DEIP Standards, Data and Interoperability Working Group

Meeting 3 – 17 June 2020

Agenda

1. Welcome & Introductions
2. Actions from previous meeting
3. SDIWG ToR – Approval & website
4. Communication & Awareness – AEMO
5. DER initial standard issues paper – AEMO
6. The Distributed Energy Resources (DER) Visibility & Monitoring Best Practice Guide – Solar Analytics
7. Battery Performance Standard – DNV GL
8. Cyber Security Taskforce scope – AEMO
9. Other business –
    1) NEXTgen 2020/2021 Program – Standards Australia
    2) Device Standards Taskforce – AEMO
10. Meeting Summary
    a. Agreed Actions & Next meeting

Agenda Item 2 - Actions from Previous meeting

No	Action	Status
2.1	AEMO to update SDIWG purpose and finalise ToR for distribution by 29 May	Complete – Agenda Item 3
2.2	SDIWG members to provide input and feedback on draft ToR by 10 June	Complete
2.3	AEMO to develop a cyber security WG scope and distribute by 29 May	Complete
2.4	SDIWG to review and prepare feedback for discussion of cyber security WG scope in next WG	Agenda Item
2.5	AEMO to commence preparation for cyber security WG in June; kick of WG from July 2020	Ongoing

Agenda Item 3:
SDIWG ToR approval

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Agenda Item 4: Communication & Awareness

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Industry Working Group Page

Distributed Energy Integration Program: Standards, Data and Interoperability Working Group

This working group relates to the Distributed Energy Integration Program (DEIP) and AEMO's Standards and connections workstream.

The DEIP 'Standards, Data and Interoperability Working Group' (SDIWG)brings together a broad range of industry stakeholders and consumer group representatives to develop specific requirements around the standards, data and interoperability capabilities for DER. This working group will collaborate with all aspects of the DER Program, with key findings and outcomes feeding into the DEIP Market Development stream and DER initiatives across the industry.

Provides an overview of why the WG exists

Objective:

The SDIWG has been developed to facilitate cross industry discussion, knowledge sharing, consensus building and decision making regarding the development of standards, data capability and interoperability of DER devices.

The key purpose of the working group are:

- Prioritising, coordinating and steer the required activities to establish uniform data, interoperability and cyber standards across the distribution network.
- Provide direction as per the DEIP steering committee outcomes and communicate this to the relevant taskforce responsible for the results.
- Provide governance to review the current standards, data and interoperability landscape and identifying gaps to integrating DER successfully into the future energy landscape.
- Communicate and highlight key priorities for the DER standards, data and interoperability landscape to industry and broader stakeholders.

Summary of the purpose of the WG as per the TOR

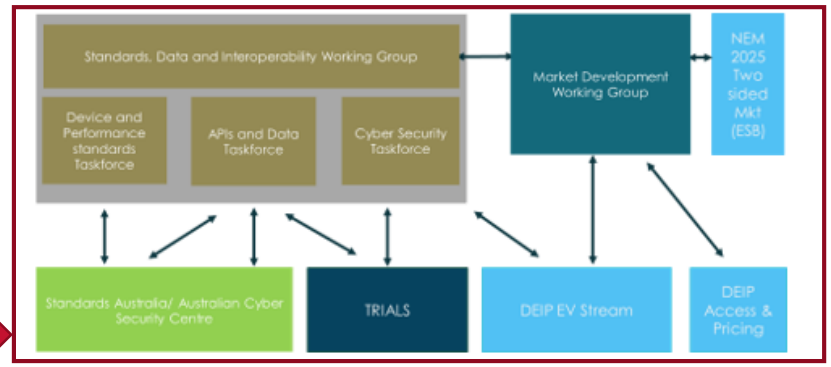
The group will also provide an avenue for sharing learnings, achievements and challenges of the Standard, Data and Interoperability workstream, how this interacts with the related DEIP working groups, and aligning tasks to the broader DER Program of work.

For more information about the scope and objectives of this working group, refer to the Terms of Reference.

SDI WG Terms of Reference [Draft]

Link to TOR (once approved by members)

Identifies how the WG links to other areas



The SDIWG will also include open channels of communication with the various DEIP working groups:

- Market Development WG
- Price and Tariffs WG
- Electric Vehicles WG

Meeting Schedule:

The Working groups will meet on a monthly basis as per the following indicative schedule:

Dates of upcoming WG meetings

Meeting	Date	Time (AEST)
Working Group #1	22-Apr-20	14:00 - 16:00
Working Group #2	20-May-20	14:00 - 16:00
Working Group #3	17-Jun-20	14:00 - 16:00
Working Group #4	15-Jul-20	14:00 - 16:00
Working Group #5	19-Aug-20	14:00 - 16:00
Working Group #6	16-Sep-20	14:00 - 16:00

Meeting Documents:

Meeting materials published after each session

Meeting #1	Presentation	Minutes
Meeting #2	Presentation	Minutes
Meeting #3		
Meeting #4		
Meeting #5		

Industry Working Group Page

Identifies participating organisations

Linked pieces of work. Any other activities & taskforces can also be linked here once made available.

The DERSDI@aemo.com.au **mailbox** has been set up to support any queries arising from activities relating to the SDIWG and taskforces.
Please ensure enquiries are sent to this mailbox (either to: or cc:) to ensure prompt responses.

Agenda Item 5: DER initial standard issues paper

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Initial national DER Minimum Technical Standard

A Consultation

Background

- Continued high uptake of DER instigated a number of programs with market bodies and ESB to better integrate DER into the grid and energy market
- In May, COAG Energy Council endorsed that AEMO submit a rule change request to put in place DER minimum technical standards by October 2020 focussing on AS/NZS 4777.2 capabilities
  - Uniformly applied technical requirements so DER can contribute to the secure and reliable supply of electricity to all consumers in the NEM, provide greater value to DER owners and minimise cross-subsidies to non-DER customers
- Energy Security Board has asked AEMO to consult **on the technical standard** *in parallel* with the rule change process on an 'initial' DER minimum technical standard
- AEMO's rule change request proposed that the 'initial standard' focus on power system challenges associated with high distributed PV penetrations
  - imperative to act demonstrated through AEMO's Renewable Integration Study and Technical Integration of DER reports

PV disconnection

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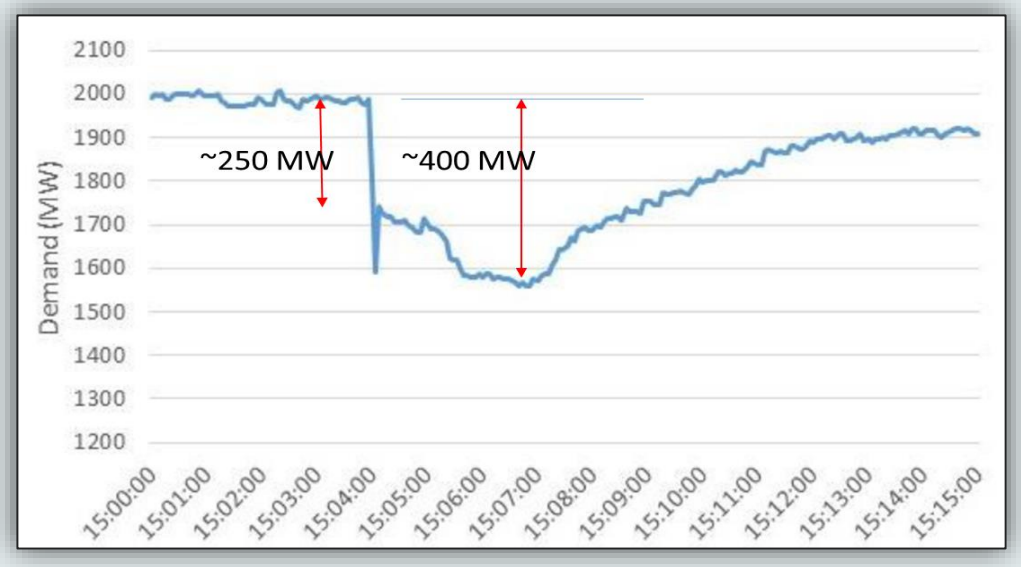
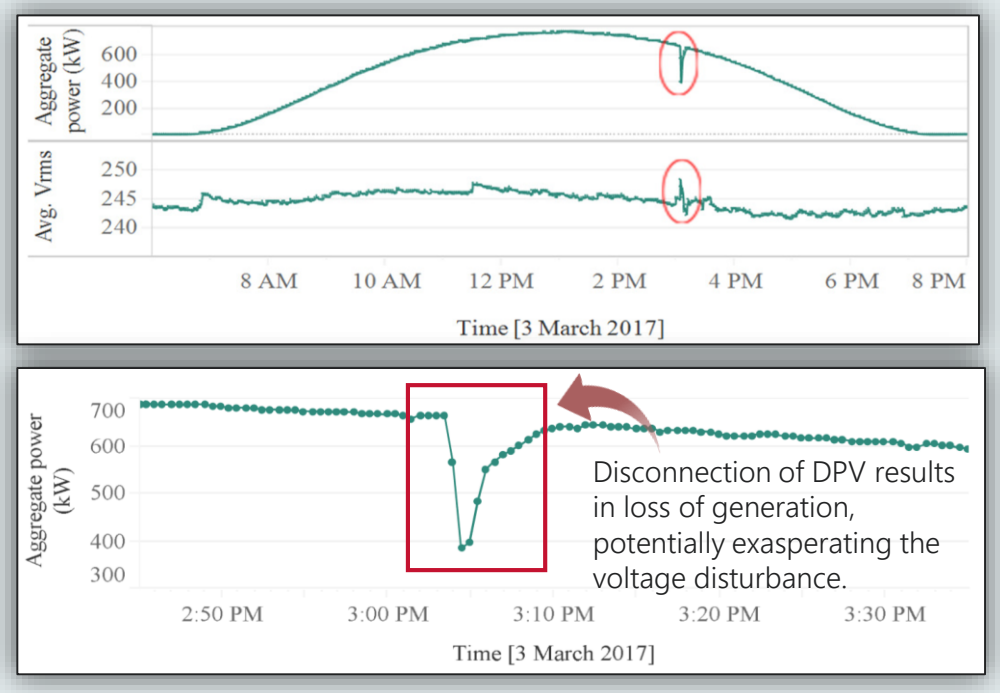
Inverter behaviour during short duration undervoltage disturbance

- The behaviour of inverters shown on 3 March 2017 in SA demonstrates the disconnection:



3 March 2017: Demand in South Australia during a short duration disturbance.



3 March 2017: Generation by distributed PV (DPV)

Existing Australian Standard

-

- AS/NZS 4777.2 covers inverter energy systems connected to the power grid
- Requires voltage disturbance ride through BUT does not sufficiently test for the behaviour of an inverter during a short duration undervoltage disturbance (between 1 and 2 seconds)
- AS/NZS 4777.2 is under review and is expected to address this but won't be implemented until 2022
- At current growth rates, means every year the equivalent of another power station in rooftop solar is installed without this critical capability

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Proposal for the initial standard

AEMO proposing to include a NEW test for EXISTING voltage ride through requirement in AS/NZS 4777.2:2015

- Bench testing - approx. 60% of common inverters can already provide the capabilities – not expecting additional costs to consumers. Potentially smaller range of inverters - temporarily
- Does not replace the current AS/NZS 4777.2:2015 test. Inverters must be compliant with both tests
- AEMO with OTR commenced consultation to require this test in SA independently of rule change
- Including the test in initial standard will bring alignment across the NEM (proposed Q1 2021)
- Will test for inverter capability to stay connected during an undervoltage disturbance between 1s and 2s –improved inverter performance
- Would apply to new and replacement inverters

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Consumer Benefits

- Reducing costs associated with procuring additional energy reserves to mitigate risk (which can be costly) by limiting the potential contingency size associated with disconnecting PV – 100s MW in SA by end 2020
- More efficient operation of the energy system resulting in more affordable energy for all consumers.
- Continued access to a wide range of inverters that already satisfy the desired behaviours (with approx. 60% of inverters completing the UNSW bench test meeting the requirements).

Minimum demand

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Initial Standard Scope

Current state	Capability proposed	Future state
Minimum demand. Distributed PV is reducing load to the grid. AEMO is concerned about insufficient demand to match the minimum output of the generating units to balance the system – coinciding without emergency conditions e.g. interconnector outage or market failure. RIS shows this a problem is SA today, and emerging in Qld, Vic. early 2020s and NSW post 2025. Without enough load there are few tools to deal with shocks to the energy system and to re-balance frequency deviations. Could lead to cascading failures and a 'black system'.	**Smart meter minimum functionality and wiring to enable emergency generation shedding** capability to remotely turn off distributed PV systems (a last resort mechanism analogous to load shedding)	A robust, last resort back-stop mechanism to shed generation, by turning off distributed PV where required to maintain security of supply to electricity consumers

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Options to manage minimum demand

- AEMO has explored various options including increasing load, battery energy storage, Under Frequency Load Shedding (UFLS) and generation shedding
  - UFLS can exacerbate the problem
  - Scalability over a short term is difficult – 100s of MWs needed
  - Others are part of a longer term approach to efficient market integration of DER
  - Important to differentiate efficient market integration of DER through two way market frameworks from system security objectives/imperatives
- AEMO's preferred solution is to enable generation shedding capability
  - necessary to maintain security supply to electricity customers – in SA from end 2020 with Queensland the next priority state.
- Can be enabled at the device level, at low cost and achieved in the short term through Power of Choice framework

Defining Emergency Backstop and Market Based Delivery Options

Focus of this presentation

1. Emergency Backstop – through Power of Choice Metering
   a) Analogist to load shedding
   b) Cybersecurity is already established
   c) Can be used for both load and generation at customers premise (i.e. both min and max demand)
   d) Available now using existing and reliable communication frameworks
   e) Provides "Blackstart" – SRAS through metering

2. Market Based – through Inverter
   a) Introduce System and Network services
      a) develop and adopt security standards; with
      b) robust communications standards
   b) Network trials are focused on to increase hosting capabilities for *export enablement*
   c) Voltage Disturbance ride-through to prevent large unpredictable "shake-off" of generation
   d) Currently voluntary connections with bespoke VPPs
   e) Dependant of customers' WiFi/internet so reliability concerns

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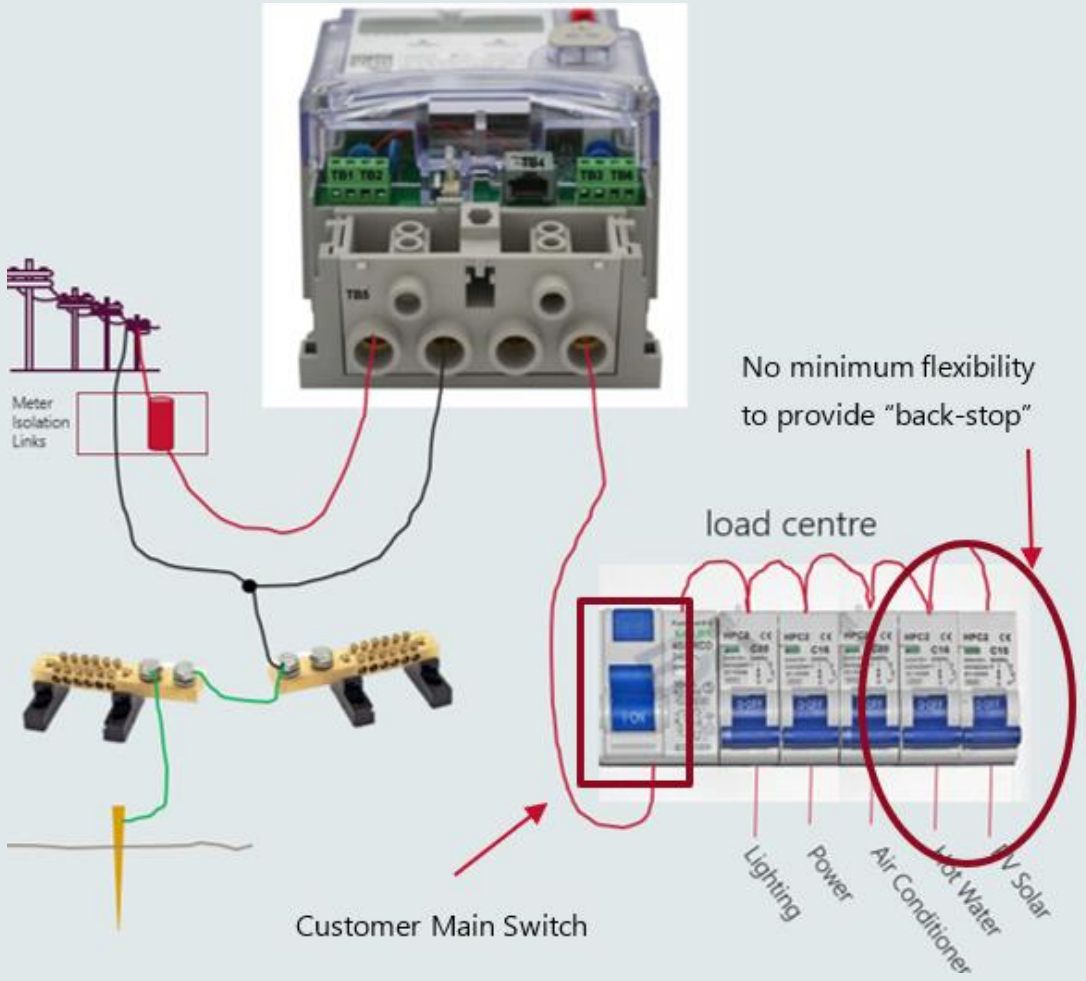
Current Meter capability & wiring

Power of Choice framework, using advanced metering infrastructure:

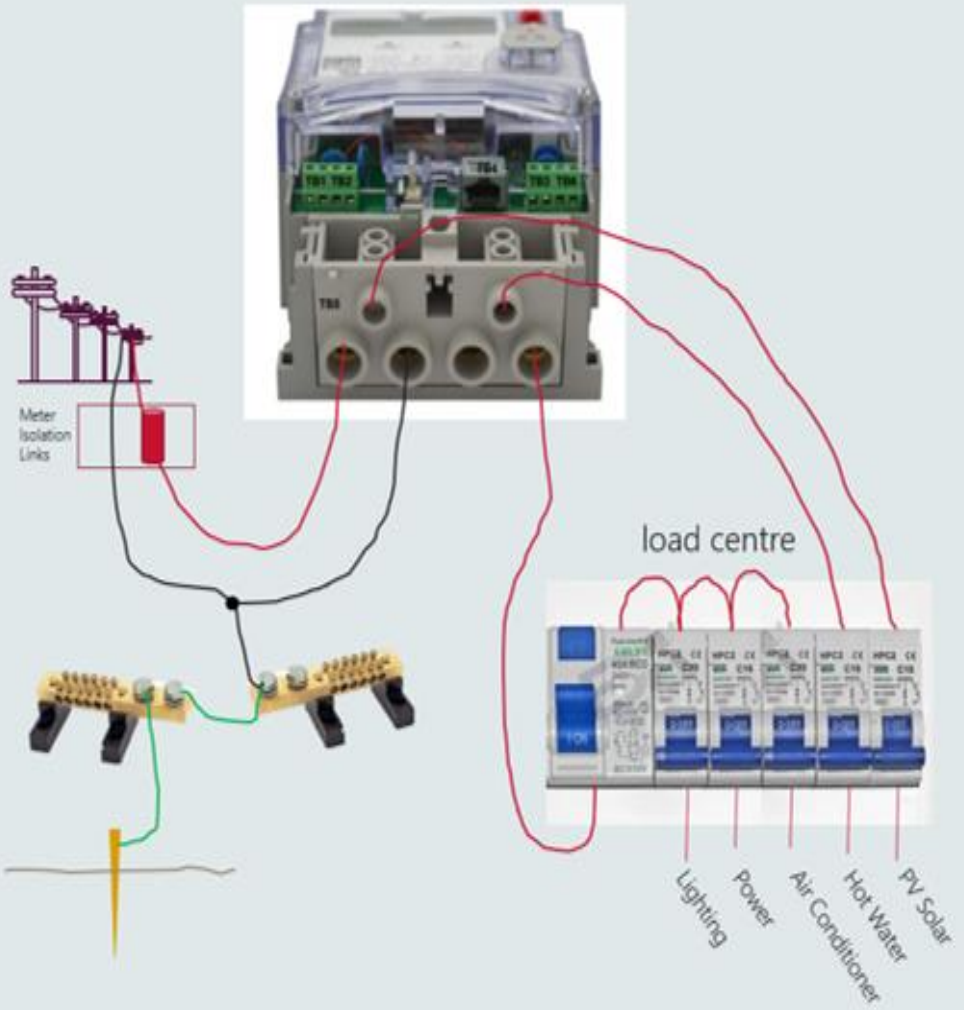
- Accept and respond to remote signals (to de-energise and re-energise)
- Cyber secure and reliable communication channel
- Communication networks in place (with metering coordinators)



Proposed Meter capability & wiring

- Additional metering element and changes to wiring to facilitate separate operation of each of the following load channels:
  - Solar PV
  - Controllable Loads such as hot water or pool pumps
  - General power and light

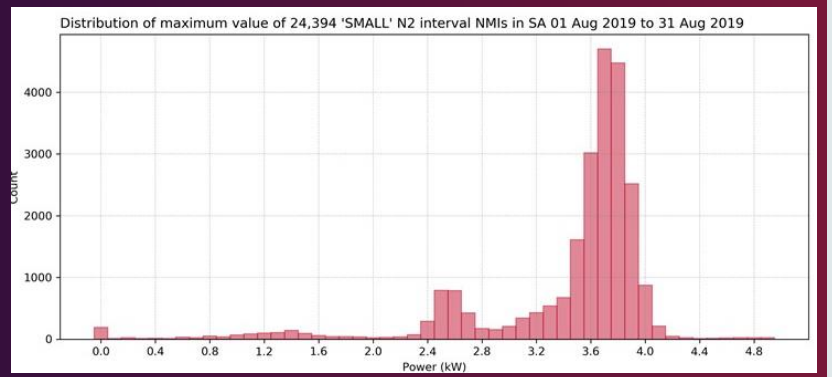
	Primary load only	Primary and controlled load
Current arrangements - standard home (no PV)	Single element, single contactor AMI or non-AMI meter	Two element, single contactor AMI or non-AMI meter
New arrangements - new (AMI) meter installation or replacement e.g. when PV installed	Two element AMI meter with two contactors	Three element AMI meter with three contactors



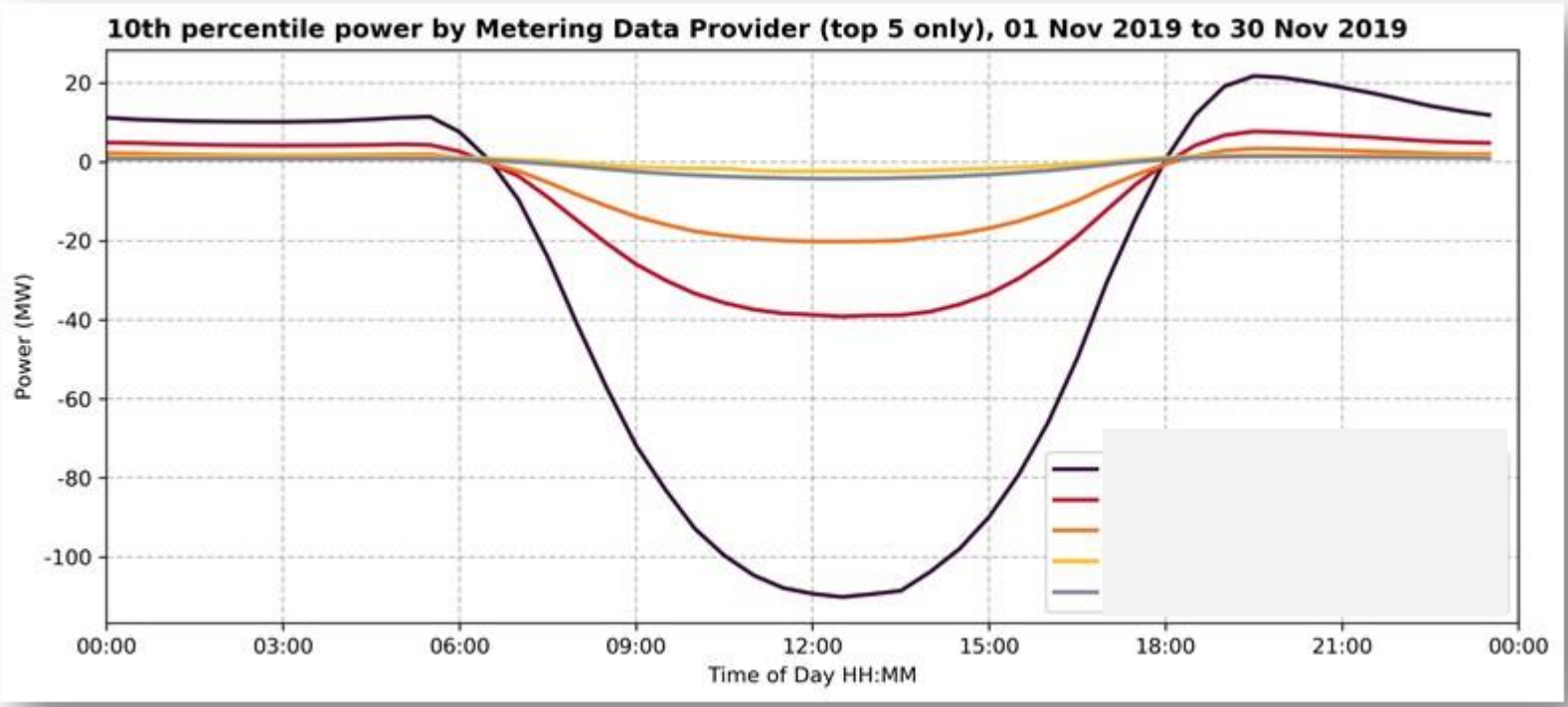
OFGS – 110MW

UFLS – 50MW

Two services with the same minimum capability



- ~110 to 20MW of connected Generation (OFGS)
- Highly repeatable 50MW of connected Hot Water load [24k customers] (avg 2kW per customer)



	ACTION WHEN DEMAND ≠ SUPPLY	AREA OF IMPACT	IMPACT	CUSTOMER IMPACT
CURRENT: Feeder Shedding	TNSP/DNSP sheds feeder/zone	Feeder/Zone [10,000 households]	100,000 Households for 2hr period (rotating)	
PHASE 1: Individual "targeted" households	House load/generation switched on/off	Individual households	10,000 Households for shorter periods (rotating)	
PHASE 2: Full capabilities utilised	House load/generation dialed up/down	Household generation / load increased or decreased	100,000 appliances for shorter periods (invisible)	

Why smart meters

- Builds on and uses PoC minimum specification:
  - Remote signalling – controllable
  - Cyber – secure solution
  - **Not reliant on Wi-Fi connection – high reliability incl. during black start** (when NBN is out)
  - Existing communication network to the meter
- Robust, low cost solution as appropriate for emergency back stop mechanism for power system security
- Cost effective approach - $30 to $50 for the majority of customers going from single to two elements (~80% of customers) up to $130 for most of the rest
- Will trigger when a new meter is installed or when a replacement is required to current installed meter.

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Consumer Benefits

- For DER customers – the capability to ensure supply continuity to loads by de-energising distributed PV systems (separate from load) if required for power system security. The alternative (to manage minimum demand) may be shedding the local feeder, which results in the loss of supply to thousands of customer premises and may even exacerbate the minimum demand problem causing perverse outcomes.
- The same benefit extends to all customers – load shedding could also occur at a household level where this is beneficial to customers (by potentially reducing the number of households that need to be shed).
- Improved choice, control and flexibility for DER customers in managing their power costs through the ability to use PV generation to offset primary and controlled loads. This means that rather than exporting additional energy to the grid they can use this energy in the home to save more on their power bills.
- The use of smart meters will also provide accurate measurement of PV generation allowing customers more visibility to make informed decisions.

Consistency with NEO

- Efficient maintenance of power system security in emergency conditions through management of generation and loads at low cost using existing technology that can deliver large capacity of response rapidly.
- Uses existing communications systems for aggregate dispatch meaning improved operation of electricity services at low cost to consumers.
- Efficient use of existing Power of Choice minimum level of meter functionality and cyber secure communication pathway to provide a high-quality secure communications link to enable communication across the distributed PV generation fleet.

Implementation

- Considered by the AEMC as part of their Rule change consultation process.
- AEMO proposed that each DER standard stipulate its publication and implementation date, and these be considered as part of consultations. This is similar to the approach taken with Australian Standards.
- **Under-voltage disturbance ride through capability** - AEMO proposes 3 month implementation from the date the standard is published (Q1 2021)
  - bench testing indicates ~60% of commonly used inverters can already provide the desired capabilities,
  - Manufacturers able to test inverters in readiness for Q1 2021 through the South Australia fast track process – AEMO has recommended SA adopt the same test from late 2020.
- **Smart meter wiring and configuration** – Consulting: may be prudent to be regionally staged
  - Aligns with the implementation of metering safety standard *AS 62052-31 Electricity metering equipment (AC)* on the back of international standard IEC 62052-31 that requires all NMI M6 approved meters post Nov 2021.

Agenda Item 6:
The Distributed Energy Resources (DER) Visibility & Monitoring Best Practice Guide

2020

Background

Australia leads the world in rooftop solar and DER

Chart 1: By 2030, 45% of generation will be behind the meter in Australia

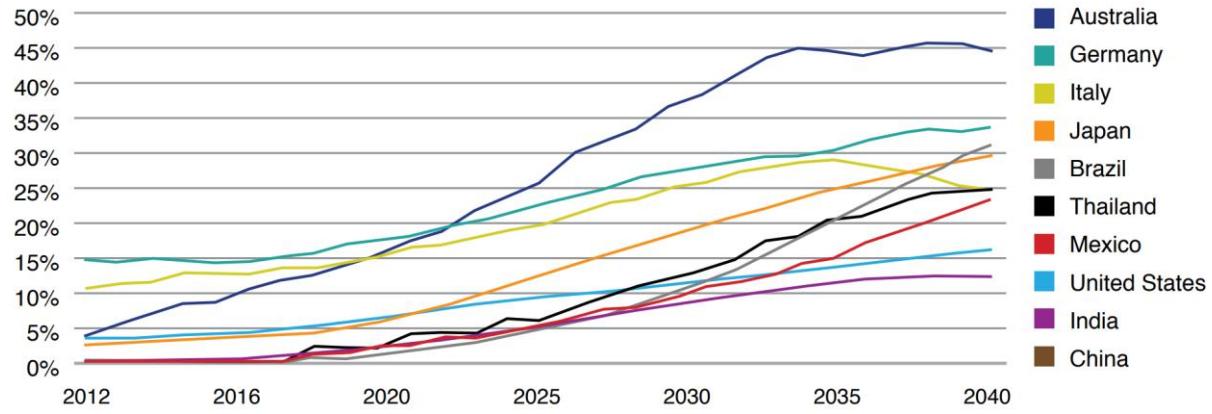

Chart 2: Forecast battery energy storage power, energy and duration for Australia, 2013 – 2024

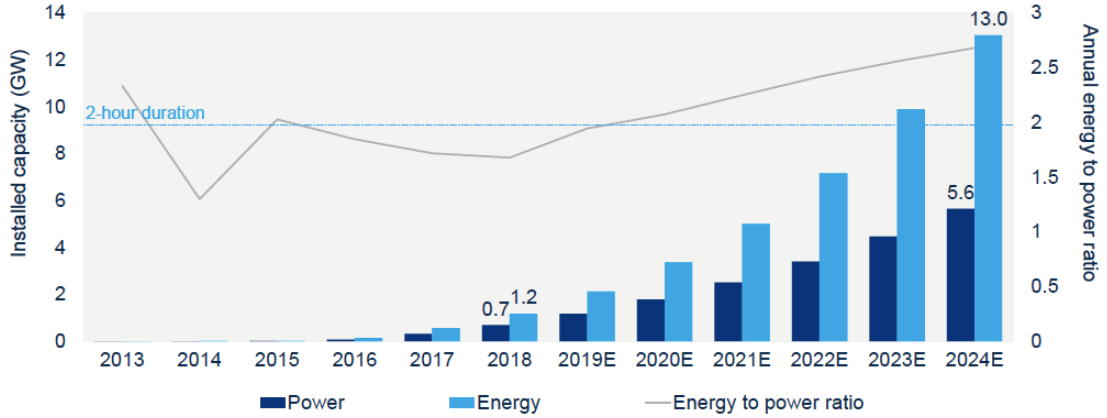

Chart 1 Source: AEMO and Energy Networks Australia, Open Energy Networks, Consultation Paper; July 2018
Chart 2 Source: Wood Mackenzie

Australia in 2020

- 9GW rooftop solar systems installed
- Network capacity is increasingly reaching the limits of DER hosting
- **Lack of visibility of the LV network and DER operations cited by DNSPs, AEMO and other industry bodies as their #1 issue in transitioning to this high DER grid**
- Lack of visibility is hampering network operations, planning, and regulations needed to increase and manage DER
- There is an opportunity now to enable DER to support the network and all electricity customers through data visibility that will enable future dynamic DER operations

Context for this Guide

- Customers are **choosing DER** with smarts built in
- Smart DER can **provide dynamic data** for visibility and monitoring
- Motivated **tech vendors can develop a consistent approach** that industry can adopt
- A **consistent static + dynamic data set supports more renewables** and **grid reliability**

A group of motivated local and global technology companies with industry input has developed a consistent data set and approach to DER visibility.

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Guide developed by leading local and global technology providers

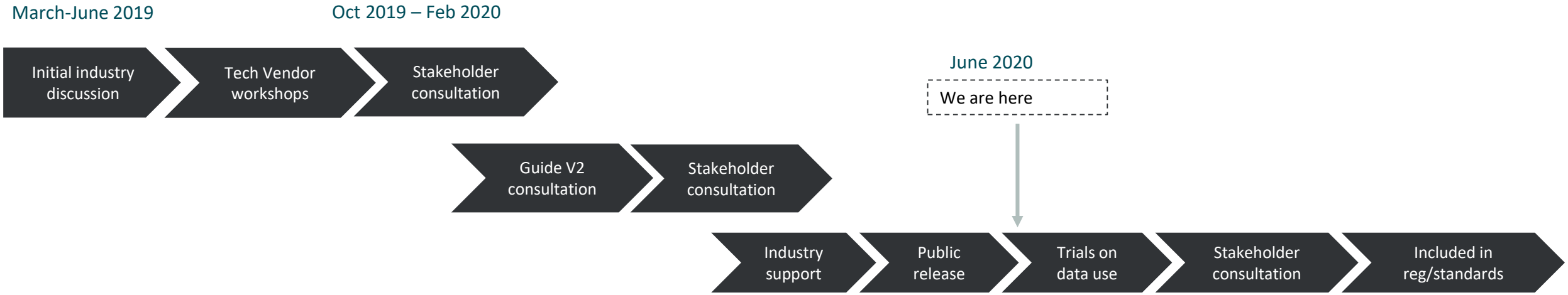
These organisations have been actively involved in developing the format and content of the Guide, however they do not necessarily endorse this Guide or state that their products conform to the Guide

With input / consultation from key industry organisations

Employees of these organisations provided input into the thinking about and development of the Best Practice Guide.

AEC, AEMC, AEMO, AER, AGL, ANU, APVI, ARENA, AusGrid, Ausnet, Australian Energy Foundation, CEC, CER, Cool or Cosy, Delta, ECA, ENA, Endeavour Energy, EPC Solar, Ergon, Energy Queensland, ESB, Essential Energy, GSES, Horizon Power, InStyle, ITP, LJW, Metropolis, National Renewable Group, NRG, NSW Government, Penrith Solar Centre, Planet Ark Power, Positronic Solar, Reposit, SA Regional Solar, SAPN, Selectronic, Service Stream, Siemens/Clipsal Solar, Smart Energy Council SEC, Solar Cutters, Solar Energy Installers Association SEIA, Solar Victoria/DEWLP, Solarwatt, SunWiz, Synergy, Tesla, University Queensland, University Sydney, University Victoria, UNSW, UTS, Western Sydney Solar, Zen Energy

From ideation to release



Consultations to date have confirmed:

- There is increasing **acceptance that this is the "right data set"**
- There is **capability in tech providers to support** and enable
- Waiting for, or wrapping this into, a 'standards' process will delay the valuable experience and iterative development that is made possible through **practical demonstration**
- **Consistent, comparable DER data is key** to any and all future market participation by DER owners (customers) and their agents

Feedback has been largely positive and progress oriented:

- Eg. SA Power Networks said: "We would be thrilled to get the data you are proposing – even just the compulsory set. We've encountered significant issues acquiring consistent data sets and/or services from DER and other distributors devices."

Overview of data use cases

The following use cases were identified by the consulted industry organisations or outlined in published reports

Use	Parameters required (at site)	Key user group
Network state estimation and performance	Voltage	Networks, AEMO
Fault identification	Voltage and current	Networks, AEMO, customers
DER hosting capacity	Voltage, active/reactive power generated/consumed	Networks, regulators, customers
Compliance	Active/reactive power generated, voltage	Customers, regulators, networks
Constraint management	Capacity, voltage active/reactive power generated/consumed	Networks, AEMO
Constraint reporting	Capacity, voltage active/reactive power generated/consumed	Networks
Orchestrating DER	Capacity, voltage active/reactive power generated and consumed	Networks, AEMO, VPP operators
Asset owner information on own DER	Static data, site active imported/exported, site active generated/consumed, time	Customers

Alignment with other initiatives

- The Guide has been developed to **align with the AEMO DER Register, AEMO VPP** Trial data specifications, Evolve **DER API Technical Working Group,** and **IEEE 2030.5**
- This Guide is the first essential step to enabling our high penetration DER energy future

In developing the guide, we have proactively sought to enable alignment with other initiatives and advised key stakeholders throughout

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Why a Best Practice Guide for distributed energy resources (DER) visibility & monitoring?

Objectives of this Guide

1. **Establish a common** static and dynamic (near) real-time **data set collected for new DER** installed behind the meter on the low voltage electricity network.

2. **Increase** confidence in the **quality and performance of DER** to owners, industry and government through the provision of real time system performance data to customers and authorised industry entities.

An industry Best Practice Guide can

- **Support practical solutions**
- **Support informed decision-making**

Why a Best Practice Guide

- **A Best Practice Guide** can be agile to needs and technology capabilities
- **Codification** requires a compliance regime and a sponsoring entity
- **Standards** take years to develop and can end up not being fit for purpose or misaligned to needs

Best practice guidance should be:

- **Industry led** and **owned**
- **Agile to fit** product interest/**market need**
- **User** supported

Design approach

- **Industry** led
- Data **readily captured** and made available
- **Customer permitted**
- Data is **valued** and readily accessed via API
- Delivers clear customer **benefits**
- **Voluntary** with minimal administrative burden

Best Practice Guide Principles:

- **Minimum** required data points
- **Maximum** impact
- **Market** oriented
- **Customer** permitted

The data fields:

15 Static (9 required, 6 optional)

13 Dynamic (7 required, 6 optional)

Required static data

Static data is data relating to a DER that does not change, or is changed infrequently

Data	Description	Unit	Notes	In AEMO data?
System ID	Unique **identifier required for each connection point** where DER installation is.	Alpha-numeric	Required for new installations and what is monitored by the Technology Provider	No
Location	Postcode, statistical area, feeder or address depending on privacy and use	Alpha-numeric	AEMO retrieves this information from NMI	No
System type	Type of DER (solar, battery, ev etc) for each DER.	Pick list	Must be able to generate power to be classified as DER.	Some*
Technology Provider	Organisation name of the Technology Provider (company that provides the data set)	Alpha-numeric	More than one provider for a site may occur but is expected to be rare. Input tool to allow more than one provider entered (as an option).	Some**
Remote access/ connection	Details of type of monitoring attached to site/DER. Specify type of comms (if any), and if any remote control is available	Y/N, Type (WiFi, 4G, Ethernet, etc)	Type of comms available, remote control available? Note if not connected by customer choice	No
Approved capacity	Approved small generating unit capacity as agreed with network in the connection agreement	Numeric (kVA)	Can be distinct or equal to an export limitation	Yes: DER Register
Solar Retailer	Solar /DER Retailer company name and ABN	Alpha-numeric	Entity accountable for the installation, modification or removal of the DER. Accredited installer is optional.	Yes: DER Register
Site details	Site details and controls applying (eg. export limits)	Alpha-numeric	Eg. protective controls, # phases or export limits.	Yes: DER Register
Commissioning date	The date that the DER installation is commissioned	Date		Yes: DER Register

Optional static data fields: NMI; AC Connection ID; Equipment details; Equipment settings; Device ID; Device details

* Type aligns with AEMO VPP definitions

** Aligns w/ AEMO VPP Data - device maker device model (hardware), and device control box (3rd party software)

Required Dynamic data

Dynamic data is data that is frequently changing, eg power generation, consumption, voltage.

Dynamic data is collected in 5 min granularity or greater can be made available in near real-time.

Parameter	Description	Units	Notes
Site Gross Load – Active/Reactive power	Total Active/Reactive power consumed by the customer. Per phase is preferable with combined acceptable.	kW/kVAr	Max, Min, Mean
Site Active/Reactive exported power	Active/Reactive power exported from the site. Per phase is preferred with combined acceptable.	kW/kVAr	Max, Min, Mean
Site Active/Reactive imported power	Active/Reactive power imported from the grid to the site. Per phase is preferred with combined acceptable.	kW/kVArh	Max, Min, Mean
DER generation Active/Reactive power	Active/Reactive power generated by each DER. Per phase is preferred with combined acceptable.	kW/kVArh	Max, Min, Mean
DER consumption – Active/Reactive power	Active/Reactive power consumed/stored by each DER. Per phase is preferred with combined acceptable	kW/kVArh	Max, Min, Mean
Site Voltage	Average AC voltage over the period – measured at meter board	V	Max, Min, Mean
Time	Accepted date formats: yyyy-MM-ddThh:mm:ss or yyyy-MM-ddThh:mm:ss.sss	UTC	Date and time matched to AEMO VPP data (ISO 8601)

Optional dynamic data fields: Site active/reactive energy imported/exported; DER active/reactive energy consumed/generated; Battery SOC; Frequency

Customer data provision

- A customer-oriented data set is made available to the customer via website/customer portal
- Customer data includes access to relevant static and dynamic data

As a minimum customers will have access to real time 5 min data:

- **Site energy or power imported/exported**
- **Site energy or power generated**
- **Site load or consumption**

Customer privacy, data, permissions

- All Providers conforming with this guide required to comply with Australian consumer law, privacy provisions and data management regulations
- A data collection statement must be provided to customers and their permission granted to collect the data

Data management includes security of data ‘in flight’, authentication, authorization for provision, access, storage, use and misuse.

Implementation

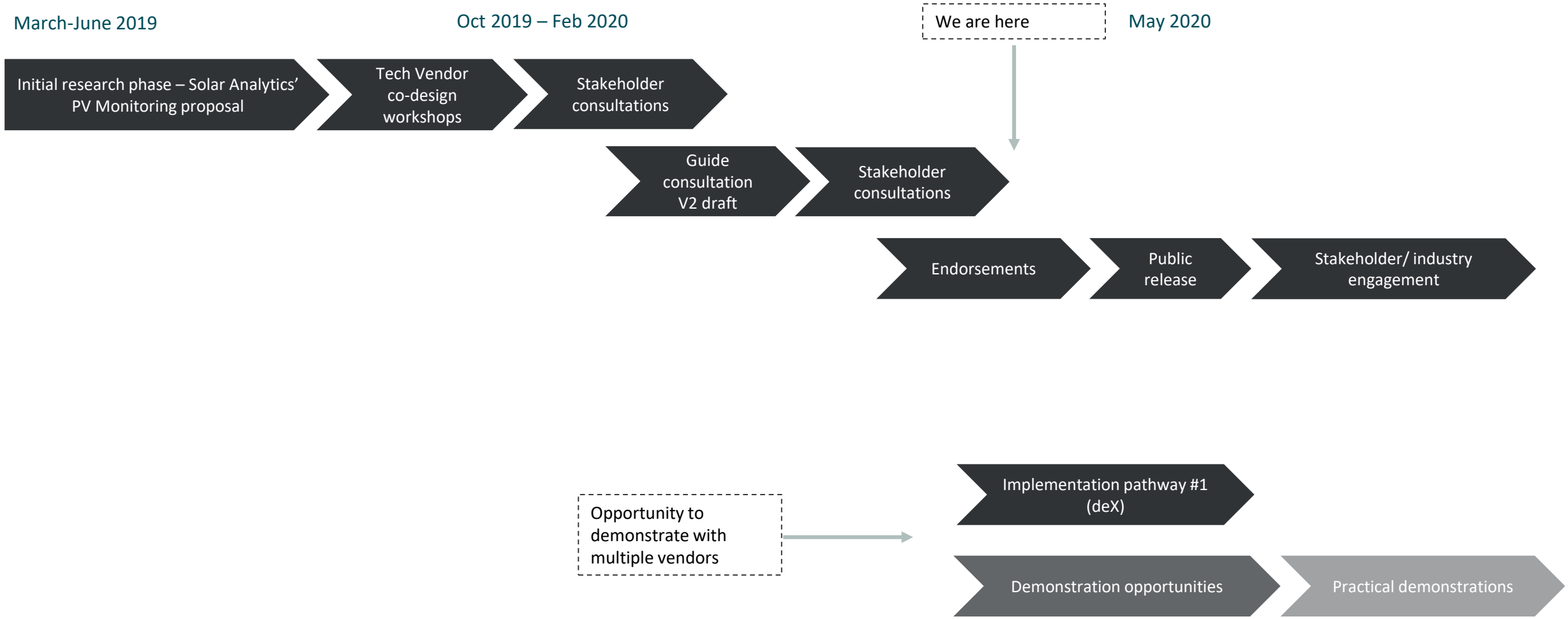
Implementation pathways

- Tech Providers who conform with this Guide and can **make the data set available** via:
  - **Direct** (bilateral) contracting and provision, or
  - **Platform** intermediary (deX) contracting and provision
- **In all cases, consumer permission** is required to enable data sharing

Over 2020, Tech Providers will progressively enable these data services.

Users will be able to request access via conforming tech providers on commercial terms and in accordance with Privacy Policies.

From ideation to demonstration



Support & Conform

- Organisations may choose to support this Guide or use it as a reference
- Tech Providers may elect to have some, or all, of their products conform with this Guide.
- **Conformance** with the guide is determined (for now) **by self-assessment**
- Changes to be determined by workshops/consultations

Endorsement is done via public statement that the organisation supports the Guide.

Administration, endorsement and enquiries:

admin@DERmonitoringguide.com.au

Thank you.

DER visibility and monitoring best practice guide

API Taskforce role

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Recommendation: API Taskforce Role

- Progress the guide to final development stage
- Develop API platforms and communications to support data collation
- Communicate processes to those participating
- Promote value of participation
- Develop data platforms and dashboards to support ongoing learning and knowledge sharing

Agenda Item 7:
Battery Standard Proposal

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ENERGY

Australian Battery Performance Standard

Project update-AEMO

17 June 2020

More examples

Brand	Type/chemistry	Manufacturer reported cycle life	Conditions
ABB React 3.6-TL	Lithium ion	4500	100% DoD
Akasol NeeoQube	Lithium ion	5000	80% DoD
Alpha ESS	LiFePO4	6000	90% DoD
Ampetus super lithium	LiFePO4	10000	90% DoD
BMZ	NMC	5000	Not given
BYD B-Box LV	LiFePO4	6000	Not given
Delta Hybrid E5	Lithium ion	6000	80% DoD
Enphase	LiFePO4	7300	Not given
Fiamm SMG/S 1150	Lead acid	1500	60% DoD
Fronius Solar Battery 10.5	LiFePO4	8000	80%% DoD
Giant Power DC2V1025Ah	Tubular lead acid	3500	50% DoD
Grid Edge GEF M400	Sodium nickel	4500	80% DoD
Leclanche Apollion Cube 15S	Lithium ion (titanate)	5000	80% DoD
Narada REXC	Lead crystal	3000	50% DoD
GenZ	LiFePO4	3800	75% DoD

Without using same conditions, cycle life comparisons cannot be made as different values will be obtained under different conditions.

Source: https://www.smartenergy.org.au/batteryfinder

Project overview

Who?

- DNV GL Australia Pty Ltd (Project Lead)
- CSIRO, Smart Energy Council, Deakin University
- Funding partners: ARENA & DELWP

What?

- Develop a Performance Standard, for BSE connected to domestic/small commercial PV systems
- Maximum BSE size considered is: 100kW, 200kWh

Why?

- No such Standard currently exists, and this is an area of significant interest and potential
- Market growth depends on consumer confidence. This needs clarity to compare offerings.

How?

- Standards review and gap analysis, to determine elements required in this Standard
- Undertake a program of battery tests to trial practicality and repeatability of proposed test methods

Project timeline

Late 2016: Project idea identified

31/07/2018: Official project begin

28/10/2018: Battery procurement (for testing)

30/11/2018:
Stage 1 completed.
Stage 2 started.

- Comprehensive gap analysis of existing standards
- High level draft outline of proposed Standard
- Review & analysis of ITP test data

15/01/2020:
Delivery of:

- Recommended criteria to select a battery management system (BMS)
- Recommend minimum set of information for safety data sheet (SDS)

15/06/2020:

Stage 2 completed, project completion.
Delivery of:

- Report on Performance-related hazard identification process
- Report on Battery Capacity Estimation Methodology
- Final Proposed Battery Performance Standard
- Interim Industry Best Practice Guideline

Testing: battery selection

Battery Rated Size	Chemistry
1.2kWh	Lithium iron phosphate
130Ah	Lead acid
63Ah	Nickel manganese cobalt
100Ah	Lead acid
3.6kWh	Nickel manganese cobalt
2.56kWh	Lithium iron phosphate
1.93kWh	Lithium titanate
1.06kWh	Advanced lead acid
53Wh	Lithium supercapacitor
10kW	Zinc bromine flow
3.55Wh	Lithium supercapacitor
200Ah	Lead acid

Battery Rated Size	Chemistry
13.5kWh	Nickel cobalt aluminium
2.4kWh	Lithium iron phosphate
7.4Wh	Nickel manganese cobalt
1.94Ah	Nickel manganese cobalt
2.38Ah	Lithium manganese oxide
2.5Ah	Nickel manganese cobalt
65Wh	Lithium iron phosphate
12.5Ah	Lithium iron phosphate
2.5Ah	Lithium iron phosphate
3.0Ah	Lithium manganese oxide
1.35Ah	Lithium titanate
20Ah	Lithium titanate
2.85Ah	Nickel cobalt aluminium

Stakeholder Engagement

- **More than 20: 1-on-1 industry discussions over the last 3 months**

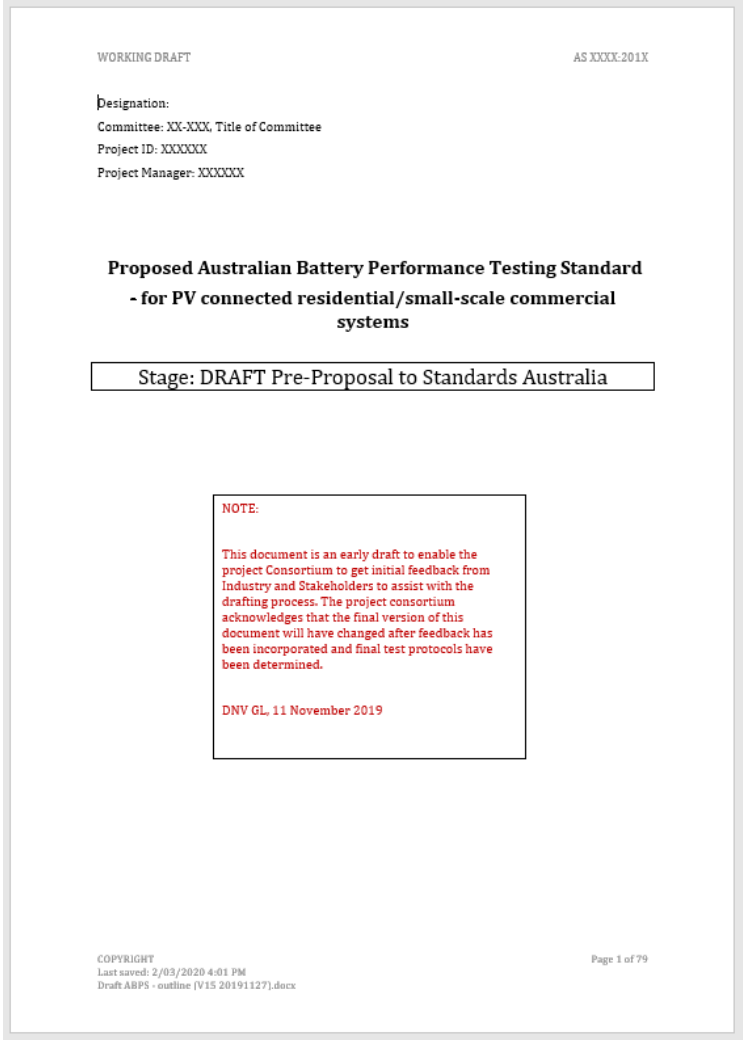
Government policy makers; Regulators; Energy network bodies; Industry associations; Consumer groups; Global and Australian battery manufacturers; Solar and battery storage retailers and installers; and Battery storage trainers.

MEMBERS

DNV GL	ABB	AEMO	AGL	Alpha ESS	ARENA
Century Yuasa	Clean Energy Council	Clean Energy Regulator		CSIRO	Deakin University
Ecoult	Energy Consumers Australia	Energy Queensland		Huawei	ITP Renewables
Jemena	LG Chem	Power Plus Solutions		Redback Technologies	Redflow
RedT Energy	Smart Energy Council	Smart Energy Training Centre		Solar Edge	Solar Quip
Sonnen	Standards Australia	Tesla		University of Wollongong	Victorian Government, DELWP

Overview: proposed standard & BPG

- Both have the same technical content
- Best practice guide has some additional information around for e.g. why it was developed and claiming compliance
- The BPG is to be voluntarily adopted



WORKING DRAFT AS XXXX:201X

Designation:
Committee: XX-XXX, Title of Committee
Project ID: XXXXXX
Project Manager: XXXXXX

Proposed Australian Battery Performance Testing Standard - for PV connected residential/small-scale commercial systems

Stage: DRAFT Pre-Proposal to Standards Australia

NOTE:

This document is an early draft to enable the project Consortium to get initial feedback from Industry and Stakeholders to assist with the drafting process. The project consortium acknowledges that the final version of this document will have changed after feedback has been incorporated and final test protocols have been determined.

DNV GL, 11 November 2019

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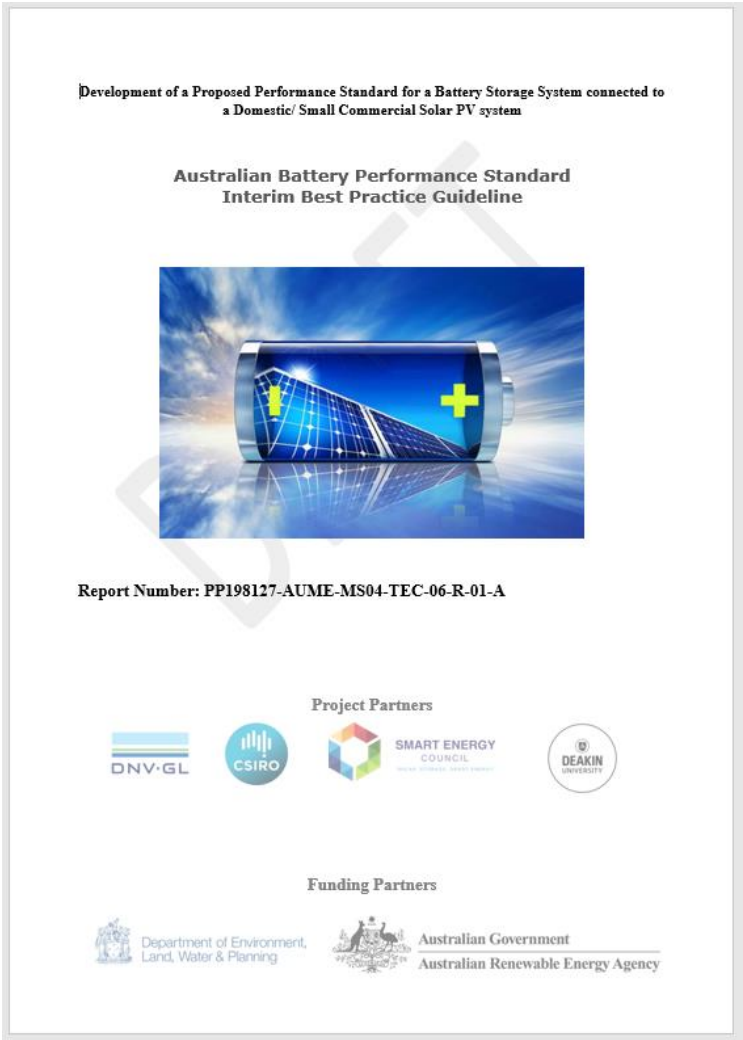
Page 1 of 79



Development of a Proposed Performance Standard for a Battery Storage System connected to a Domestic/ Small Commercial Solar PV system

Australian Battery Performance Standard
Interim Best Practice Guideline

Report Number: PP198127-AUME-MS04-TEC-06-R-01-A

Project Partners

DNV·GL CSIRO SMART ENERGY COUNCIL DEAKIN UNIVERSITY

Funding Partners

Department of Environment, Land, Water & Planning

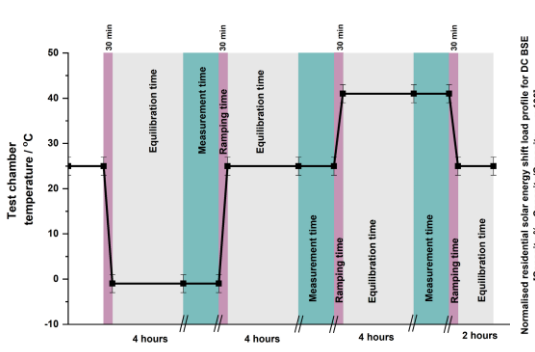
Australian Government
Australian Renewable Energy Agency

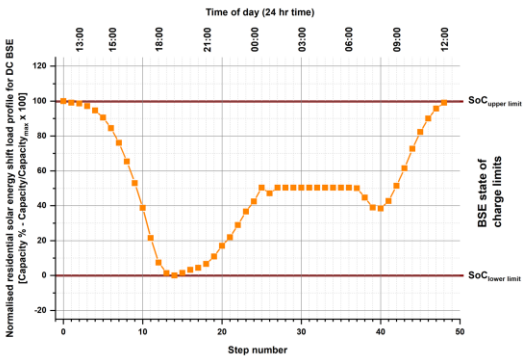
Highlight: What it covers

- The draft Standard details:
  - That type testing is to be performed
  - The performance metrics to be measured
  - The climatic conditions under which they are to be measured
  - The use case profiles to be tested, and
  - How the results are to be reported

- The tests are written in step by step detail to allow any manufacturer or 3rd party testing agency to pick up the draft Standard and apply it
- The tests can be applied to both DC and AC systems

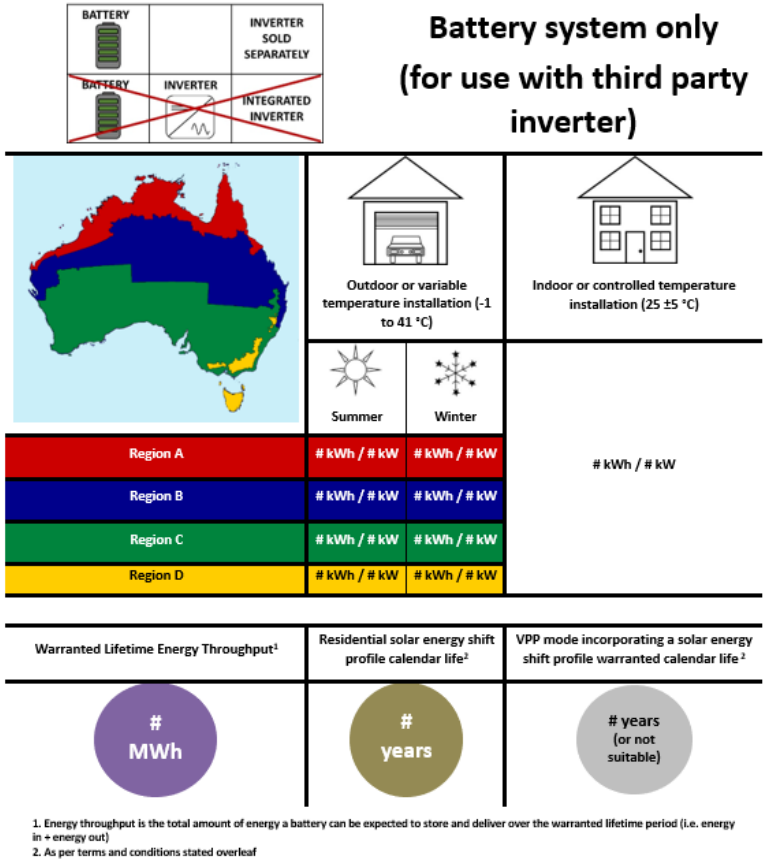
- [Tested] Maximum power (over 10s)
- [Tested] Sustained power (over 30s and 2 mins)
- [Tested] Energy (based on C_5 rate (5 hour charge or discharge rate))
- [Tested] Capacity (based on C_5 rate (5 hour charge or discharge rate))
- [Tested] Round trip efficiency (energy & coulombic based on C_5 rate (5 hour charge or discharge rate))
- [Manufacturer specified] Voltage limits
- [Manufacturer specified] Maximum current & discharge rate range
- [Manufacturer specified] Response time
- [Manufacturer specified] SoC window
- [Manufacturer specified] Warranted energy throughput
- [Manufacturer specified] Warranted personal use calendar life
- [Manufacturer specified] Warranted personal use with VPP operation calendar life





Highlight: Overview reporting of results

- Reporting of results is split into two sections:
  - Overview page with just the pertinent performance metrics relevant to the average end-user
    - On the rear, the critical warranty conditions need to be outlined
  - Detailed reporting pages of all test results, more relevant to those requiring technical details



Reporting	Details
Key warranty limitations (actions that will void manufacturer's warranty)	Installation location, temperature of operation, usage limitations etc.
Australian Consumer law statement	As needed: ***Goods**: Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.* *Or* ***Goods and services:** Our goods and services come with guarantees that cannot be excluded under the Australian Consumer Law. For major failures with the service, you are entitled:* • *to cancel your service contract with us; and* • *to a refund for the unused portion, or to compensation for its reduced value.* *You are also entitled to choose a refund or replacement for major failures with goods. If a failure with the goods or service does not amount to a major failure, you are entitled to have the failure rectified in a reasonable time. If this is not done you are entitled to a refund for the goods and to cancel the contract for the service and obtain a refund of any unused portion. You are also entitled to be compensated for any other reasonably foreseeable loss or damage from a failure in the goods or service.*
Warranty terms and conditions	As needed:

Highlight: Detailed reporting of results

[State DC or AC] testing results - Manufacturer declared values																			
Residential Solar Shift performance (please provide an additional and separate table for VPP solar shift performance if required)																			
Installation location requirements [indoors / outdoors, ...?]																			
	Maximum range[1]	Extreme temperature range (non-indoor locations)[1]	Region A				Region B				Region C				Region D				Accelerated testing
Declared characteristics			Aut	Win	Spr	Sum	Aut	Win	Spr	Sum	Aut	Win	Spr	Sum	Aut	Win	Spr	Sum	–
10s Maximum Power (kW) @ DoD%	kW to kW	kW to kW	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2 min Sustained Power (kW) @DoD	kW to kW	kW to kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	–
30 min Sustained Power (kW) @ DoD	kW to kW	kW to kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	
Useable C_5 Energy (kWh) and current used to determine	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	kWh and A	
C_5 Capacity (Ah) and current used to determine capacity	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	Ah and A	
Minimum useable Voltage limit (V)[2]	Vdc	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Maximum useable voltage limit (V)[2]	Vdc																		

[1] Multiple values for these values will have been recorded during testing. The values to be reported are the lowest and highest of these values, and the depth of discharge / current at which each occurred.
[2] Not tested, manufacturer reported value

Project status

- Testing of profiles is completed
- Both the Standard and best practice guide are completed
- A formal standard proposal submission, including an early draft of the draft Standard, was made on 22nd of May 2020 to SA
- SA is still evaluating the proposal and to which committee it will go to
- Final projects deliverables submitted on 15th June 2020

STANDARDS Australia

Proposal Form –
Standards Development Projects

Version: 4.4
Issued: 11 October 2019

Please click here for guidance on the proposal submission process.

Proposal title	Battery Performance Testing Standard - for PV connected residential/small-scale commercial systems
Your name	Nishad Mendis, Felix Liebrich
Preferred contact number	
Email address	Nishad.mendis@dnvgl.com, Felix.liebrich@dnvgl.com
Name of employer	DNV GL Australia Pty Ltd
Job title or position	Senior Engineer
Postal address	Level 12, 350 Queen Street, 3000, Australia
Suburb	Melbourne
State	VIC
Postal code	3000
Web address	https://www.dnvgl.com/index.html

Thank you for listening

www.dnvgl.com/ABPS

research.csiro.au/abps/

www.dnvgl.com

SAFER, SMARTER, GREENER

Agenda Item 8: DER Standards Cybersecurity stream

Technical working group scope

June 2020

AEMO

V0.2

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Provide review and input for Cybersecurity knowledge sharing deliverables

1.1 DER Cyber security blueprint

- 1.1.1 Australian DER ecosystem threat matrix (“the why”)
- 1.1.2 DER cyber standard / framework (“the what”)
- 1.1.3 DER cyber security implementation guide (“the how”)

1.2 Cyber security of DER ecosystem implementation plan

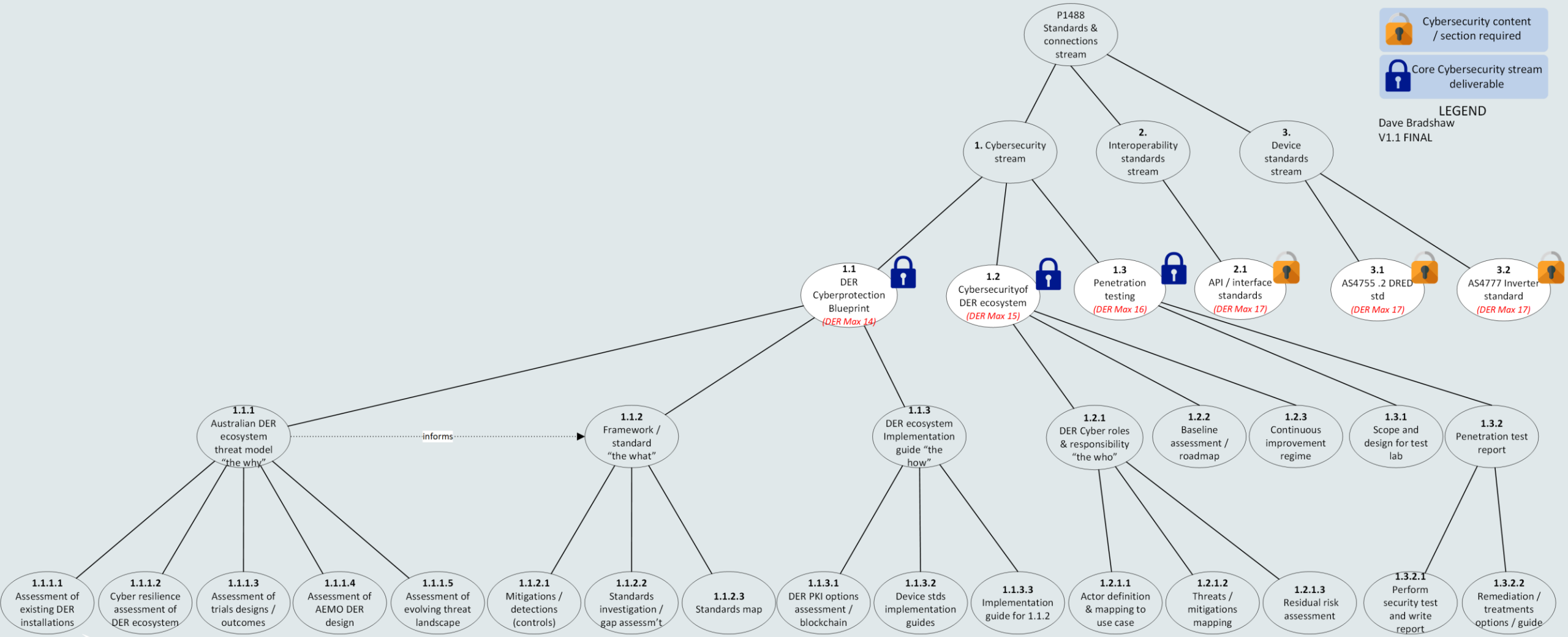
- 1.2.1 DER Cyber roles & responsibility “the who”
- 1.2.2 Baseline assessment / roadmap
- 1.2.3 Continuous improvement regime

1.3 DER device penetration test

- 1.3.1 Scope and design for test lab
- 1.3.2 Penetration test report

- Cybersecurity input into API/data and device standards tabled

Cyber Security standards for DER Ecosystem



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1.1 DER Cyber security blueprint

Knowledge sharing deliverable	Activity	Deliverable Description	Deliverable content	Timing	Cybersecurity technical workring group scope
DER Cyber security blueprint	1.1.1 Australian DER ecosystem threat matrix ("the why")	*Why do we need consistent cybersecurity controls to protect the Australian DER ecosystem? A description of the cybersecurity threats applicable at both the macro and micro level with specific reference to introduced threat vectors (demand side).* *The ANU cyberresilience research provides an invaluable cyberphysical link describing particular failure scenarios that could result from cybersecurity compromises - this information can be used to qualify the impact of cybersecurity threat realisation and prioritise the cybersecurity control categories that will be most effective.*	Cyber threat assessment of current DER implementations (1.1.1.1)	FY21	Review report and findings and provide feedback as input into mitigations / detections exercise. Where applicable, assist with internal communications within sponsor organisation to help communicate findings and provide feedback and collateral if required
			Cyber resilience assessment of DER ecosystem (1.1.1.2)	FY21	Review report and findings and provide feedback as input into mitigations / detections exercise
			Cyber threat assessment of trial designs / outcomes (1.1.1.3)	FY21	Review report and findings and provide feedback as input into mitigations / detections exercise. Where applicable, assist with internal communications within sponsor organisation to help communicate findings and provide feedback and collateral if required
			Cyber threat assessment of AEMO DER solution design (1.1.1.4)	FY22	Review report and findings and provide feedback as input into mitigations / detections exercise. Where applicable, assist with internal communications within sponsor organisation to help communicate findings and provide feedback and collateral if required
			Cyber threat assessment of emerging threats (e.g. quantum computing, IoT connectivity) (1.1.1.5)	FY23	Review findings / output and provide feedback and input as required, Are there additional controls / mitigations that are required?
	1.1.2 DER cyber standard / framework ("the what")	*What are the cybersecurity controls required to mitigate the threats identified in 1.1.1, presented in a consistent industry accepted format. This document will allow DER ecosystem participants to assess cybersecurity maturity against by defining their current posture and identifying gaps to address. Intention is to investigate existing cybersecurity standards / frameworks and reuse where applicable.*	Mitigations / detections (cybersecurity controls design) (1.1.2.1)	FY21	Provide input into report and targetted feedback on suggested controls.
			Standards investigation / gap assessment (1.1.2.2)	FY22	Review finding / output and validate gap assessment. Provide input on the documentation target (standard / framework / jurisdiction).
			Standards map (graphical representation of this deliverable to aid understanding for DER participants) (1.1.2.3)	FY23	Input into scope and objectives. Review and provide feedback
	1.1.3 DER cyber security implementation guide ("the how")	*Best practice guidance to the successful implementation and management of control objectives derived from 1.1.2. Immediate term focus on PKI use, comparison with California rule 21 PKI and applicability (and review of alternatives including blockchain) for securing communications between participants and devices in the DER ecosystem.*	DER PKI options assessment / blockchain (1.1.3.1)	FY21	Review PKI options and recommendations; provide feedback and input as required
			DER ecosystem implementation guide for 1.1.2 (1.1.3.3)	FY22	Review and provide input on guides - where applicable, assist with internal communications within sponsor organisation to help communicate findings and provide feedback and collateral if required.

1.2 Cyber security of DER ecosystem implementation plan

Knowledge sharing deliverable	Activity	Deliverable Description	Deliverable content	Timing	Cybersecurity technical working group scope
Cyber security of DER ecosystem implementation plan	1.2.1 DER Cyber roles & responsibility "the who"	*Recognising that the successful defence of the DER ecosystem is dependent upon many disparate but interconnected parties – this deliverable describes the responsibilities for cyber security protection of the DER ecosystem by role. Cybersecurity controls identified in the DER Cybersecurity blueprint tasks are mapped to roles and the interrelationships across roles for an effective controls implementation are detailed. A residual risk assessment exercise validates the effectiveness of the plan in reducing Cybersecurity risk to the DER ecosystem.*	Actor definition & mapping to DER solution (1.2.1.1)	FY21	Provide input and validate output for cybersecurity responsibilities with the DER ecosystem. This task may necessitate feedback from the sponsoring organisation.
			Threats / mitigations (cybersecurity controls) mapping – align the threats / controls applicable per role noting that some mitigations / detection will need to be applied across multiple roles to be effective (1.2.1.2)	FY22	Provide input on impediments to implementation of the standards and security control options. Provide input on residual risk tolerance. Provide input and review of alignment of controls to DER ecosystem parties on impediments to implementation of cybersecurity control and options. Where applicable, assist with internal communications within sponsor organisation to help communicate findings and provide feedback and collateral if required. Is the plan feasible? Are DER ecosystem parties appropriately incentivised to implement required controls? If not, are alternative cybersecurity controls an option?
			Residual risk assessment – third party assessment of residual risk to DER ecosystem post controls designed in 1.1.2 and implemented per 1.1.3 (1.2.1.3)	FY23	Review and validate scope. Review report. Provide feedback to sponsoring organisation.
	1.2.2 Baseline assessment / roadmap	*An indicative assessment (opt-in) of current state of DER cybersecurity maturity against the DER ecosystem cyber security standard / framework (1.1.2) and the generation of a report detailing a roadmap for areas to improve. Work with DER participants to identify improvement areas.*	Assessment of current maturity and design of roadmap to address key areas / gaps identified (1.2.2)	FY23	Agree scope and review roadmap for completeness and feasibility. Where applicable, assist with internal communications within sponsor organisation to help communicate findings and provide feedback and collateral if required.
	1.2.3 Continuous improvement regime	*Design and implementation of a continuous improvement assessment and controls effectiveness testing regime to guide the assessment of DER participant maturity, test standard/framework against emerging threats*	Continuous improvement regime (1.2.3)	FY23	Provide input and validate output. How would a continuous improvement regime work that is not onerous nor orthogonal to current cybersecurity risk and compliance activities performed by DER ecosystem parties? How should this regime be delivered? How should this regime be governed?

1.3 DER device penetration test

Knowledge sharing deliverable	Activity	Deliverable Description	Deliverable content	Timing	Cybersecurity technical working group scope
DER device penetration test	1.3.1 Scope and design for test lab	*Provide real world evidence for risk impact and threat matrix scenarios by scoping a red team engagement for retail and commercial DER devices popular in the Australian market.*	Scope document and test lab design / build (1.3.1)	FY21	**Review penetration test scope and objectives**
	1.3.2 Penetration test report	*Perform offensive security test of default / manufacturer recommended configuration of DER components prevalent in the Australian marketplace.*	Perform security test and write report (1.3.2.1)	FY21	**Review report / findings**
			Remediation / treatments options / guide (1.3.2.2)	FY22	**Review treatments as input into Cybersecurity ecosystem implementation plan**

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Agenda Item 9a: NEXTgen 2020/2021 Program

Standards Australia

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NEXTgen

STANDARDS Australia

What is NEXTgen?

- A program providing emerging industry and technical experts with the exciting opportunity to become involved in national and international standardisation processes supporting Australian industry, community, and government.

- The goal of the program is to support the future of Standards development by investing in the next generation of standards leaders and experts.

What does the NEXTgen program provide?

Training

- Introduction to Standards
- Drafting rules for Australian Standards
- Building your personal brand
- How to be an effective committee member

Webinars

- How Standards get started
- Introduction to Nominating Organisations
- Standards across the world
- What happens after the program

Observation

- Observe 3+ committee meetings

Mentoring

- Goal setting
- Identifying opportunities
- Building your personal network

Participation

- Opportunity to join a committee as an FIO participant for 2 years upon successful program completion

What can participants gain from the program?

- An in-depth understanding of the standardisation process
- Develop the necessary skills to be an effective technical committee member
- Identify professional development opportunities
- Hear from nominating organisations and establish professional networks
- Join the accomplished community of program alumni

How to apply

- Further program and application details, including the program schedule, are available on our website: https://www.standards.org.au/nextgen

- Applications to be submitted no later than **30 June 2020**.

- Please contact the NEXTgen team nextgen@standards.org.au directly for further information.

Agenda Item 9b: Standards Taskforce

Next steps

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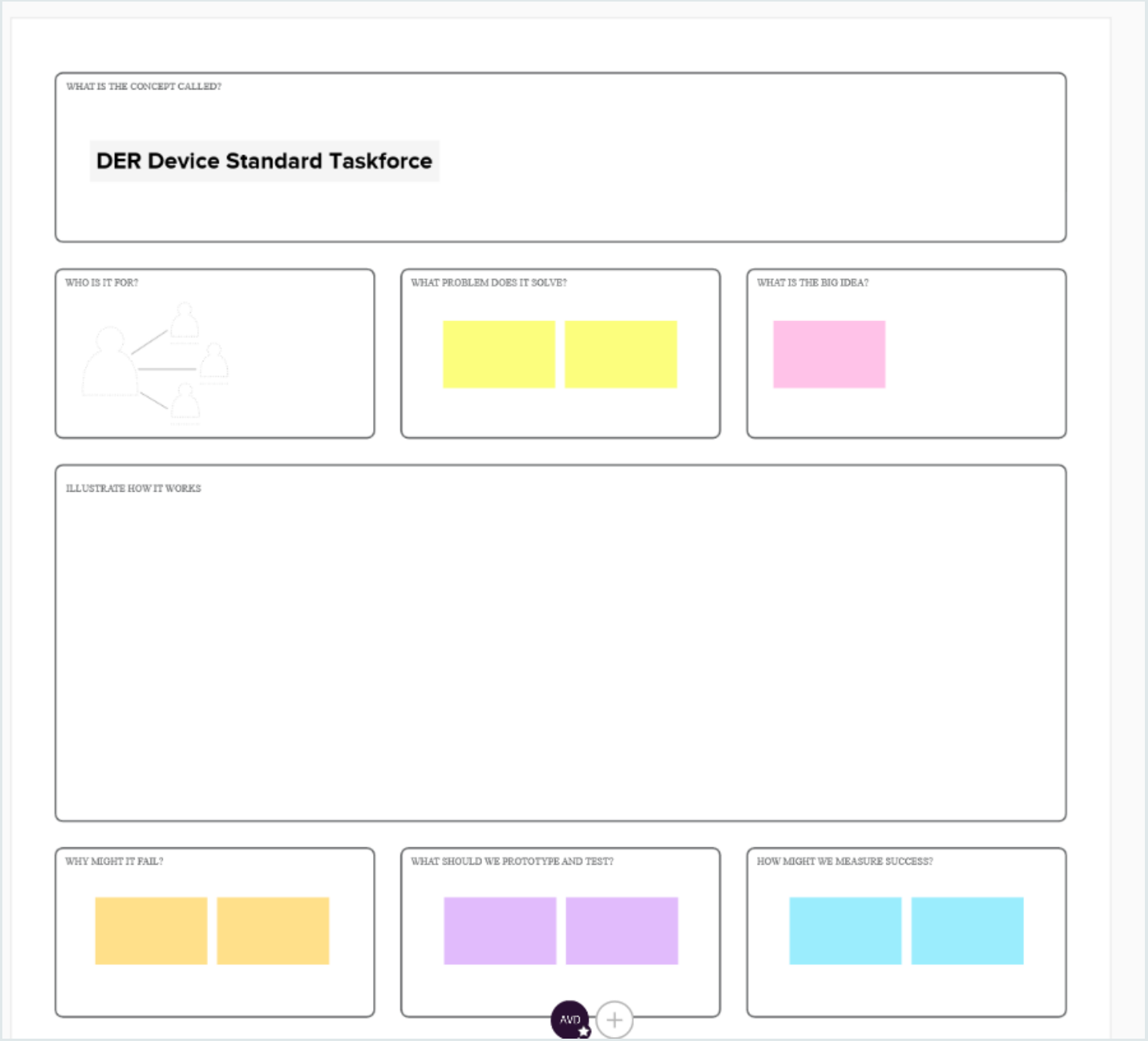
Actions

- Define taskforce scope for discussion at next Working Group (15 July)
- AEMO will utilise a similar format to this template and distribute prior to the next meeting for discussion
- AEMO to put forward prioritization list for feedback and discussion



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Meeting Summary

Agreed Actions
Next meeting: 15 July 2020

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