Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**
Energy Policy WA

DSR Review WORKING GROUP

Meeting 3

5 July 2023

Working together for a **brighter** energy future.

Constrained load access

Western Power offers runback connections to some new customers (“curtailable loads”)

Runback connections and fast tripping protection schemes island customers when required

Western Power has been connecting some new customers with runback connections in congested parts of the network

- This is a cheaper option than reinforcing the network system in the affected regions
- Runback customers are curtailed on a pre-contingent basis
- **The frequency of new customers connected through a runback connection is expected to increase and expand out to other regions**
- What would cause connection constraints for ESR: it’s ability to inject; or its ability to withdraw; or both?
- **The volume of runback schemes, customer load sizes and curtailment triggers are not clear to the boarder energy sector**
- Western Power provides AEMO with some of the details
- Some affected customers have some prior signaling of real-time operation of the network and the likelihood of curtailment

It appears that runback connections lack transparency and integration into the market.

The siloed nature of runback connections pose a few problems that should be considered now before an increase in new connections

1. **How are curtailed loads considered in Western Power network planning**
2. **How are curtailed loads considered in AEMO system adequacy planning**
3. **Are curtailed loads factored in the determination of the Reserve Capacity Target**
4. **Are the curtailment terms factored in the NAQ calculation?**
   - **If the curtailed load values are not reflected on the left side of constraint equations, it could be resulting in higher NAQs and possibly exceeding the network capacity at peak if the load curtailment occurs at peak**
   - **This could be resulting in lower NAQs and possibly making it harder to achieve the RCT**
5. **If the DSP contains a curtailable load are curtailed loads suitably valued when accrediting capacity credits?**
6. **Are the curtailment terms factored in the RTM optimisation?**

Striking the right level of level of transparency and integration of runback connections in the various market components

Does the group agree that visibility of curtailable loads should be provided and fully integrating curtailable loads into the WEM rules is likely to increase efficiency of WEM outcomes?

Should any elements of the curtailable loads not be integrated into the WEM rules? Such as:

- **Setting out the rules for how WP shares information on curtailable loads to AEMO**
- **The manner in which AEMO integrates curtailable loads in determining the RCT and Capacity credits**
- **Optimsing curtailable loads with the RTM**
- **Providing details of the curtailable loads curtailment triggers as part of the constrains library**
- **Any other examples where it makes sense to not integrate curtailable loads into the WEM rules**

Hybrid Facility Examples

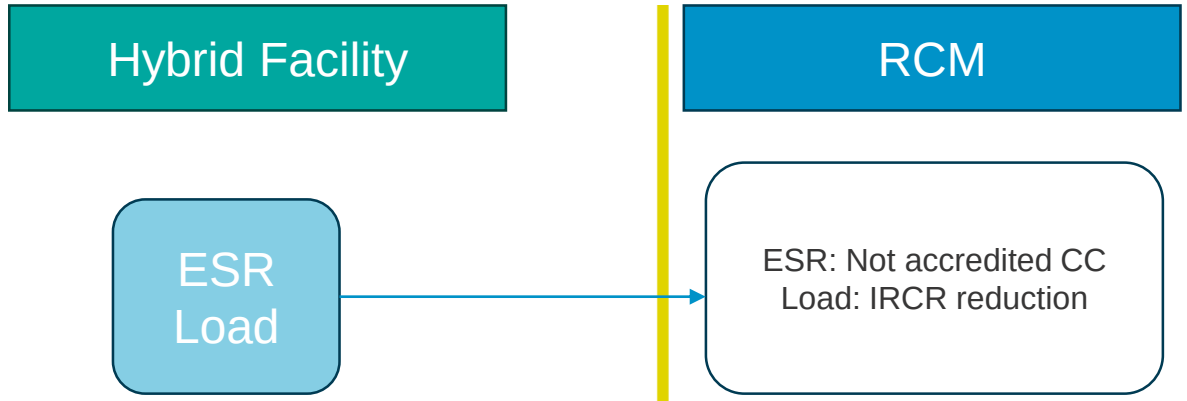
Is the participation of hybrid facilities suitability flexible

- It may be possible to use the same DSR across the different markets (RTM, ESS, RCM) to provide different specific services
- DSR providers should have a choice of services that they provide and the markets they operate in
- The aim with hybrid facilities is to provide options so that market participants can make efficient choices for themselves

Getting the right value out of DSR

- If compensation for DSR response is based on value provided then the DSR's profit motivation should be well aligned with its value to the market - allocative efficiency
- Market rule limits/constraints/barriers should be aligned with technical feasibility of the DSR service provision and correctly allow/incentivise DSR to be allocated where it provides the most value
- The following examples are intended to test this

Example 1.1: Battery and on-site load



A hybrid Facility may choose to not seek capacity credits and opt to use ESR to assist in reducing the Load's IRCR

- **Is this currently possible under the WEM Rules: Yes**
  - **Should it be allowed: Yes**
  - **Is there more that could be done?**

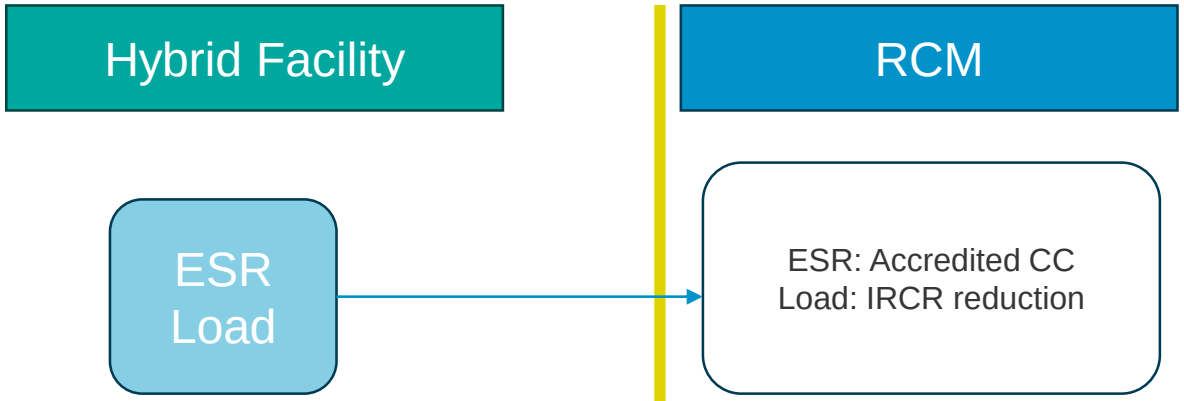
Discussion

Working group feedback is being sought to ensure that:

- **The correct limits/constraints/barriers are present and do not create unnecessary obstacles to 'value-stacking'**
- **Incentives created are aligned with participant profit drivers and market value provision**
- **Technical feasibility is being correctly assessed to ensure that system security and reliability are not compromised (and the secondary/consequential problem of 'double-dipping' does not arise).**

Example 1.2: Battery and on-site load

On-site load turned off



A hybrid Facility is awarded capacity credits for the ESR and the Load seeks to reduce its IRCR without supply from the ESR

- **Is this currently possible under the WEM Rules: Yes**
  - **Should it be allowed: Yes**
  - **Is there more that could be done?**

Discussion

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- **The correct limits/constraints/barriers are present and do not create unnecessary obstacles to 'value-stacking'**
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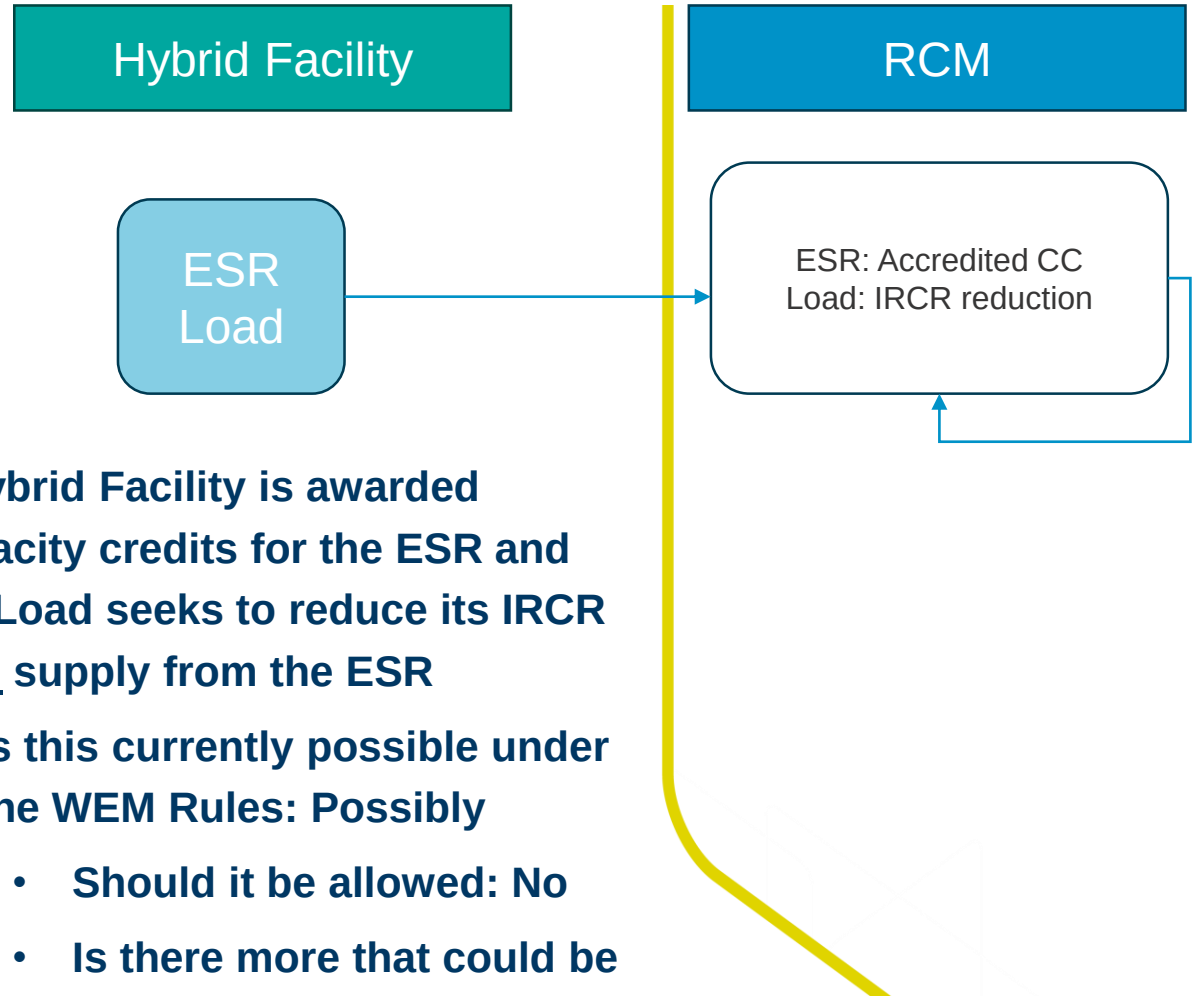
Example 1.3: Battery and on-site load

On-site load supplied by ESR



A hybrid Facility is awarded capacity credits for the ESR and the Load seeks to reduce its IRCR <u>with</u> supply from the ESR

- **Is this currently possible under the WEM Rules: Possibly**
  - **Should it be allowed: No**
  - **Is there more that could be done?**

Discussion

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- **The correct limits/constraints/barriers are present and do not create unnecessary obstacles to 'value-stacking'**
- **Incentives created are aligned with participant profit drivers and market value provision**
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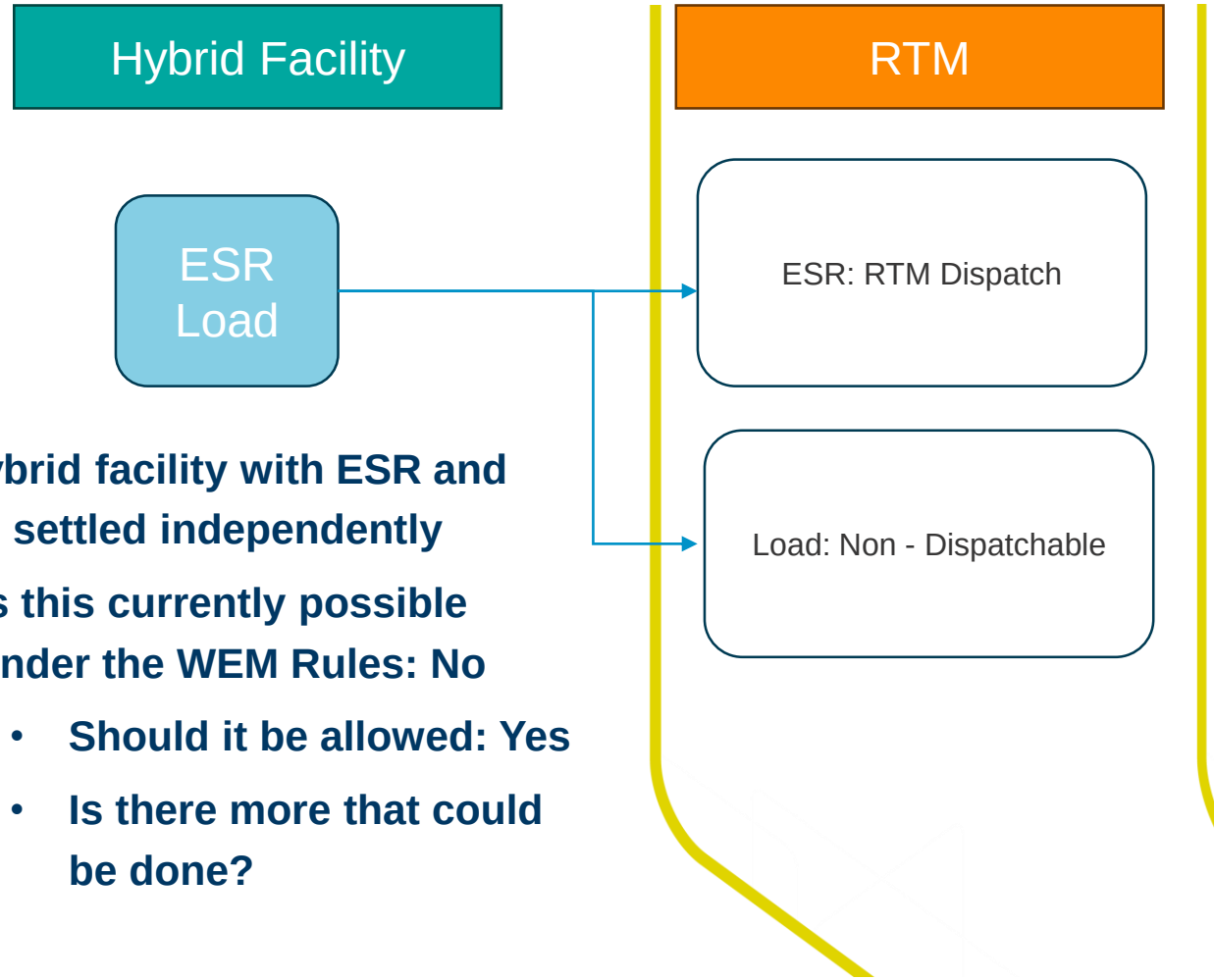
Example 1.4: Battery and on-site load



A hybrid facility with ESR and load settled independently

- **Is this currently possible under the WEM Rules: No**
  - **Should it be allowed: Yes**
  - **Is there more that could be done?**

Discussion

Working group feedback is being sought to ensure that:

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- **Incentives created are aligned with participant profit drivers and market value provision**
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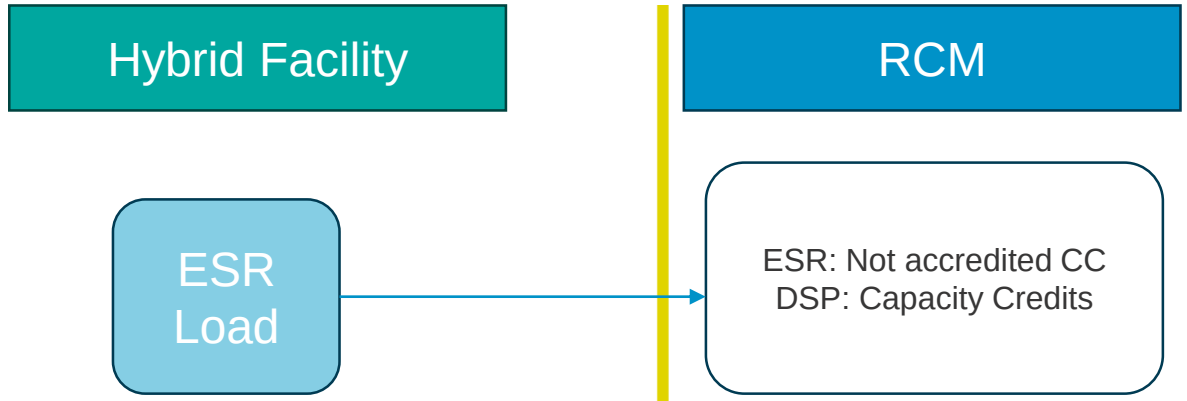
Example 2.1: Battery and DSP



A hybrid Facility not receiving CC for the ESR and only the DSP component being awarded CC

- **Is this currently possible under the WEM Rules: Yes**
  - **Should it be allowed: Yes**
  - **Is there more that could be done?**

Discussion

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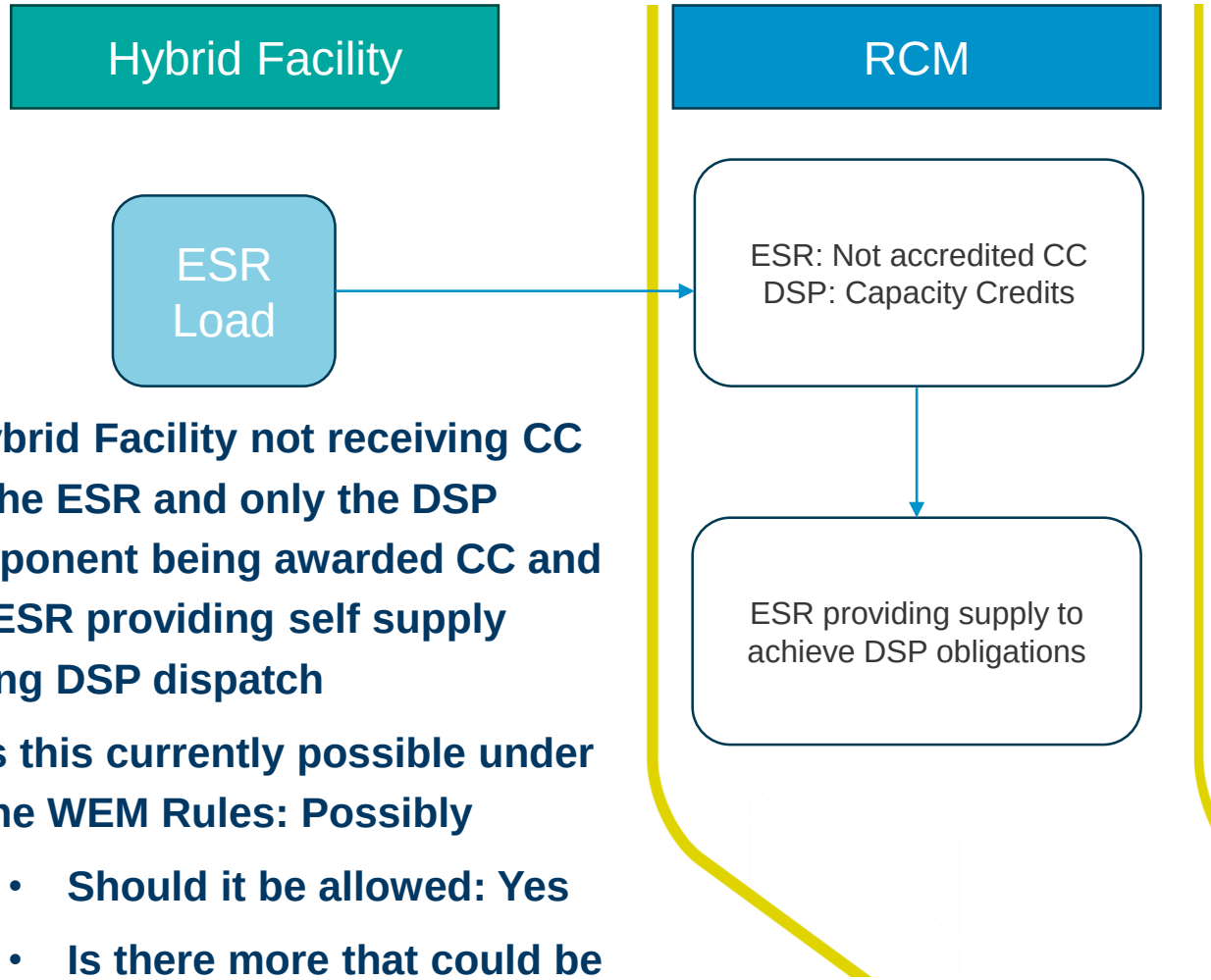

A hybrid Facility not receiving CC for the ESR and only the DSP component being awarded CC and the ESR providing self supply during DSP dispatch

- **Is this currently possible under the WEM Rules: Possibly**
  - **Should it be allowed: Yes**
  - **Is there more that could be done?**

Discussion

Working group feedback is being sought to ensure that:

- **The correct limits/constraints/barriers are present and do not create unnecessary obstacles to 'value-stacking'**
- **Incentives created are aligned with participant profit drivers and market value provision**
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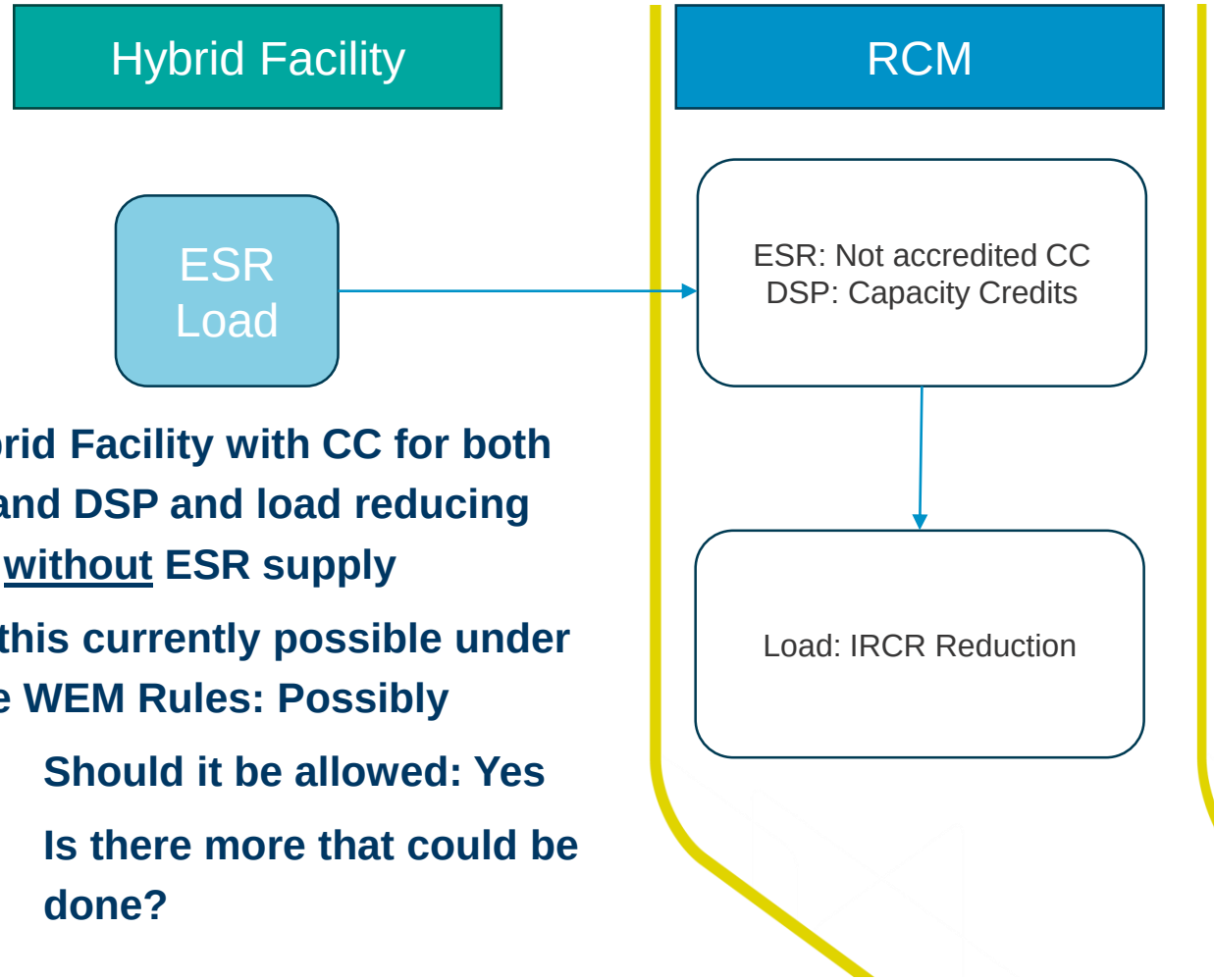
Example 2.3: Battery and DSP

On-site load turned off



A hybrid Facility with CC for both ESR and DSP and load reducing IRCR <u>without</u> ESR supply

- **Is this currently possible under the WEM Rules: Possibly**
  - **Should it be allowed: Yes**
  - **Is there more that could be done?**

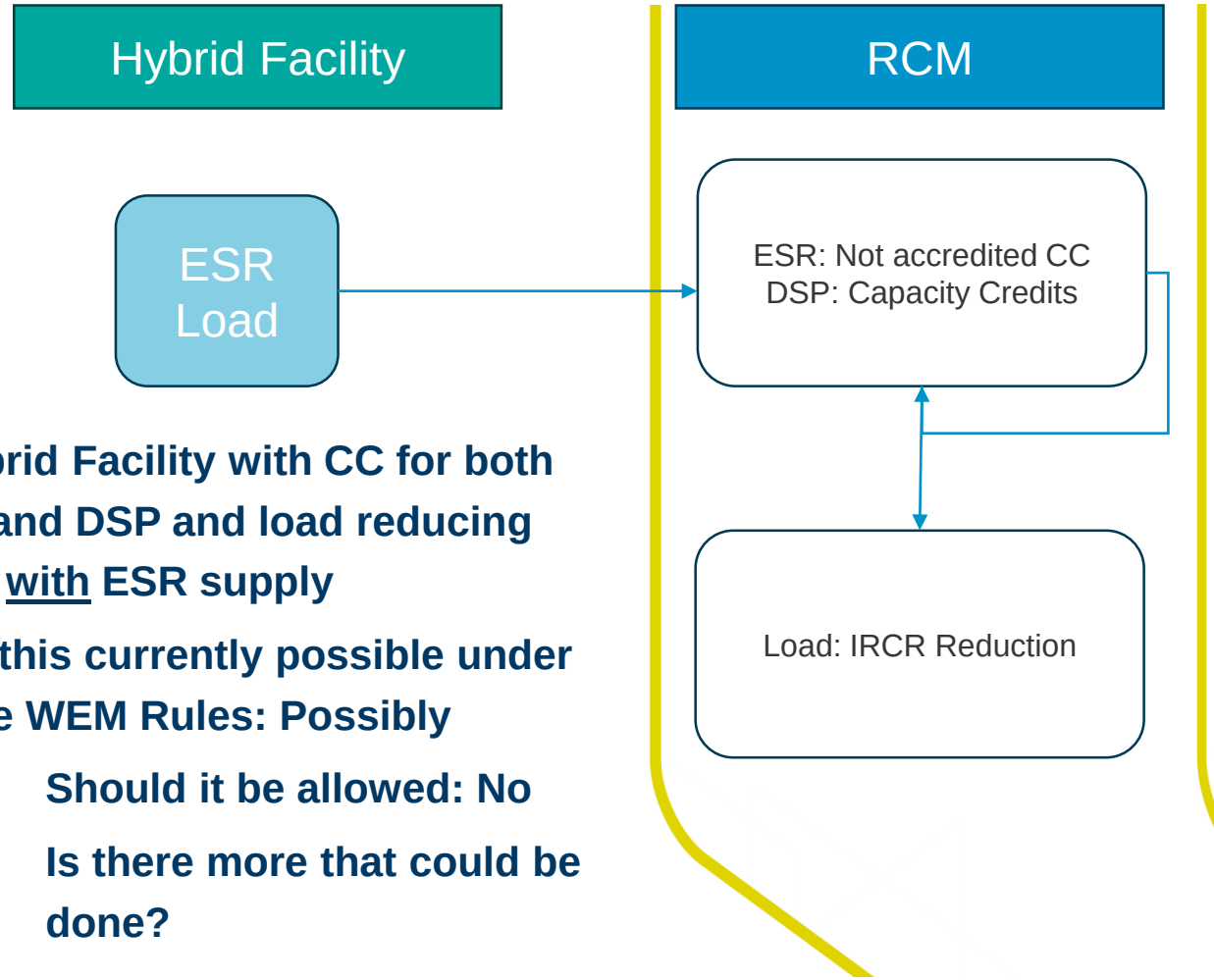
Discussion

Working group feedback is being sought to ensure that:

- **The correct limits/constraints/barriers are present and do not create unnecessary obstacles to ‘value-stacking’**
- **Incentives created are aligned with participant profit drivers and market value provision**
- **Technical feasibility is being correctly assessed to ensure that system security and reliability are not compromised (and the secondary/consequential problem of ‘double-dipping’ does not arise).**

Example 2.4: Battery and DSP

On-site load supplied by ESR



A hybrid Facility with CC for both ESR and DSP and load reducing IRCR with ESR supply

- **Is this currently possible under the WEM Rules: Possibly**
  - **Should it be allowed: No**
  - **Is there more that could be done?**

Discussion

Working group feedback is being sought to ensure that:

- **The correct limits/constraints/barriers are present and do not create unnecessary obstacles to 'value-stacking'**
- **Incentives created are aligned with participant profit drivers and market value provision**
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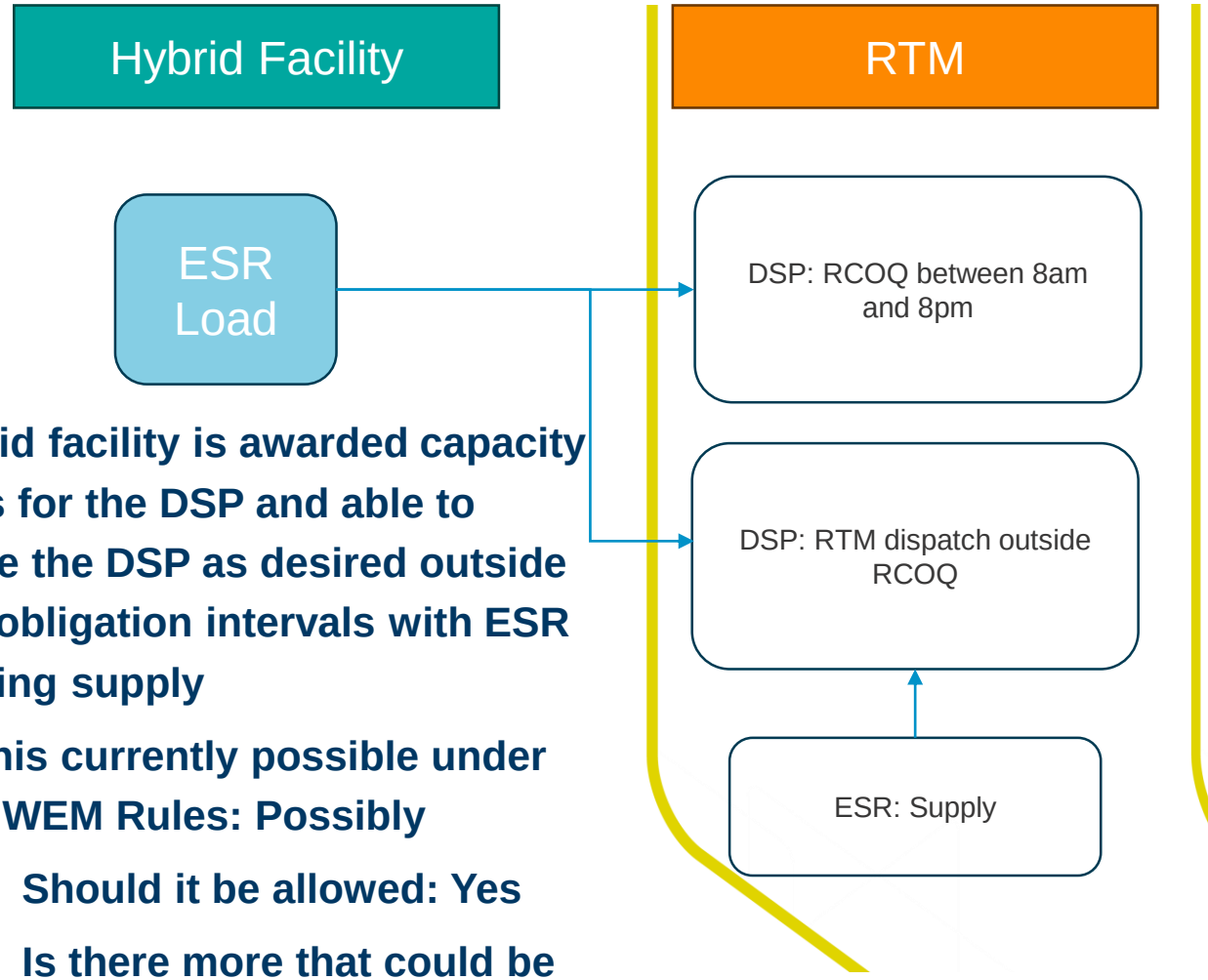
Example 2.5: Battery and DSP



A hybrid facility is awarded capacity credits for the DSP and able to operate the DSP as desired outside of the obligation intervals with ESR providing supply

- **Is this currently possible under the WEM Rules: Possibly**
  - **Should it be allowed: Yes**
  - **Is there more that could be done?**

Discussion

Working group feedback is being sought to ensure that:

- **The correct limits/constraints/barriers are present and do not create unnecessary obstacles to 'value-stacking'**
- **Incentives created are aligned with participant profit drivers and market value provision**
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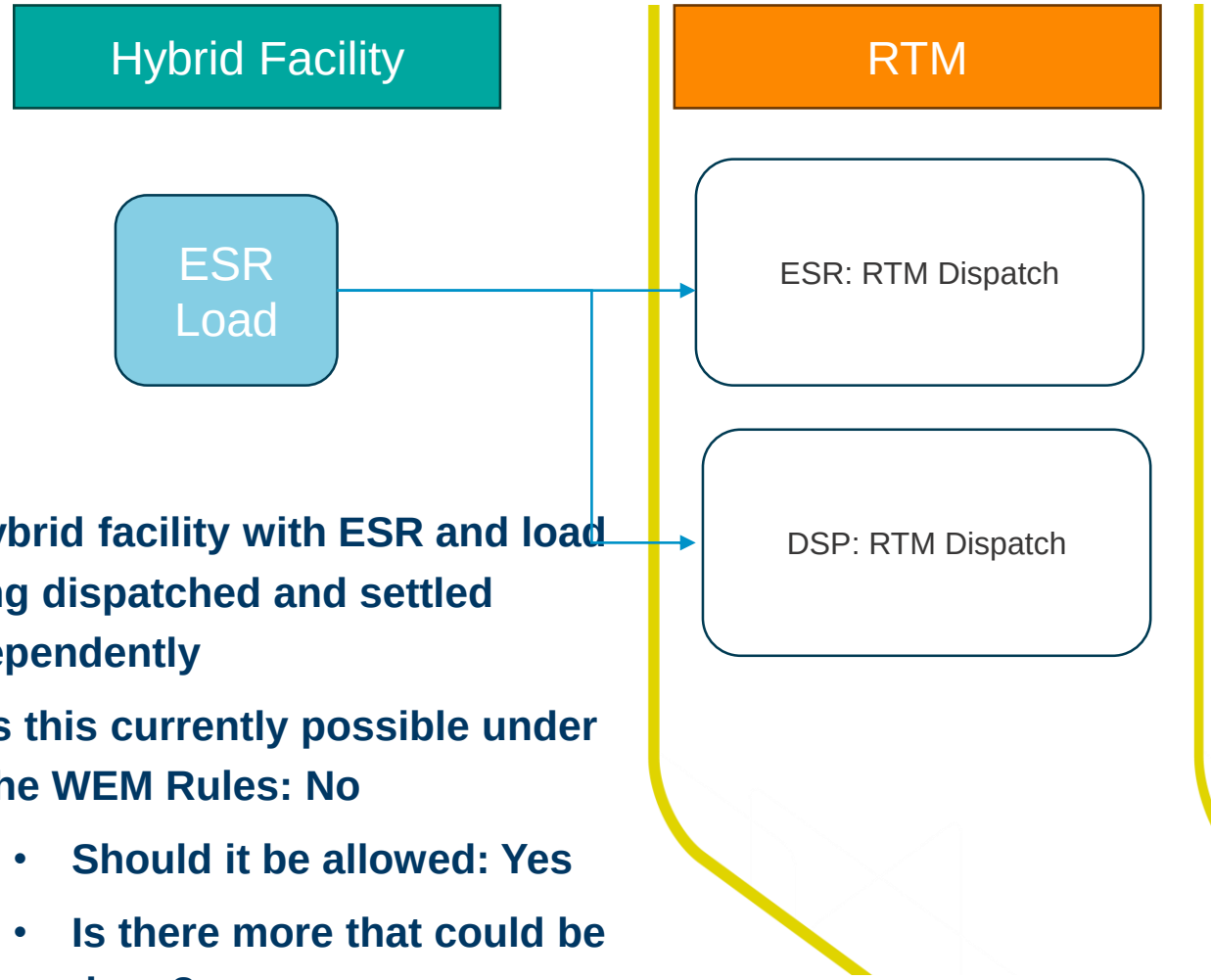
Example 2.6: Battery and DSP



A hybrid facility with ESR and load being dispatched and settled independently

- **Is this currently possible under the WEM Rules: No**
  - **Should it be allowed: Yes**
  - **Is there more that could be done?**

Discussion

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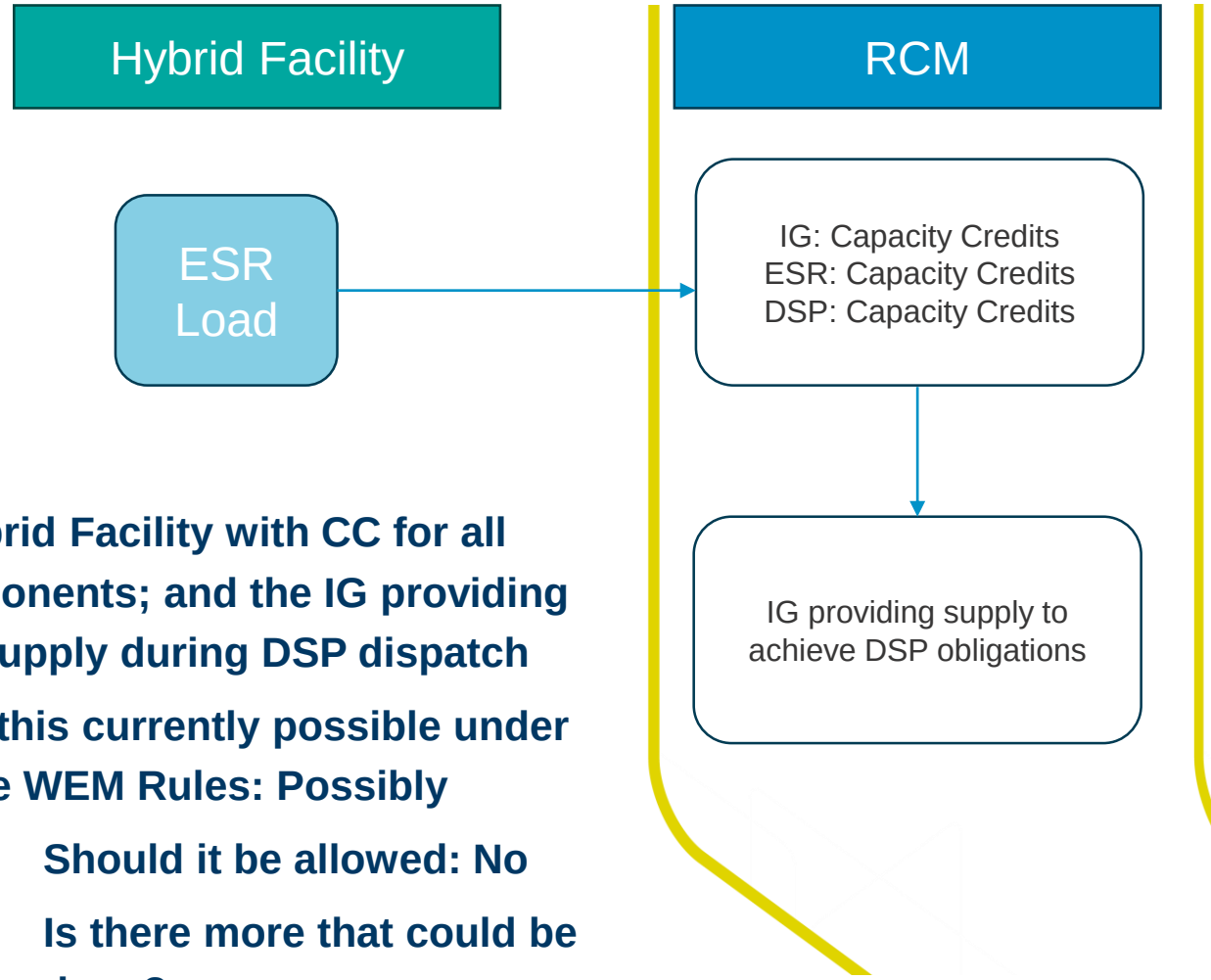
- **Technical feasibility is being correctly assessed to ensure that system security and reliability are not compromised (and the secondary/consequential problem of 'double-dipping' does not arise).**

Example 3.1: Battery, Intermittent Generation and DSP



A hybrid Facility with CC for all components; and the IG providing self supply during DSP dispatch

- **Is this currently possible under the WEM Rules: Possibly**
  - **Should it be allowed: No**
  - **Is there more that could be done?**

Discussion

Working group feedback is being sought to ensure that:

- **The correct limits/constraints/barriers are present and do not create unnecessary obstacles to 'value-stacking'**
- **Incentives created are aligned with participant profit drivers and market value provision**
- **Technical feasibility is being correctly assessed to ensure that system security and reliability are not compromised (and the secondary/consequential problem of 'double-dipping' does not arise).**

Minimum demand support

Minimum demand

The problem in the WA system:

SWIS minimum operational demand is falling as inverter-based generation increases. With less synchronous generation available alternative response is required to counter:

- **Low levels of inertia**
- **Lower operational flexibility**
- **Reduced system strength**

Energy Policy is coordinating and leading the Low Load Project. We are just considering what role larger scale DSR could play to support the low load problem.

DSR can contribute in two ways:

1. **Help keep demand above MDT (minimum demand threshold)**
2. **Provide alternative response to maintain system stability**

Minimum demand

Key question: How can minimum operational demand be avoided?

- **Load Shifting – from peaks to troughs (**both reducing IRCR and assisting with Min Load)
- **Increasing demand in low load periods or high PV output periods?**
- **DSR Incentives?**
  - Where discretionary demand exists, the real time price during low demand periods should signal greater load. Provided that discretionary loads are not fully hedged (fixed tariffs or future contracts).

Working Group Questions:

- What volume of discretional demand exists?
- What type of loads are these?
- Are current WEM price incentives (negative prices) sufficient?
- Are large load participants generally exposed to price signals or is hedging more the norm?

Many parallels exist between managing troughs and managing peaks

Minimum demand

Key question: How can minimum operational demand be avoided?

Table: Actions taken or proposed to address key question #1 (taken from the low load project)

Action	Description	Timeframe	Working Group Questions
Installation of large-scale batteries	Synergy are currently in the construction phase of their 100 MW / 200 MWh battery storage system. Other market participants are investigating similar projects. These assets will be able to provide additional services to the SWIS through contract or new market mechanisms.	An investment that is being constructed and will be in-service in about 1 year's time. Other projects may be in-service within 2-3 years.	Any barriers seen that might limit the feasibility/efficacy of this?
Interruptible load demand response	Use of future NCESS to contract with loads to reduce their embedded generation (increase system load).	Proposed. Potential to take effect in about 1 year's time.	Could this be provided as a new market service (product)? Advantages/disadvantages of this approach?
Increase day-time load through tariffs	A ToU tariff pilot to encourage greater energy consumption in the middle of the day is being trialled as part of the DER roadmap.	In effect now. Benefits from wide uptake likely seen in 3-5 years.	Any barriers seen that might limit the feasibility/efficacy of this?
DER participation projects (including Project Symphony)	Developing capability for opt-in VPP services that can be called upon to reduce PV output or increase load as a commercial transaction with DER owners.	Sufficient scale-up could be achieved in 5 years.	Smaller aggregated loads outside scope of this project.

System Stability at minimum demand

Key question: What are some alternative responses to ensure system stability, especially when system is short on synchronised generation?

Problem identified in low load project	Potential synchronous generation response	Potential DSR response	Working Group Questions
Frequency control	• Greater volume creates higher inertia -> lower frequency disturbance from events. • 6 second pulsing. • Governor response. • Out-of-merit dispatch.	• Direct load control • RoCoF (rate of change of frequency)	• Any other potential DSR response, especially when system is short synchronized generation? • Any perceived barriers/obstacles?
Raise frequency nadir	• System inertia, both actual and synthetic.	• RoCoF (rate of change of frequency)	• Any other potential DSR response? • Any perceived barriers/obstacles?
Ramp management (from min. demand to peak demand)	• Multi-period dispatch planning. • Out-of-merit dispatch.	• Dispatchable demand.	• Already considered in the RCM Review as a second capacity target for flexible capacity. • Is there any further potential for DSR in this? Any perceived barriers/obstacles?
Voltage stability	• Reactive power	• Pre-contingent load management. • Post-contingent load management (immediate response).	• How feasible is DSR in this situation? • Any perceived barriers/obstacles?

Note: The above table ignores (out of scope) traditional network and transmission potential responses to support system stability

DSP Obligations

DSP obligations

An overview of current obligations for demand-side providers in the WA market

Why are obligations necessary?

- **System security and reliability**
- **System Operator confidence to use resource**
- **Level playing field/equity – really just allocative efficiency**

What is the current DSP obligation?

DSPs are a last-resort reserve capacity supplier (very seldom dispatched)

Their contribution is measured against a counterfactual (what they would have consumed if they had not been dispatched)

DSPs can be dispatched for up to 200 hours each year and are restricted to their number of Capacity Credits.

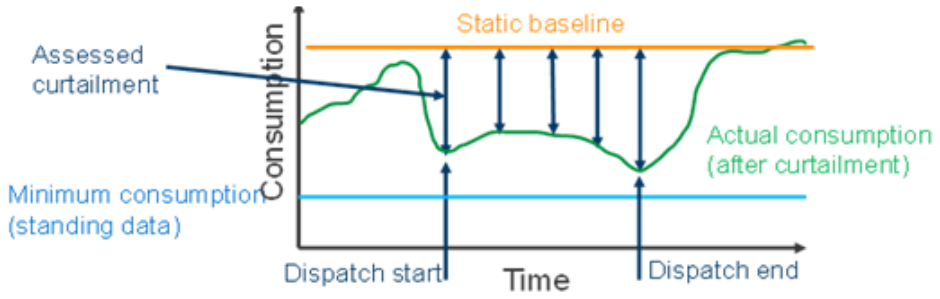
DSPs are dispatched against a static baseline:

- Based on demand in the previous Capacity Year
- Uniform for all trading intervals
- Changing only where a DSP's associated loads change

DSP obligations (from the RCM Review papers*)

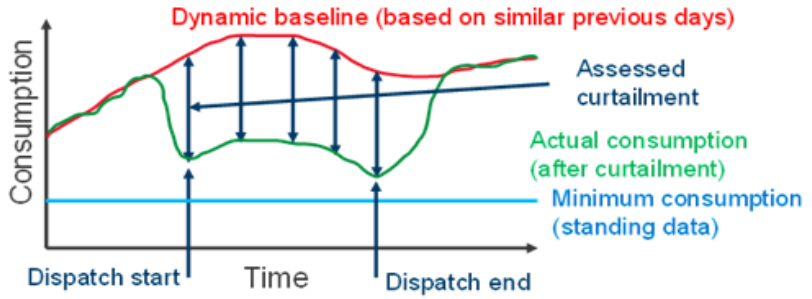
Key question: How can we design an efficient dynamic baseline?

Static baseline



- Fairly accurate for loads with relatively flat consumption profile.
- Can under or overstate the contributions for variable consumption loads.
- If the counterfactual load is overstated, then DSP dispatch will not deliver the expected reduction in load, which increases the risk to system security and reliability.
- If the counterfactual load is understated, then system security is not at risk, but the DSP will deliver more reduction than required or requested, meaning load will have been unnecessarily curtailed.

Dynamic baseline



- Dynamic profile which varies across trading intervals.
- Suitable for loads with a time-varying consumption profile.
- Potential for gaming, as a DSP could artificially increase its baseline consumption in key dispatch periods.
- This occurred in 2013, where a customer in the USA was assessed a USD $780,000 penalty for inflating its load reduction (and corresponding payments) in the lead up to expected periods of curtailment.

Working Group Questions: Are regulatory monitoring and penalties needed for an efficient dynamic baseline? Or could this be addressed through stricter calculation guidelines? Any other ways to maintain efficiency of a dynamic baseline?

* This project is intended to compliment (not replace) the work being undertaken by the MAC in this area – gaming and risk of dynamic baselines

DSP obligations

Key question: How are DSP obligations managed in comparable jurisdictions?

Reliability classes

In Singapore there are different reserve provider groups for each class of reserve. These groups represent the reliability of different reserve sources in providing reserve, and their effectiveness in curtailing falls in system frequency.

For example, some generating stations or DSR may have a poor record for response. Reserve provider groups are a means of correcting this variability:

- All reserve providers are assigned by the PSO to a reserve provider group for each class of reserve they provide.
- The MCE discounts the quantities scheduled from reserve provider groups to account for the likelihood of a lower quantity of reserve being provided when it is requested (based on historic failure rates).
- The reserve price paid to reserve provider groups is correspondingly discounted.

Other methods seen:

- Automatic penalty regimes
- Some leeway built in
- Rule breaches dealt with case-by-case

Working group question: Any other jurisdictions suggested for relevant case studies?