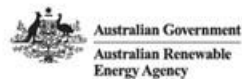


Project EDGE | CBA Methodology

Demonstrations Insights Forum | 19 July 2022



Agenda



Item	Lead	Timing
Welcome, Acknowledgement of Country	Ryan Batchelor (Nous)	5 min
Quick project status update	Nick Regan (AEMO)	5 min
Results from market suspension tests	Nick Regan (AEMO)	10 min
CBA methodology presentation	Alina Dini (Deloitte)	60 min
Close and next steps	Ryan Batchelor (Nous)	5 min

A photograph of a lush green forest with many tall, thin trees. The sky is a clear, bright blue. The trees are densely packed, and their leaves are a vibrant green. The lighting suggests a sunny day, with some shadows visible on the ground and lower branches.

Acknowledgment of Country

We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay our respects to their Elders past, present and emerging.

Project EDGE update

Current position

- Formally writing up of results from Market Suspension tests
- Stakeholder Consultation - CBA Detailed Methodology
- Ongoing development of platform capability and sophistication
- Ongoing customer acquisition (including additional) C&I customers
- Two new aggregators being onboarded for participation from September

Key upcoming activities

- Publication of CBA Methodology Consultation Paper
- Further consultation on data exchange problem statements and use cases
- Wider sharing of results from Market Suspension tests
- Ongoing results analysis and input into reform

Results from market suspension tests

EDGE Market Suspension field tests

To operate the system AEMO needs:

1. **Visibility:** Telemetry in real time
2. **Predictability:** Generator forecasts
3. **Controllability:** Dispatch instructions
4. **Measurement:** Telemetry (settlement)



The AEMO, AusNet and Mondo team reacted quickly to establish a test plan to learn from this rare event

Why specific Market Suspension tests?

In Market Suspension AEMO was directing large scale generators.
What should this look like in a high DER future (via VPPs)?

Hypothesis 1:
 AEMO Dispatch Instructions that give a ‘target’ are more reliable than DOEs which give ‘permissible limits’.

Hypothesis 2:
 These two signals together will conflict at times and this needs to be understood to be managed in future operations.

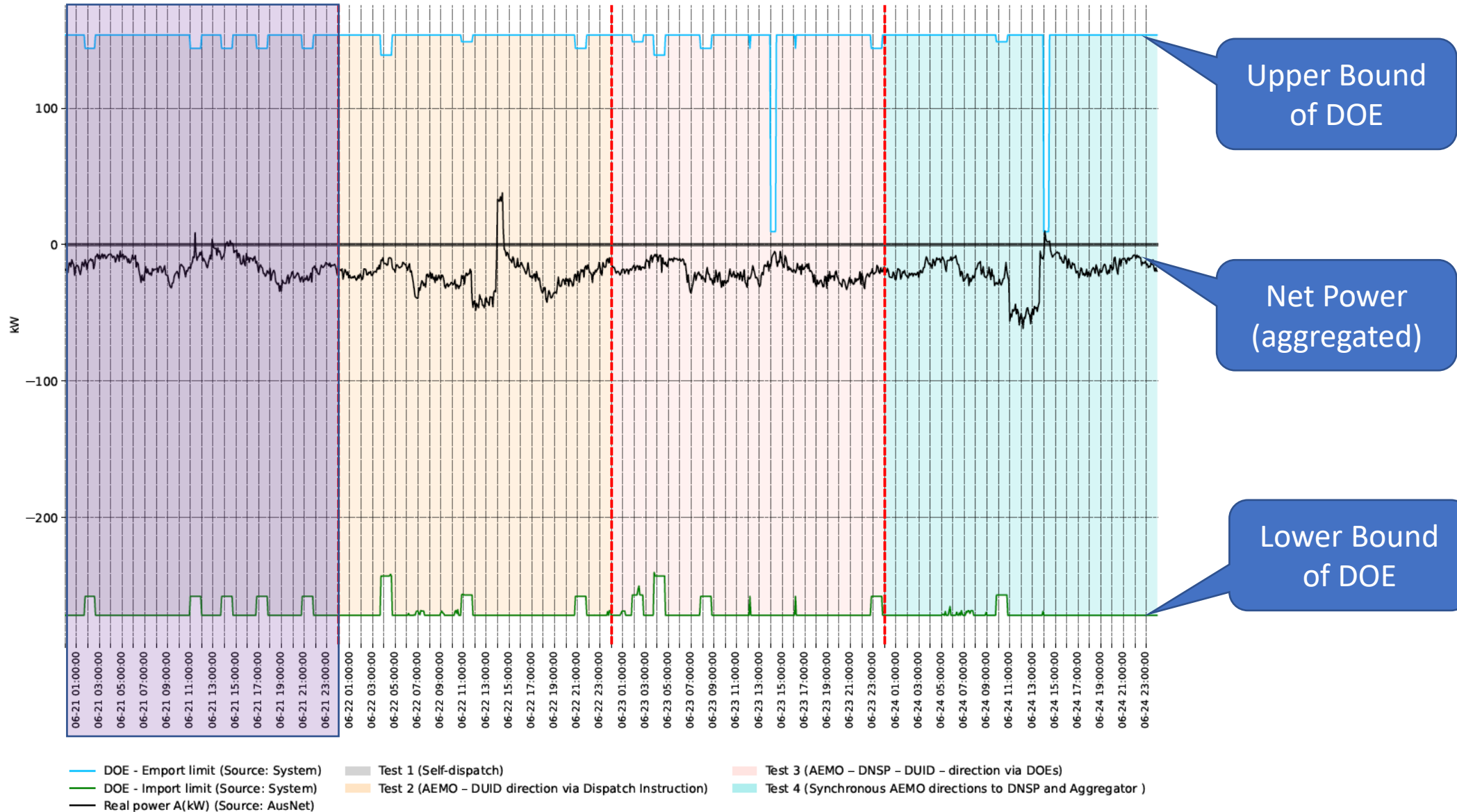
What did we do?

Test	Summary
Test 1 Self-Dispatch (no AEMO direction)	<ul style="list-style-type: none"> In lieu of capability to dispatch VPPs at scale (‘Controllability’) i.e current state, AEMO needs visibility (telemetry) and predictability (forecasts via boffers) to consider when directing large scale resources Q: What do VPPs do without AEMO direction?
Test 2 AEMO -> DUID direction via Dispatch Instructions	<ul style="list-style-type: none"> Under market suspension AEMO instructs generators/loads test is for future where controllability exists for VPPs (i.e test will provide setpoints for aggregators to follow). How reliably can VPPs follow AEMO directions that differ from market incentivised behaviour?
Test 3 AEMO -> DNSP -> DUID direction via DOEs	<ul style="list-style-type: none"> Currently AEMO instructs NSPs to maintain a profile within their network, NSPs currently do this by shedding load or generation. Are DOEs a better mechanism than directing VPPs under a non-market use case (e.g market suspension) ?
Test 4 Synchronous AEMO directions to DNSP and Aggregator (Test 2+3)	<ul style="list-style-type: none"> Testing synchronous instructions from AEMO to DNSP and Aggregator to see if this helps reduce potential conflicts. Test 2 & Test 3 together. Is it worth building capability to do both mechanisms for redundancy?

Findings to be shared in coming weeks and relate to some gaps as highlighted in [the Engineering Frameworks Paper¹](#)

¹ At <https://aemo.com.au/-/media/files/initiatives/engineering-framework/2021/nem-engineering-framework-march-2021-report.pdf?la=en&hash=3B1283D31B542115CC56E0ECCDFB3D69>

Test 1 – Actual Net Active Power from Portfolio

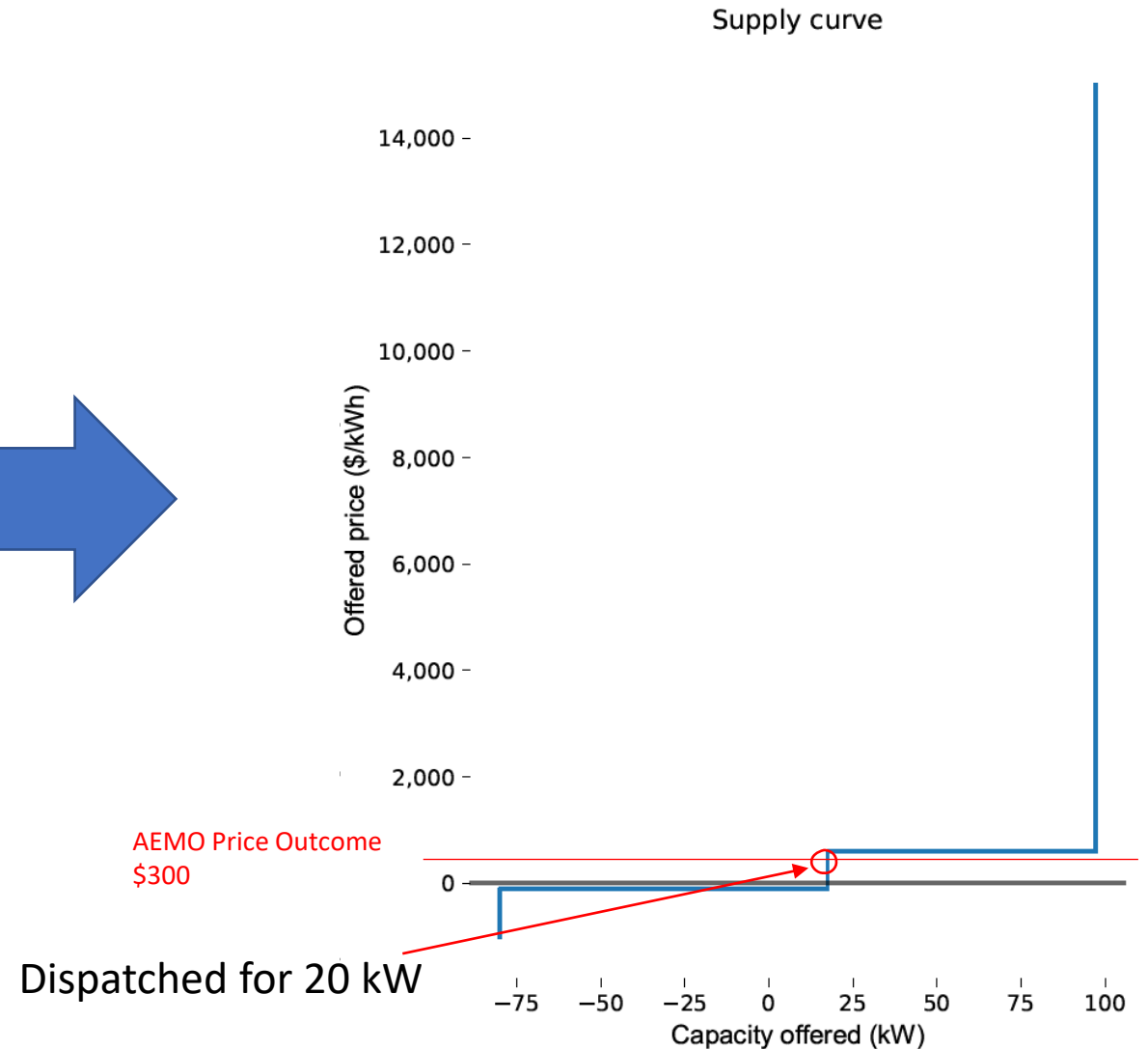
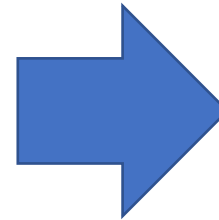
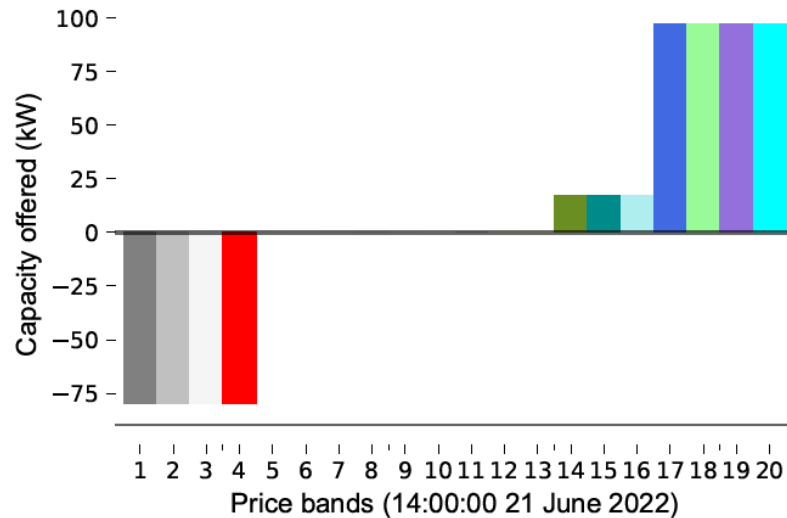
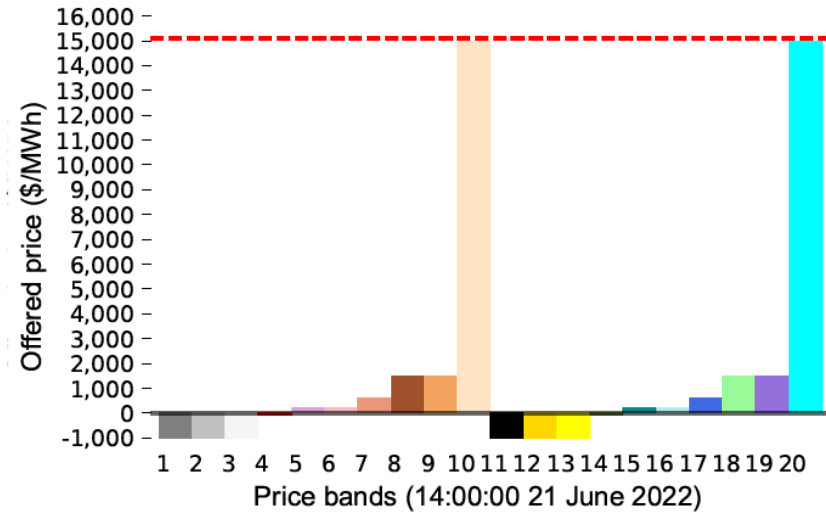


Test 1

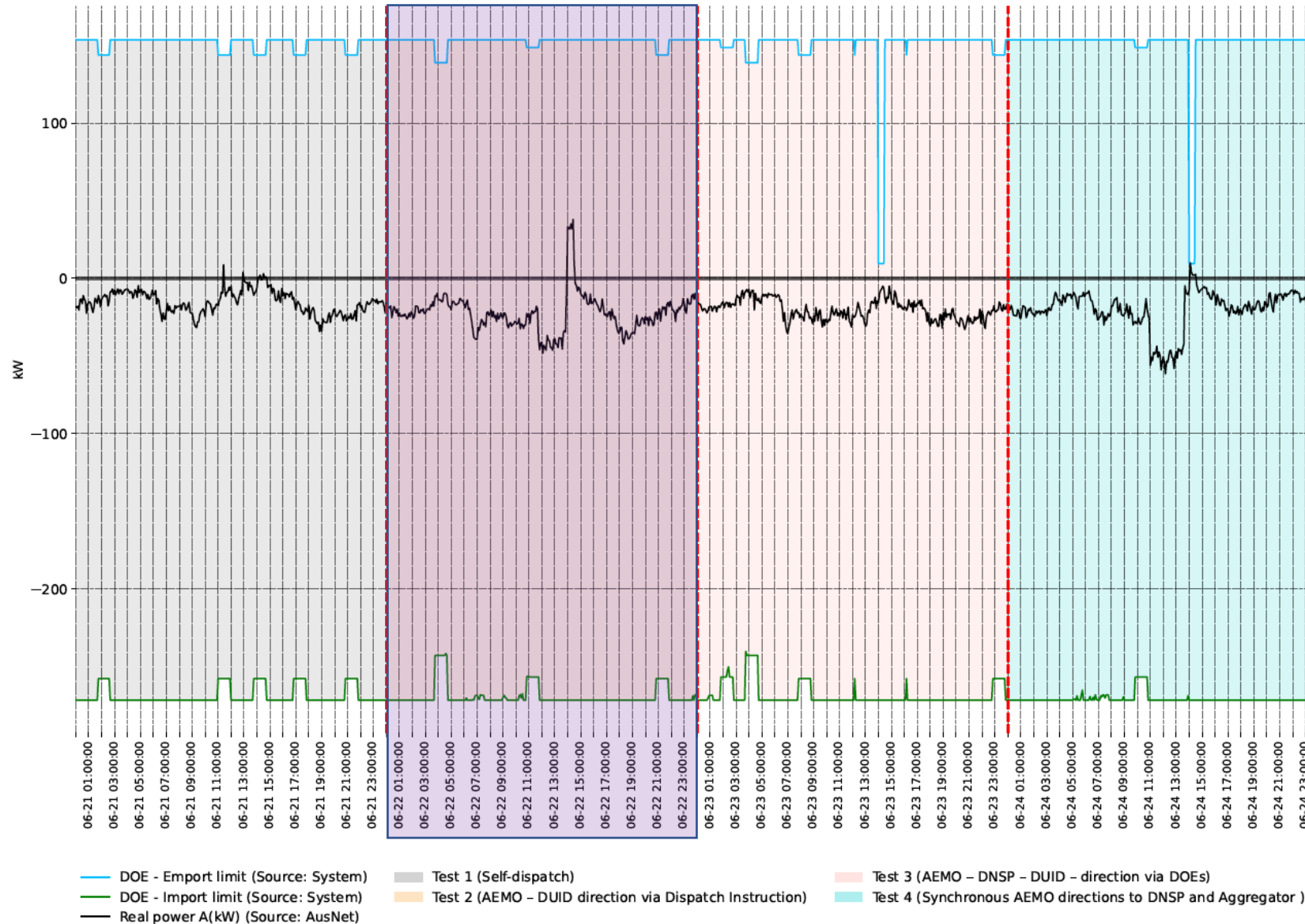
Q: What do VPPs do without AEMO direction?

Self-Dispatch (no AEMO direction)

In lieu of capability to dispatch VPPs at scale ('Controllability') i.e current state, AEMO needs visibility (telemetry) and predictability (forecasts via boffers) to consider when directing large scale resources



Test 2 – Actual Net Active Power from Portfolio

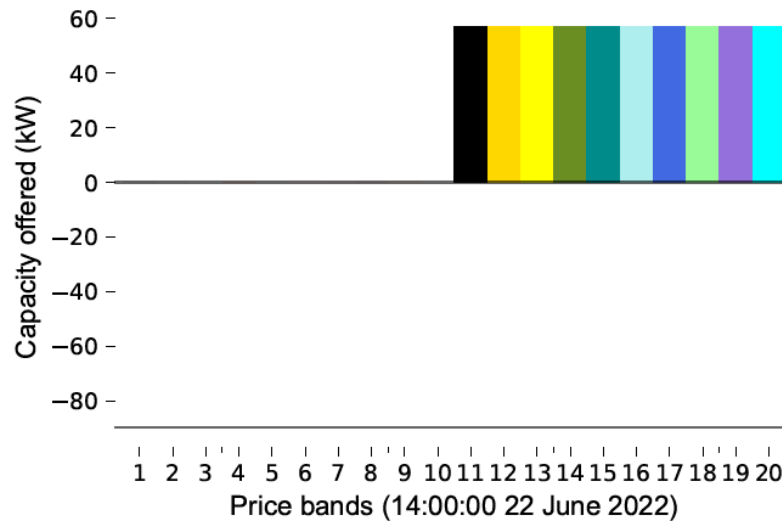
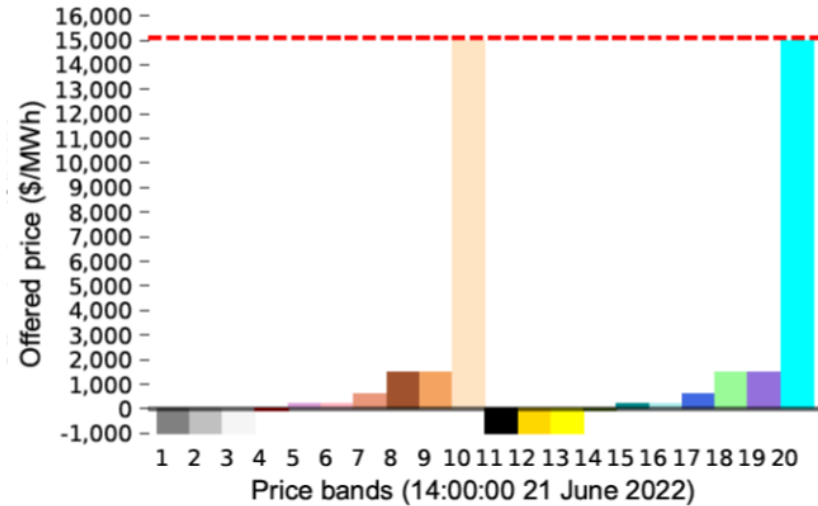


Test 2

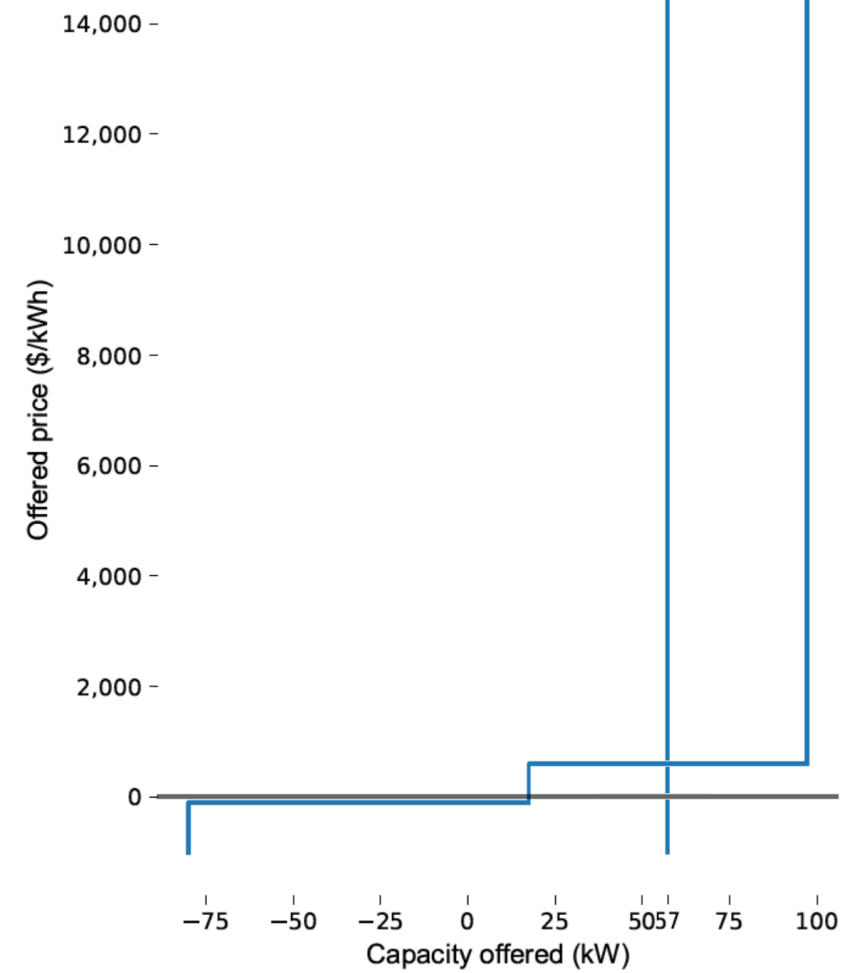
Q: How reliably can VPPs follow AEMO directions that differ from market incentivised behaviour?

AEMO -> DUID direction via Dispatch Instructions

Under market suspension AEMO instructs generators/loads test is for future where controllability exists for VPPs (i.e test will provide setpoints for aggregators to follow).



Supply curve Test 2 Test 1



Finding Question:
How should boffers which have been directed by AEMO be formed.

Trial simulated a directions for 57kW of flexible export from 14:00-14:30.

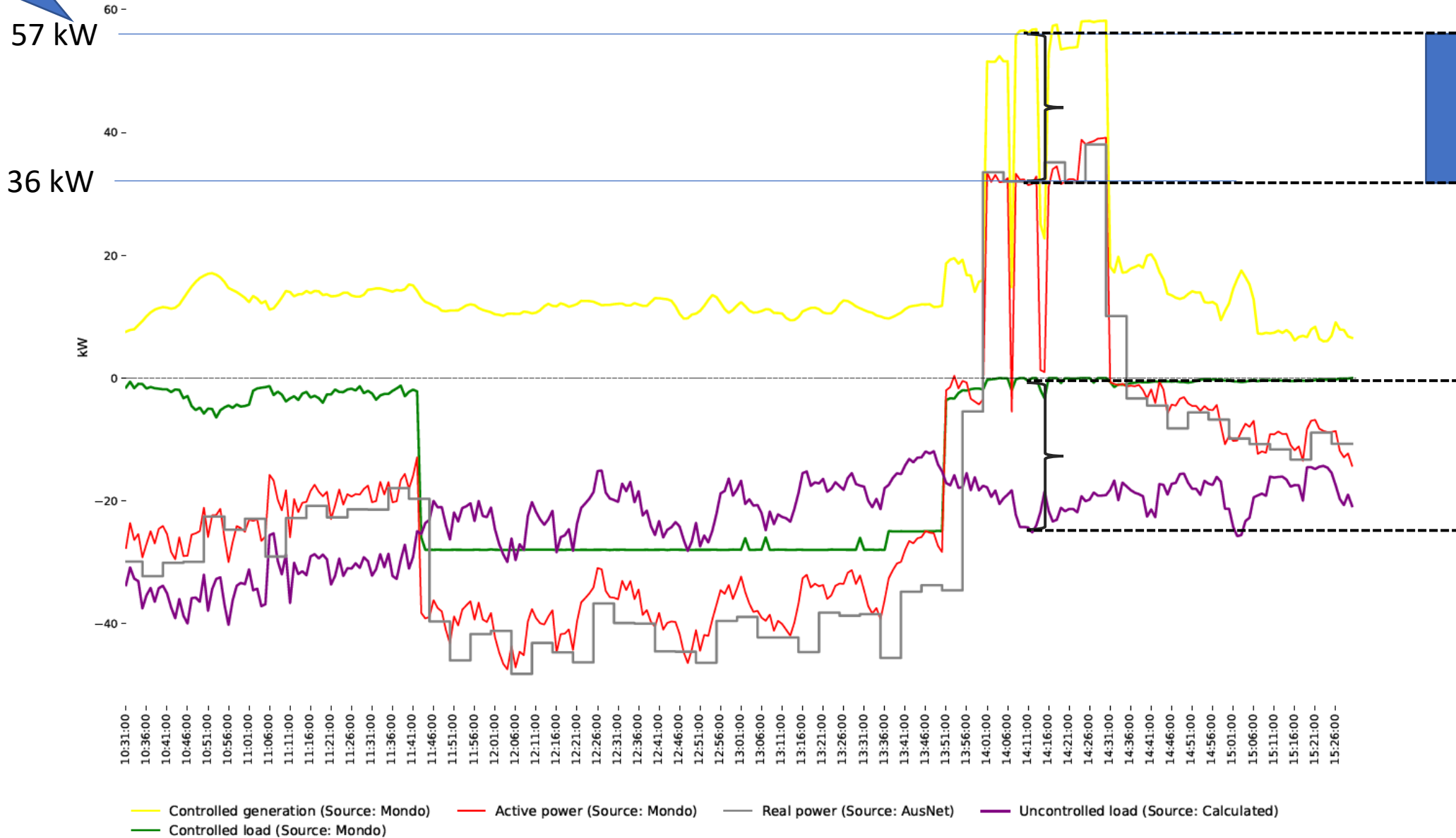
Energy Fixed Loading a better Boffer?

Trial simulated a directions for 57kW of flexible export from 14:00-14:30.



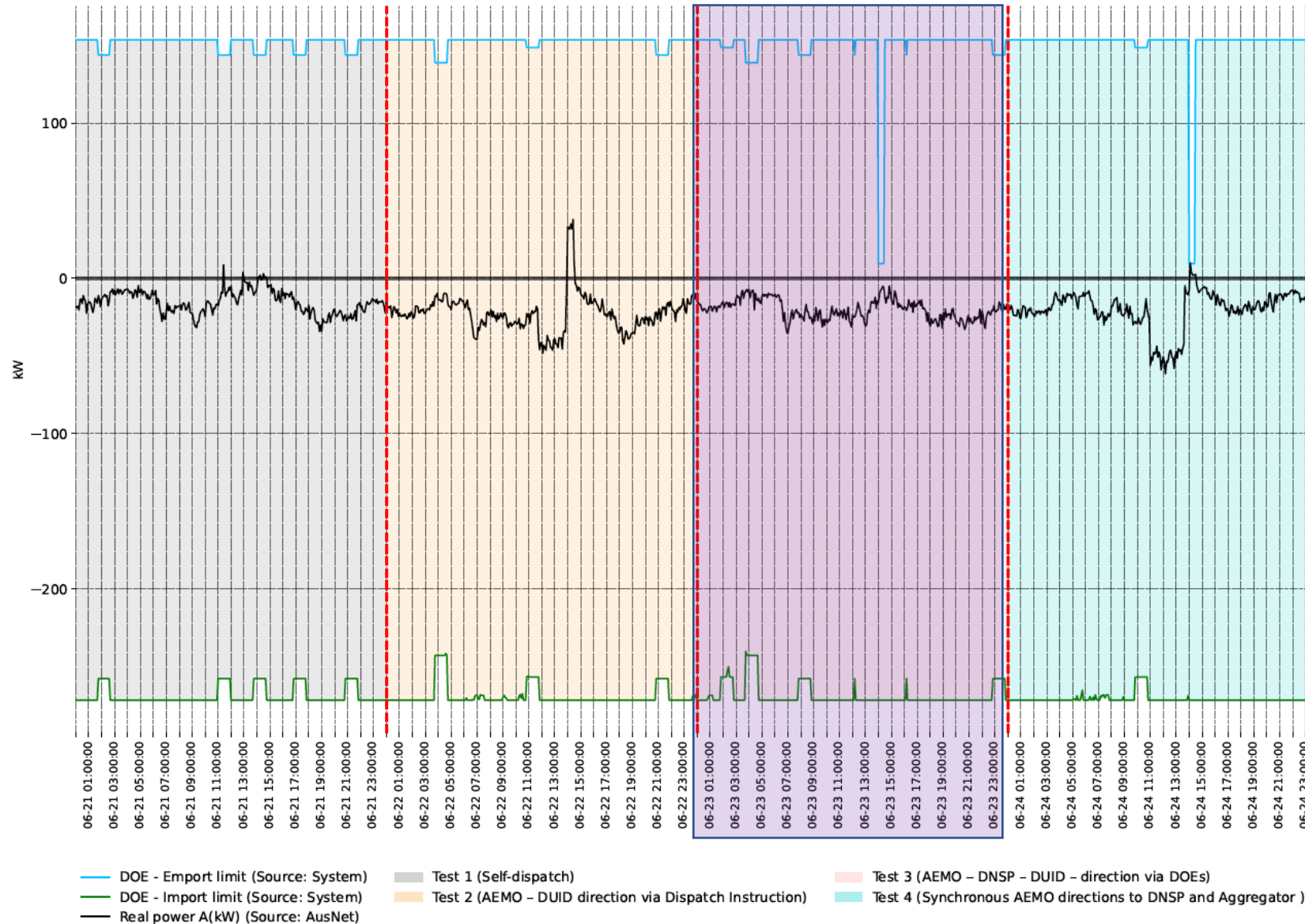
Flexible Target achieved

Test 2: AEMO - DUID direction via Dispatch Instruction (22 June 2022)



Difference between Flex and Net equals the amount of non-controlled load

Test 3 – Actual Net Active Power from Portfolio

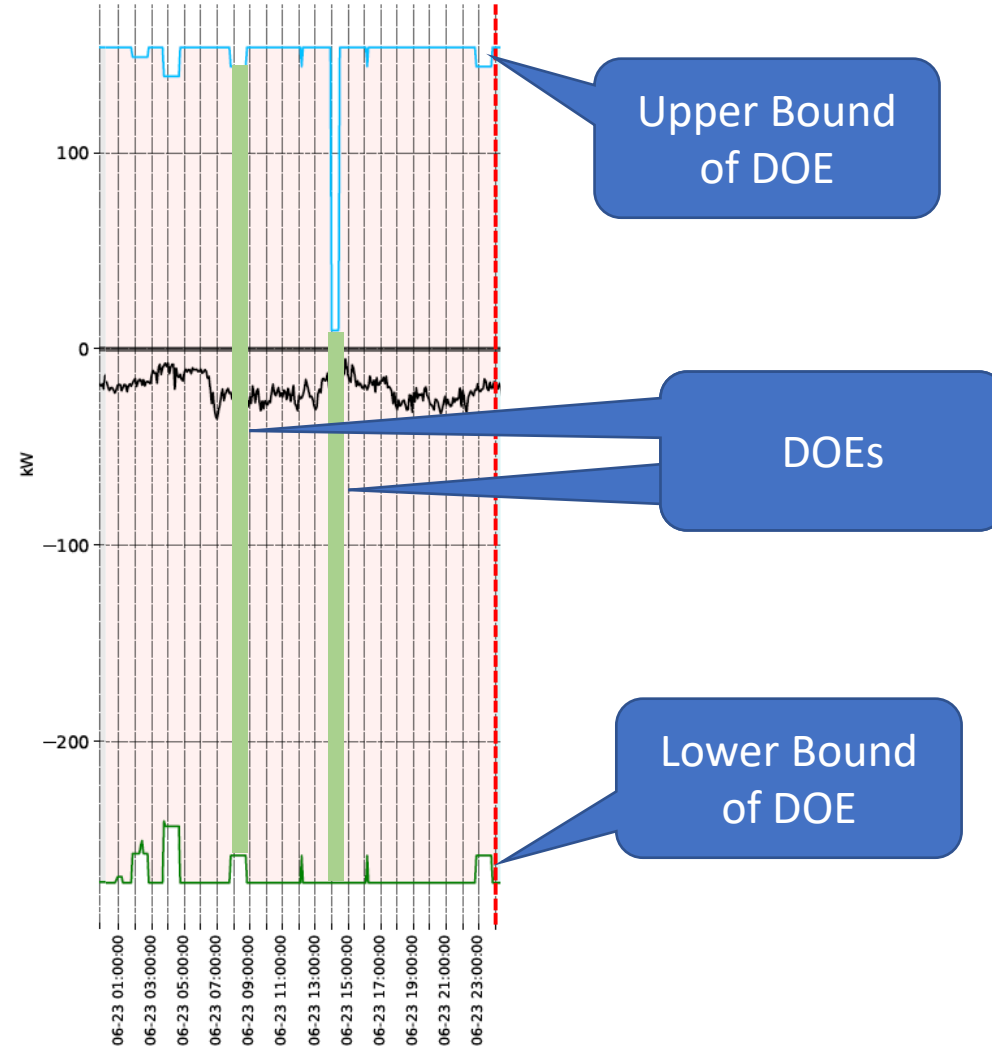


Test 3

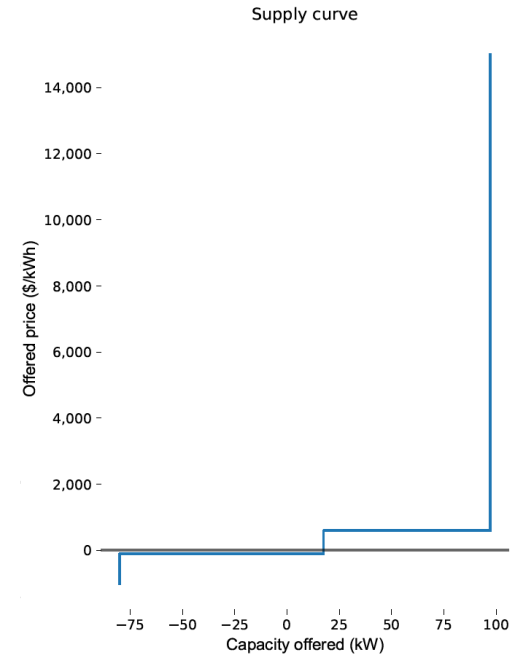
Q: Are DOEs a better mechanism than directing VPPs under a non-market use case (e.g market suspension) ?

AEMO → DNSP → DUID direction via DOEs

Currently AEMO instructs NSPs to maintain a profile within their network, NSPs currently do this by shedding load or generation.



Hypothesis 1:
AEMO Dispatch Instructions that give a 'target' are more reliable than DOEs which give 'permissible limits'.



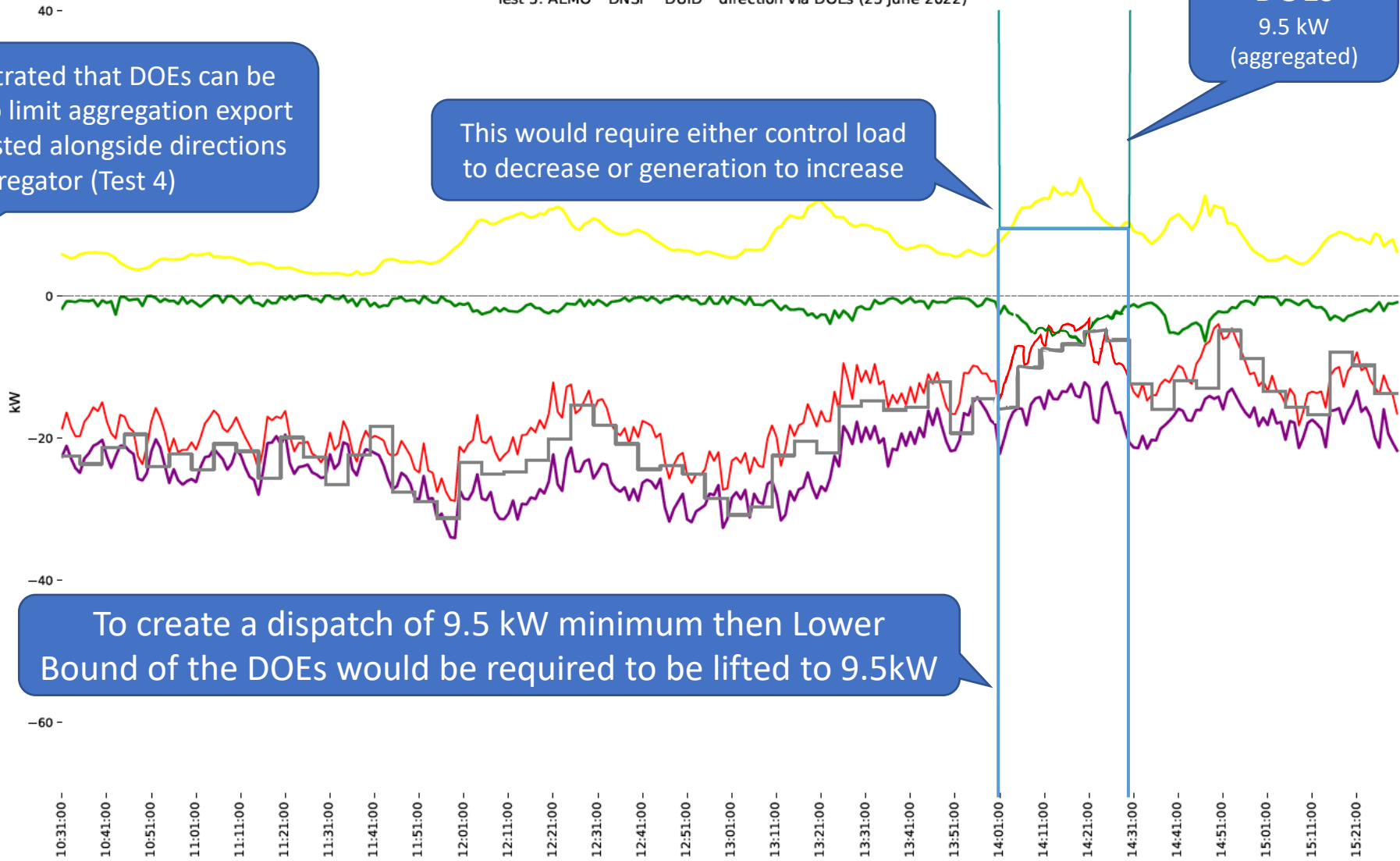
Test 3 – Actual Telemetry Active Power from Portfolio

Test 3: AEMO – DNSP – DUID – direction via DOEs (23 June 2022)

Test 3 demonstrated that DOEs can be set calculated to limit aggregation export and this was tested alongside directions to aggregator (Test 4)

This would require either control load to decrease or generation to increase

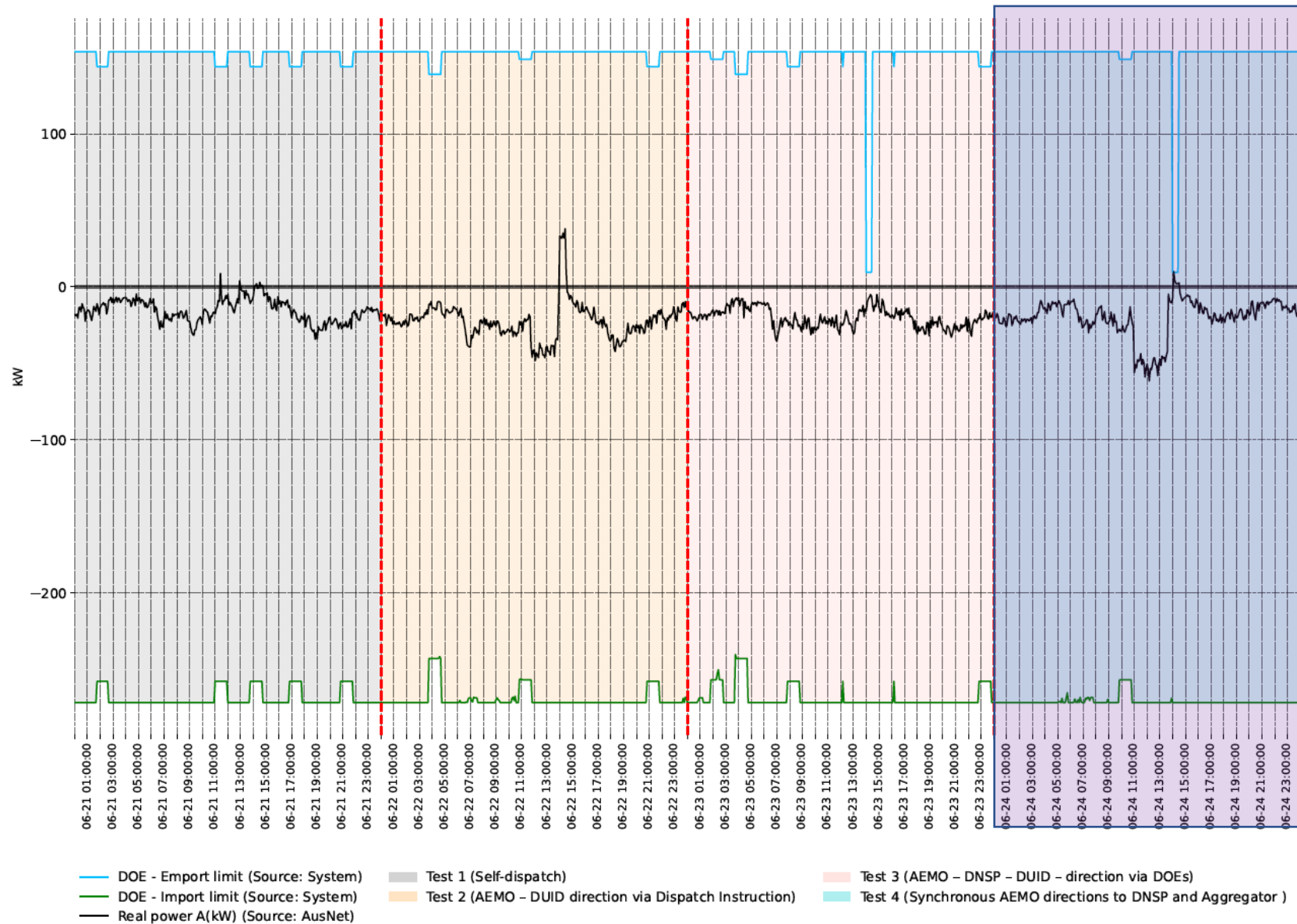
DOEs
9.5 kW
(aggregated)



To create a dispatch of 9.5 kW minimum then Lower Bound of the DOEs would be required to be lifted to 9.5kW

- Controlled generation (Source: Mondo)
- Controlled load (Source: Mondo)
- Active power (Source: Mondo)
- Real power (Source: AusNet)
- Uncontrolled load (Source: Calculated)
- DOE: Export limit (Source: System)

Test 4 – Actual Net Active Power from Portfolio

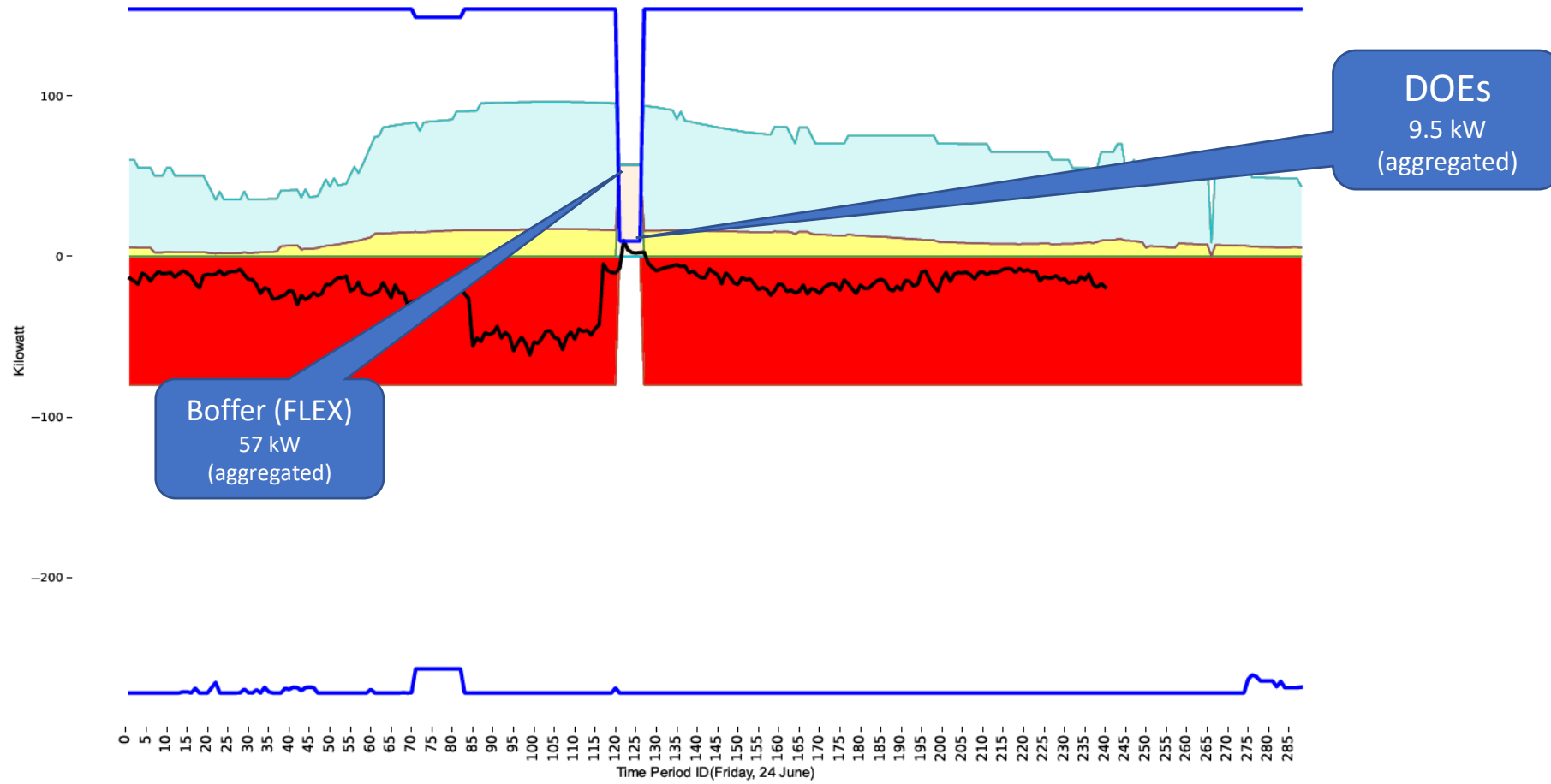


Test 4

Q: Is it worth building capability to do both mechanisms for redundancy?

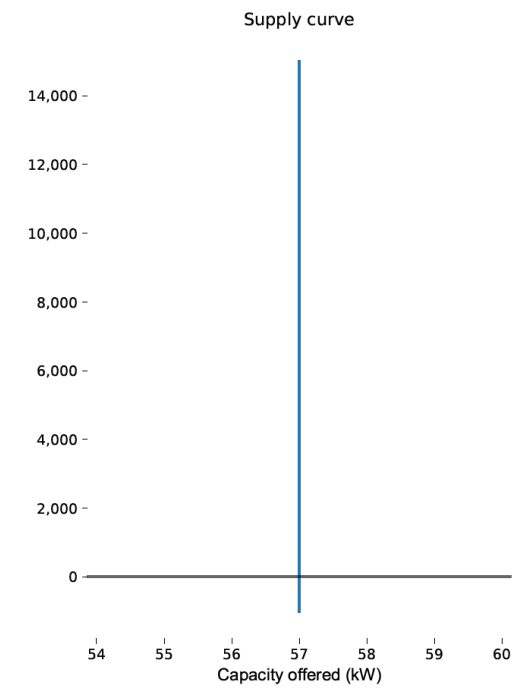
Synchronous AEMO directions to DNSP and Aggregator (Test 2+3)

Testing synchronous instructions from AEMO to DNSP and Aggregator to see if this helps reduce potential conflicts. Test 2 & Test 3 together.



Hypothesis 2:
These two signals together will conflict at times and this needs to be understood to be managed in future operations.

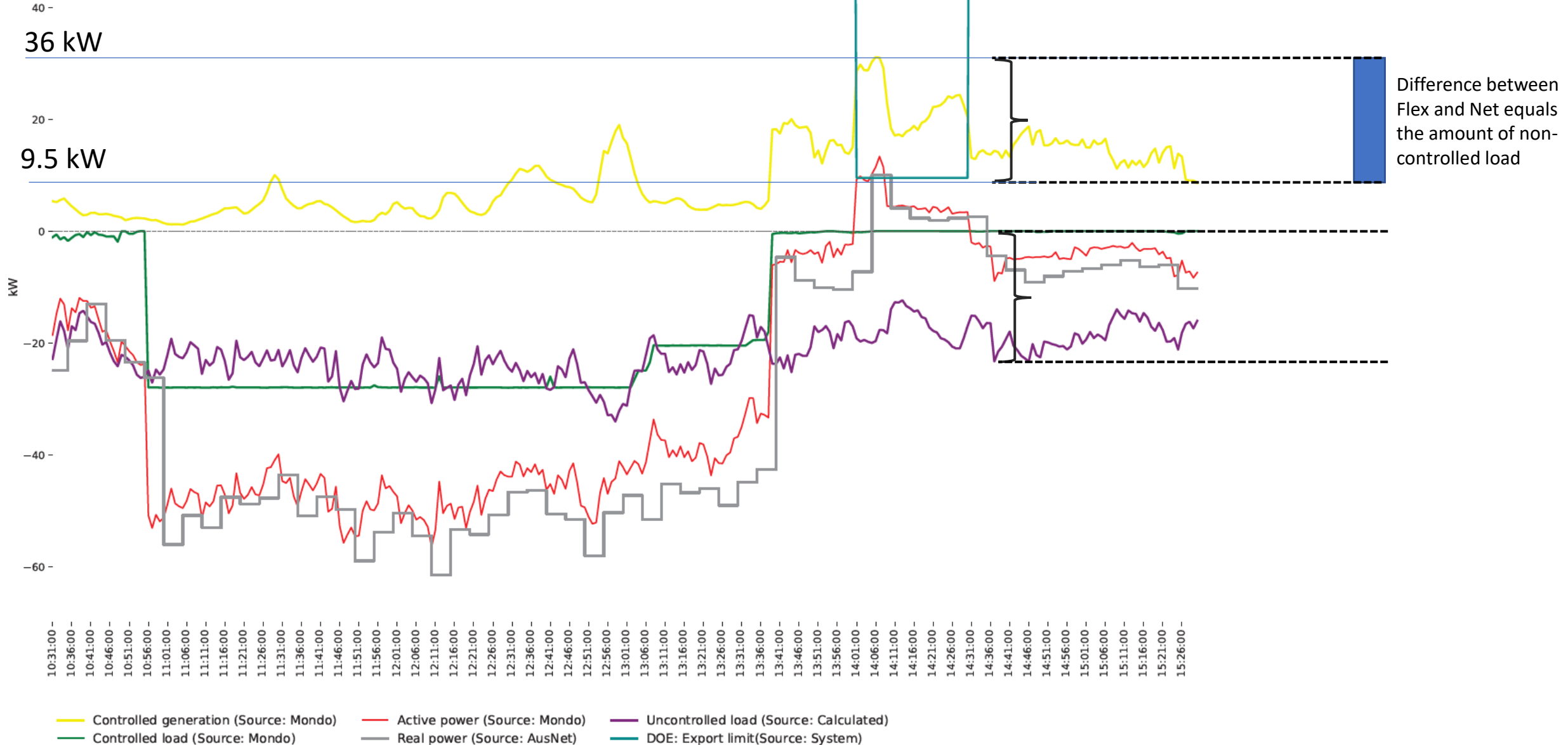
- Prices between band1 (-999) and band2 (-998)
- Prices between band2 (-998) and band3 (-997)
- Prices between band3 (-997) and band4 (-100)
- Prices between band4 (-100) and band5 (228)
- Prices between band5 (228) and band6 (229)
- Prices between band6 (229) and band7 (600)
- Prices between band7 (600) and band8 (1497)
- Prices between band8 (1497) and band9 (1498)
- Prices between band9 (1498) and band10 (14999) and band11 (-999)
- Prices between band10 (14999) and band11 (-999)
- Prices between band11 (-999) and band12 (-998)
- Prices between band12 (-998) and band13 (-997)
- Prices between band13 (-997) and band14 (-99.99)
- Prices between band14 (-99.99) and band15 (228)
- Prices between band15 (228) and band16 (229)
- Prices between band16 (229) and band17 (600.01)
- Prices between band17 (600.01) and band18 (1497)
- Prices between band18 (1497) and band19 (1498)
- Prices between band19 (1498) and band20 (14999)
- Real power A(kW) (Source: AusNet)
- DOE - export limit (positive) and import limit (negative) (Source: System)



Unable to achieve 57kW of flex

Trial simulated directions for 57kW of flexible export from 14:00-14:30.

Test 4: Synchronous AEMO directions to DNSP and Aggregator (24 June 2022)



CBA Methodology

We will use Miro to facilitate the Q&A session and gather relevant feedback



Link: <https://miro.com/app/board/uXjVOIHnFRg=/>
Password: "EDGE-DIF12"

Visibility	Focused Question Do you agree with the identified costs and benefits of increased visibility (across different market participants)? How are they best quantified?	Visibility General Feedback	Visibility Potential issues and red flags	Other
DNSPs Distribution Network Service Providers				
TNSPs Transmission Network Service Providers				
DER Aggregators Bundlers of DER to operate as VPPs				
Retailers Buyers of wholesale electricity for on selling to customers				
Generators Owner and operator of generation connected to NEM				
Market Operator				
Other Other market participants and stakeholders				

Move post-it note responses here

Process:

1. Post questions, comments, or feedback using post-it notes in the relevant table
2. Any and all feedback is welcome
3. We will use this to guide our thinking and help tailor future knowledge sharing and reporting

Structure:

- 5 topics for discussion
- *Miro activity after each presentation – 3 minute activity*

circulation

Close and next steps