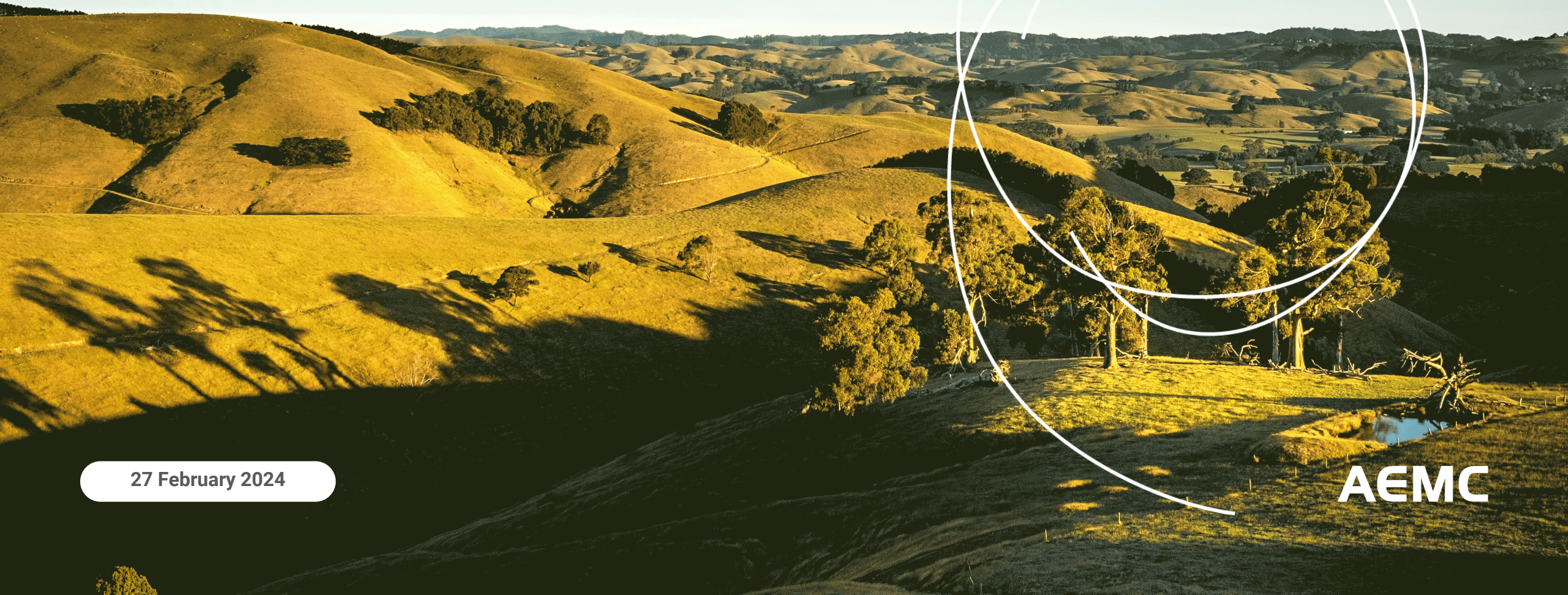
# TWG2: Visibility session 1

Integrating Price Responsive Resources into the NEM rule change



27 February 2024

AEMC

# ACKNOWLEDGEMENT OF COUNTRY

*The AEMC acknowledges and shows respect for the traditional custodians of the many different lands across Australia on which we all live and work. We pay respect to all Elders past and present and the continuing connection of Aboriginal and Torres Strait Islander peoples to Country. The AEMC office is located on the land traditionally owned by the Gadigal people of the Eora nation.*

# Agenda

| | | |
|---|---|---|
| 1 | Introductions and competition protocols | 10.30 – 10.40am (10 mins) |
| 2 | Presentation on AEMO forecasting | 10.40 – 11.10am (30 mins) |
| 3 | Presentation on the alternative visibility model | 11.10 – 11.40am (30 mins) |
| 4 | Break | 11.40 – 11.45am (5 mins) |
| 5 | Discussion of key policy issues (2 parts) | 11.45am – 12.50pm (65 mins) |
| 6 | Wrap up | 12.50 – 1.00pm (10 mins) |

# TWG purpose and materials disclaimer

We have established this TWG to gain industry insight and feedback to evolve our policy thinking throughout the rule change.

Please note that the information in this pack is the *Integrating price responsive resources into the NEM* project team's initial views. We have included our initial views in places to assist with discussions.

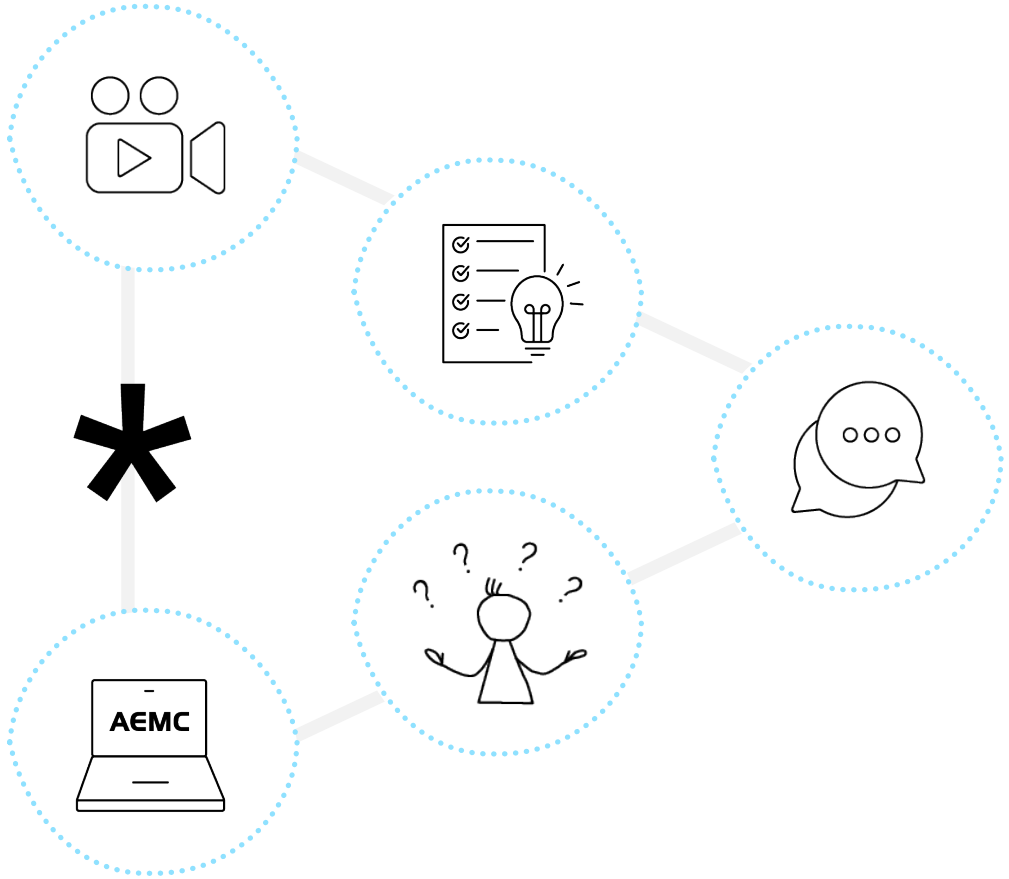
The views the team expresses in this pack or in TWG meetings do not necessarily represent the views of the Commission or what will be in our upcoming Draft Determination.

# CONSENT TO USE OF PERSONAL INFORMATION

By participating in this workshop, **you give your consent** to our collection, use and disclosure of the personal information you provide to us during this workshop (like your name) for the purpose of completing our consultation and publishing our draft and final determinations and reports on this rule change or review.

Please read our privacy policy for more information.

*We aren't recording this workshop. We will be conducting it under Chatham house rules. We will be publishing summary minutes and the slides in this session.*



# COMPETITION PROTOCOL

KEY PRINCIPLES

The AEMC is committed to complying with all applicable laws, including the ***Competition and Consumer Act 2010*** (CCA), during this forum. Breaching the CCA can lead to serious penalties for individuals involved in any breach (including large financial penalties and imprisonment for key individuals involved). This protocol governs the way in which discussions will proceed at this forum, and each attendee agrees to adhere to this protocol in order to comply with the CCA.

**Each attendee** must make an independent and unilateral decision about their commercial positions and approach in relation to the matters under discussion in this forum.

Attendees must not discuss, or reach or give effect to any agreement or understanding which relates to:

- **pricing** for the products and/or services that any attendee supplies or will supply, or the terms on which those products and/or services will be supplied (including discounts, rebates, price methodologies etc)
- **targeting (or not targeting) customers** of a particular kind, or in particular areas
- **tender processes** and whether (or how) they will participate
- any decision by attendees:
  - about the purchase or supply of any products or services that other attendees also buy or sell
  - to not engage with persons or the terms upon which they will engage with such persons (i.e. boycotting); or
  - to deny any person's access to any products, services or inputs they require
- **sharing competitively sensitive information** such as non-publicly available pricing or strategic information including details of customers, suppliers (or the terms on which they do business), volumes, future capacity etc
- **breaching confidentiality obligations** that each attendee owes to third parties.

# COMPETITION PROTOCOL

## COMMUNICATION AND MEETING GUIDELINES

Attendees must ensure that all communications (including emails and verbal discussions) adhere to the ***Key Principles***.

**This forum** will be conducted in accordance with the following rules:

- The agenda for this forum does not include anything that could contravene the Key Principles set out in this protocol.
- We will read and minute the below *competition health warning*:
  - Attendees at this forum must not enter into any discussion, activity or conduct that may infringe, on their part or on the part of other attendees, any applicable competition laws. For example, attendees must not discuss, communicate or exchange any commercially sensitive information, including information relating to prices, marketing and advertising strategy, costs and revenues, terms and conditions with third parties, terms of supply or access.
  - Participating in this forum is subject to you having read and understood the protocol including the Key Principles.
- We will keep accurate minutes of the forum, including details of attendees.
- If something comes up during the forum that could risk contravening any competition laws, attendees should:
  - Object immediately and ask for the discussion to be stopped.
  - Ensure the minutes record that the discussion was objected to and stopped.
  - Raise concerns about anything that occurred in the forum with their respective legal counsel immediately afterwards.
- All attendees understand that any competitively sensitive matters must be subject to legal review before any commitment/agreement can be given.
- Any decision about whether, and on what terms, to engage with customers and suppliers is an independent and unilateral decision of each attendee.

# TWG timeline

| Meeting time | Indicative issue areas for discussion* |
|---|---|
| **Wednesday 21 February**<br>**3 – 5pm** | TWG1<br>Introduction to the TWG |
| **Tuesday 27 February**<br>**10.30am – 1pm** | TWG2: Visibility #1<br>Visibility option(s) to continue to draft determination |
| **Monday 4 March**<br>**2 – 5pm** | TWG3: Dispatch #1<br>The overarching framework for the rule and participation |
| **Tuesday 12 March**<br>**10am – 1pm** | TWG4: Incentives<br>Incentives for solutions will be discussed |
| **Wednesday 10 April**<br>**2 – 5pm** | TWG5: Visibility #2<br>Contd. Discussion from 27 Feb |
| **Tuesday 16 April**<br>**2 – 5pm** | TWG6: Dispatch #2<br>Contd. Discussion from 4 March |
| **Tuesday 7 May**<br>**2 – 5 pm** | TWG7: Wrap up<br>Outstanding issues |

* Note that the areas are indicative and could evolve as the project progresses

For discussion today

# Visibility issues tree (February 2024)

**Overarching goal for a visibility model**

We need a visibility model because not all price-responsive resources (PRR) can be dispatched. Visibility should be an in-between-model that captures PRR that are either:

- not controllable, or
- could be dispatched, but it would be costly/inefficient to integrate into dispatch.

| | Key questions | Sub-issues for design from key questions |
|---|---|---|
| 1 | **Can visibility be used to improve AEMO-side forecasting and efficient dispatch?** | • What does AEMO need to do?<br>  • incorporate info into forecasts?<br>  • situational awareness? |
| 2 | **Can participants provide the information accurately?** | • What is capable of being forecast by participants? What technologies/stuff exist?<br>  • What resources and behaviours can be forecast?<br>  • What timeframes?<br>  • What level of accuracy/confidence?<br>• Can it feed into planning and operations?<br>  • Real-time; Predispatch; ST PASA; MT PASA; ESOO; network planning; ISP |
| 3 | **What are the minimum requirements for participation?** | • Who is the participant: **FRMP**<br>• What does the participant need to do?<br>  • Provide info: Submit quasi-bids for total or PRR portion of demand/supply; Update standing data<br>  • How often: daily/dispatch intervals; ad-hoc?<br>  • What period should info cover: Predispatch, ST PASA, etc.<br>  • Are there conformance requirements? **No as it would require the participant to receive dispatch instructions**, but potentially require new entrants to prove that PRR estimates are better than AEMO estimates. |
| 4 | **What are the performance incentives?** | • What's the incentive to get PRR accurately estimated – What's the risk to get it wrong? What's the reward to get it right?<br>• Is it market-based self-fulfilling (e.g. FPP) and/or administrative (e.g. misc payment)?<br>• Could it be gamed? If yes, how could gaming be addressed? |
| 5 | **Can visibility be used to improve use of distribution networks?** | • Can the visibility model be used to help DNSPs provide non-network services (e.g. voltage support) / relieve network constraints?<br>• Can the information from the model be shared with DNSPs to improve situational awareness? |
| 6 | **What are the likely costs?** | • Who bears the costs? AEMO, market participants, other?<br>• Implementation – complexity, timeframe? |
| 7 | **What are the compliance requirements?** | • TBD based on selected visibility design |

# Teams poll question

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Agenda item 2

# Presentation on AEMO forecasting

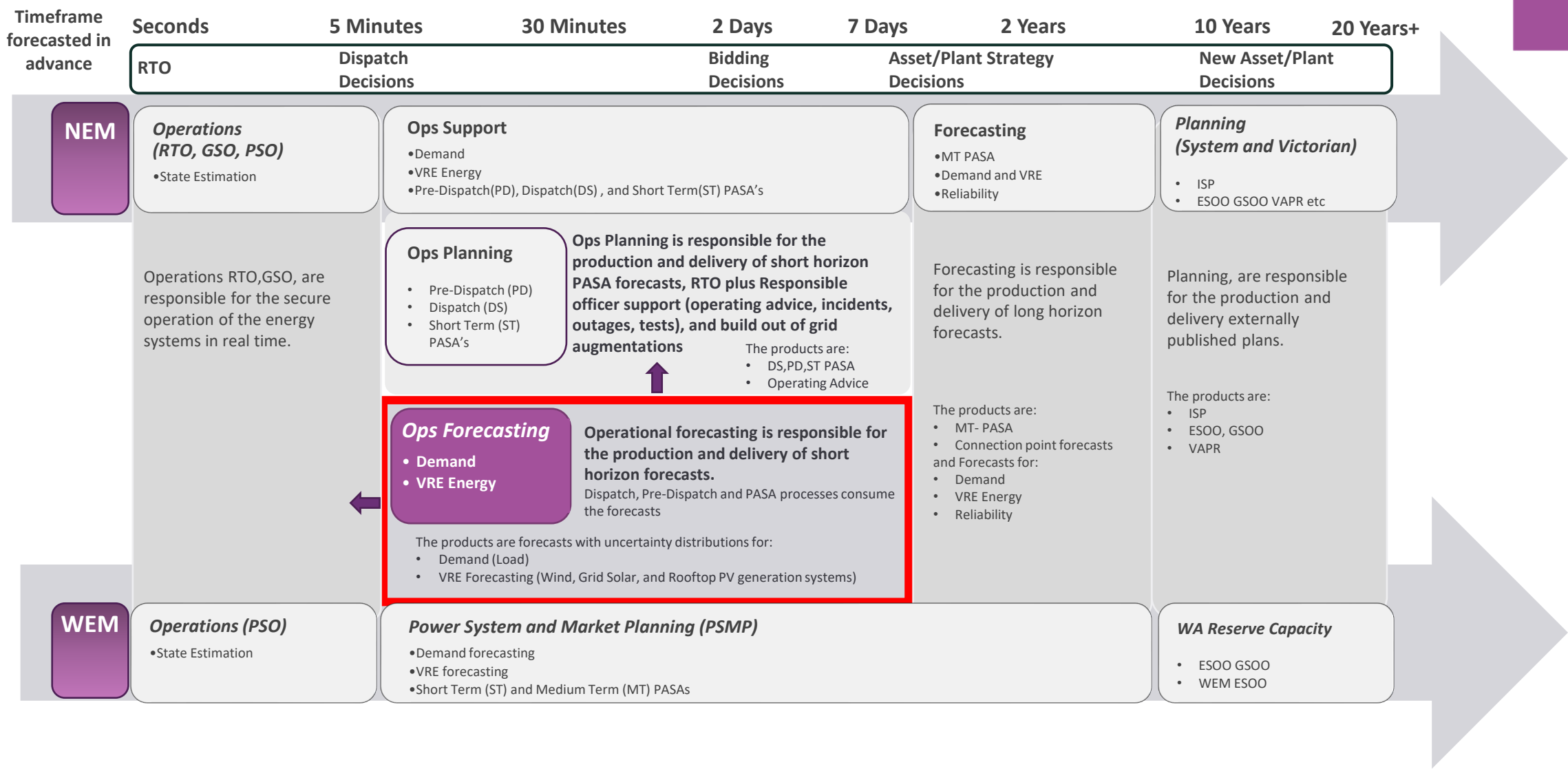
AEMO team

# Agenda

- Overview of the Operational Forecasting Role in the NEM
- The Evolving Landscape of Operational Forecasting - Challenges
- Operational Forecasting - Use of data

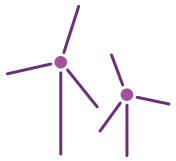
# Overview to the Operational Forecasting Role in the NEM

# The Role of Operational Forecasting



# Operational Forecasting: Other Functions

Situational awareness for control room and wider AEMO



Supporting AEMO's onboarding and connections process

Provide input to Market Reform initiatives

Reporting and documentation

Engagement with International ISO's

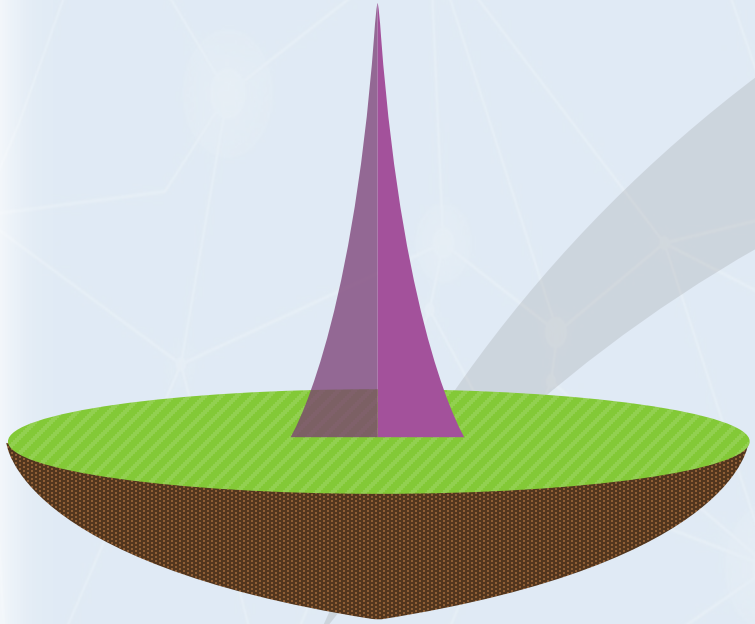
# The Evolving Landscape of Operational Forecasting

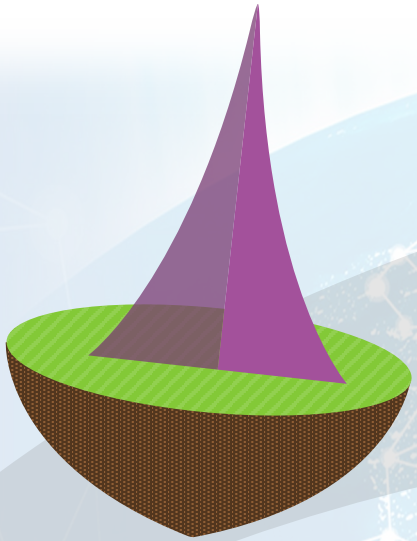
Challenges due to the increasing penetration of non-scheduled price responsive resources

# Embracing Uncertainty

### 1998

At the start of the NEM the operating envelope for a stable grid state was large compared to the uncertainty of the forecasts used to operate it.





### 2024

Today the balance between uncertainty and control is becoming challenging

### Undesirable Future State

Where the level of uncertainty and variability exceeds the span of control of the system operators.

# Visibility, Predictability & Control

Visibility, Predictability & Control

Lower

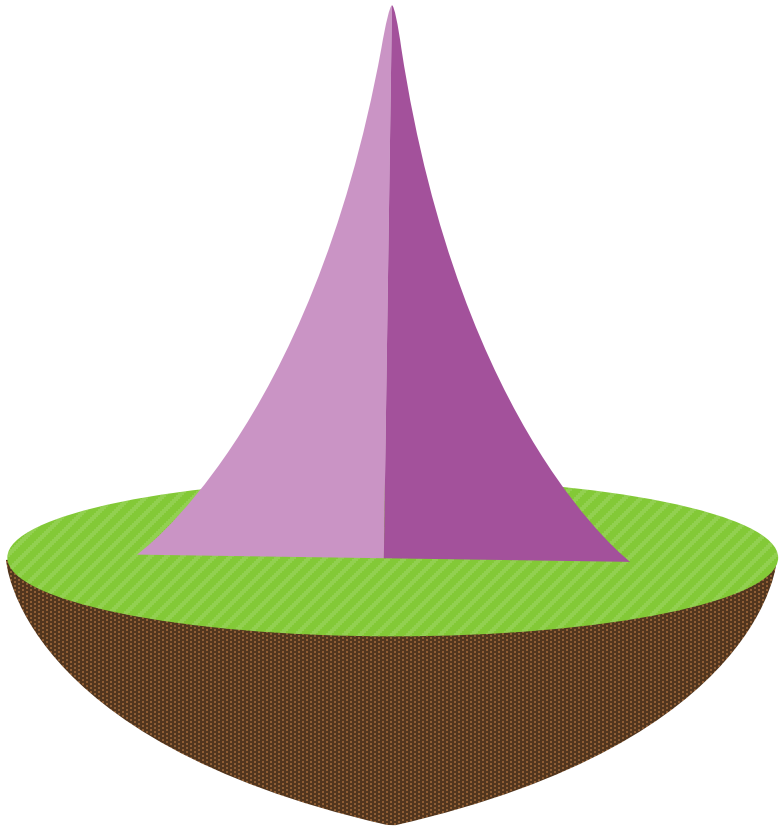
Higher

## Demand side

- Non-Scheduled generators (> 5 MW)
- Distributed Energy Resources (DER)
  - Rooftop PV
  - Home Batteries
  - Controlled Loads
- Aggregators and Virtual Power Plants (VPP)
- Small Non-scheduled generators (< 5 MW)

## Supply side

- Scheduled generators
- Semi-Scheduled generators
- Intermittent Non-Scheduled generators (> 30 MW)
- Wholesale Demand Response (WDR)



# Visibility, Predictability & Control

Visibility, Predictability & Control

Lower

Higher

**Demand side**

- Non-Scheduled generators (> 5 MW)
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**Supply side**

- Scheduled generators
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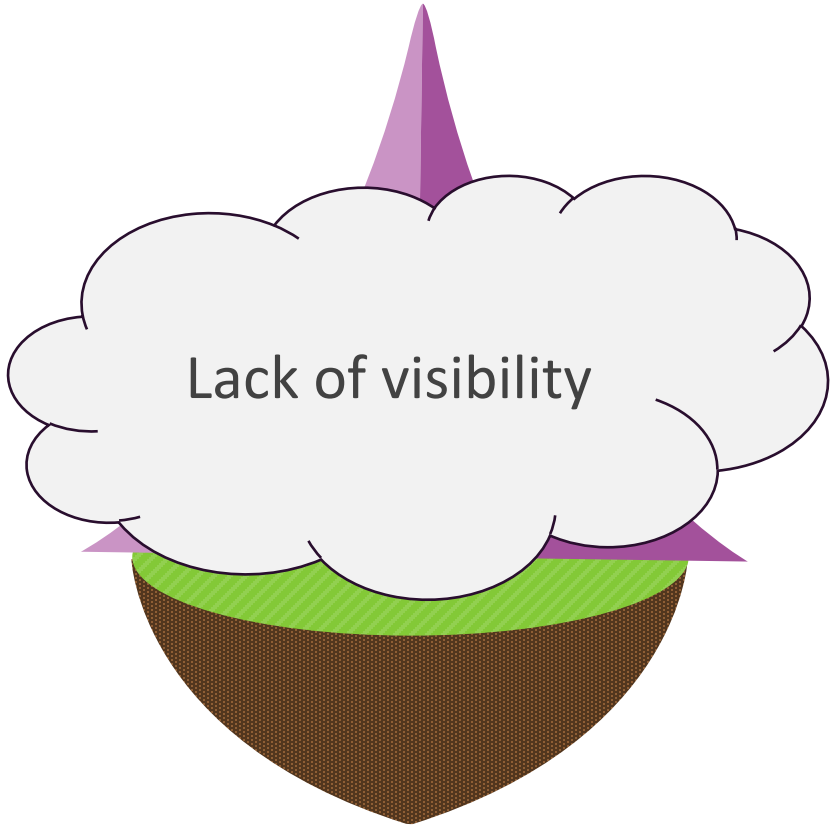


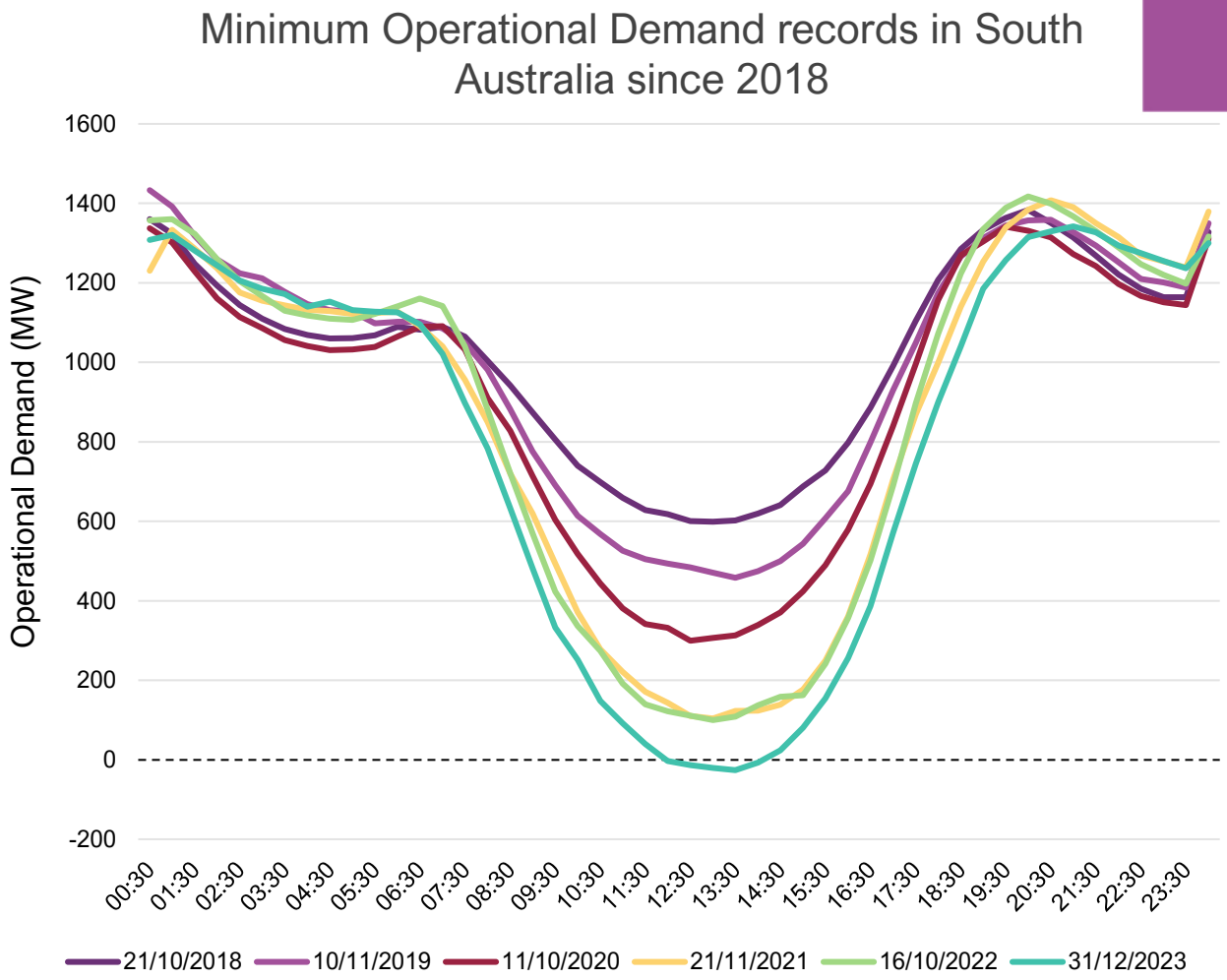
# Daytime Minimum Demand Records

**20 GW** of Distributed PV (DPV) capacity in the NEM.

DPV is distributed, largely passive, and operationally "invisible"

Growth in distribution connected capacity is changing the shape and trend in operational demand.

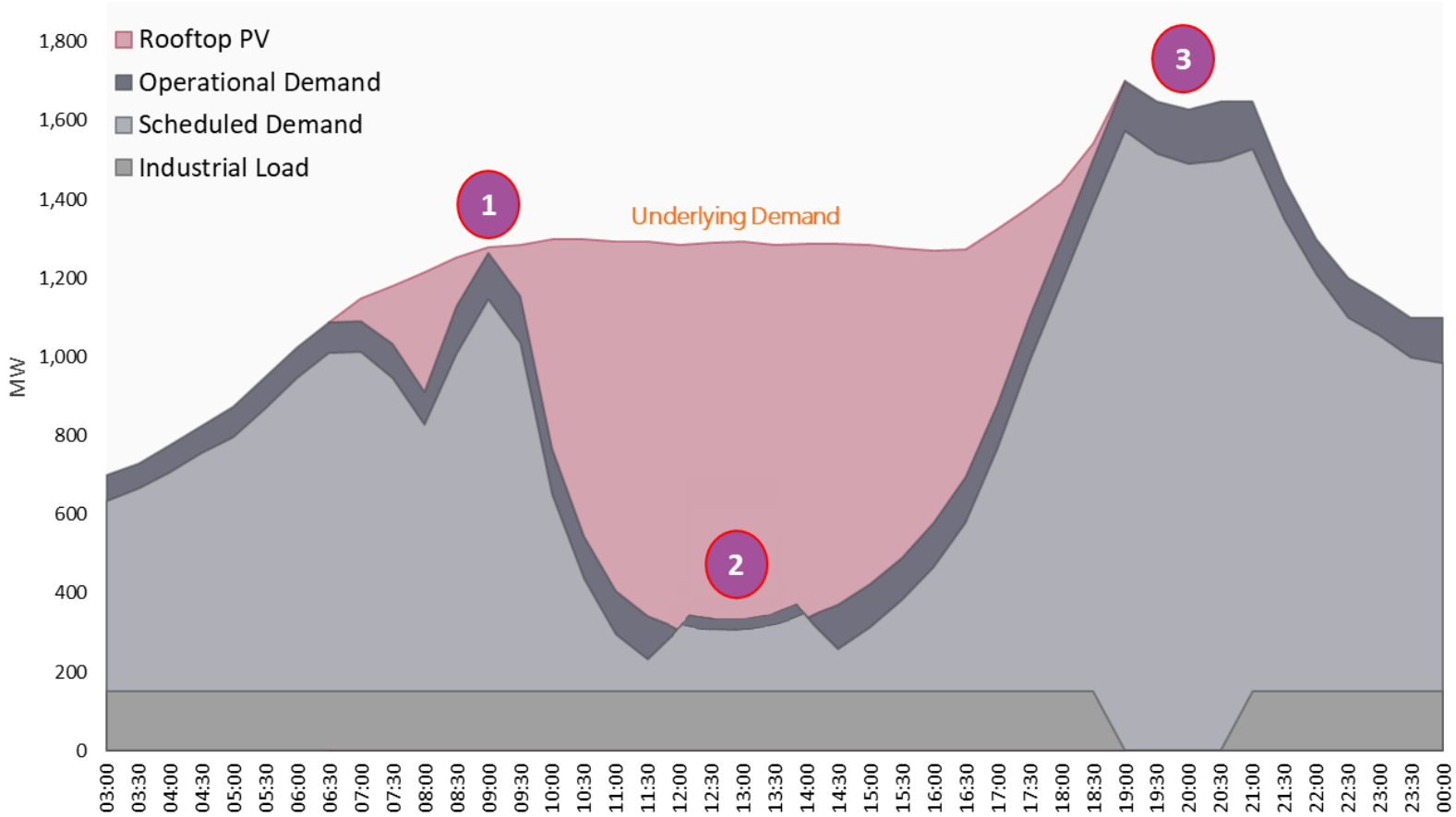
DPV curtailment and activated DER is starting to slow the reductions in daytime demand




| | | | | | | |
|---|---|---|---|---|---|---|
| **Min demand** | 599 MW | → 458 MW | → 300 MW | → 104 MW | → 100 MW | → -26 MW |
| **DPV capacity** | 967 MW | 1,182 MW | 1,510 MW | 1,826 MW | 2,053 MW | 2,374 MW |

# Variability in Operational Demand

The demand forecast currently produced by AEMO is a scenario of what would be without demand-side response to prices and event driven control. It is a demand-side bid for market generators.




### 1 Rooftop PV Volatility

- Cloud cover suppressing and varying DPV output
- Impacts of flexible operating envelopes

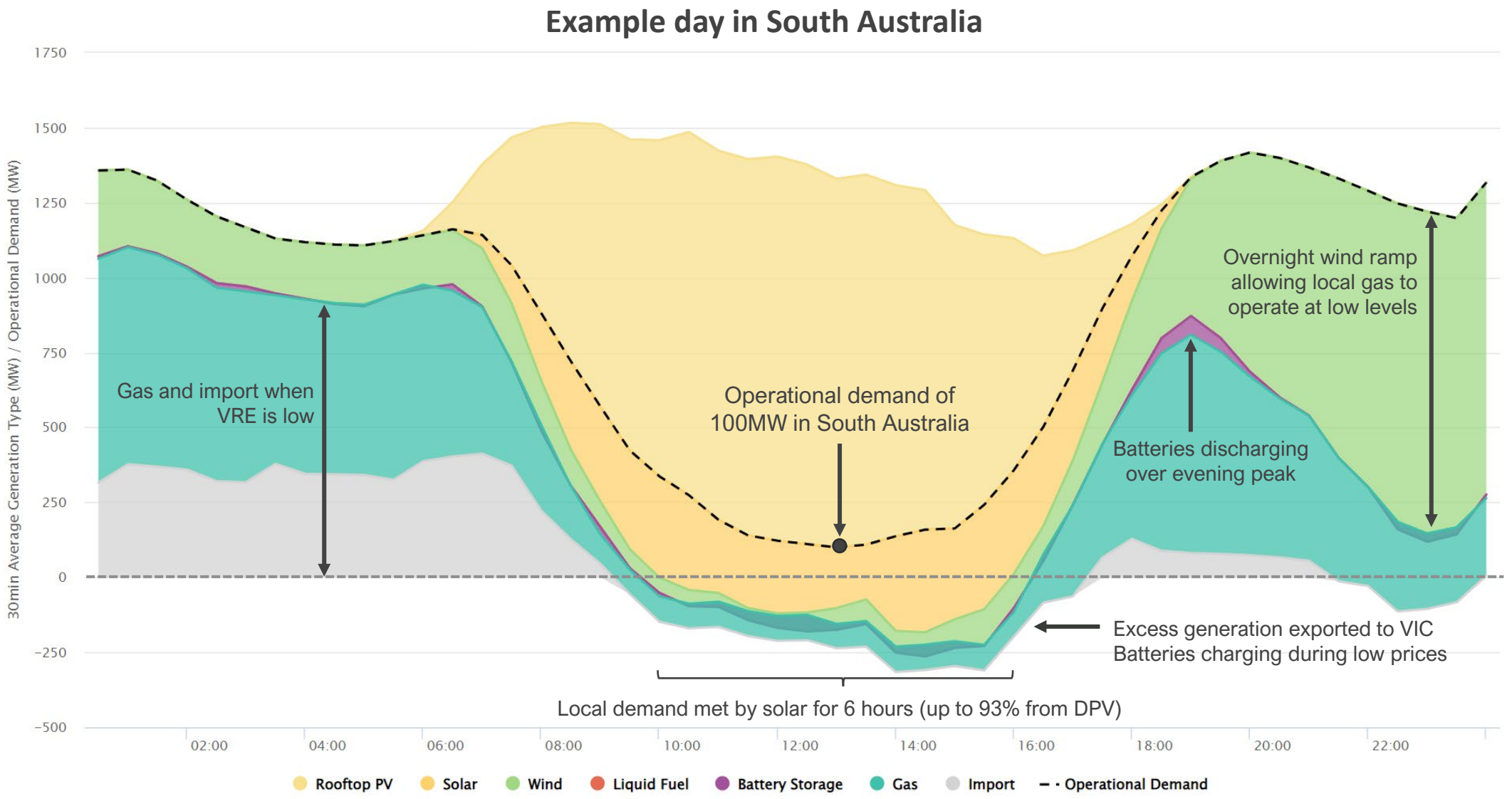
### 2 Responses to lift demand

- Large & small NS units switching off
- DPV management by DNSP
- Coordinated DER charging (VPP)

### 3 Responses to lower demand

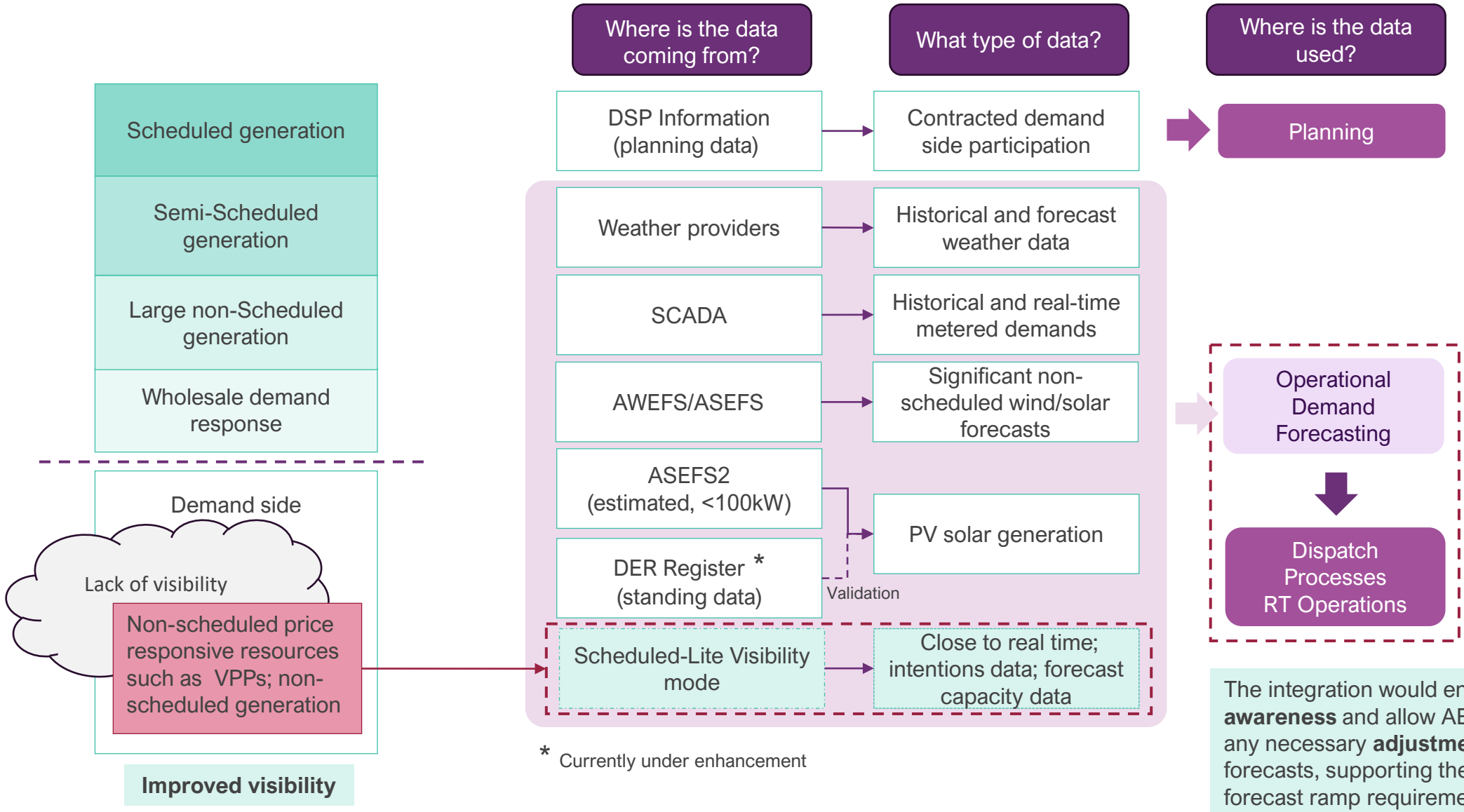
- Industrial load reductions
- DNSP Load Shifting
- Coordinated DER generation (VPP)

# Variability & Ramping in Supply



# Operational Forecasting - Use of data

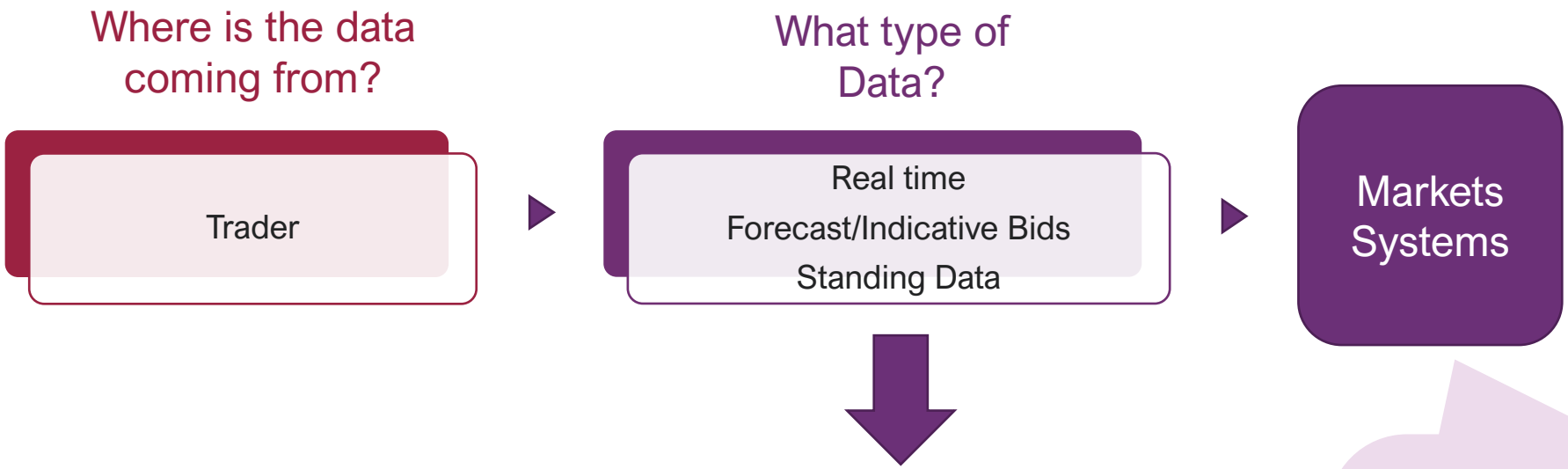
# Overview – Ops Forecast data use




* Currently under enhancement

The integration would enhance **situational awareness** and allow AEMO to track and make any necessary **adjustments** to its demand forecasts, supporting the management of forecast ramp requirements and more efficient use of ancillary services.

# Visibility Model - Overview



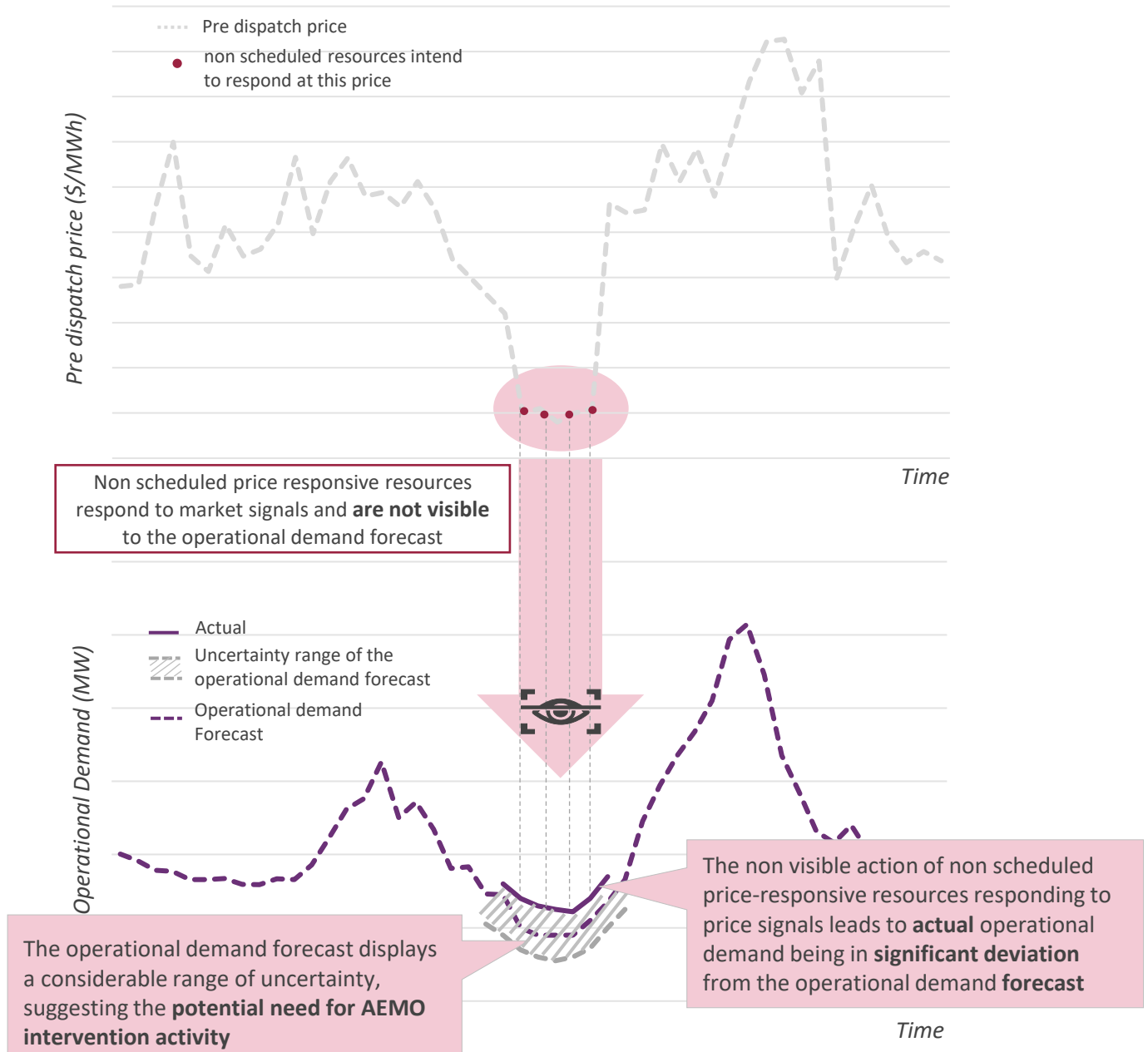

| Type of data | Proposed requirement |
|---|---|
| **Frequency of RT data provision** | Data reads every 5 minutes |
| **Granularity of RT data** | At least 5-minute granularity |
| **Forecast capacity** | Data set of anticipated capacity across short-term horizon |
| **Price-Quantity Pairs (Indicative Bids - Intentions data)** | Forecast volumes at price points across short-term horizon, including passive consumption and generation where relevant (Price/quantity pairs i.e. $/qty) |

Market Systems **will have access to enhanced visibility and predictability of these type of resources**. Therefore, markets systems could use this data to **reduce operational uncertainty** and for **proactive operational decision-making** e.g. use of enhanced visibility and predictability for **situational awareness** would enable efficient use of reliability services

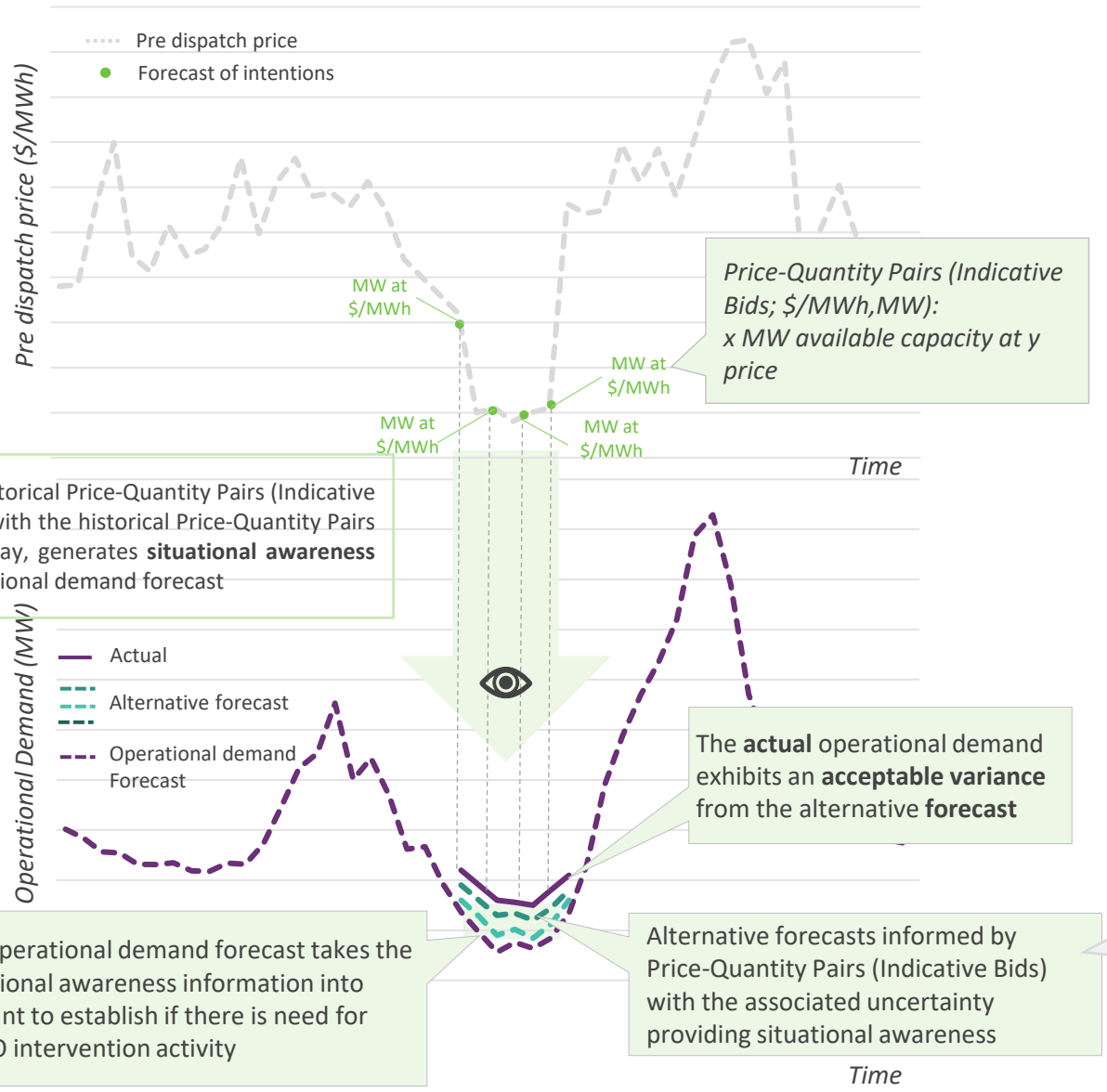
# Worked example - Purpose

- The purpose of constructing a worked example is to **emphasise the value of enabling enhanced visibility and predictability to market systems** of non scheduled price responsive resources, which is the purpose of the Scheduled Lite Visibility Mode.
    - It is important to note that the worked example intends to provide a snapshot of the benefits for a given event rather than a full set of benefits
    - The worked example delves into the value of enabling enhanced visibility and predictability of this type of resource on the **operational demand forecast**
    - The worked example explores **two scenarios**: status quo- current operational demand forecast and enhanced visibility and predictability for situational awareness
    - Enabling a **comparison exercise** that highlights the value of enhanced visibility and predictability to the market

# Status Quo


Pre dispatch price
non scheduled resources intend to respond at this price
Pre dispatch price ($/MWh)
Time
Non scheduled price responsive resources respond to market signals and **are not visible** to the operational demand forecast
Actual
Uncertainty range of the operational demand forecast
Operational demand Forecast
Operational Demand (MW)
The non visible action of non scheduled price-responsive resources responding to price signals leads to **actual** operational demand being in **significant deviation** from the operational demand **forecast**
The operational demand forecast displays a considerable range of uncertainty, suggesting the **potential need for AEMO intervention activity**
Time

# Enhanced visibility and predictability for situational awareness




*Price-Quantity Pairs (Indicative Bids; $/MWh,MW):*
*x MW available capacity at y price*

**Historical data sets** informed by historical Price-Quantity Pairs (Indicative Bids) and performance, combined with the historical Price-Quantity Pairs (Indicative Bids) provided on the day, generates **situational awareness** information that informs the operational demand forecast

The **actual** operational demand exhibits an **acceptable variance** from the alternative **forecast**

The operational demand forecast takes the situational awareness information into account to establish if there is need for AEMO intervention activity

Alternative forecasts informed by Price-Quantity Pairs (Indicative Bids) with the associated uncertainty providing situational awareness

It could support decision-making in situations such as day to day improvement and interventions (e.g. RERT, curtailment)

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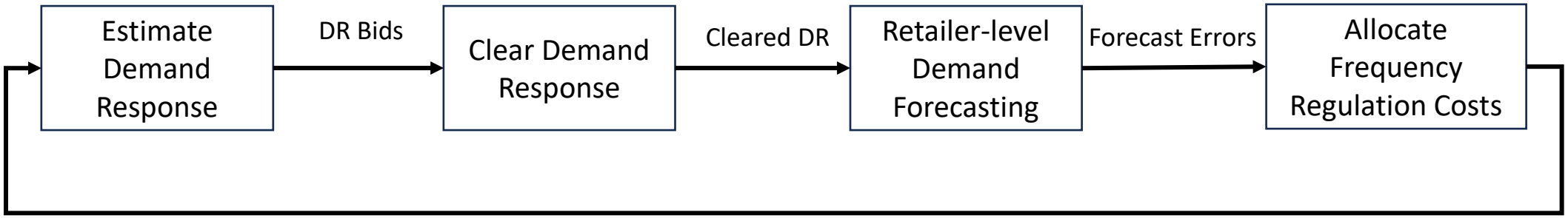
Agenda item 3

# Alternative visibility model

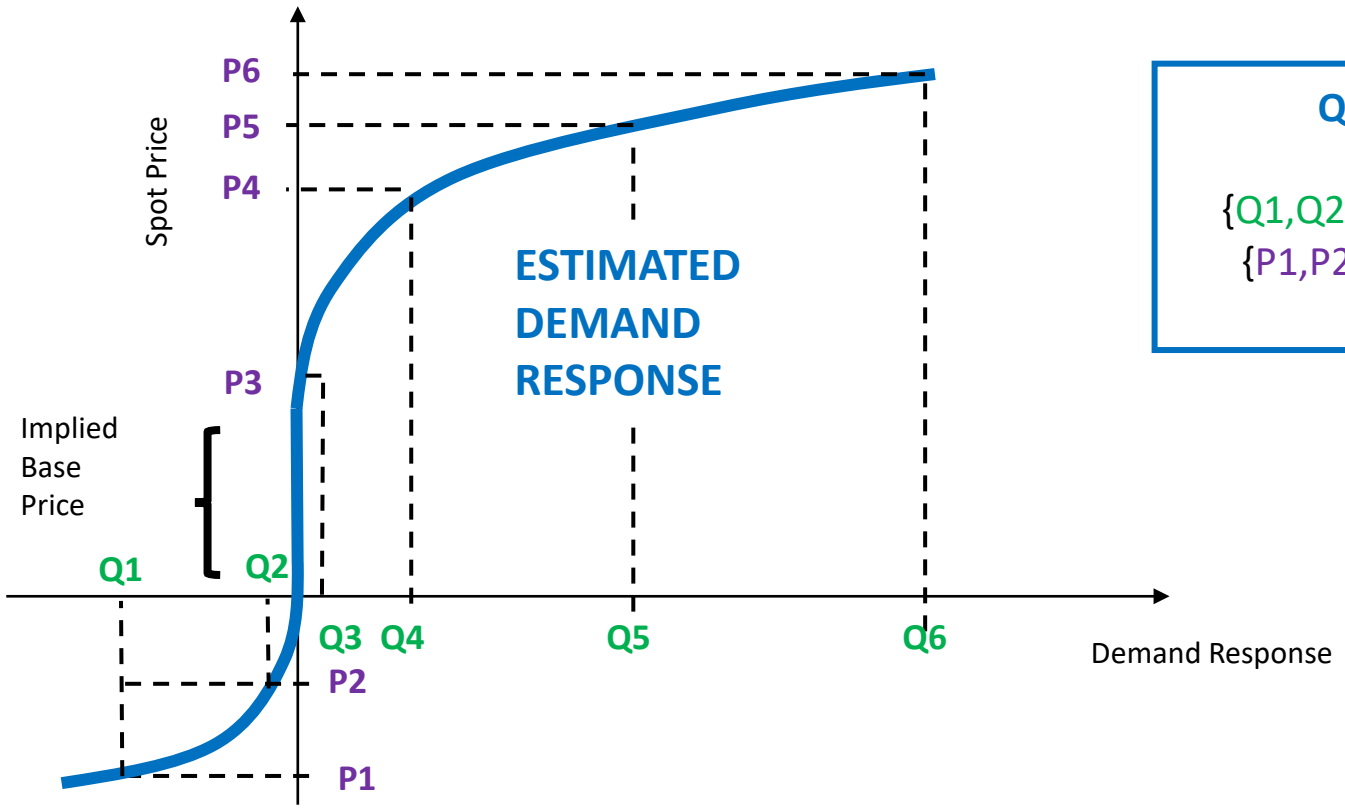
Dave Smith (Creative Energy Consulting)

# Four Steps to create Incentives




Cost Savings encourage retailers to estimate demand response

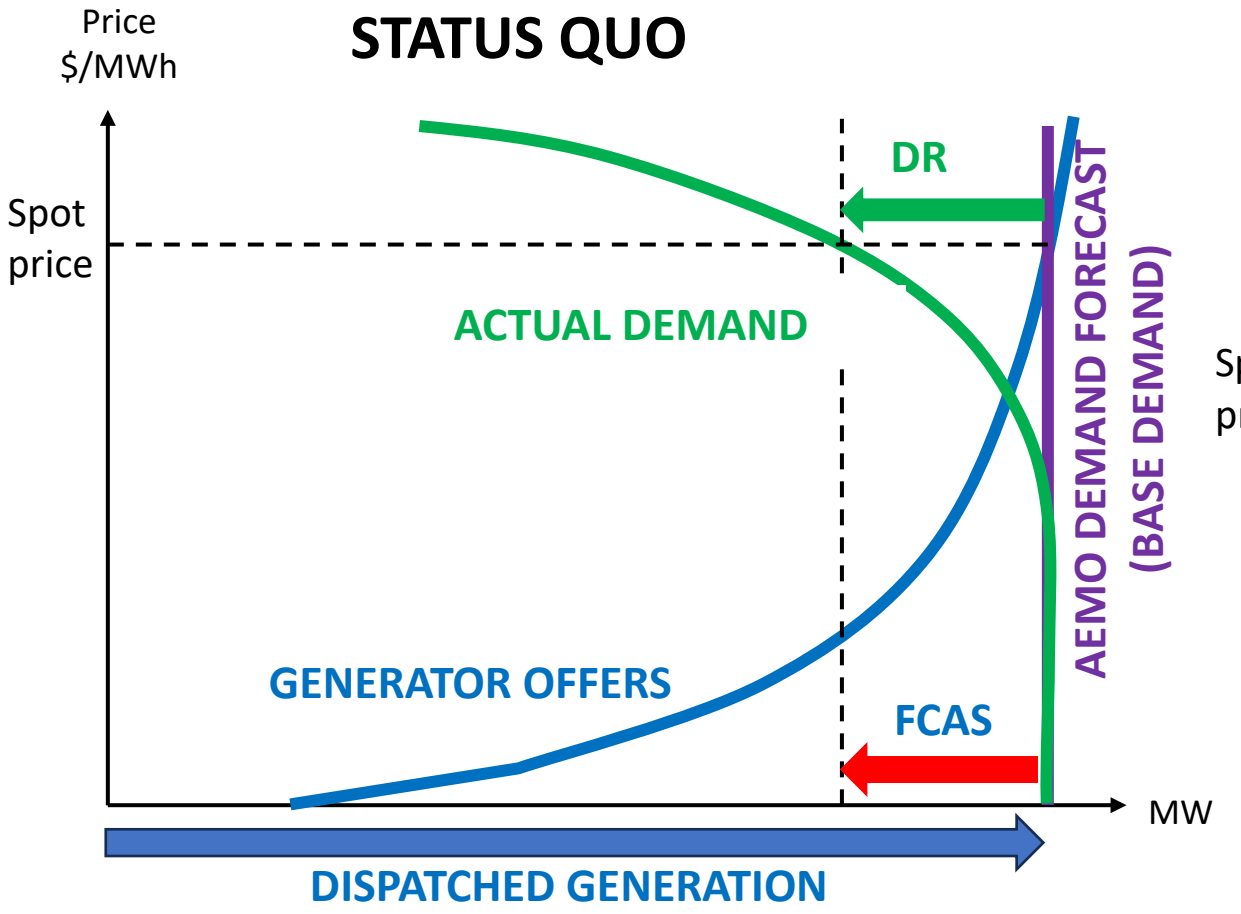
# Figure 8: Quasi-bidding

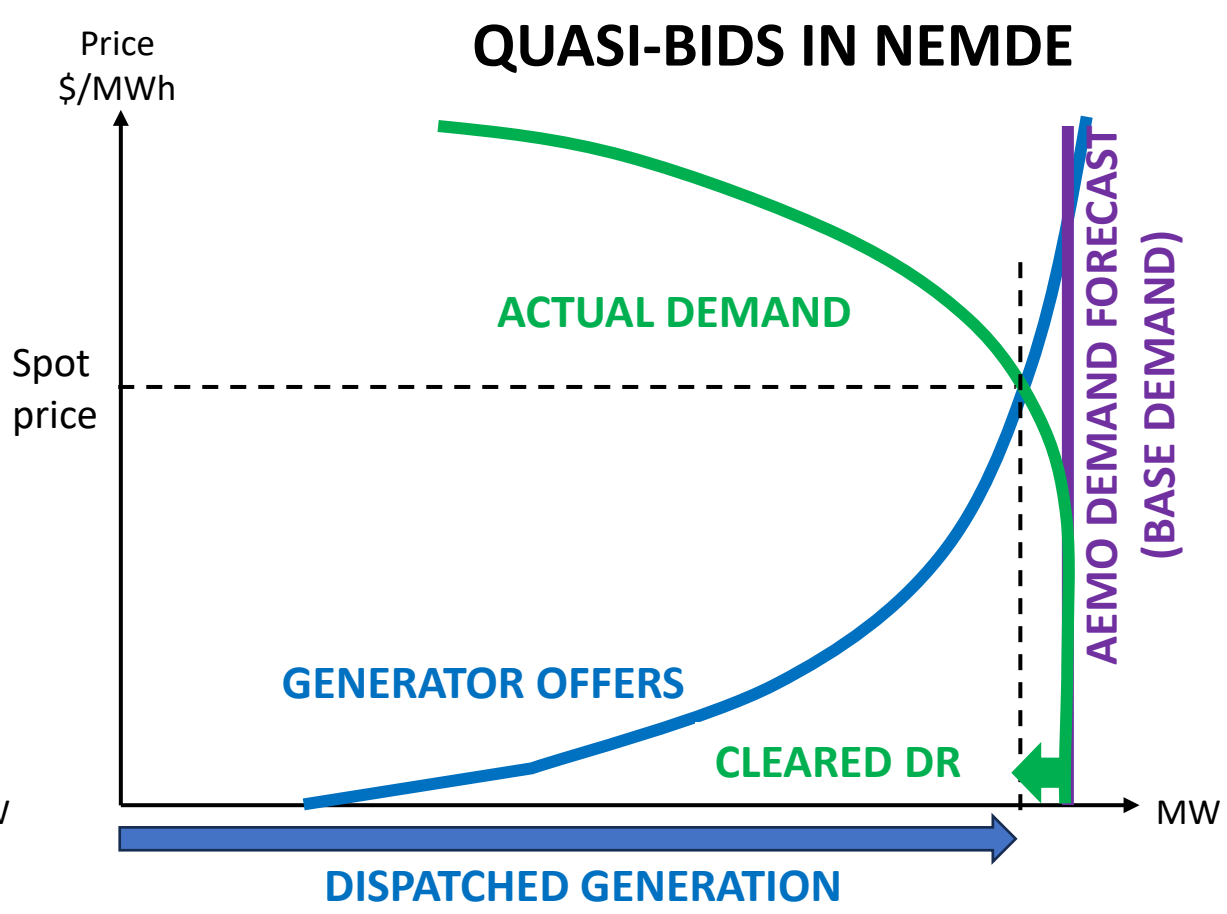



**QUASI-BID**

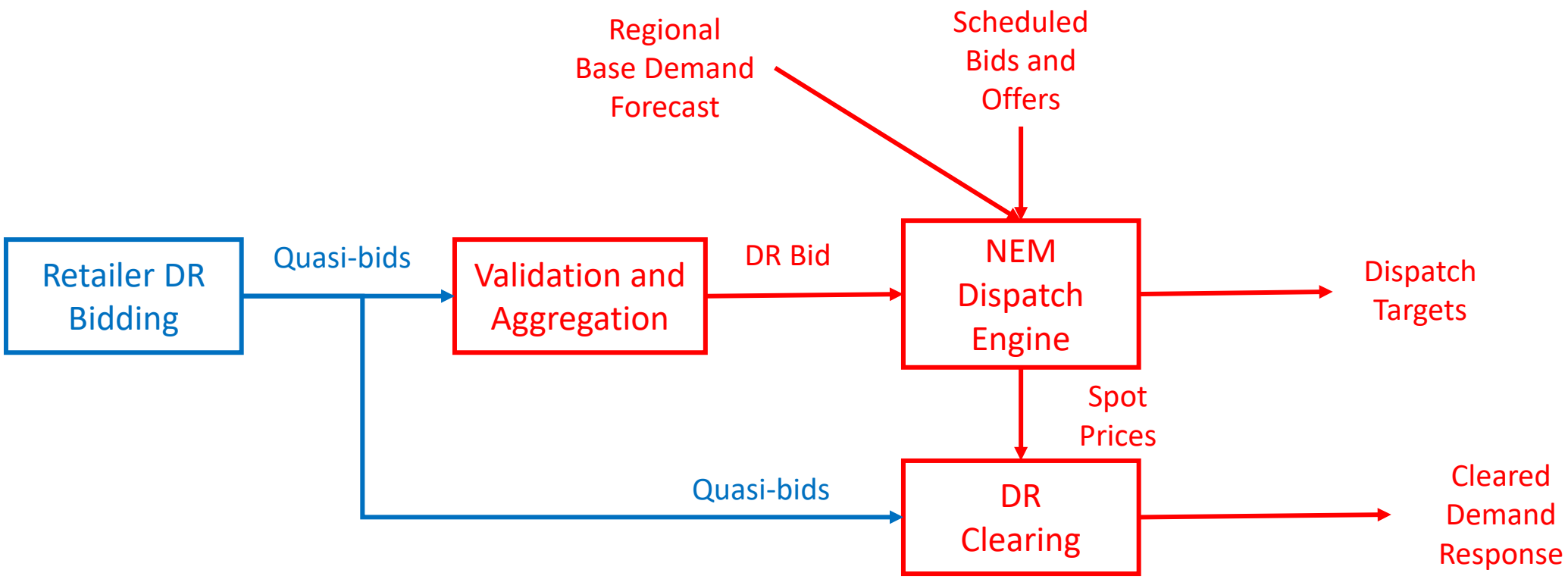
{Q1,Q2,Q3,Q4,Q5,Q6}
{P1,P2,P3,P4,P5,P6}

# Demand Response needs to be made Visible

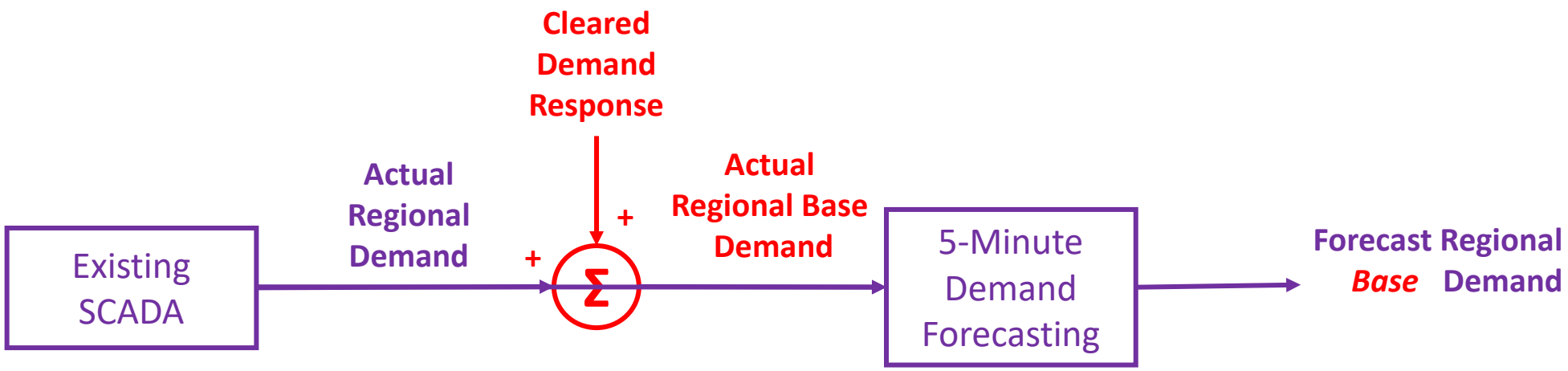


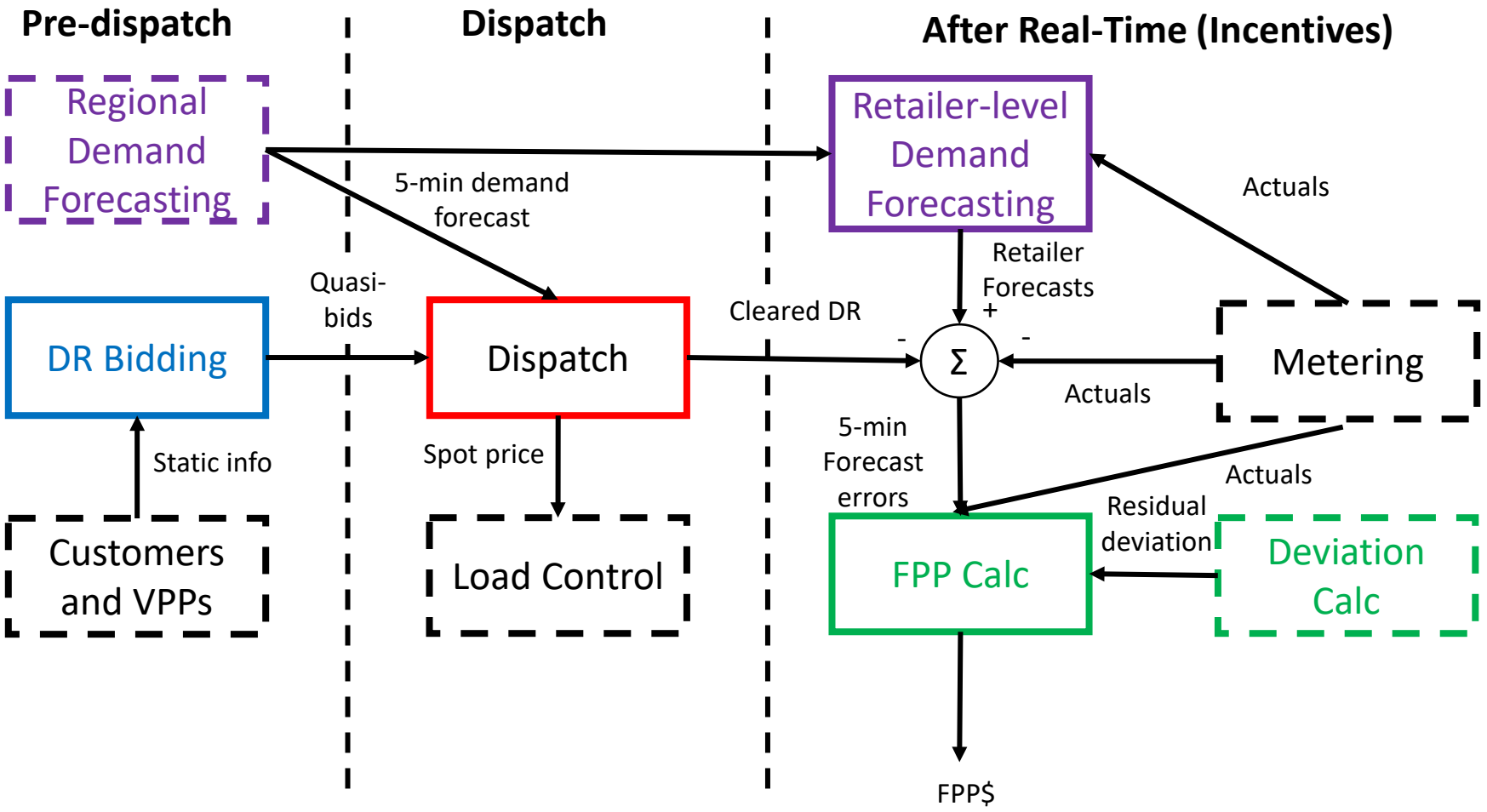
# Bidding and Dispatch Processes



# Regional demand forecasting



# Design Architecture



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Agenda item 4

# Five min break

AEMC

Agenda item 5

# Discussion of key policy issues

AEMC team

# Discussion part 1: Can participants provide the information accurately?

**Overarching goal for a visibility model**

We need a visibility model because not all price-responsive resources (PRR) can be dispatched. Visibility should be an in-between-model that captures PRR that are either:

- not controllable, or
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| 6 **What are the likely costs?** | • Who bears the costs? AEMO, market participants, other?<br>• Implementation – complexity, timeframe? |
| 7 **What are the compliance requirements?** | • TBD based on selected visibility design |

# **Discussion part 1:** Can participants provide the information accurately?

*Table adapted from Origin's submission – noting that this includes example PRR, some of which will be covered by the entire rule change (dispatch and visibility)*

| | Price responsive resource (PRR) | | Constraints |
|---|---|---|---|
| Residential | **Batteries** | • Optimise output of residential batteries<br>• Community battery trials starting soon | • Customers require minimum level of storage at all times<br>• Annual export limits<br>• Customer options to switch between 'modes' |
| | **Electric vehicles** | • Shifting charging to lower demand periods of the day<br>• Small but growing volume | • Customers require a minimum level of charge per a given period |
| | **Controlled load hot water** | • Shifting hot water load, generally from overnight to the middle of day<br>• Partly automated to respond to changes at 30-min intervals | • Customers require minimum levels of hot water at all times |
| | **Solar** | • Management of solar exports. Not currently actively managed | • Limits on how much solar export can be controlled |
| | **Spike** | • Behavioural demand response which provides incentives to reduce demand during peak events nominated by retailer | • At discretion of customer whether to participate<br>• Requires a baseline for comparison |
| C&I | **Back-up generation** | • Some customer have on-site generators which can run in periods of high prices (e.g. data centres and water utilities) | • Customers can opt-out of specific events<br>• Can take time to respond<br>• Bespoke customer requirements such as security and public health |
| | **Demand response** | • Various C&I loads can be turned down for incentive payments (e.g. cement, meat processing and paper goods) | • Custers can opt not to participate in specific events<br>• Can take time to respond |

*For TWG feedback*

1. Are there other substantial PRR we should be specifically considering for visibility?

2. For each PRR:
   - Can it be forecast? If yes, with what accuracy level of accuracy/confidence?

3. For forecastable PRR, over what timeframes?
   - Predispatch (up to 36h ahead)
   - ST PASA (up to 7 days ahead)

# Discussion part 2: What are the minimum requirements for participation?

**Overarching goal for a visibility model**

We need a visibility model because not all price-responsive resources (PRR) can be dispatched. Visibility should be an in-between-model that captures PRR that are either:

- not controllable, or
- could be dispatched, but it would be costly/inefficient to integrate into dispatch.

| | Key questions | Sub-issues for design from key questions |
|---|---|---|
| 1 | **Can visibility be used to improve AEMO-side forecasting and efficient dispatch?** | • <u>What does AEMO need to do?</u><br>  • incorporate info into forecasts?<br>  • situational awareness? |
| 2 | **Can participants provide the information accurately?** | • What is capable of being forecast by participants? What technologies/stuff exist?<br>  • What resources and behaviours can be forecast?<br>  • What timeframes?<br>  • What level of accuracy/confidence?<br>• Can it feed into planning and operations?<br>  • Real-time; Predispatch; ST PASA; MT PASA; ESOO; network planning; ISP |
| 3 | **What are the minimum requirements for participation?** | • Who is the participant: **FRMP**<br>• <u>What does the participant need to do?</u><br>  • Provide info: Submit quasi-bids for total or PRR portion of demand/supply; Update standing data<br>  • How often: daily/dispatch intervals; ad-hoc?<br>  • What period should info cover: Predispatch, ST PASA, etc.<br>  • Are there conformance requirements? **No as it would require the participant to receive dispatch instructions**, but potentially require new entrants to prove that PRR estimates are better than AEMO estimates. |
| 4 | **What are the performance incentives?** | • What's the incentive to get PRR accurately estimated – What's the risk to get it wrong? What's the reward to get it right?<br>• Is it market-based self-fulfilling (e.g. FPP) and/or administrative (e.g. misc payment)?<br>• Could it be gamed? If yes, how could gaming be addressed? |
| 5 | **Can visibility be used to improve use of distribution networks?** | • Can the visibility model be used to help DNSPs provide non-network services (e.g. voltage support) / relieve network constraints?<br>• Can the information from the model be shared with DNSPs to improve situational awareness? |
| 6 | **What are the likely costs?** | • Who bears the costs? AEMO, market participants, other?<br>• Implementation – complexity, timeframe? |
| 7 | **What are the compliance requirements?** | • TBD based on selected visibility design |

# **Discussion part 2:** What are the minimum requirements for participation?

Questions 3a and 3e are core the all three proposals to improve visibility: AEMO's proposal, Alternate visibility mode and improved standing data.

- **3a) Who is the participant?** All visibility models consider the FRMP as the participant.
- **3e) Are there AEMO conformance requirements?** There can be no conformance requirements for visibility as no dispatch instructions would be issued.

*For TWG feedback*

Note the team's view on participant and conformance requirements.

# **Discussion part 2:** What are the minimum requirements for participation?

**3b)** What information will the participant provide?

| AEMO visibility | Alternative visibility | Improving standing data |
|---|---|---|
| • Register NMIs in a Light Scheduling Unit (LSU)<br>• Submit indicative bids for everything (price responsive or otherwise) for each LSU<br>• LSU must be within a zone (e.g. a NEM region, or parts of a NEM region). | • No registration requirements<br>• Submit quasi-bids for expected PRR.<br>• Quasi-bids for a FRMP's PRR within a NEM region. | • Use the existing arrangements for demand-side participation information portal (DSPIP) and/or DER asset register. |

*For TWG feedback*

1. What's going to make it easier to participate?
   - submit bids for all demand/supply within an LSU?
   - submit bids for PRR deviation within a region?
   - more regularly update standing data?

2. What is going to make the information most accurate?
   - zonal level (i.e. a NEM region or parts of a NEM region)?
   - regional level?
   - NMI level?

# **Discussion part 2:** What are the minimum requirements for participation?

**3c)** How often must the information be provided?

| AEMO visibility | Alternative visibility | Improving standing data |
|---|---|---|
| For all dispatch intervals (as the indicative bids are for all demand/supply from an LSU) | For all dispatch intervals where PRR is anticipated (as the quasi bids are for PRR) | TBD – Currently, the rules require an annual update. |

**3d)** Time period that the information should cover?

| | | AEMO Visibility | Alternative visibility | Improving standing data |
|---|---|---|---|---|
| Operations | Dispatch | Yes – bids not directly incorporated into dispatch | Yes – quasi bids incorporated into dispatch | No* |
| Operations | Predispatch | Yes – to improve situational awareness | No* | No* |
| Operations | ST PASA | Yes – to improve situational awareness | No* | No* |
| Forecast | MT PASA | No* | No* | No* |
| Planning | Network planning | Current standing data informs planning | | Yes |
| Planning | ESOO, ISP | Current standing data informs planning | | Yes |

*For TWG feedback*

1. Frequency of information being provided
   - How granular should the information be? E.g. dispatch intervals, every 30 minutes, daily, weekly, annually, etc.
2. How should information be incorporated into operational and planning timeframes?

*Not in current models, but model could be adapted to include information for these timeframes

AEMC

Agenda item 6

# Wrap up

AEMC team

Email Sam.Markham@aemc.gov.au if you would like to discuss any issues raised in the TWG

# AEMC

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