SOLAR AT NIGHT
ELECTRICITY MARKET POLICY BRIEF

SOLAR AT NIGHT

Storing the sun's energy during the day,
Powering Australia overnight.

SOLAR AT NIGHT

AUSTELA
Australian Solar Thermal Energy Association

Benefits Summary

Our proposed policies will:

- Achieve the aggregate lowest cost of electricity for consumers, industry and government.
- Keep the lights on as coal exits the grid.
- Be the catalyst for a domestic CSP industry.

Electricity Market Policy Brief

This document outlines the Solar at Night campaign's policy position which will deliver secure, reliable, low-cost clean energy. In short, it is that:

Renewable energy policy must incentivise and reward energy storage projects based on MWh capacity, not simply MW.

With this position as a starting point, we recommend considering the following policy options discussed in detail on page 2:

- Storage Target
- Capacity Mechanism
- Tax Credits
- Offtake Contracts

Context

Coal-fired generators currently provide just over 50% of our electricity. However, this is skewed to the morning and evening peaks (around 70%) and overnight (around 50%). Coal is our night-time fuel of necessity from 6pm to 9am.

Coal will soon be retired from the grid and unless we are willing to endure rolling blackouts we must replace this overnight capacity with dispatchable electricity generation. Options include gas (which produces emissions), batteries (uneconomic beyond 2-4 hours), and long-duration renewable energy storage with 10+ hours of capacity such as Concentrated Solar Power and Pumped Hydro Energy Storage (PHES).

Concentrated solar thermal power (CSP) is ideally suited to meet the urgent need for renewable, dispatchable electricity. The technology uses mirrors to reflect and concentrate sunlight onto solar receiving towers that capture the energy as heat. That heat is stored in molten salt with the potential to supply electricity for up to 15 hours or more. When required, the heat is used to create steam to power a turbine similar to those used in coal-fired power plants. CSP is already operating in sunny countries around the world, increasingly as a hybrid: solar PV for cheap day-time electricity and CSP for power from its storage at night.

Despite having some of the highest levels of solar radiation in the world, there are no utility-scale CSP plants operating in Australia. Historically, the lack of investment in CSP is because solar PV is cheaper for day-time generation and market policies like the RET have not recognised the extra value of dispatchability. Currently, PV + lithium-ion batteries are being built to keep the grid stable through provision of Frequency Control and Ancillary Services (FCAS) and to provide short-duration (1-2 hours) storage. PV + battery cannot meet the overnight energy gap created when coal is retired from the system.

CSP plants are urgently required to replace the overnight energy FCAS currently provided by coal-fired generators. However, there is broad recognition that the NEM 'energy only' market is not fit for purpose in sending the correct investment signals to facilitate orderly construction of the required dispatchable capacity.

Long-duration storage is about MWh

For any policy to be effective, long-duration storage policy must be centred around storage capacity (MWh) as that is the key need. The cost of storage systems is linked to both the amount of energy storage (MWh) and the power level (MW). Mechanisms that target MWh will favour long-duration storage solutions such as CSP and PHES that are cheap per MWh but expensive per MW. Conversely, a MW focus will favour batteries that are cheap per MW but expensive per MWh – and that won't solve the problem.

Our policy options

We propose **FOUR policy options** that would each facilitate sufficient utility-scale dispatchable zero-emissions power to be generated overnight to replace coal.

- **Storage target:** if energy policy shifts to a national Large-scale Renewable Energy Storage Target (LREST) or similar, the storage measure must be specified in MWh to effectively target the desired outcome. Consideration should be given to design details to ensure it is truly technology neutral.
- **Capacity Mechanism:** the Federal Government could incentivise long-duration renewable energy storage projects through a payment based on MW capacity but subject to a firmness derating factor. The longer the duration for which a storage system can reliably supply utility-scale electricity to the grid, the higher should be its value.
- **Tax Credits:** the Federal Government could incentivise long-duration renewable energy storage with a program similar to the United States' Inflation Reduction Act which gives a 30% tax credit to projects deploying complying energy storage technologies. Such a tax credit would immediately lower the cost of Australian CSP to an economic level.
- **Offtake Contracts:** Federal and State Governments could enter into offtake agreements with long-duration renewable energy storage projects. The term of such arrangements should be at least 25 years, delivering long-term certainty of dispatchable renewable energy supply at low cost.

Appendix – Other considerations for policy-makers

- **Pumped-Hydro:** it should be noted that pumped hydro energy storage (PHES) is the other viable option for the provision of long-duration renewable energy storage. However, as Snowy 2.0, Kidston and the cancelled Shoalhaven expansion have recently demonstrated, such projects are expensive, risky, environmentally fraught, long dated and hard to finance. However, the energy grid of the future will be more robust if diverse resources are harnessed, and we are supportive of the construction of more pumped hydro where possible.

- **Avoid cul-de-sacs:** measures taken to meet 2030 emissions reduction goals should act as a springboard to full de-carbonisation by 2050 and must not create outcomes that make subsequent steps harder (e.g., construction of new gas-fired generation that lock in further emissions for 20 years, should be avoided).

- **Planning:** the total environmental and economic cost of the energy transition will only be minimised by modelling generation, storage and transmission augmentation on a 'whole of system decarbonisation and cost' basis. This is required as a counterbalance to the prevailing market structures that only solve today's issues. As an example, the market is currently busy delivering short duration batteries which target the FCAS market. However, the technologies we will build in coming years to replace coal-fired generation, such as CSP and PHES, can provide FCAS at zero additional cost. The market is solving part of the problem today whereas planning for CSP and PHES would deliver a lower cost outcome by doing the job only once.

- **Storage is not just pure-play:** mechanisms that target storage only, or "electricity in, electricity out", will omit technologies that have intrinsic storage or dispatchability such as CSP, bioenergy and seasonal hydro.

- **Technology agnostic, not role agnostic:** rules should define the roles different technologies need to play (e.g., renewable long-duration storage), but not specific technologies. We need to avoid limiting the options available if we're to achieve least cost de-carbonisation

- **Procurement timelines:** cost-effective long-duration storage technologies such as CSP and PHES take longer to build, so short procurement timelines will rule them out

- **Avoid Perverse Outcomes**: finally, we must avoid policy prescriptions that appear viable in the short term, but simply invite an argument to keep gas and coal-fired synchronous generation in the system. While batteries are a good renewable storage technology for short-term and mobile applications, it is not suited to the long duration, utility-scale energy task that is measured in MWh and is required for overnight demand. Batteries are optimised for 1-2 hours and are being built-out for up to four hours. A policy that concentrates on batteries in the short term, at the expense of building CSP and PHES for the medium and long-term, could lead to keeping gas and coal in the system for many decades.