Sherine Al Shallah
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

9 October 2018

Dear Ms Sherine Al Shallah,

Review of the regulatory frameworks for stand-alone power systems

With the rapid advancements in distributed energy resources, there is significant opportunity for network businesses to deploy more efficient and reliable solutions for many customers, and grid alternative technologies such as microgrids and stand-alone power systems should form a key part of energy service provision across Australia. However, since a September 2016 request [1] for distribution network businesses to explore alternatives to grid supplied network services, uncertainty remains for networks to leverage these advancements and transition customers off the grid. If there is an alternative to network supply that is more cost-effective, and improves service to the customer, it should be enabled and incentivised.

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide the Australian Energy Market Commission (AEMC) with feedback on its latest issues paper as part of its review of the regulatory frameworks for stand-alone power systems.

While best known for its vehicles, Tesla also utilises the battery expertise and production capacity developed for its vehicles to make innovative, cost-effective energy storage and control systems for use in homes, commercial buildings, and on the wider electricity network. With over 1000 megawatt-hours (MWh) of stationary energy storage systems installed and operating, Tesla has extensive experience in both manufacturing and deploying commercial energy storage systems for both off-grid and grid-tied solutions.

Tesla's international experience in delivering these solutions can be replicated across regional and remote areas of Australia. In addition to being an integrated hardware solutions provider, Tesla can also provide a full suite of other services to support a successful off-grid project and as such, has a strong interest in accelerating the developing of a national framework for stand-alone power systems.

The below submission provides an overview of Tesla's stand-alone power systems, the broader benefits of microgrid solutions, as well as some initial feedback on some of the key regulatory principles for the AEMC to consider as part of its review process.

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[1] https://www.aemc.gov.au/sites/default/files/content/b379bfe2-5ee0-43e5-a36c-6eef9068b05c/Rule-change-request-Western-Power.pdf

In summary, Tesla agrees that the current regulatory framework does not support network service providers from deploying stand-alone power systems and should be reviewed. We support both network and third-party ownership of stand-alone power systems as outlined in the AEMC issues paper's two priority work streams. Stand-alone power systems offer an attractive alternative for networks to supply particular remote customers, and with advancements in renewable and storage technologies, these systems can ensure security of supply and improve service provision to these customers, whilst reducing network costs for all customers. This benefit should be unlocked and implementation should be accelerated.

a) Potential of stand-alone power systems

Stand-alone power systems play a major role in providing affordable energy to rural, regional and remote regions around the globe. As recognised by the AEMC's definition, they include both off-grid microgrids and individual power systems - two service contexts that present unique challenges that require robust solutions to maintain stable and sustainable power supply.

For isolated regions in particular, distributed renewable energy and battery storage solutions are playing an increasing role in supporting existing generation and network assets - by offsetting the need for diesel-centric microgrid solutions, or as is the case for fringe of grid areas across regional Australia, presenting attractive alternatives to new or ongoing network investment.

With its vast geography and relatively low customer density outside of urban centres, Australia is uniquely positioned to transition its traditional network service model towards enabling the more efficient deployment of stand-alone power systems. The benefits of this approach are already well recognised for customers based in regional and remote areas currently being served by expensive and un-reliable feeder lines, highly susceptible to weather risks – ideal candidates for individual power systems utilising the latest technology and control systems.

Stand-alone power systems offer an alternative to traditional network provision of energy to these remote and isolated communities, without sacrificing on the level of energy service to these customers. The adoption of a suitable framework to support these systems can provide a cost effective approach for all consumers.

Tesla's experience

Tesla's stand-alone power solutions leverage its existing capabilities in the design, manufacture and deployment of its energy storage and associated products, such as the Tesla Powerwall, unit level controllers, and a frequency-based load sharing scheme. Larger microgrid solutions can also integrate Tesla Powerpack storage systems with solar photovoltaic (PV) assets and existing generation assets where it makes sense.

Tesla's Microgrid Controller manages the various Distributed Energy Resources (DERs), such as the Tesla Powerwall or Powerpack system, diesel generators and solar PV to ensure reliable, low cost supply to the system loads. This ensures that the electricity services can operate as efficiently as possible in grid forming mode (where the communities or individuals served are completely off-grid).

At the town-level, microgrids can also include virtual power plants, or other aggregated distributed energy resources, again providing an alternative to the traditional approach of using large, centralised generation and network models.

In total, Tesla has over 20 operational microgrids around the world - from remote communities, commercial and industrial facilities to utility substations, military bases and mining operations. These systems are modular and fully scalable using Tesla's battery storage technology – ranging in size from 13kWh at the household level, to between 210kWh to 6MWh for microgrids. An overview of some of Tesla's off-grid stand-alone microgrid projects are provided below:

- **Ta'u - American Samoa[2].** The island of Ta'u previously relied on diesel generation to supply all of their electricity at significant cost. This was replaced with a 1.4MW solar PV array and 750kW / 6MWh Tesla Powerpack to offer a more reliable source of electricity. The microgrid allows the island to store and use solar energy 24/7, reduces diesel costs, removes the hazards of power intermittency and reduces outages. The microgrid is operated by the American Samoa Power Authority.
- **Vunabaka – Fiji[3].** The Vunabaka resort in Fiji, which consists of two private marinas, 73 private villas and a luxury hotel is completely off-grid. The resort island relies on 1MW of solar PV and 4MWh of storage to provide their energy needs, with diesel generation only providing back-up in the event of a storm.
- **Singita Kruger National Park – South Africa[4].** This project includes an integrated Powerpack system with existing solar photovoltaics (PV) and existing diesel generators to form a hybrid microgrid system, which provides Singita Kruger National Park with a reliable, cost-effective source of energy. The upgraded hybrid microgrid system at Singita Kruger National Park is forecast to provide 1,600 MWh of renewable energy a year to power Singita Lebombo and Sweni Lodges, which is expected to reduce diesel consumption to less than 20% of the total energy supply on site.

Given the increasing importance of energy storage across a range of grid forming applications, Tesla would be happy to provide the AEMC and other interested stakeholders any additional information on the technical capabilities of these solutions, specific to the context of stand-alone systems.

Benefits of stand-alone power solutions

There are significant benefits to be gained from stand-alone power system solutions for customers, network providers and State Governments more broadly.

For customers, stand-alone power systems provide a technological advancement, alternative to poles and wires, that is able to significantly reduce the risk of power outages, removes the need for large network infrastructure to be built across the landscape, and provides a cleaner and local source of energy supply whilst maintaining, if not improving, the level of energy service.

For network operators, storage provides intelligent grid control with low maintenance costs and reduced downtime, to ensure reliability with low ongoing operational spend. Remote communities and individual customers served by long skinny feeder lines are more susceptible to reliability issues, and stand-alone power located at the load source significantly reduces the risks of power supply interruptions, allowing networks to substantially improve reliability metrics and meet network targets.

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[2] https://www.sciencealert.com/this-island-in-american-samoa-is-almost-100-powered-by-tesla-solar-panels
[3] https://electrek.co/2016/12/23/tesla-powerpack-microgrid-fiji-island/
[4] https://singita.com/press-release/singita-partners-tesla-use-powerpacks-sustainable-energy/

Stand-alone systems provide a significant opportunity to minimise ongoing costs of infrastructure augmentation, and reduce the costs associated with serving customers in remote areas. As Western Power noted in their original rule change request to the AEMC in respect of "Removing barriers to efficient network investment",[5] in the longer term this results in more efficient infrastructure investments and lower costs to customers.

For State Governments across Australia – the enablement and efficient adoption of stand-alone power systems and the resulting reduction in network infrastructure spend can also work to reduce the cross-subsidisation of electricity service provision to remote and regional areas, paid either by all other energy consumers in the State, or by State Governments directly.

b) Key enablers and framework principles

Tesla recognises the broad scope of the AEMC review, encompassing issues across customer protections, network and retail models, governance, and market frameworks amongst others. To assist with this process, Tesla recommends that policy design principles be introduced and form a central driver for future framework design considerations, particularly around ensuring customer protections, customer choices and realisations of reliability benefits (e.g. to ensure customer standards of service to be the same, or better than what is being achieved via grid-connection).

Whilst several different operating models and policy designs can be implemented and achieve stand-alone power system deployment, as a primary focus, the objective of this review should remain centred on improved customer outcomes – for all energy customers. If stand-alone power systems provide a cost-effective non-network solution, it should be explored, as this will also drive a reduction in cross subsidisation from all other customers connected to the network. The stand-alone power system market is traditionally a highly subsidised market with below average reliability performance. Enabling network service providers to explore non-network solutions should not simply be undertaken as a cost-reduction exercise for individual customers, but should instead be pursued as a means to improve customer service provision and cost-reduction for all customers. Ideally the two objectives are completely aligned – as highlighted by the trials being conducted in Western Australia by both Western Power and Horizon Power[6]. As an overarching principle, the AEMC should ensure that customers have the same, if not improved, electricity experience compared to being grid connected.

In addition, whilst Tesla supports the AEMC's proposed assessment criteria, we recognise the large body of work that has already been undertaken over the past few years.[7] As such, a criterion based around ease and speed of implementation should be included to facilitate the uptake of stand-alone power solutions given the immediate benefits that can be realised by all stakeholders once an appropriate framework is in place. In an area as distinctive and complex as off-grid electricity supply, any framework must balance policy design and risk mitigation with the practicalities of deployment. By aligning regulatory, commercial and technical considerations within one national framework, the level of legal, contractual and systems change required will be dramatically simplified and accelerated for all networks and technology providers.

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[5] https://www.aemc.gov.au/sites/default/files/content/b379bfe2-5ee0-43e5-a36c-6eef9068b05c/Rule-change-request-Western-Power.pdf

[6] https://westernpower.com.au/media/2500/stand-alone-power-systems-stakeholder-report-20170906.pdf

[7] In particular, the AEMC's prior consideration of Western Power's rule change request on alternatives to grid-supplied network services

To progress implementation, a trial based approach may be useful to initiate in the short term, to prove out technical capability and refine vendor requirements, whilst ensuring security of supply and customer protections are maintained. However, any framework outlining technical requirements should aim to strike a balance between consistency at the national level, whilst allowing for regional flexibility. It would be sub-optimal to have each network or jurisdiction around Australia have completely separate or contradictory sets of requirements.

c) Feedback on specific regulatory provisions

Further to the framework design principles above, there are several specific regulatory considerations that will be vital in ensuring that stand-alone power systems can operate effectively in the NEM. Tesla understands these will be explored in more detail as the AEMC progresses its review, and has included some initial feedback on the key questions raised in the Issues Paper below:

- **Effective governance** is vital by managing not just the decisions around asset ownership, but also closely monitoring network service provider's deployment models to support expedient uptake of non-network alternatives. This may require the AER lowering regulatory investment test thresholds or creating specific classifications for stand-alone system considerations, and ensuring ring-fencing guidelines are appropriate for both individual and microgrid contexts.
- **Customer protections** must be maintained (along with all rights, privileges and concessions), especially during the initial phase of deployment where consumers may be reluctant to transition away from grid-connection based on anecdotal or historic experiences of poor and expensive stand-alone solutions. This should include careful consideration of how consent, retail contestability and re-connection provisions apply within each customer region, and as such, this may be better served under jurisdictional-based policy decisions. In Tesla's experience, a customer-led model is always preferred.
- **Facilitating efficient service** by ensuring a robust competitive tendering process is in place from the outset of Priority 1 implementation, which also aligns with moving to contestable frameworks as soon as practical. This may also require a mandated (efficiency-based) approach rather than jurisdictional opt-in. For example, there are a range of existing capabilities and services that the market can already provide and network businesses should be required (or have the right incentives in place) to fully investigate these solutions where they represent more efficient service provision – particular in relation to operations and generation systems outside of a network's core business.
- **Eligibility based on network efficiency** will guide how much new customers, without grid-connection, need to contribute to capital works, similar to existing connection and contributions policies. This will also guide obligation to supply requirements – acknowledging that jurisdictions will have a range of existing network requirements to satisfy. Existing grid-connected customer candidates should be transitioned to stand-alone service by network providers at no cost. These existing customers have no current incentive to disconnect and procure a stand-alone solution at full cost from the market.
- **Accelerating the transition** to stand-alone service models should be a key objective given the time-bound nature of network investments, with network businesses making grid investment and maintenance decisions today that will influence off-grid solution deployments for the next 30 plus years. As stand-alone solutions are still an emerging sector, the AEMC should consider additional

incentives outside of traditional regulatory return models to promote innovative non-network solutions and build initial consumer and network confidence. Aligned incentives would not only simplify the decision making framework, but drive additional private investment in new forms of energy supply, creating further benefit for the off-grid market segment.

Finally, Tesla notes the related processes currently being conducted on enabling future grid architectures and supports the AEMC's approach to closely coordinate with its own work on embedded networks, as well as its intention to monitor the outcomes from Western Australia's separate review on stand-alone power systems and Parliamentary Inquiry into Microgrids. However, with renewed support from COAG, the AEMC has an opportunity to define an umbrella national framework for all other jurisdictions and unlock what is currently a restricted market by creating well needed consistency for the role of network service providers in these rapidly emerging non-network markets.

Tesla looks forward to continuing to work with the AEMC throughout this consultation process and in accelerating the opportunities for stand-alone power systems across Australia. We are happy to provide further information on any of the projects, broad benefits, or policy feedback discussed in the submission above.

If you have any further questions please contact Dev Tayal at atayal@tesla.com.

Kind Regards

Mark Twidell

APAC Director – Energy Products