TWO-SIDED MARKET

SCHEDULING, DISPATCH AND PRICING

FOCUSED TECHNICAL WORKING GROUP

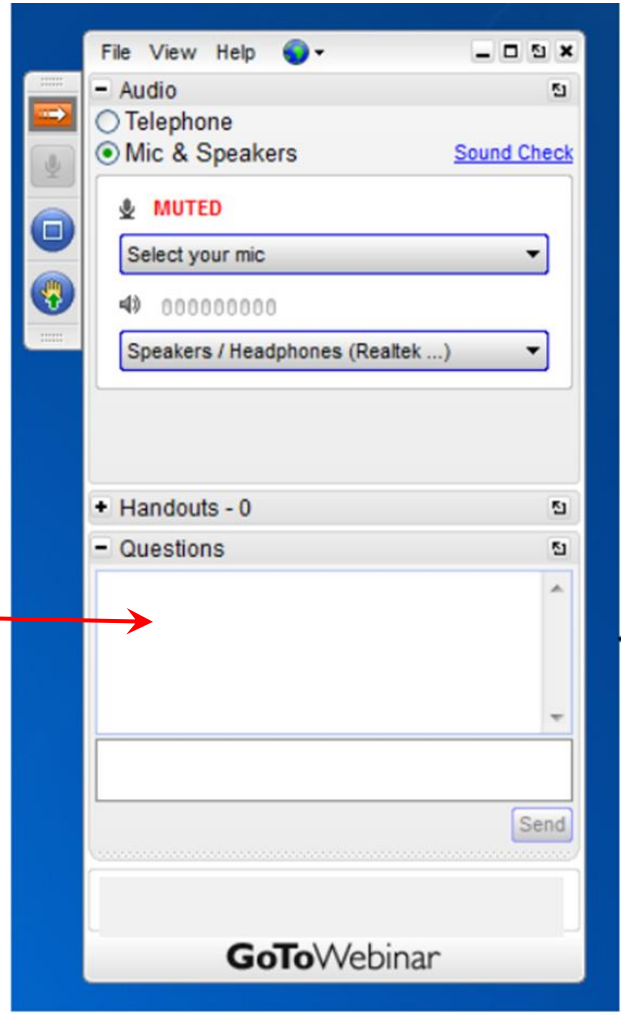
21 SEPTEMBER 2020

IMPORTANT NOTES

- These slides are solely for workshop purposes only. The content provides general information to support informed stakeholder engagement and feedback.
- The presentation does not represent the official position of the Energy Security Board or any related body.
- The webinar is being recorded and a link to the recording will be provided after the webinar.
- All previous webinar recordings and slides are available here for your reference.

WEBINAR-WORKSHOP LOGISTICS

- All participants are currently in listen-only mode
- We will pause periodically for discussion. Please use the **Raised Hand** to signal that you would like to speak.
- If you would like to record a comment without discussion, feel free to type it into this field.



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OVERVIEW

1. Recap – cover objective of workstream
2. Barriers and incentives to greater participation in central dispatch
3. Evolving arrangements for participation in scheduling
    1. Scheduled load
    2. Arrangements for demand flexibility
    3. Scheduled light
4. Next steps

RECAP

NOTE: THE FOLLOWING THREE SLIDES RELATE TO THE PREVIOUS TWG. THEY WILL NOT BE PRESENTED TO AT THIS MEETING.

RECAP

- We presented on scheduling and dispatch to the two-sided market TWG in August. Key points:
  - We considered there were sufficient drivers for change to look at how we approach scheduling in the NEM.
  - More price responsive demand and supply is good for the NEM. However, at large quantities, the fact that this demand response isn't transparent or active in the market can pose challenges in terms of balancing supply and demand.
  - More active, predictable participation in central dispatch could lead to reduced system costs, improved demand forecasts, and prices and dispatch levels being more efficient.
  - Under the current arrangements, very few loads have elected to be scheduled. There are a range of barriers that explain this outcome.

RECAP

- We also set out how we were thinking about scheduling through a two-sided market:
  - We set out the current arrangements for participation in scheduling and dispatch:
    - Generally, large dispatchable generators are scheduled, utility scale renewables are semi scheduled and small generators are non-scheduled.
    - Load is generally non-scheduled with the exception of scheduled loads, ancillary service loads and loads participating in the wholesale demand response mechanism.
  - Going forward, we should be seeking to strike a balance in the framework for participating in dispatch such that participation occurs when:
    - The overall benefits of price-responsive behaviours actively participating in the market is greater than the overall benefits of these behaviours occurring outside of dispatch.
    - The firmness of scheduling should reflect the service provided e.g. security services may need greater certainty of being provided.

DRIVERS FOR CHANGE

Driven by digitalisation and new business models, we foresee greater participation in dispatch via a two-sided market can enhance market efficiency and drive benefits to all end users.

- **Technological advances** will mean consumers will not need to monitor electricity prices and decide how or when to participate as these decisions are set up to happen autonomously or through a third party.
- Specific **assets** such as electric hot water, pool pumps, air conditioners, solar PV and batteries can be set and controlled remotely to withdraw or inject electricity at times at which it is most financially beneficial, without impacting the use or value end users obtain from their assets.
- These trends will be supported and accelerated by the entrance of **new services providers** and **innovative business models** (i.e. home energy management services; demand management services).
- The **market framework is evolving** in response to **changing system dynamics**, giving rise to the entrance of new essential system services and resource adequacy mechanisms within which traders can buy and sell services, maximising the value of installed assets while delivering revenue streams to end users.

BARRIERS AND INCENTIVES TO PARTICIPATION

BARRIERS TO PARTICIPATION IN SCHEDULING AND DISPATCH

Barriers which constrain the ability of end users or traders to participate in dispatch may limit both the individual and collective interests of the market. The design of a two-sided market can explore an approach for addressing and removing these barriers while seeking to establish a level playing field for participation.

Market barriers

- End users' level of market engagement (opportunity, ability, motivation)
- Ability to engage and directly access and respond to spot price signals
- Existing arrangements accommodating non-scheduled resources
- Minimum capability and operational overhead to interface with market systems
- Penalties or costs for compliance for deviations

Technical and regulatory

- Capacity to participate (AGC/SCADA/communications/smart metering)
- Minimum integer bidding thresholds
- Forecasting capability
- Framework for consumer protections for electricity as an essential service
- Network access and pricing arrangements

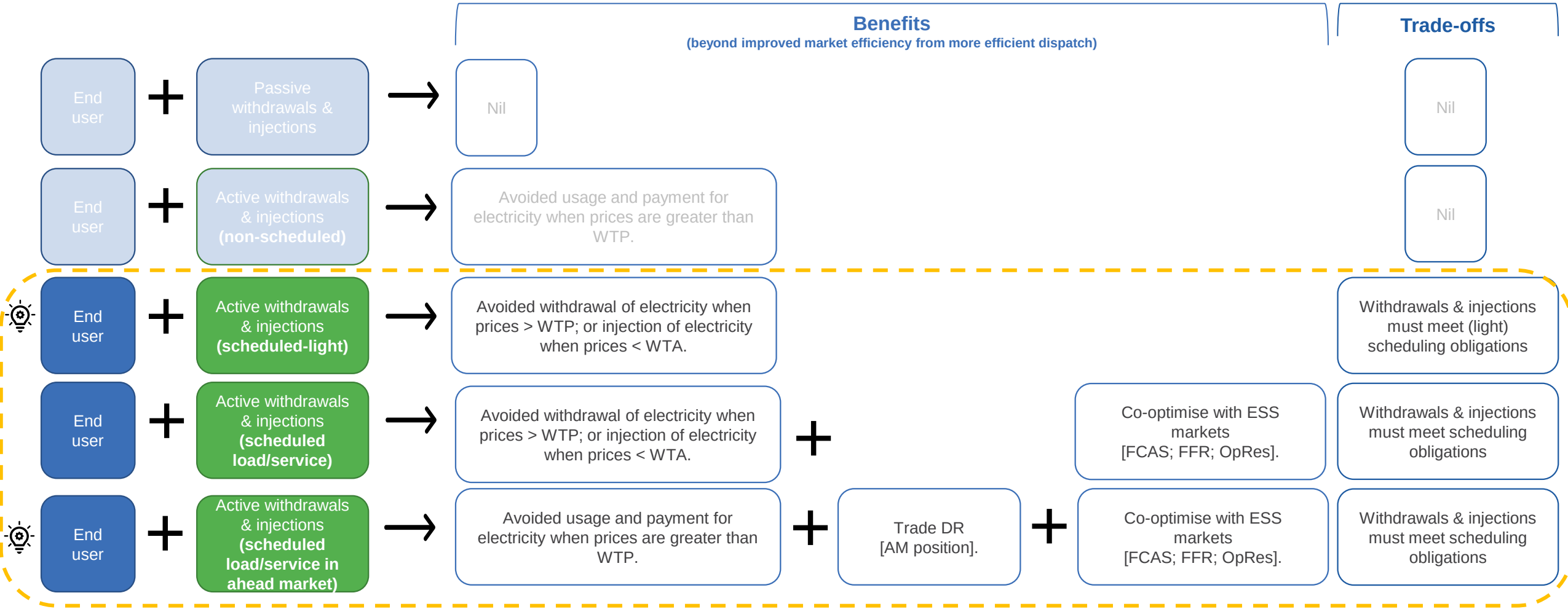
INCENTIVES

Controllable, price-responsive withdrawals and injections are not naturally motivated to participate in central dispatch (generally opting for flexibility to express their elasticity privately without being required to adopt market participation obligations for dispatch).

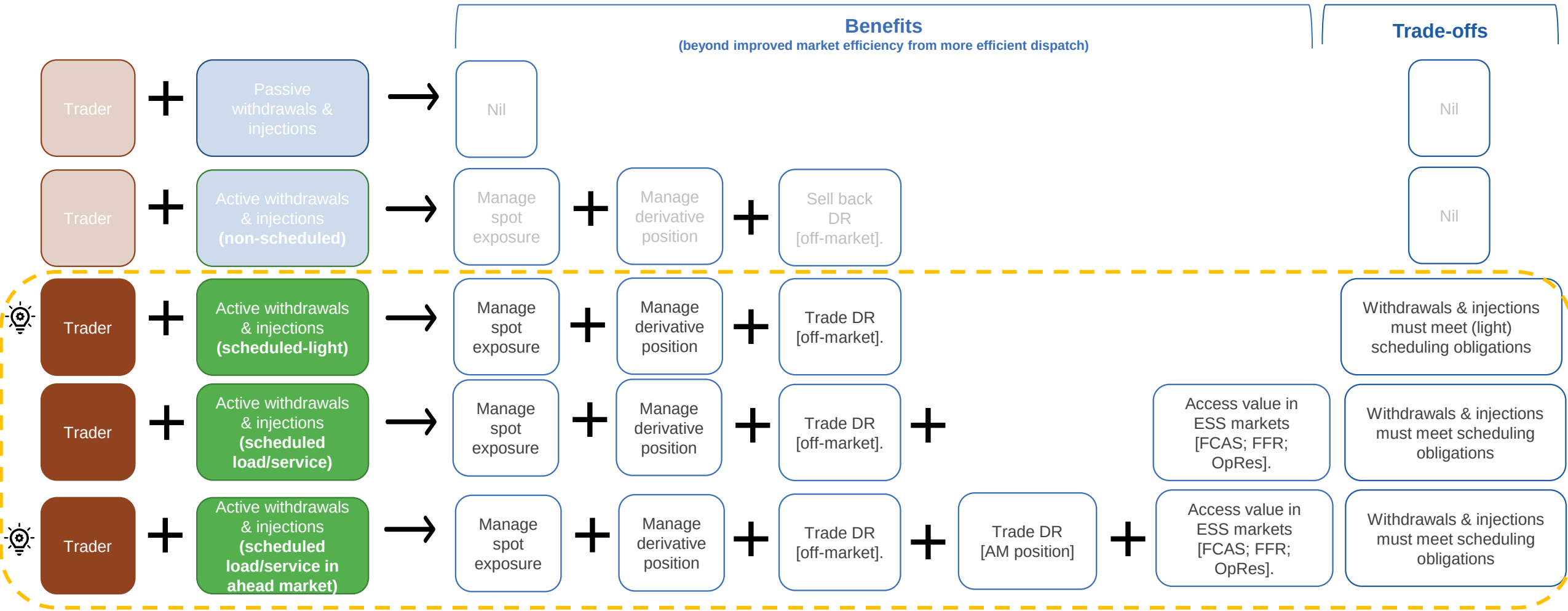
Incentives will play an important role in unlocking capacity and encouraging end users and traders to participate in a coordinated manner in central dispatch. Incentives include:

- Avoided cost of withdrawals when market prices > willingness to pay;
- Earn revenue from generation and set market prices for energy and system services;
- Eligibility to access multiple revenue streams (DR; co-optimisation with essential system services; RAMs, distribution service markets to manage congestion);
- Manage exposure to the allocation of non-energy costs (FCAS, RERT);
- Access to locational pricing signals.

BENEFITS AND TRADE-OFFS (*END USER EXPERIENCE*)



BENEFITS AND TRADE-OFFS (*TRADER EXPERIENCE*)



EVOLVING ARRANGEMENTS FOR PARTICIPATION IN SCHEDULING

EVOLVED ARRANGEMENTS FOR PARTICIPATION IN DISPATCH

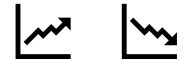
- Evolved arrangements to incentivise traders (representing end users) to voluntarily participate in dispatch are being explored.
- Some arrangements we are looking to explore:
  - Scheduled load model
  - Arrangements for valuing demand flexibility
  - Scheduled ‘light’ model
- We are seeking your engagement and input on the design characteristics of these types of models
- These are not be definitive and would need to evolve as the capabilities of end users and needs of the system evolve over time

USE CASE: ‘SCHEDULED’ LOADS

‘SCHEDULED LOAD’

Current state

- Scheduled loads have the same bidding and dispatch obligations as scheduled generation (advanced metering; telemetry; SCADA; bids submitted in 10 price bands, band volume adjusted in rebids; ramp rates; dispatch compliance)
- Single connection point bidding
  - Not an aggregator model
  - No ability to segment/classify a portion of load behind a connection point
- Only connection points currently operating as ‘scheduled loads’ are:
  - Pumped hydro [pumping]
  - Battery Energy Storage Systems (BESS) [charging]

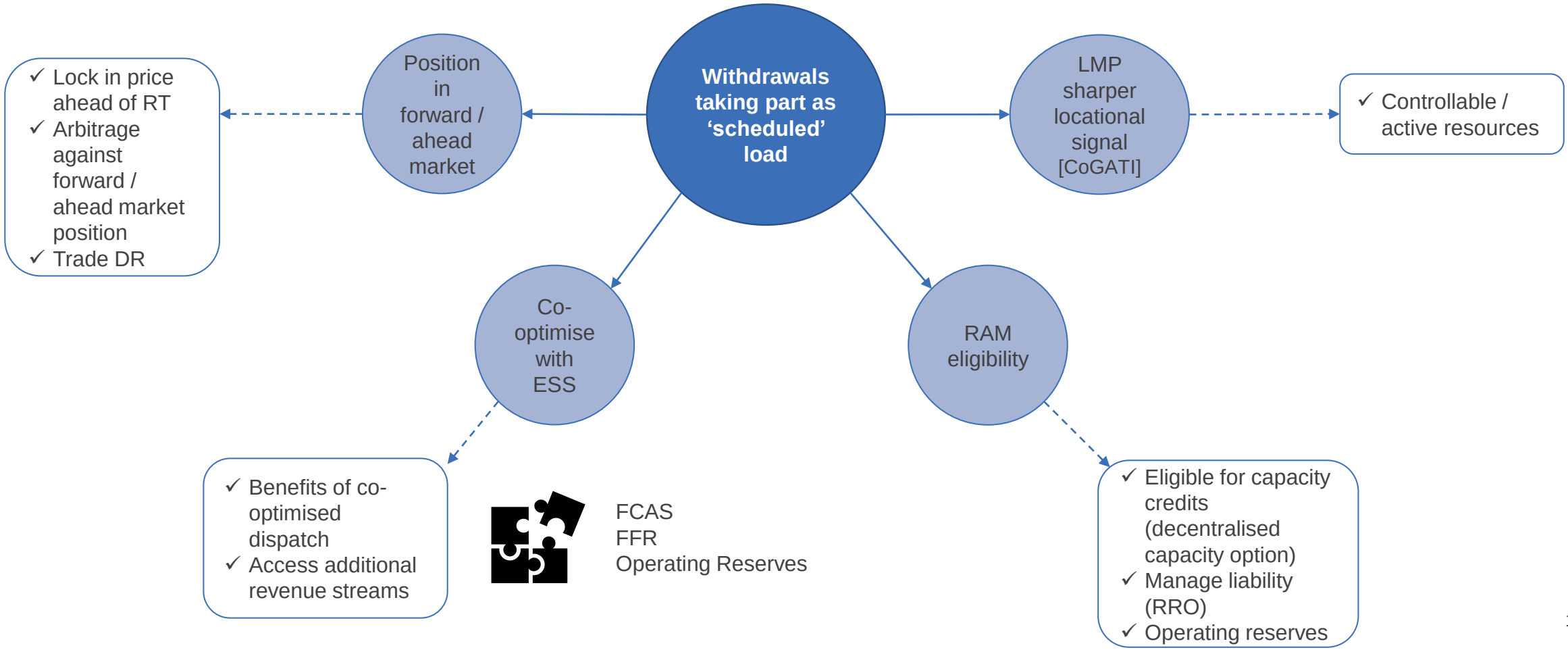
Barriers	
	Low motivation (when compared to the alternative of being non-scheduled [passive] load)
	Uncertain foresight and forecast for withdrawals
	Technical capabilities of withdrawals to respond and be controlled (ramp) to meet to five-minute dispatch instructions
	PASA and bidding obligations
	Compliance burden and consequences
	Trader models don’t facilitate aggregation nor sub-classification of total load

If…

- New technology and end user motivations are driving more price-responsive decisions when withdrawing electricity
- Growth in resources (DREDs; controllable loads) which can be operated and controlled in relation to price

…how may these be motivated to participate as a scheduled load?

WHAT COULD THE MARKET REFORMS ENABLE?



EVOLVING ‘SCHEDULED LOAD’

Considerations

- A scheduled load could be an aggregation of connection points and loads or devices, not a single asset.

  …Is aggregation across connection points beneficial from a Traders’ perspective?

- Traditionally suited towards controllable plant.

  …What are the types of withdrawals (i.e. what types of loads / devices) are suited to price-responsive bidding and dispatch?

- Scheduled loads have strict biding and dispatch compliance obligations.

  …What barriers could be relaxed that may make the scheduled load category more attractive?

- Bid availability can match physical installed capacity.

  …A sub-component of the load be considered scheduled behind each connection point, akin to the classified ‘demand responsive component in WDRM?

USE CASE:
‘DEMAND FLEXIBILITY’

DEMAND RESPONSE

Current state

- Types of demand response are broadly **market price** or **reliability** driven
- Current NER arrangements for demand response are:
  - Wholesale Demand Response Mechanism for large end users [2021]
  - Reliability Emergency Reserve Trader (RERT)
- Off-market arrangements for demand response include:
  - End user + Retailer
  - End user + NSP
- Program types include
  - Behaviour-based programs
  - Controlled load programs

Barriers	
	Low priority; energy is an essential input to core business.
	Cost is greater than reward
	Uncertainty in forecast market prices to secure and justify foregone production
	Excludes small end user connection points
	PASA, bidding, 5-minute dispatch and compliance obligations *[WDRM]*
	Baseline reliance

DEMAND FLEXIBILITY

- Not just demand ‘response’ in the traditional sense of peak shaving but the **role** of demand ‘flexibility’ is growing
    - Ramping conditions
    - Minimum demand conditions
- **Sources** of demand flexibility are also growing
    - Small-customer owned devices (DREDs); controllable loads; DER
- Technology provides the **capabilities** to support demand flexibility
    - Smart chargers; autonomous control devices
- **Service providers** are innovating and can aggregate capabilities to provide quantifiable responses

- Arrangements for demand flexibility need to be *definable*, *eligible* to participate, be able to *realise value* and be *dispatched* when engaged in a market.
- Objectives and principles for establishing arrangements or measures for demand flexibility should seek to:
    - Capture the broadest capabilities of end users, including small end users, while having regard to the confidence levels in the delivered response and needs of the system
    - Reduce reliance on mechanisms which rely on artificial baselines

If…

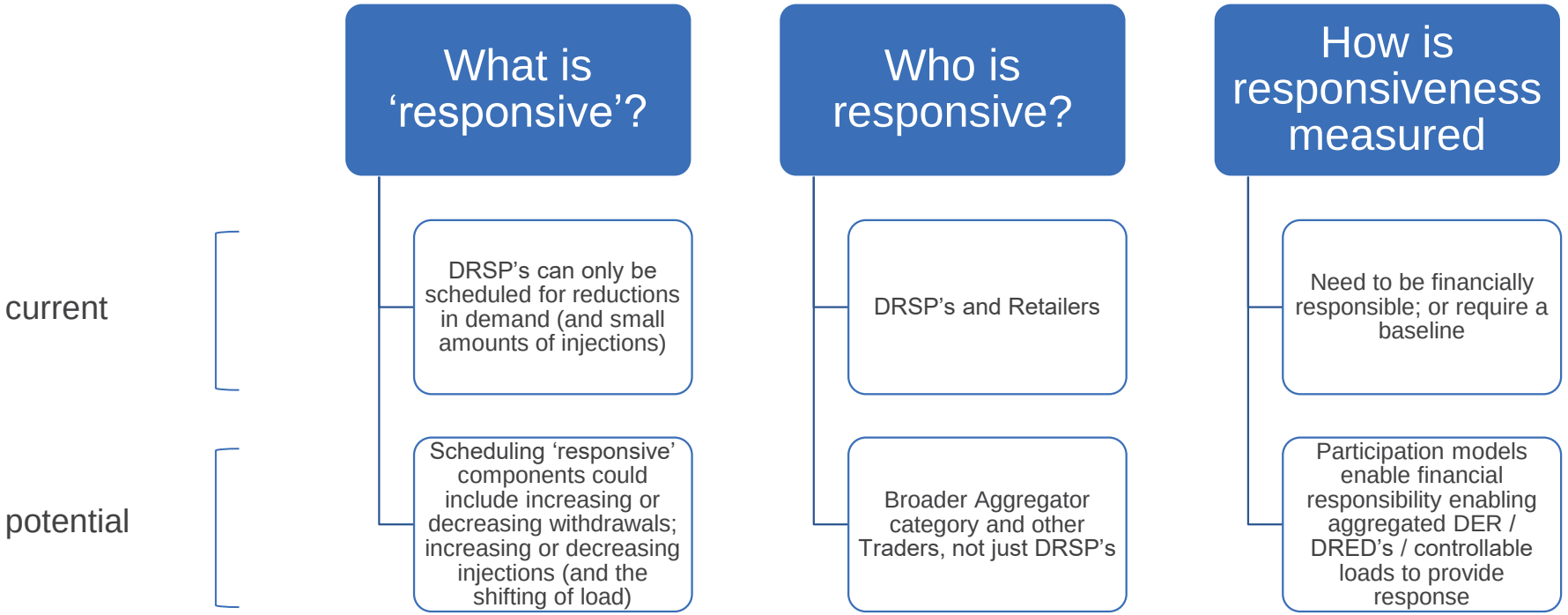
- There is continued growth in resources (DREDs; controllable loads) which can be operated and controlled in relation to price or end user preferences
- System variability can be managed by both flexible demand and flexible supply resources

…how can greater demand flexibility be brought into the system in a scheduled manner?

DEMAND FLEXIBILITY

… SCHEDULING '*RESPONSIVE*' ACTIVITIES

- Evolving the scheduling arrangements for demand flexibility in-market can look to what is considered 'price-responsive' or a 'responsive component'
- This could provide for responsive controllable loads and aggregations of DER
- The establishment of a 'responsive component' under WDRM is one feature which could evolve



DEMAND FLEXIBILITY

… SCHEDULING IN AN ENERGY AHEAD MARKET

- P2025 program is exploring scheduling arrangements for a voluntary energy ahead market
- An energy ahead market would determine a schedule of prices and volumes for multiple trading intervals ahead of the real-time market for an end user or Trader

An energy ahead market could enable …

- Demand and DER to bid in the ahead market assuming controllability and price-responsiveness.
- Traders of demand response being able to establish a financial baseline via contracts and ahead market positions as a contrast to reliance on Retailer at connection point (WDRM). Noting WDRM arrangements including baselines could be replicated for the ahead market.
- Longer lead times may facilitate supply of demand response from broader range of customers.
- Facilitate load shifting.
- An End User with control over the energy it injects or withdraws could trade and arbitrage between the ahead market and the RT market

Some use cases …

- Opportunity for aggregators of DER to improve coordination of portfolio; potential to co-optimise with distribution network constraints and other services
- C&I end user shifting load in response to day ahead prices with greater opportunity to plan production
- Scheduled resources taking position to maximise negative prices and responding to forecast system needs (such as correlated with minimum demand)

DEMAND FLEXIBILITY

… COMMODITISING AND VALUING

- Arrangements to unitise and commoditise demand response could:
  - aid how demand response realises value in market arrangements
  - support investment in demand flexibility and capability to participate in wholesale market
- Linking incentives for demand response capacity to delivery and dispatch in real time.

Some examples of commoditisation …

- Jurisdiction schemes such as NSW peak demand reduction scheme fund capacity in installing demand response enabled devices
- Demand flexibility within resource adequacy mechanism:
  - secure capacity from demand-side resources (demand flexibility) in exchange for a guaranteed response when called upon.
  - offset traders' liabilities within resource adequacy mechanism
- Hedging tool for traders or VRE portfolio could be built up and traded by an aggregator (for example, a DRSP)

CONSIDERATIONS FOR DEMAND FLEXIBILITY IN MARKET REFORMS

- New concept of a ‘responsive component’ introduced in WDRM provides for DRSP’s to bid in reductions in load. Akin to what is ‘active’ or ‘controllable’.

  …What type of facility could enable bids demand-side flexibility (withdrawals up/down; injections up/down)?

  WDRM’s ‘responsive component’ where bids are made when available for dispatch?

  Continuous bidding and dispatch akin to scheduled participants?

- What characteristics (structure; notification time etc) are important to bidding in demand flexibility?

  …block- or multi-part bids; relationships with bids and contractual agreements

- Ways for Traders to unitise or verify (i.e. certify) a quantify of demand flexibility for the purposes of trading and valuing flexibility in market mechanisms or liability obligations

  …Do Traders need to be financially responsible for the asset or component providing the response?

USE CASE: ‘SCHEDULED LIGHT’

INTRODUCTION

- Considering the design and feasibility of a ‘scheduled light’ dispatch arrangement
- The intention is to encourage more participation in central dispatch that accounts for the difficulties in doing so under the current arrangements.
- The expected use case is VPP operators, aggregators of injections, withdrawals or demand response.
- A scheduled light model would seek to:
    - Improve information provision from currently non-scheduled, price responsive behaviours
    - Have a lower level of obligations and barriers to participation.
    - Potentially allow for users to be able to set price, depending on how it is designed.
- A similar model is being implemented in New Zealand.

WHO MIGHT USE THE SCHEDULED LIGHT MODEL?

The end-users we are most interested in are those that are hardest to centrally forecast on behalf of. These are the end-users where there is a material information asymmetry that makes them difficult to externally predict/forecast.

For example, end users that are responding to temperature or time of day are **not necessarily a problem that can or should be solved through scheduled light**. This relationship between temperature and consumption can be more easily observed and accounted. In addition, a retailer or aggregator wouldn't necessarily have a materially better understanding of this relationship.

However, **how end-users might respond to prices seems to be a much more dynamic relationship**. Where this response is dictated by DER, storage and digitalisation, we expect that this would be very difficult to centrally predict and consequently account for in central dispatch. Therefore, the scheduled light model may present an opportunity to move from centrally forecasting these end-users to allow them to self forecast.

Therefore, the focus for scheduled light is on price-responsive end-users.

OPTIONS FOR CONSIDERING HOW TO DESIGN SCHEDULED LIGHT

Can take one of two approaches: top down or bottom up.

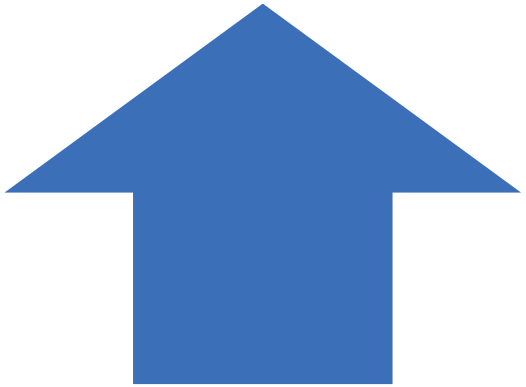
Top down

- Starting from the current arrangements for scheduled participants, what are the barriers to entry?
- Can these barriers be reduced where efficient to do so while meeting system operation needs?

The following slides will focus on a bottom up approach.

Bottom up

- We don't have visibility of price-responsive behaviours from a large portion of the market
- What information is needed and what are ways to enable provision?



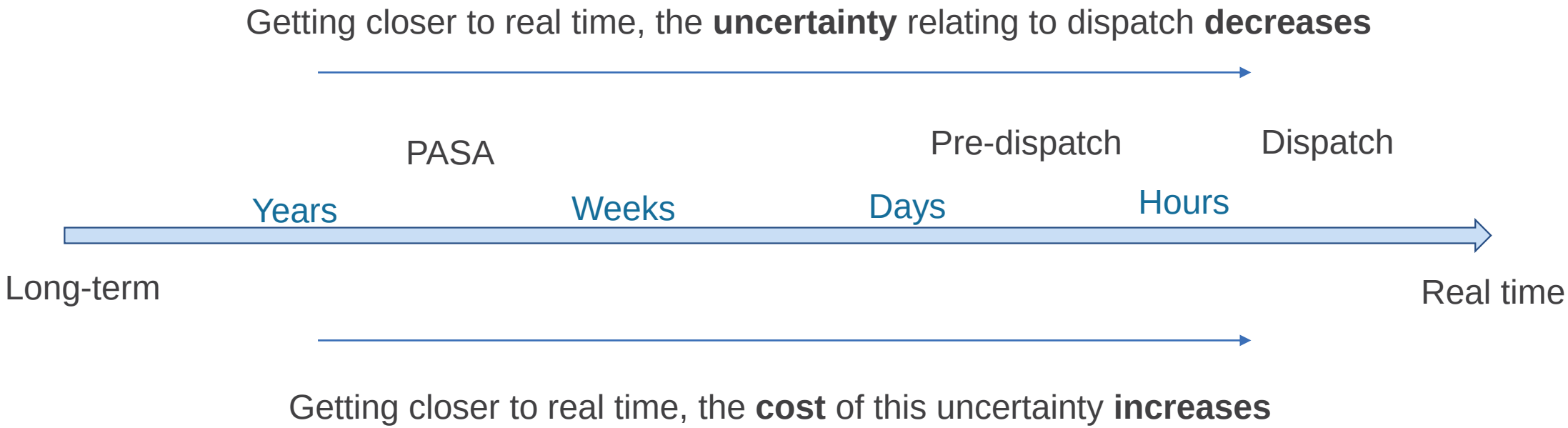
STARTING PROPOSITION

More information on the intentions of price-responsive supply and demand is a good thing. Questions arising include:

- What information is useful?
  - Over which timeframes?
  - What degree of certainty or commitment comes with it?
- How is it communicated?
  - What are the technical and communications requirements?
- Who is responsible for communicating it?
- Why would it be communicated?
  - Obligations? Because there are incentives to provide the information?
- How is the information used?

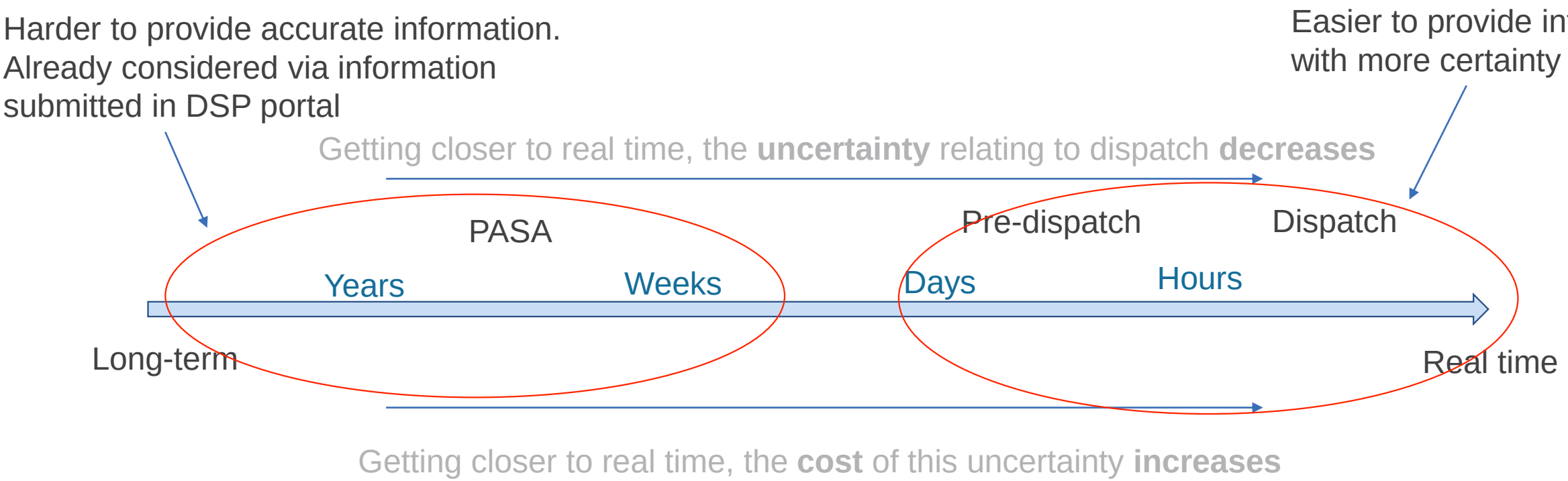
Explored over the next slides

WHAT INFORMATION IS VALUABLE?



WHAT INFORMATION IS VALUABLE?

- The ability to provide information with certainty as a participant also gets harder the further we are from real times.



WHAT INFORMATION IS VALUABLE?

- In terms of the information relevant through a scheduled light category, we should look for information that is:

  Novel – not easily or currently provided through existing mechanisms e.g. DSP portal

  Valuable – would make a meaningful improvement on system and market operation outcomes

  Accessible to scheduled light participants – information asked for and how it is expected to be communicated is accessible to the participants.

- There is a significant diversity amongst different types of non-scheduled resources and end users that would need to be accommodated:
  - Commercial and industrial demand response may have a longer lead time – therefore could provide information a few hours before actual demand response.
  - DER and VPPs are likely to be able to make rapid changes in consumption and generation in response to short term prices while also demonstrating an ability for accurate operational forecasts hours to days ahead of real time.

HOW IS THE INFORMATION USED?

- The ‘value’ of the information is also derived from what we can use it for.
- This information provided by scheduled light participants could be used centrally by AEMO and/or it could be used decentrally by market participants.
- How much confidence do we need to have in a bid from a scheduled light participant to be:
  - Used in clearing the market? I.e. setting the price and dispatch targets for other scheduled participants
  - Fed into forecasts? Which forecasts? And how would it be represented? Does it count in market reserves? Is there a weighting to how demand forecasts are adjusted?
- If the information is used by market participants, it would just need to be published somewhere so it can be accounted for.

WHAT INFORMATION IS VALUABLE?

Intuitively, as we explore a ‘scheduled light model’, it seems as though information provided relating to the short term price-responsiveness from non-scheduled participants is:

- Likely to be the most valuable for helping system operator and market participants in making commitment decisions
- Not currently provided under any existing mechanisms
- Easier for non-scheduled participants to provide accurately.

This could be in the form of bids (which don’t need to be binding), operational forecasts of intended injections and withdrawals, price-responsive thresholds or something else?

Question:

- Do attendees have views on what information would be valuable and accessible for provision into central processes?
- How can this information be incorporated to provide value to market participants and consumers?

HOW IS THE INFORMATION COMMUNICATED AND MADE VISIBLE

- The communication of price-responsive *information* into the market must consider the **market access** capabilities (provision of information into market systems) by the Trader or end user themselves
  - Can operational forecasts be provided and to what frequency and foresight?
  - Does the end user or Trader have access to market systems?
  - What arrangements may accommodate the provision of information (e.g. APIs, as are used in the VPP demonstrations)?
- The visibility of price-responsive *behaviours* in the market must consider the **technical capabilities** (telemetry and control) required of the end user
  - Currently, scheduled participants require SCADA links. A threshold for requiring SCADA links or alternatives is being introduced for demand response delivered under WDRM.
  - SCADA and advanced telemetry remain a high bar for most loads and aggregations of DER.

Question:

- What capabilities may facilitate the communication and visibility of price-responsive intentions or behaviours?

VALUE OF INFORMATION IS ALSO A FUNCTION OF CERTAINTY

- There are two main reasons why a participant would use the scheduled light model: incentives or obligations
- The balance of obligations and incentives also potentially influence the certainty/confidence of the information provided through the scheduled light mechanism is also another.
- How can we balance incentives and obligations to get an appropriate level of participation? And what does this balance mean for the usefulness of the scheduled light model?

Less certain	More certain
Lesser obligations	Higher level of obligation
Little/no attached financial incentives associated with how certain the information is	Financial incentives to provide information with certainty
Lower cost to provide, lower barriers to entry	Harder to provide, higher barriers to entry

Question:

- Do attendees have view on the mix of incentives and obligations that may be used to encourage participation as scheduled light?

COST ALLOCATION IN TWO-SIDED MARKETS

- We have also considered the allocation of costs within a two-sided market as potential incentives to participate in a scheduled manner.
- There are non-scheduled resources that change consumption and exports to increase/decrease their exposure to the spot price. There is greater value for these flexible resources in responding to price signals as opposed to a muted price signal through a retail tariff.
- Would these resources participate in scheduled light model to manage exposure to other costs? E.g.

  FCAS costs – could have a reduced exposure to smeared FCAS costs?

  Locational prices – could respond to locational marginal prices?

  Reliability costs – reduces cost exposure to RERT and RRO due to reducing reliance on these mechanisms?

Question
- Would these price signals provide a meaningful incentive to participate as a scheduled light participant?

SUMMARY OF POTENTIAL MODEL

Reviewing a potential model for expanding participation in scheduling to a greater range of participants.

- What: information that is novel, valuable and can be readily provided – proposing to focus on participation in ST-PASA, pre-dispatch and central dispatch. Expect participants would submit bids to consume or generate but would not necessarily be binding.
- How: a low technological barrier to entry is important. Use the precedent set by VPP demonstrations and wholesale demand response mechanism
- Who: either the FRMP, or possibly a third party.
- Why: a combination of obligation and incentives. If there are efficient incentives that can be leveraged, this would be preferable to trying to impose obligations
- Use: function of the above decisions but could feed into central demand forecasts and potentially into price setting in the market

EXAMPLE OF SCHEDULING WITH LOWER OBLIGATIONS

- The NEM has an example of a scheduling mechanism with a lower set of obligations: semi-scheduled generation.
- Recognised that as more variable renewable generation entered the market and grew in size, having this generation either all non-scheduled or scheduled was not practical
- Introduced the semi-scheduled category:
    - AEMO still centrally forecasts output through AWEFS and ASEFS. However, some generators have started submitting their own forecasts.
    - Generators still need to submit availabilities to AEMO.
    - Generators receive a dispatch target but are not required to comply with it unless flagged by AEMO. However, deviating from dispatch targets does incur a contribution factor and the potential for FCAS costs.

Question:
Is this a useful example to inform the design of a scheduled light category?

OVERSEAS EXAMPLE – NEW ZEALAND

- The Electricity Authority in New Zealand is exploring dispatchable demand and distributed generation. They're setting up an optional mechanism for demand side participants to participate in central dispatch.
    - Retailers, or elected third parties, are able to classify loads as dispatch-capable load stations (DCLS).
    - The retailer or third party then becomes a dispatchable load purchaser.
    - Dispatchable load purchasers submit bids that form prices and feed into demand forecasts
    - They also receive dispatch targets that they are expected to comply with.
    - The dispatchable load purchasers can nominate periods where they do not want to participate in central dispatch, and can decline a dispatch instruction so long as they immediately reoffer.
    - If the dispatchable load does not follow dispatch targets, it will be removed from the process

Question:
Is this a useful example to inform the design of a scheduled light category?

NEXT STEPS

NEXT STEPS

- ESB paper in September contains an update on this MDI and interlinkage with other MDIs
- Technical working group presentations on other two-sided market topics will be held later in the year

For any questions or feedback, contact:

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