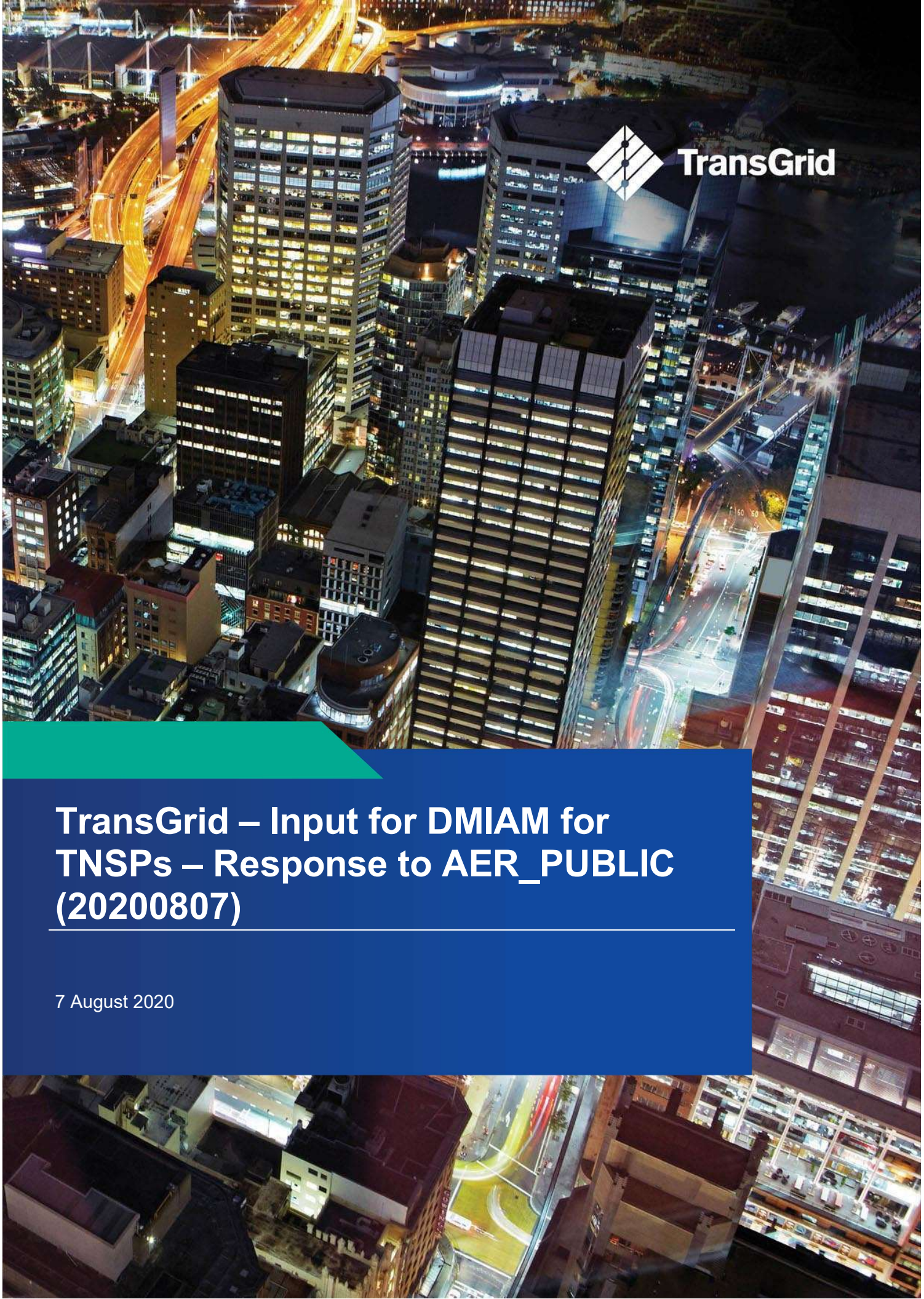

TransGrid – Input for DMIAM for TNSPs – Response to AER_PUBLIC (20200807)

7 August 2020

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Overview of this document

This document has been prepared by TransGrid in response to the Australian Energy Regulator's (AER) Information Request in relation to the development of a guideline for the demand management innovation allowance mechanism (DMIAM) that will apply to transmission network service providers (TNSPs) for the next round of revenue proposals.

Specifically, TransGrid has developed a list of potential projects that involve research and development (R&D) in demand management, which have the potential to reduce long term network costs. These innovative types of projects are not funded by any other mechanism available to TNSPs at present.

We have used the intent of the Distribution DMIA guideline eligibility criteria to guide and provide a high level scope of these projects. However, we submit that any eligibility criteria applied to TNSPs should not restrict innovation, in order to encourage the most novel transmission projects and be flexible enough to adapt to an evolving demand management market. In recent years, market and regulatory developments have included:

- Wholesale Demand Response Mechanism (DRM) draft rule
- Reliability and Emergency Reserve Trader (RERT) and its increased use
- AEMO and ARENA (R&D) funding for RERT-related projects
- OpEN Energy Networks (R&D) and its proposed NSCAS[1] trial.

Given the urgency of this information request, our list of potential projects have been scoped at high level. These projects (and others) will be scoped in more detail in our upcoming revenue submission for RCP 2023-2028.

We hope that the information provided in response to this Information Request is sufficient from the AER's perspective but we would, of course, welcome the opportunity to discuss further any aspect of these projects and the exciting potential of these demand management initiatives in them.

1. AER Information Request #1 – Input for types of DMIA projects for TNSPs

AER Information Request #1:

As you are aware, Energy Networks Australia (ENA) submitted a rule change request proposing amendments to the NER that would require the AER to implement a demand management incentive scheme (DMIS) and demand management innovation allowance mechanism (DMIAM) to apply to transmission network service providers (TNSPs).

The AEMC released its final rule determination on 5 December 2019 to make a final rule to apply the DMIAM, and not the DMIS, to TNSPs. Under the rules, the AER is required to develop a guideline by March 2021 to implement the scheme in time for the next round of network revenue proposals, including the process and criteria for applying the innovation allowance.

[1] Required Capabilities and Recommended Actions, Open Energy Networks Interim Report, AEMO and ENA, July 2019.

The DMIAM provides funding for research and development (R&D) on demand management projects that have the potential to reduce long term network costs. A DMIA project can be a combination of desktop studies through to field trials.

Given the transmission construction projects can be complex and larger in size, when compared with DM trials in the distribution network, for example even small equipment may need specialised protection systems and the need of current and voltage transformer as a part of the protection installations. We are seeking your inputs:

- The possible type of DM projects for TNSPs
- The size of the projects in terms of project delivery time frame and expenditure.

TransGrid's potential DMIA projects for RCP 2023-2028 can be categorised into:

- Technology trialling – using existing technology in innovative ways to shift demand from existing network elements (transmission lines and transformers)
- Collaboration – engaging with industry stakeholders about how to best utilise DMIA funding
- Market understanding and research – understanding how future demand will evolve in a decarbonised world and its effect on transmission. Collaborating with leading researchers to study future sources of demand, and develop strategies to manage their effects on the grid

The tables below summarise some of the potential projects TransGrid will propose for RCP 2023-28.

1.1 Technology trialling

Potential Project	Description	Estimated Cost
Distributed Energy Resources Management System (DERMS)	Distributed Energy Resources (DERs) are expected to provide 13-22% of total NEM consumption by 2050 (AEMO draft 2020 ISP). Despite the proliferation of DERs, TransGrid currently has no system to monitor or manage third-party controlled DERs. For large DM programs, such as the Powering Sydney's Future (PSF) project, TransGrid requires the capability to dispatch a large volume of DERs to manage the system security risk associated with outages of transmission cables supplying the Inner Sydney area. TransGrid is procuring up to 80 MW of demand management over a four-year program from 2018/19 summer to 2021/22 summer. Currently, these resources are dispatched through phone calls/emails, which is not sustainable for a larger portfolio spanning multiple providers and facilities. Each resource has different contractual rules (notice periods, availability dates and times, cancellation triggers, dispatch costs, and sizes), which affect available capacity and dispatch priority. Scope: • Automating the communication process to dispatch a portfolio of DERs (e.g. 80 MW for DM programs like Powering Sydney's Future), and reducing the time to make operational decisions to selectively dispatch a high volume DERs, which are dependent on location.	Setup costs range from $200,000 to $4.5 million, and annual license costs (depending on the number of DERs connected) range from $400-500,000 per annum. 12-36 months implementation, ongoing software licensing

	• Connecting the DERMS to future AEMO/ENA Distribution Service Market for NSCAS (Open Energy Networks). • Providing DER visibility • Interoperability - supporting a range of technologies, communication protocols (APIs) and platforms (VPPs), including distribution systems. • Forecasting DER availability for network constraints • Verifying and baselining DER performance • Cybersecurity	
Fast runback Demand Response Trial	Special Protection Schemes (SPS) are commonly used to runback or trip renewable generation quickly in response to contingencies across a wide area to manage stability and thermal constraints in weak networks. A fast runback DR trial would target the load-side of a SPS instead of generation. Contracting fast-acting load in equal magnitudes with runback generation will allow TransGrid to increase the transfer capability of the line. SPSs rely on fast-acting sensors and low-latency communications to trip or runback generation and load, which are sometimes far away from the contingency. Scope: • Identify a suitable location and load of sufficient magnitude to address underlying thermal constraints that restrict generation output. • Contract the load, as part of the SPS. • Develop a fast runback or tripping scheme, as part of the SPS in consideration with generation. • Increase the transfer capability of existing transmission lines by running them at a higher thermal rating. • When a contingency occurs, the load and generation are runback together.	$1-4 million depending on the complexity of the scheme (number of inputs and loads) 12-24 month implementation
Behavioural Demand Response	Bushfires underneath transmission lines in the Snowy region caused ongoing supply scarcity issues in NSW in 2020. The NSW Energy minister in January 2020 requested three times (4th, 23rd and 31st) for the community to voluntarily help reduce demand between 5-9pm by turning off pool pumps, unnecessary appliances & turning up air conditioning to 24°C on Twitter. Consumers must be compensated for voluntary curtailment to continue to be effective. Retailers currently offer Behavioural Demand Response (BDR) products to their customers, via SMS/email alerts and smart meters, as part of the ARENA demand response trial. We propose to partner with existing BDR providers to stack the benefits of responding to similar transmission-related events.	$200-300,000 per annum 12 month implementation
Electric Vehicle Fleet trials	The electrification of transport – particularly with fleet vehicles – has the potential to introduce large uncontrolled loads on transmission networks. Transmission networks and substations may need to be upgraded to	$500,000 24 months to implement and conduct the trial

	accommodate a variety of charging patterns, particularly with many fast-chargers operating at once. We propose to partner with an electric fleet vehicle proponent to trial different methods of charging fleet vehicles (rather than personal vehicles) to minimise their peak demand contribution on the grid.	
Commercial HVAC DR trials/ Chilled water storage	Curtailment of HVAC load in large commercial buildings offers significant DM potential. Barriers to entry include: • the split-incentive between stakeholders (building owner, building operator, multiple tenants) • Backup generators are often sized for emergency lifts and lighting (rather than the whole buildings). • ROI – less than three years. We propose to trial DM for commercial buildings, in partnership with building optimisation groups. HVAC strategies may include pre-cooling (e.g. pre-cooling using air or chilled water storage), cycling DM between buildings, and switching non-essential load to backup generators.	$500,000 36 months to implement and conduct the trials

1.2 Collaboration

Potential Project	Description	Estimated Cost
DMIA Stakeholder engagement for RCP 2023-28	Engaging with industry stakeholders about how to best utilise DMIA funding. This will be held together with TransGrid's revenue consultation with stakeholders.	$100,000 Initial workshop, and ongoing consultation throughout RCP

1.3 Market Understanding and Research

Potential Project	Description	Estimated Cost
Increasing load flexibility study – Going with the Wind & Sun	To date, the design of the grid has been fundamentally 'load-following'. That is, generation and transmission lines have been built to accommodate load centres in cities. The purpose of this study is to investigate mechanisms (technology, industrial processes, and physical re-location) to increase load flexibility. Increased flexibility in loads may allow commercial and industrial customers to temporally shift their operations to follow variable generation sources and be 'generation-following' similar to residential PV hot water. Alternatively, new controlled loads (e.g. data centres) may be able to be sited in REZs that experience high levels of curtailment and losses. Combined, this has the potential to reduce the amount of transmission required to connect new sources of generation (often in remote areas) with load centres.	$50,000 3 months

	Scope: • Investigate new types of equipment for existing processes that are more flexible in operation (e.g. aluminium smelting, steel-making) • Investigate the potential to shift industries physically to renewables rich locations, thereby reducing congestion, reducing losses (increase MLF), and curtailment. • Identify the MW potential for flexible load to be generation-following • Identify potential new flexible loads (e.g. hydrogen) as sources of demand	
Integration with VPPs	Virtual Power Plants (VPP) aggregate thousands of DERs (mostly residential batteries and rooftop PV) to form coordinated virtual versions of large power plants. VPPs promise to provide benefits to stakeholders throughout the electricity supply chain. However, accessing multiple value streams can be challenging, especially with competing use cases. As the market of VPPs mature, which are currently subsidised by state and federal government schemes, it is critical to be able to unlock these finite resources, as DM resources. We propose to study the best way to stack the benefits of VPPs for transmission. Scope: • How to help subsidise take-up of DERs in emerging transmission constrained areas that will be controlled by a VPP • How to manage power system security with VPPs • How to ensure transmission use cases are prioritised in dispatch • How to design contracts to ensure transmission needs are met and not diluted • Optimising size of batteries	$200,000 6 months
Partnerships with external academics and international experts	Jointly work on addressing the latest research and development 'gaps' in demand management/network planning/system operation	$50,000 per annum.