Learnings from CSIP-AUS Testing for Dynamic Connections

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Manager Connection Standards

Test Procedures

CSIP Test Procedures

- Initially relied on smaller subset of CSIP Test Procedures and OEM self-assessment of CSIP-AUS extensions (by an RPEQ)

CSIP-AUS Test Procedures v1.0

- Required OEM self-assessment (by an RPEQ) to CSIP-AUS v1.0 Test procedures once it was released in July 2023
- Alternatively allow mutual recognition of testing against SAPN Test Procedures for PV only

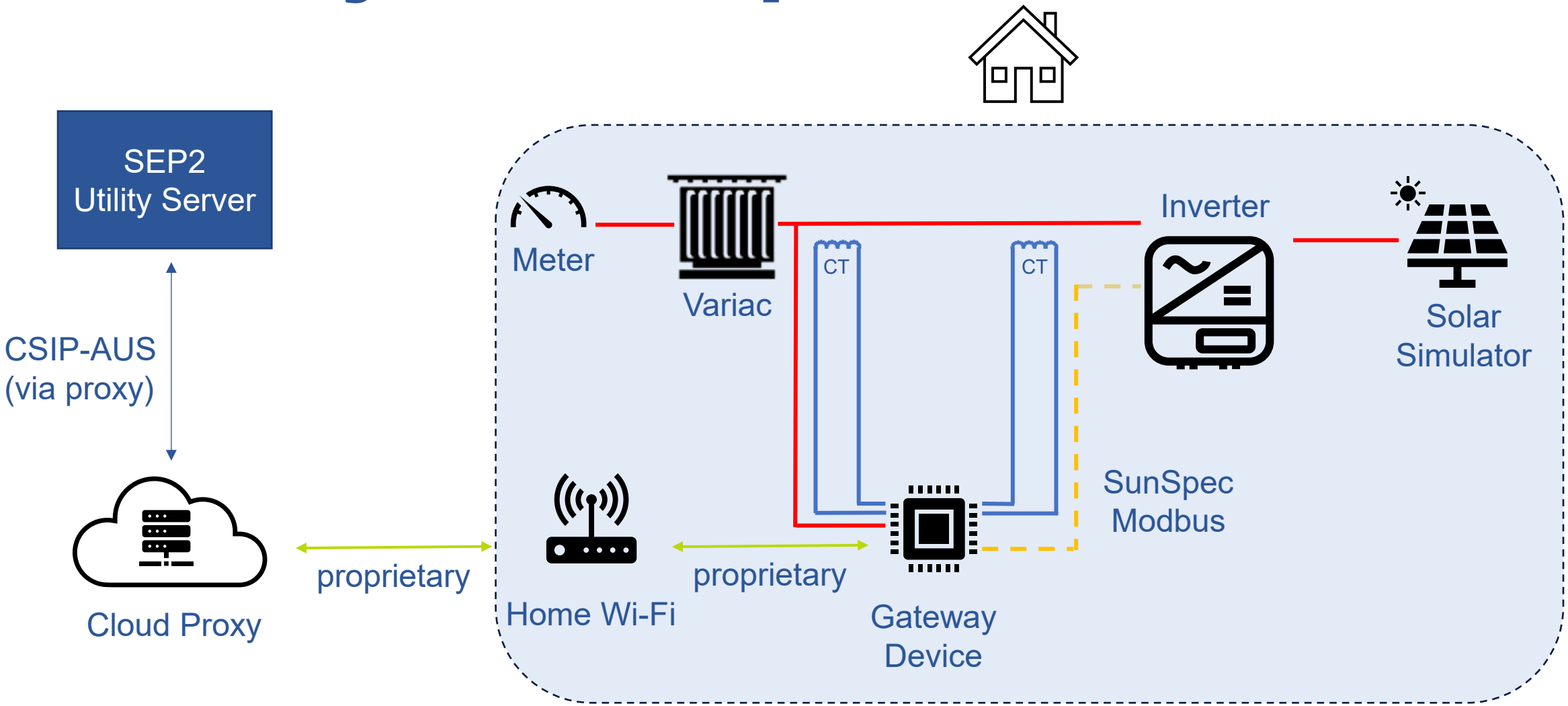
SA TS 5573:2025

- Implementing transition plan to SA TS 5573-2025 test procedures (which now make physical response in scope)

Our Testing Timeline

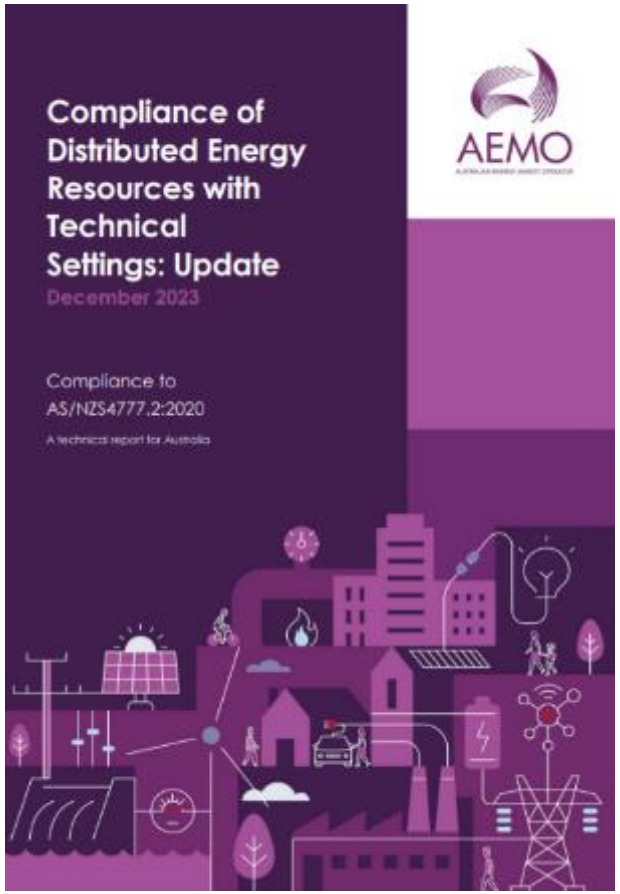
- Trial Testing at Energex Depots during 2021-2022
- Ongoing interoperability test with OEMs as part of onboarding
- Laboratory Testing in MIST Lab during 2023-2024
- Fleet Test using Smart Meter data in Aug 2024
- Further Laboratory Testing in MIST Lab planned for 2025-2026

Laboratory Test Setup



Lab Results – Operation

✅	Interoperability of volt-var, volt-watt & export control.
❌	Reactive Power non-compliance identified, in line with AEMO's DER compliance findings.
✅	Export control effective while supplying customer's local load requirements.
✅	System can correctly adhere to a base 1.5kW export limit.
✅	System can be monitored by customer via the dedicated mobile application.



Results – Communication Outages

- System dropped to a minimum export limit during internet outages.
  - No locally stored forecasts - export limited when connection to the Cloud Proxy is lost.

Interestingly we found…

- 0 kW export limit implemented at inverter, if gateway device is unreachable.
  - May not meet customers' expectations of a 1.5kW min. as per network agreement.
- System drops instantly to the minimum export limit, rather than ramping down.

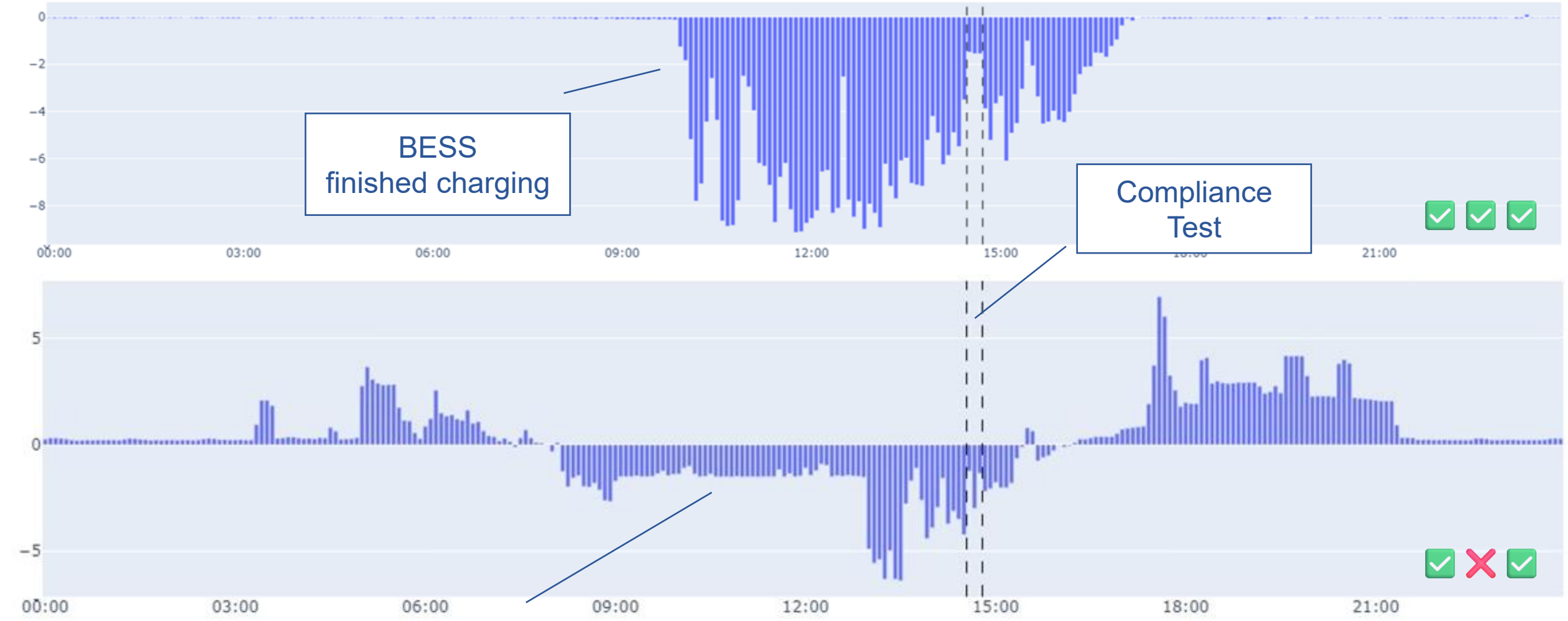
Meter Data Compliance Test

An export limit compliance test was carried out on Wed 21 August 2024 (14:35 to 14:50). Three individual 5-minute tests were carried out, to understand compliance of different functionality.

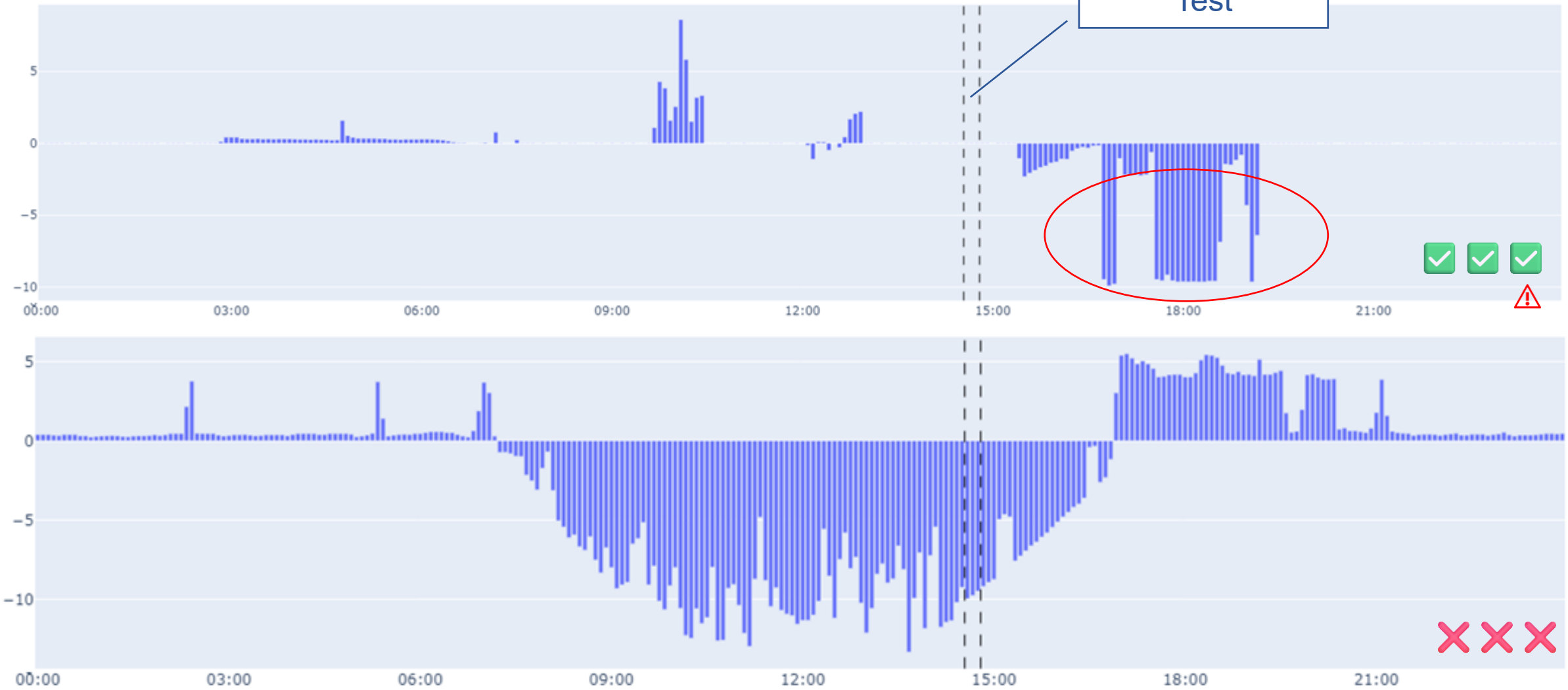
A. **Reduced export limit** – The export limit of the DOE Program associated with each NMI was reduced to the fixed export limit of the customer contract.
B. **System-wide program** – All NMIs were enrolled a global system program with higher priority (lower primacy) that was issued with a 1.5 kW export limit.
C. **Fallback limits** – The standard DOE program was cancelled, requiring sites to revert to their fixed export limit.

2024-08-21	14:30 - 14:35	14:35 - 14:40	14:40 - 14:45	14:45 - 14:50	14:50 - 14:55
DOE Program (Primacy #2)	ExpLimW = 10.0 kW ImpLimW = 15.0 kW	**ExpLimW** = **1.5 kW** ImpLimW = 15.0 kW	ExpLimW = 10.0 kW ImpLimW = 15.0 kW	No dispatch	ExpLimW = 10.0 kW ImpLimW = 15.0 kW
System Program (Primacy #1)			**ExpLimW** = **1.5 kW**		
DefaultControl	ExpLimW = 1.5 kW ImpLimW = 1.5 kW				
Fixed Limits	ExpLimW = 1.5 kW ImpLimW = 1.5 kW				
Implied Mode Defaults	GenLimW = ∞ kW LoadLimW = ∞ kW Connect = True Energize = True				
Site Behaviour	ExpLimW = 10.0 kW ImpLimW = 15.0 kW	ExpLimW = 1.5 kW ImpLimW = 15.0 kW	ExpLimW = 1.5 kW ImpLimW = 4.0 kW	ExpLimW = 1.5 kW ImpLimW = 4.0 kW	ExpLimW = 10.0 kW ImpLimW = 15.0 kW
Notes	Normal	Exp 1.5 kW A - Reduced DOE	Exp 1.5 kW B - System Program	Exp 1.5 kW C - Default Control	Normal

Customer Examples



Customer Examples



Sites not communicating with server
… so should have been max 1.5 kW Export

Compliance Rates with Export Limit

What percentage of sampled customers exceeded the expected export limit at the time of the test?

	✅ Exporting at or below limit	❌ Exporting above limit
Fixed – Full Export	98%	**2%**
Fixed – Partial Export	55%	**45%**
Fixed – Non-Export	19%	**81%**
Dynamic – Unregistered	24%	**76%**
Dynamic – Communicating	57%	**43%**

Note: for fixed connections, the max 5 min export for the whole day was used to determine compliance.

Outcomes and Learnings

- A new Connection Process and Compliance team at Energy Queensland established to work through site installation non-compliance issues
- New tests written and fed into DERIAPITWG which have now been incorporated into SA TS 5573:2025 Test Procedures, such as
  - ALL-23 Communication loss between client and server
  - ALL-25 Active control ramp rates
  - GEN-10 Primacy validation for generators
  - LOA-10 Primacy validation for loads
- Opportunities for improvements identified have been provided as feedback to relevant standard committees
- Developing better mechanisms for customers and installers to better diagnose problems (e.g. visibility of last communicated date, expected envelopes)

Outcomes and Learnings (cont.)

- **A national testing program will need to support multiple test designations (including future ones) and not just generation-type DER (PVs)**
- SA TS 5573 and the CSIP-AUS explainer should now address and resolve most interoperability issues between server and client implementations that have been encountered so far
- The uplift requirements to the new test procedure may vary significantly by OEM

Table 12.5(A) — Applicability of tests to classes of DER client

Test designation	Client type
(A)	All clients managing DER that are not claiming conformance with the demand response capabilities defined in Section 10
(G)	Clients managing generation-type or storage-type DER
(L)	Clients managing load-type or storage-type DER
(C)	Clients confirming with the optional ConnectionPoint extension
(S)	Clients implement Subscription/notification functionality
(M)	Clients supporting management of sets of DER as described in Clause 13.6
(DER-A)	All DER