



Date 11 February 2022

Energy Security Board,  
Submission by CT Lab.

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Dear Board Members:

The essence of our submission relates to synchronised monitoring at zone distribution substations. We are aware of the various methodologies for the control of distributed generation, chiefly commercial, industrial and domestic solar PV generation. We understand that the use of IEC2030.5 as a communication means with inverters will provide a uniformity with material advantages, enabling DNSPs a high level of flexibility for inverters controls appropriate for flexibility in future commercial arrangements with prosumers. Whereas this potentially allows for the control of power flow in feeders and control of voltage so as to provide all prosumers a stable supply, we note that there are several other serious issues not necessarily addressed. These include:

- Dynamic restraint of under frequency load shedding relays (UFLS) under reverse power flow conditions;
- Anti-islanding of inverters due to network faults and/or voltage (vector) angle shifts;
- Voltage oscillation due to network impedances affecting phase locked loop (PLL) functioning in inverters;
- Extreme minimum external load levels of demand of substations leading to challenges in transmission line voltage control.

We note that the matters as raised above are best addressed at substation level, requiring basically synchronous observation and reporting of instantaneous voltages, current, their sequence components, their vector angles (synchrophasors), power, reactive power and certain power quality parameters, chiefly dominant harmonics and ideally time variant (electromagnetic transient) measurands.

In addition, and of increasing importance from a small signal transient stability aspect in the NEM grids, will be the integration of substation monitoring as described, with current and future AEMO dispatch engines.



We understand the value of advanced metering infrastructure (AMI) as embodied by some smart revenue meters, in particular for some aspects of distribution network voltage control and state discovery. However, there are limitations in the technologies as well as complications in aggregating data in ways that address substation and high voltage grid as well as sub-transmission grid operation. For example, inadequate minimum demand control at substation level can necessitate investment in var compensation and in power oscillation damping due to high variability in demand.

As Australia transitions in its step change adoption of renewables, PTP based, synchronised, to within 100 nanosecond, synchrophasor measurement at substation level, its participation in substation automation and integration with future dispatch engines, we hold to be essential. We look forward to the opportunity to discuss these matters with you.

Yours sincerely,

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