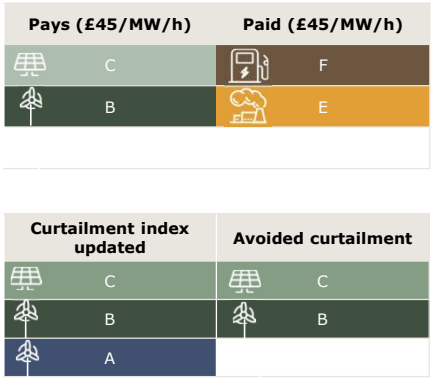
WORKED EXAMPLE

Real-time & post settlement – curtailment based on new, traded merit order, payments are made based on trades

6. CURTAILMENT BASED ON TRADED MERIT ORDER



7. POST REAL-TIME SETTLEMENT



AFRY

Current thinking:

- During the settlement period, curtailment will be based on the new traded merit order
- Buyers will pay the clearing price if the Seller is curtailed, and Seller's will receive the clearing price payment
- Buyers will have their curtailment index updated if their matched Seller is curtailed (as if the Buyer had been curtailed)

In this example

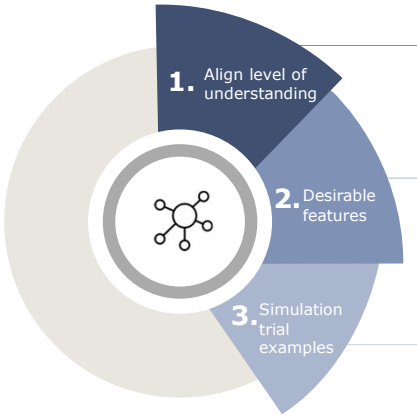
- The depth of curtailment is as expected – 3MW
- F, E and A are therefore curtailed
- C pays F the clearing price, and B pays E the clearing price
- C and B get their curtailment index updated
- A also gets their curtailment index updated as they were curtailed (and had not sold their way into the curtailment)

Agenda Trading Rules

- Context
- Market design blocks
- Example for the trade
- **Questions and next steps**

QUESTIONS AND NEXT STEPS

Aligning the level of understanding and incorporating any preferrable features for the trading rules would be essential to the success of this project



We would like to check how clear the trading rules appear to you and answer any doubts

We would like to understand from you what would be some of your preferences e.g. the timing of the payment and if there are any major blocking points to be able to trade.

AFRY's next steps will be to incorporate the feedback of preferences and introduce simulation trial examples for the trading

BUILDING BLOCKS

We have taken initial decisions on the key building blocks but would welcome feedback on these

Building block	Details	Initial decision
Product definition	How are the parties affected by the trade?	Sellers to top of curtailment queue, buyers to the bottom (but above non-curtailable connections)
	What is the nature of traded product?	Curtailment obligations – seller must be capable of responding in the same (short) timeframes as the buyer
	What is the expected action and how is it measured?	Answer to the DNO signal in real time with method for the traded volumes to be clarified
Participant qualification	Which participants are eligible to participate as Buyers or Sellers?	Buyers – curtailable connections; Sellers – non-curtailable connections and generation/demand turn up
Timing of the trade	What would be the timing of the trade and duration?	Daily auction after the day ahead market with hourly trading block for a trading day
Payment structure	What would the trading be based on? e.g. utilisation, availability	Utilisation
Settlement	What method would be used to define the price? e.g. pay as clear, pay as bid market	Pay as clear

QUESTIONS

Some questions would be useful to understand from our side

POTENTIAL INITIAL SET OF QUESTIONS

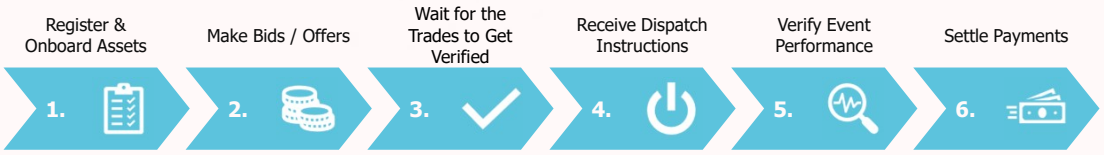
- With the current design presented, what major roadblocks do you foresee in order to participate?
- What other key inputs would you need in order to make a decision?
- If there was a single auction on the day ahead, would your preference be to have it before or after the day ahead?
- Does an hour settlement period seem reasonable to you?
- Are there major issues associated with a utilisation payment only?
- Do you have any preferences between pay as bid or pay as clear?


ELECTRON
Platform Functionality

Trading platform functionality

Theme:	Key Findings:		
Ease-of-Use	Ability to operate multiple assets at once	Clean UI / UX – only relevant information displayed	Workflow that minimises the number of required clicks
User Interfaces	Access to a Web Application Interface	Access to an API Interface	
Bidding Process	Ability to update bids / offers regularly	Rolling ('set and forget') bids / offers	
User Types	Primary users (e.g. traders and others) – full access	Secondary users – view-only access	Ability to associate one asset with several organisations
Data Requirements	Insights on curtailment forecasts	Access to raw trading data	Market data available to every participant
Notifications	Dispatch instructions available through API	Configurable notifications	

BiTraDER high-level process overview



Qualify your organisation & assets to participate in the market.

We are anticipating a process similar to qualification for DSO Flexible Services.

Make bids & offers at any time.

Use constraint forecast information to finalise bids & offers before the next delivery window deadline.

Wait for the ANM system to verify agreed trades.

This step is needed to ensure that trades are still valid in light of changing network conditions and that both trading parties will still benefit from trading.

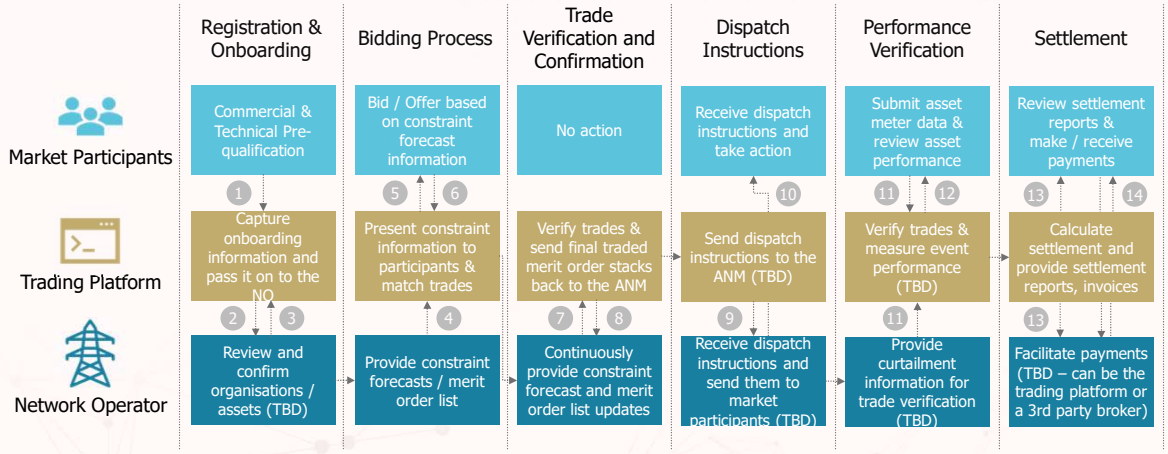
Receive dispatch instructions before the event start from either the trading platform or the ANM and dispatch your assets.

After the end of the event, submit meter data to the trading platform (metering requirements are still to be agreed).

After the event performance is verified, review settlement reports and make / receive payments.

Payments will be facilitated by either the trading platform, the network operator, or a 3rd party broker – still to be decided.

BiTraDER process flow summary



Wrap Up & Next Steps

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Wrap Up

- Thanks to all for attending and your participation
- Take Aways
  - Need to re-iterate the specific use case for BiTraDER – trading the obligation to curtail
  - Need to highlight the value proposition to encourage participants
- Legal – solicitor joining the project to review existing contractual arrangements allow BiTraDER
- Technical Design – ENWL IT team need to speak with customers regarding the API design – can anyone supply a relevant contact

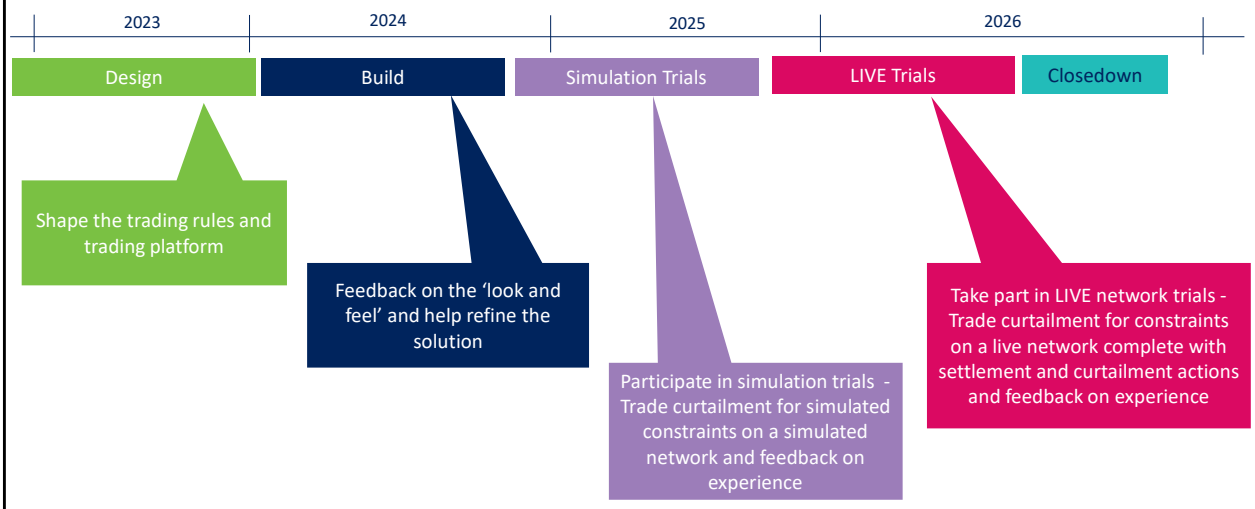
BiTraDER – Overall project plan and deliverables

Workstream	Tasks	2021	2022	2023	2024	2025	2026
Project Mobilisation							
Customer	Customer Impact						
	Customer Engagement						
Design	Scenario Planning						
	Trading Rules R&D						
	Trading Rules Platform Design						
	Site Selection & Trial Design						
	Data Model						
	Interface to ENWL System						
Build	Application Development						
	Interface to ENWL System						
	Application Integration						
Trials & Analysis	Simulation Trials						
	Network Trials						
Closedown & BAU transition	Functional Specification for BiTraDER						
	Closedown						
	BaU Transition						
Deliverables			1	2	3	4 5	6 7 8
Learning & Dissemination							9

Deliverables

1	BiTraDER Initial Report – Customer Engagement and Scenarios
2	BiTraDER Trials Plan, Trading Rules and Initial Specification Report
3	BiTraDER Interim Report – Trading Platform Design
4	BiTraDER Architecture Build Lessons Learned Report
5	BiTraDER Simulation Trials Report
6	BiTraDER Network Trials Report
7	BiTraDER Functional Specification
8	BiTraDER Final Report
9	Knowledge Transfer

We need your support to make BiTraDER a reality



How do we keep you engaged across the lifetime of the project?

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QUESTIONS & ANSWERS

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Please contact us if you have any questions or would like to arrange a one-to-one discussion