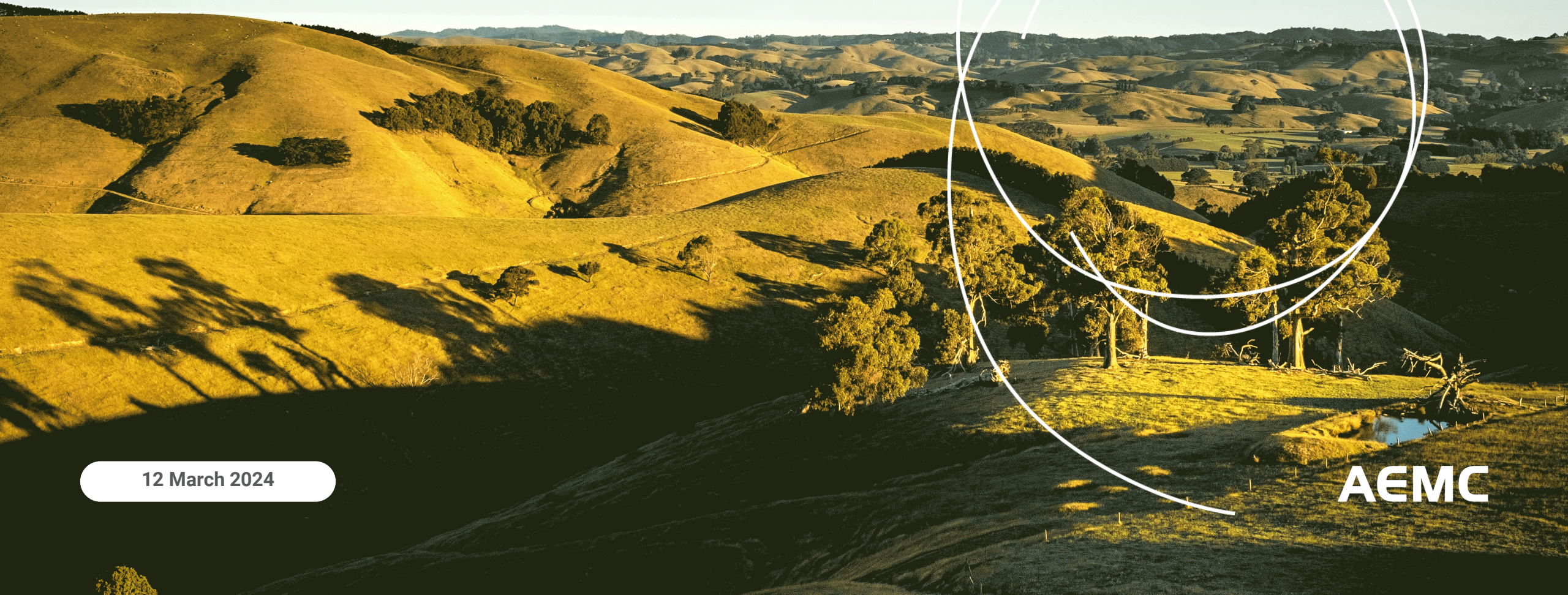
TWG4: Incentives

Integrating Price-Responsive Resources into the NEM rule change



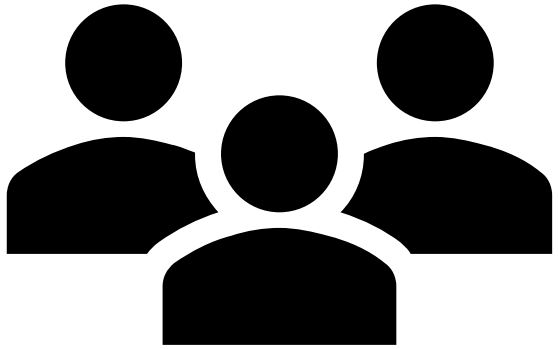
12 March 2024

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.

AEMC project team



EGM: Andrew Lewis

Project sponsor: Ben Davis
Project leader: Rachel Thomas

Lead areas
Visibility lead: Sam Markham
Dispatch lead: Harrison Gibbs
Incentives lead: Rachel Thomas

Additional
Lawyers: Lily Mitchell and Ben Bronneberg
Market expert: Craig Oakeshott
Graduate: Jacqueline Price

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.

TWG timeline

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

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

Objective of today: Get TWG input on incentive design principles and the materiality of different incentives that we are examining

Agenda

1	Acknowledgment of country, competition protocols	10:00 – 10:15 (15 mins)
2	Context and background	10:15 – 10:30 (15 mins)
3	Incentive design objective and principles	10:30 – 11:20 (50 mins)
	Break	11:20 – 11:30
4	Incentives to be examined and their materiality	11:30 – 12:20 (50 mins)
	Break	12:20 – 12:25
5	Frequency performance payment	12:25 – 12:50 (25 mins)
8	Wrap up	12:50 – 13:00 (10 mins)

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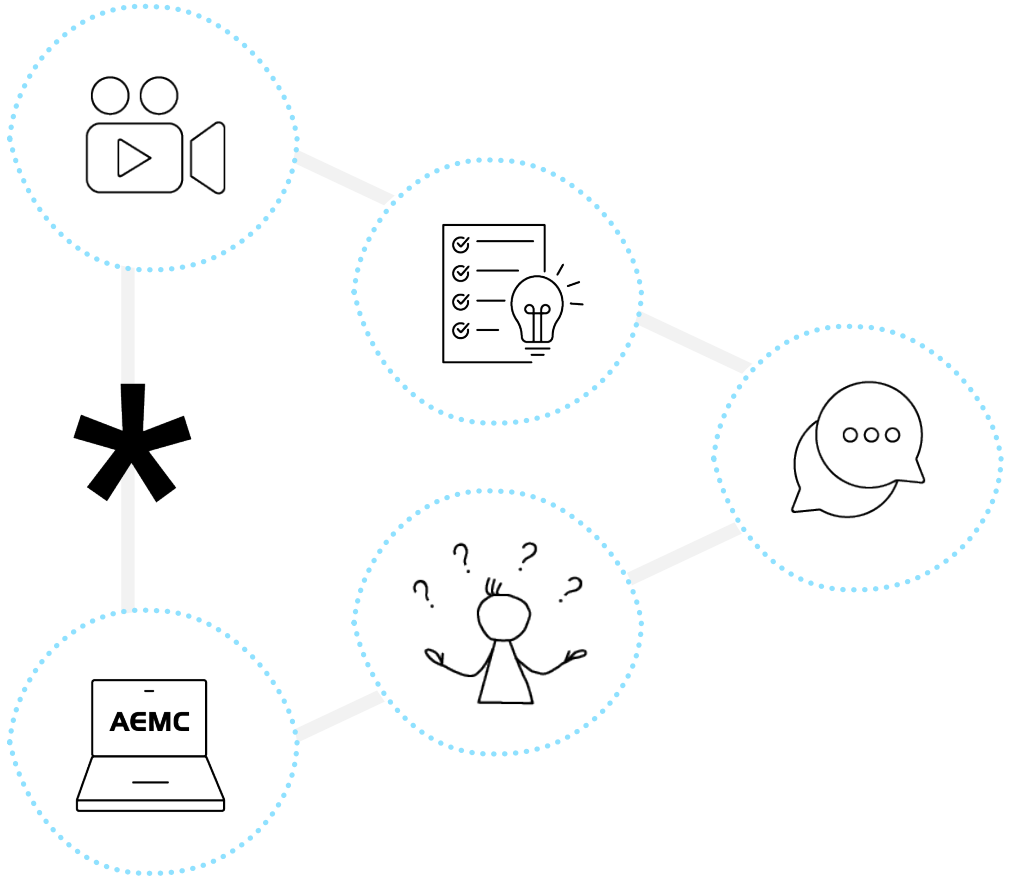
Please read our privacy policy for more information.

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

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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:

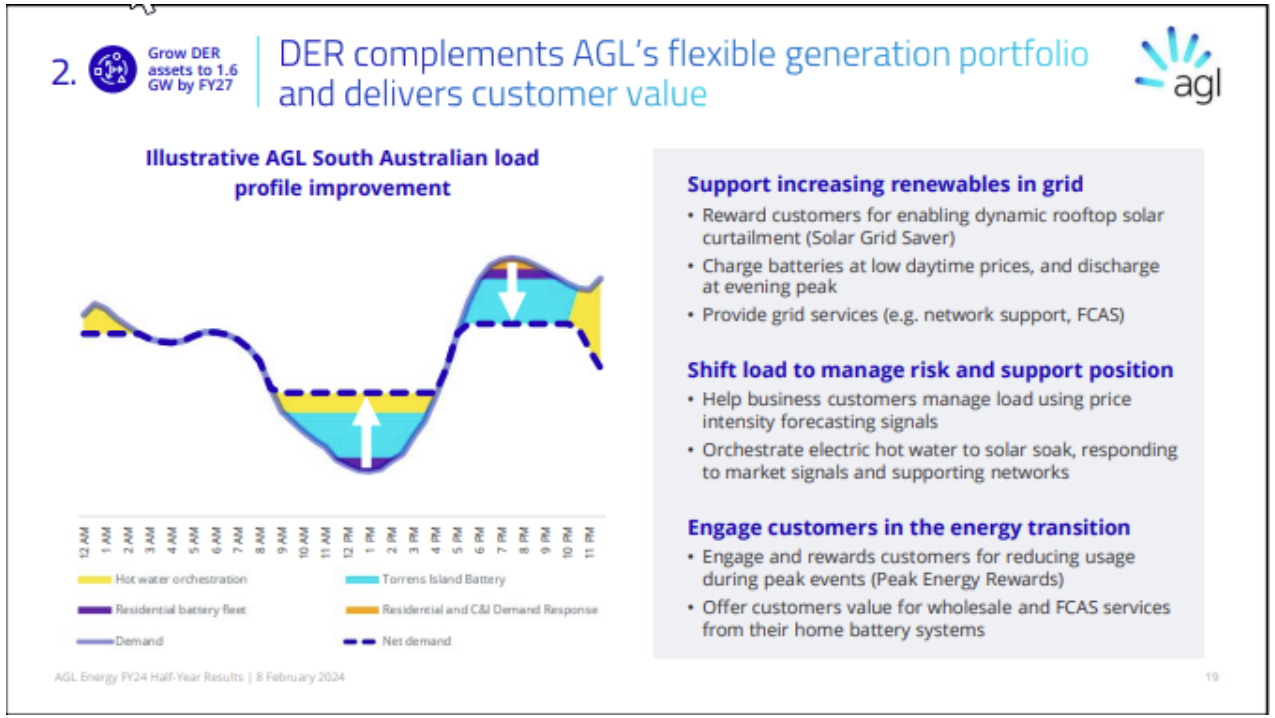
- The agenda for this forum does not include anything that could contravene the Key Principles set out in this protocol.
- We will read and minute the below *competition health warning*:
  - Attendees at this forum must not enter into any discussion, activity or conduct that may infringe, on their part 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.

Context and background

The benefits and costs from reform and who faces these

Increasing flexibility and price-responsiveness is a significant opportunity

- Substantial growth in Consumer Energy Resources (CER) is expected
- Retailers are currently indicating that they have 100s of MW in their Virtual Power Plants (VPPs). These are providing a variety of services, for example: Contingency Frequency Control Ancillary Services (FCAS), Network services, Reliability and Emergency Reserve Trader (RERT), hedging customer demand and offering self-optimisation services for customers.
- By 2050, the Integrated System Plan (ISP) modelling predicts that VPPs, vehicle-to-grid (V2G) services and other emerging technologies will provide approximately 31 GW of dispatchable storage capacity.



Source: AGL half-yearly results presentation February 2024

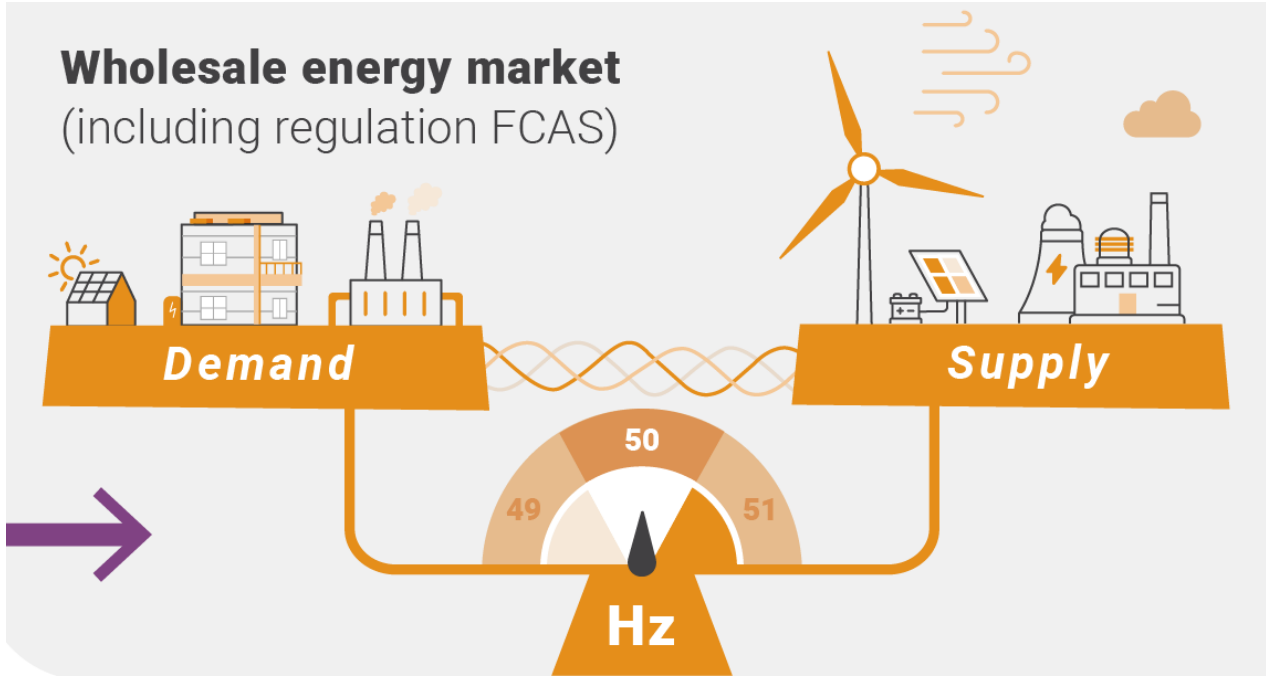
But the price-responsiveness is not generally visible to the market or AEMO or scheduled in the wholesale market

Substantial forecast growth in price-responsive resources will challenge AEMO's ability to efficiently operate the market, procure market services (e.g. reg FCAS) and inform participant bidding and dispatch.

- Responses due to price are challenging for AEMO to integrate into demand forecasting.
- Generating units above 30MW (and 5MW for batteries) are generally scheduled in the NEM. There are no requirements for aggregated resources. If financially responsible market participants (FRMPs) control and influence the movement of significant resources, there could be large sudden changes in the balance of electricity at any given moment.
- Aggregated small resources also don't have the same access as other resources. There is no mechanism for them to access the full value stream:

  - they are excluded from regulation FCAS because they are not scheduled

  - they are excluded from schemes for dispatchable resources (capacity investment scheme (CIS) etc.)



Benefits from the reform –IES ‘size of the prize’

- IES modelled three scenarios:
  - **Base case:** where no rule change is made. AEMO’s forecasting systems attempt to identify potential price-responsive resources in its demand forecast without specific reliable information in operational timeframes. Substantial increases in these resources over time lead to material demand forecasting errors and consequential inefficient outcomes.
  - **Visibility:** IES models a ‘generic’ visibility reform. Price-responsive resources remain unscheduled and are not dispatched by AEMO. However, participants submit information operation timeframes to AEMO which reduces demand forecasting errors.
  - **Dispatch:** IES models a ‘generic’ dispatch reform. Resources are integrated into central dispatch and scheduling processes. Participation in central dispatch means higher forecast accuracy and higher participation in FCAS markets because of dispatchability.

- IES found the following benefits in the reform cases:
  - lower FCAS requirements (between $711 and $889 million NPV);
  - lower use of scheduled generation, resulting in;
    - lower emissions (between $514 and $719 million NPV), and
    - lower generation costs (between $154 and $186 million NPV);
  - lower requirements for emergency reliability measures ($121 million NPV);
  - lower spot prices (between $10 and $11 billion NPV); and
  - lower FCAS prices (between $586 and $738 million NPV).

The benefits from these proposed reforms are to all consumers, not participants

Benefits that arise from participation	Who receives this benefit?
FCAS costs. Successful participation will reduce FCAS requirements and costs. As participation decreases demand forecasting errors, less FCAS is required.	Not the participant. Reduced FCAS costs from reduced forecasting errors caused by participation from an individual participant are spread across all participants.
Emissions. Successful participation reduces emissions because it reduces dispatched generation at times of high price/demand which tends to be peaking gas generation.	Not the participant. Lower emissions are a benefit to society/the environment as a whole.
Generation costs. Successful participation reduces generation costs because it reduces dispatched generation at times of high price/ demand which tends to be high-cost peaking gas generation.	Not the participant. Overall lower generation costs are likely to flow through to consumers in the long run, but are not a benefit to any individual participant.
RERT. Successful participation reduces the need for RERT and RERT costs because it provides greater visibility to AEMO of responses to high prices. A general decrease in forecasting uncertainty also reduces the need for RERT.	Not the participant. Lower RERT costs are spread across FRMPs in the region that RERT was needed (except for retailers participating in the RERT event).
Spot prices and generation investment. Incorporating price-responsive demand into dispatch decreases spot prices (on average). This flows through to less need for generation investment/cost.	Not the participant. Lower prices will be paid by all retailers. Furthermore, given the vertical integration of the sector it is not clear that lower prices are a benefit at all to the participant.

Costs/disadvantages of participating in the proposed new modes

Visibility (generally, not specific to a reform)

- IT/data system upgrades
- Improved capabilities for forecasting
- Improved capabilities for interacting with AEMO systems
- Reveal bidding intentions

Dispatch

- IT/data system upgrades
- Improved capabilities for forecasting
- Improved capabilities for interacting with central processes
- Complying with requirements associated with being scheduled e.g. Directions
- Subject to constraints and network limits
- Reveal bidding intentions
- Included in cost recovery mechanisms (RERT, FCAS)
- Reduced ability for resources to participate in RERT

We propose to assess costs associated with the solutions after they have been further designed and as part of the next stage of the cost benefit analysis, as the answers to this will be clearer then.

Incentive design objective and principles

- What is the incentive objective?
- What are the design principles for the incentives?
- What is the target amount of uptake to achieve?
- How do we reduce unintended consequences?

Incentive design objective

To encourage an efficient level of participation from FRMPs with resources that are responsive to spot prices in visibility and dispatch modes.

- Targets FRMPs as they are ultimately financially responsible and are likely to be able to:
    - Forecast better than AEMO therefore improve demand forecasting and efficient wholesale price setting (Visibility mode), or
    - Control the resources to participate in dispatch (Dispatch mode)
- Targets the PRR that is responsive to wholesale spot prices and therefore difficult for AEMO to forecast and is unable to current participate
- The efficient level of participation is not the participation of all FRMPs with any PRR. FRMPs should only be incentivized to the extent that the benefits are likely to outweigh the costs.

Do you agree with these principles for incentivising participation in the mechanisms?

Proposed principles

- Direct benefits that participation results in should be provided to participants
- Where participation in the model demonstrates the technical capability or performance to participate in other mechanisms, they should be allowed to participate in and benefit from those mechanisms:
    - System operation (reg FCAS, dynamic limits etc.), and
    - Government schemes (CIS, peak demand reduction scheme)
- Where there are broader market benefits, we should consider targeted financial rewards or advocate for funding for these (e.g. govt and ARENA), especially for early entrants
- As far as practical, participants should not be punished for participating through application of regulations

Evaluation principles:

- Incentive arrangements should not distort performance of participants within the mechanisms
- Incentive arrangements should be easy to understand and participate in, and provide certainty of what a participant would gain

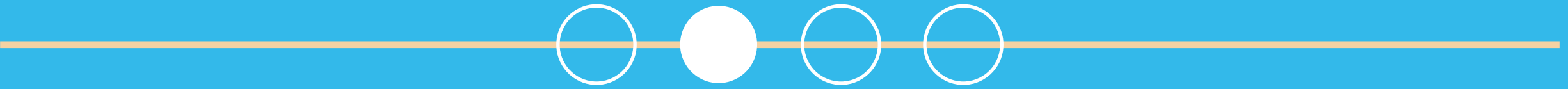
Do you agree with the types of incentives that result from these principles? Are there others that should be considered?

Resulting potential incentives from the proposed principles

Proposed principals	Visibility	Dispatch
Direct benefits that participation results in should be provided to participants	Amended FPP to provide a positive (see later slides)	FPP (automatic application from being scheduled)
	Reduced RERT cost recovery as participation results in lower use.	
Where participation in the model demonstrates the technical capability or performance to participate in other mechanisms, they should be allowed to participate and benefit from those mechanisms		Participate in other system operation services (e.g. reg FCAS and co-optimization of energy and FCAS)
	Benefit from govt scheme (e.g. peak demand reduction scheme)	Benefit from govt scheme for dispatchable capacity (CIS)
Where there are broader market benefits, we should consider targeted financial rewards, especially for early entrants	Encourage subsidies and grants, eg from govt and ARENA	
	New payments, such as to recover costs	
Participants should not be worse off or punished for participating		Consider if requirements associated with being scheduled are needed (e.g. AEMO issuing directions)
	Consideration of AEMO processes, fees, and registration requirements	

We will assess the resulting incentives to determine whether they would:

- distort performance of participants within the mechanisms
- be simple, easy to understand and participate in, and provide certainty of what a participant would gain.



Activity

Incentive areas that we are examining

- What incentive is there to participate within the mechanisms?
- Can we reduce the burden of participating?
- Are there other market services or arrangements that could incentivise participation?
- Could we create a new payment?
- Are there out-of-market incentives that could encourage participation?
- Which would materially impact participation?

How material are each of the incentives?

Team's initial mapping of potential incentive areas and their materiality – Visibility (all potential reforms)

Principles	Examples	Draft Materiality assessment*
Direct benefits that participation results in should be provided to participants	Amend Frequency Performance Payment arrangement	Medium
	Reduced RERT cost recovery as participation results in lower use	Medium
Where there are broader market benefits, we should consider targeted financial rewards, especially for early entrants.	• Payment that is a multiple of the amount received from FPP in first years • Refund costs to participate • Payment during high-cost times	Medium
	Trial funding or eligibility in government schemes	Potentially high
Participants should not be worse off or punished for participating.	Examining alternative, lower cost mechanisms (such as from Dave Smith)	Medium

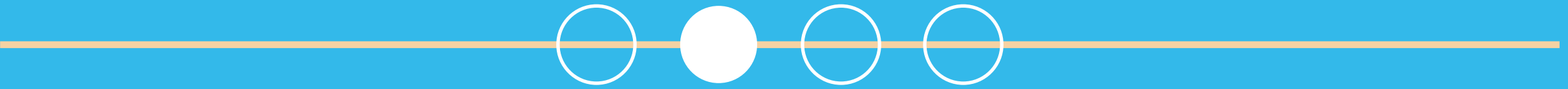
*(complexity, certainty and potential distortionary effect would also have to be considered)

How material are each of the incentives?

Team's initial mapping of potential incentive areas and their materiality - Dispatch

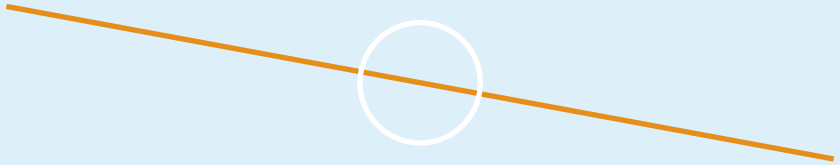
Principles	Examples	Draft Materiality assessment*
Direct benefits that participation results in should be provided to participants	FPP (automatic from being scheduled)	Medium
	Reduced RERT cost recovery as participation results in lower use	Medium
Where participation in the model demonstrates the technical capability or performance to participate in other mechanisms, they should be allowed to participate and benefit from those mechanisms	Eligible for Govt schemes for dispatchable capacity	High
	Co-optimization of energy and FCAS	High
	Access to reg FCAS	High, reg FCAS prices are expected to be material (~$20/MW)
Where there are broader market benefits, we should consider targeted financial rewards, especially for early entrants	Refund costs to participate	Medium
	Trial funding or eligibility in government schemes	Potentially high
Participants should not be worse off or punished for participating	Remove other requirements associated with being scheduled (such as directions)	Medium/Low
	Priority access at network level	Medium
	Consideration of AEMO processes, fees, and registration requirements	Medium

*(complexity, certainty and potential distortionary effect would also have to be considered)



Activity

Visibility using frequency performance payment as a positive incentive to participate



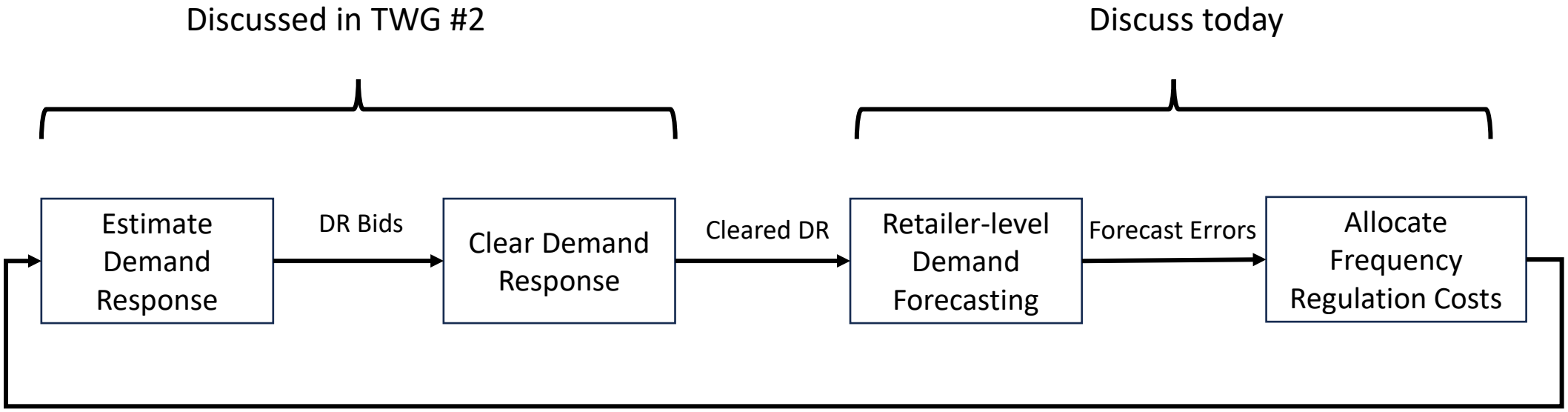
Creative Energy Consulting

Slides for IPRR TWG4

Creative Energy Consulting

March 2024

Four Steps to create Incentives



Cost Savings encourage retailers to estimate demand response

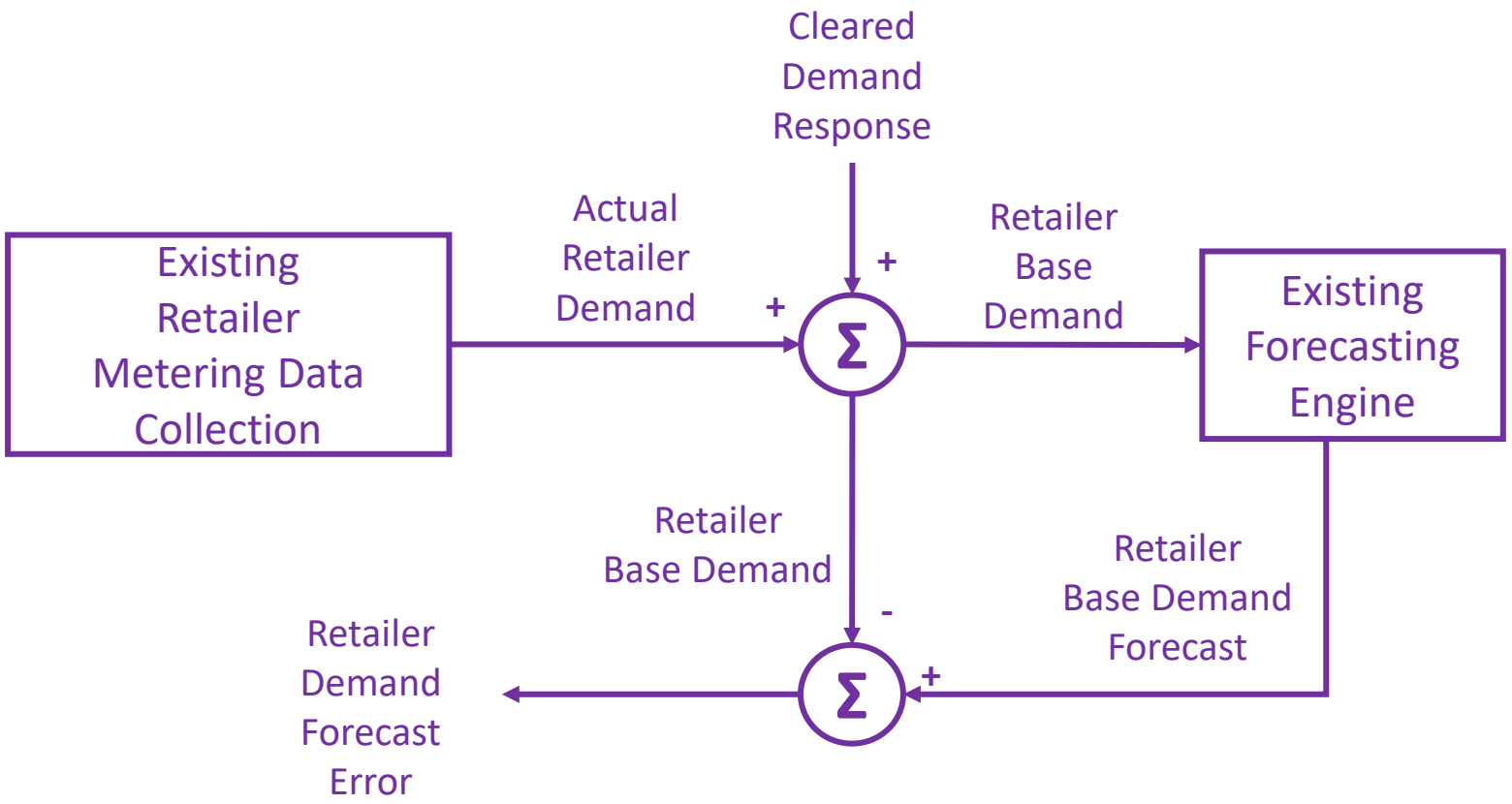
Approach to FPP based Incentive Design

1. Growth of PRR will lead to higher demand forecasting errors.
2. Higher forecast errors lead to higher costs of frequency regulation
3. The costs of frequency regulation are calculated and allocated in the FPP Rule change
4. Retailer-level demand forecasting errors are calculated and the FPP algebra adapted to reflect these: higher errors means higher charges.
5. Quasi-bidding reduces forecast errors and so reduces charges
6. This provides each retailer with an incentive to undertake DR forecasting and bidding
7. Each retailer chooses whether or not to act on these incentives

Regional vs retailer-level Demand Forecasting

Feature	Regional Forecasting	Retailer-level Forecasting
Purpose	Used in Dispatch	Assess impact of invisible DR, or accuracy of quasi-bids
Who does it?	AEMO	AEMO
When	Real-time	Settlements
Forecasting Horizon	5-minutes ahead	5-minutes ahead
Input data	Generation SCADA	Customer meter readings, aggregated by retailer
Forecasting Methodology	Same as today	Same as today
Cheating?	Not possible	Not permitted
Correction for PRR	Add cleared DR to actuals (based on quasi-bids)	Add cleared DR to actuals (based on quasi-bids)

Retailer-level demand forecasting

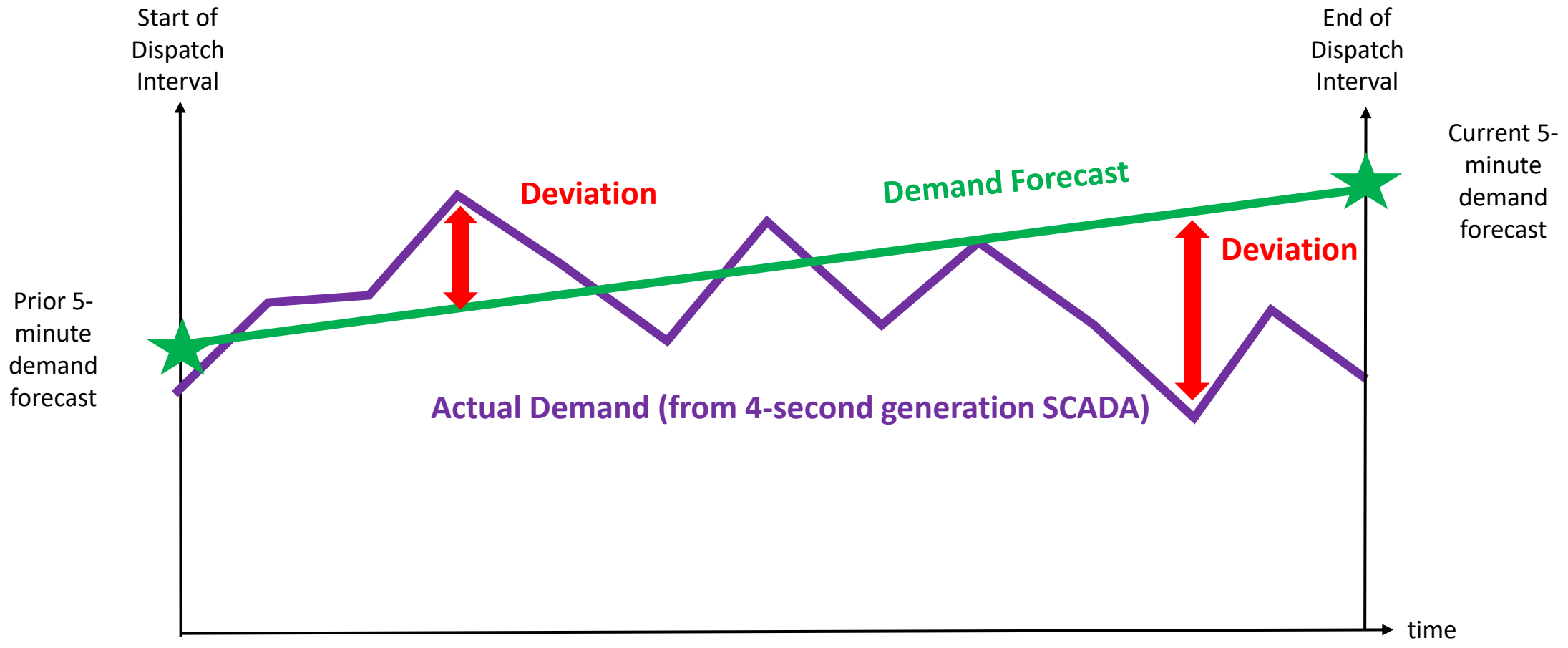


Fundamentals of Frequency Performance Payments

- Frequency deviations are caused by MW deviations away from:
  - Dispatch targets, by scheduled resources
  - AEMO forecasts, by non-scheduled resources
- To keep frequency within operational limits, 'harmful' MW deviations must be exactly offset by 'helpful' MW deviations from frequency regulation providers: ie
  - Regulation FCAS providers
  - Mandatory primary frequency regulation
  - Voluntary frequency regulation – rewarded with FPP$
- The FPP algebra is designed to distinguish between:
  - *Harmful deviations*: positively-correlated with frequency
  - *Helpful deviations*: negatively-correlated with frequency
- FPP$ = correlation x FCAS price x FCAS quantity*

*Roughly speaking, although the FPP algebra is much more complicated than this

What is the Demand Deviation*?



*Note that AEMO's FPP procedure refers to this as the "residual deviation"

Current FPP$ Allocation

	Total	Retailer A	Retailer B	Retailer C
Demand (MW)	**2000**	1500	200	300
FPP$ (for DI)	**$4000**	$3000	$400	$600

Proposed FPP$ Allocation (simplified*)

	Total	Retailer A	Retailer B	Retailer C
Characteristics		Visible DR	Invisible DR	No DR
Demand (MW)	**2000**	1500	200	300
Demand Forecast Error (MW)	**100**	30	80	-10
FPP$ due to forecast error	**$3000**	$900	$2400	-$300
Remaining FPP$	**$1000**	$750	$100	$150
Total FPP$	***$4000***	*$1650*	*$2500*	*-$150*
Current FPP$ (prev slide)	***$4000***	*$3000*	*$400*	*$600*

*The proposed design actually decomposes the FPP$ into three components, not two.

Are these FPP Incentives Strong Enough?

Question	Response
Are the incentives sufficient to encourage quasi-bidding?	Perhaps not initially, but likely to grow if invisible DR becomes a substantial problem
Does the FPP algebra calculate the true cost/ value of frequency regulation?	This is a question for the FPP designers
Should retailers receive rewards over and above the cost of frequency regulation?	Possibly, to reflect the positive externalities from improved spot pricing. But how to calibrate these benefits?

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Relevant submissions (can be found here)

"Access to Regulation FCAS and NEMDE co-optimized contingency FCAS is a significant incentive in sonnen's view."

"Shell recommends that participation in the SL dispatch mode be linked with eligibility for the Federal government capacity investment scheme and/or NSW Long-term energy service agreements (LTESA). While the AEMC may not be able to guarantee such an outcome, it could advocate for this." Shell

"We do not view any of the proposed incentive mechanisms as particularly attractive. Of these, some form of financial incentive is most obvious. However, if this was recovered through participant fees then it may not provide any net value to VPP aggregators." Origin's submission

"- current systems would require installation of AGC control to enable provision of regulation FCAS
- a SL unit with an individual contribution factor does not have a guarantee that it will be better off than the residual, shell suggest that the SL unit be given the lower of the individual and residual contribution factors
- changes to the MASS could allow for SL units to provide regulation FCAS via local frequency control." Shell submission

"VPPs can currently directly respond to price signals rather than bidding in and being dispatched, so there needs to be something extra to incentivise participation. This is particularly important because there will be costs incurred to participate." SwitchedIn submission

"The realisation of system benefits and participation payments also need to consider payback periods for the customer, particular resource types and commercial models used by retailers and aggregators. Adoption of CER for many customers depends heavily on high up front capital costs and amortising these against offsetting benefits from a retail perspective depends on managing the risk of customer churn, which may include termination fees." Energy Australia