

SUBMISSION TO THE RESIDENTIAL ELECTRIFICATION INQUIRY
Senate Economics References Committee
September 2023

SunDrive Solar welcomes the opportunity to provide this submission to the Senate Economic References Committee inquiry into Residential Electrification.

Australia has a significant opportunity to become a renewable energy superpower and a renewable energy advanced manufacturing superpower, that will help Australia, and the world, achieve net zero, through the production of cost effective, efficient and environmentally friendly solar PV.

Domestically advanced manufactured solar PV will have positive impacts on Australia's residential electrification by reducing costs for consumers, creating domestic manufacturing and greater supply chain certainty, creating thousands of jobs (particularly in transitioning regional areas), increasing our domestic energy generation capacity and energy security, and creating significant international export opportunities.

However, to seize the opportunity to keep Australian innovation onshore and capitalise on our globally competitive advantages, Australia must get the policy settings right through investment in clean energy security such as the implementation of advanced solar manufacturing production credits like those in the United States Inflation Reduction Act.

Company overview

SunDrive was founded in 2015 and the company has rapidly grown from a University of New South Wales PhD project to producing the world's most efficient commercial-sized solar cell.

SunDrive is currently constructing a large pilot manufacturing factory in Kurnell, NSW, to be completed in the coming months. We will directly employ approximately 100 full-time employees by the end of the year. And we are looking to establish an advanced manufacturing facility which will lead to the creation of 500 direct jobs with the potential to increase to several thousand over time.

SunDrive's early investors include ARENA, CEFC, Grok Ventures, Main Sequence, Blackbird Ventures and Dr Shi Zhengrong. Robyn Denholm, the global chair of Tesla, is also an advisor to the business.

SunDrive's world-leading proprietary technology enables using copper instead of silver in solar cells. This technological breakthrough has significant benefits, including:



- **Greater efficiency** - SunDrive's record breaking cells produce more electricity for every square metre.
- **Lower cost to produce** - the use of silver is currently the most expensive solar cell production step. Copper is, on average, 100x cheaper than silver.
- **A more sustainable supply chain** - copper is 1000x times more abundant than silver. Solar produces approx. 1% of the world's energy today - however, solar manufacturing consumes approximately 25% of the world's annual industrial silver consumption today. New solar cell technologies further increase silver demand and pose a supply risk as they require more silver.
- **More environmentally friendly production** – the mining and refinement of copper generates ~90% fewer carbon emissions than silver. Copper is easier to recycle than silver paste. SunDrive's manufacturing process uses considerably less heat and energy (emissions) than silver

According to the IEA's *Net Zero by 2050* report, in our pathway to Net Zero, 70% of electricity generation globally will come from solar PV and wind with solar being the single largest source of supply.¹ To achieve this, 630GW of solar PV capacity needs to be added each year - that's the equivalent to installing the world's current largest solar farm roughly every day.

The precious metal silver accounts for approximately half the cost of converting a bare silicon wafer into a finished solar cell and solar manufacturing consumes approximately 25% of the world's annual industrial silver consumption. For the world to rapidly scale up solar manufacturing in view of Net Zero commitments (only 1% of the world's energy comes from solar PV) then an alternative metal is required

With the increasing need for solar to help meet Net Zero, the industry's dependence on using silver could ultimately limit the ability for PV to scale to terawatt levels. SunDrive's world-leading technology helps to solve for this impending roadblock to net zero, while reducing costs and improving efficiency.

The opportunity for Australia

Australia can capture the value of its world-leading solar technology

SunDrive's investment of an advanced solar manufacturing industry would be catalytic to the renewable economy, job creation, advancing and diversifying industry, and building supply chain resilience.

80% of the world's solar panels are made in one country, and this represents a rare opportunity to not only drive a new industry but also build Australia's sovereign capacity in solar PV. A sovereign solar manufacturing capability represents a significant opportunity for Australia.

SunDrive would be only the second solar manufacturer in Australia and the only manufacturer of solar cells. Last year there was over \$50 billion of global revenue in the

¹ Net Zero by 2050, IEA, <https://www.iea.org/reports/net-zero-by-2050>



solar industry from solar PV made using Australian IP, with little of that value captured in Australia.

If SunDrive were to establish its advanced manufacturing facility in Australia – we would likely manufacture the world’s most efficient commercial solar module using Australian technology. Establishing the facility would create thousands of local high-paid, secure jobs (with the majority in regional areas), clean and cheaper energy for millions of households and millions of tonnes of carbon abatement.

Australia can retain our world-leading talent

A domestic solar manufacturing industry would also enable Australia to retain the world’s best talent. Australia has a long and impressive history of training the world’s best solar technology experts through universities and R&D centres. Within the past decade, top solar manufacturers in the world have had Australian-trained researchers in senior executive positions at critical stages of company development, including leading companies such as Canadian Solar, Longi, Suntech, Jinko Solar, JA Solar and Trina Solar.

Manufacturing, mining and supply job creation

Manufacturing of solar PV technologies would foster the development of new industries and support existing industries, creating jobs (particularly regional jobs) at an unprecedented scale.

According to the International Energy Agency², the entire solar PV industry (including solar glass, polysilicon, and other related components) could create 1,300 manufacturing jobs per 1GW of production capacity. For manufacturing solar PV from wafer to modules, the German institute Fraunhofer ISE estimates 750 new direct jobs are created for every 1GW.³

Materials such as glass and aluminium – the two largest components by weight in a solar module, could also be produced locally creating 1000’s of additional jobs. For example, the amount of aluminium module framing required for 10GW of Solar PV is approximately 60,000 tons and is equivalent to the entire output production capacity of Capral Aluminium, Australia’s largest producer of aluminium products with over 900 employees.

According to Net Zero Australia, Australia will need 1900GW of solar to reach Net Zero. Australia only has ~30GW currently installed. Australia will therefore need to install approx ~60GW of solar every year for the next 30 years to reach Net Zero. That would lead to the creation of up to 60,000 jobs (more than BHP, the world’s largest mining company employing 40 000 people).

A domestic solar manufacturing industry would reduce costs for consumers and ensure sovereign capability

² International Energy Agency, Special Report on Solar PV Global Supply Chains, <https://www.iea.org/reports/solar-pv-global-supply-chains>

³ Sustainable PV Manufacturing in Europe, <https://www.ise.fraunhofer.de/content/dam/ise/de/documents/publications/studies/ISE-Sustainable-PV-Manufacturing-in-Europe.pdf>



Locally produced solar panels would create a manufacturing supply chain that would reduce costs for Australian consumers by removing increasing transportation and shipping costs from the price of solar PV, while reducing environmental impact.

With the rapid increase in solar installation required for not only Australia but the world to achieve net zero, a more robust local supply chain is critical in a highly uncertain global economy.

The shifting economics and cost base of solar PV production mean Australia can be globally competitive, and Australia's advantages stand out in critical areas:

- **Materials:** Australia has large natural reserves for all major materials and minerals required for solar manufacturing - silica, bauxite, and iron ore.
- **Electricity:** In a net zero world, Australia could provide some of the lowest cost green electricity sources worldwide for the manufacturing sector.
- **Transportation:** Local manufacturing of aluminium module framing and solar glass would drastically reduce rapidly increasing transportation and shipping costs.
- **Market:** Australia has the fastest growing rooftop solar market in the world and is already the 6th largest market worldwide, impressive for a country of only 26 million people ; there is significant demand for large-scale solar to provide low-cost electricity as a key input into value added exports (hydrogen, ammonia, fertiliser, elemental iron produced from iron ore) and by the end of this decade Australia will likely have the five largest solar farms in the world.

Recommendation to the Committee: The introduction of a Federal Advanced Solar Manufacturing Production Credit scheme.

Major economies around the world are heavily investing in clean energy security and establishing local solar PV manufacturing with supportive solar manufacturing policies, in particular the United States, China, Canada, India, Turkey and the European Union.

Implementing advanced solar manufacturing production credits like those in the US Inflation Reduction Act would support establishing a long-term, globally competitive domestic solar manufacturing industry, including standing up critical elements of a local supply chain.

Advanced solar manufacturing production credits directly linked to the production of solar cells/modules would create a competitive environment for:

- **Rapidly standing up a local supply chain for Australian solar manufacturing industry.** The lack of significant scale in the supply chain presents a significant challenge in the early stages of establishing a new sovereign manufacturing capability. Production credits across the supply chain address this challenge by providing the certainty needed to drive investment decisions that grow or establish critical elements of a local supply chain.
- **Targeted, efficient and equal treatment of potential local manufacturers and companies in the supply chain.** Directly linking production credits to real-world PV



solar modules/cell production on a per-watt basis delivers the greatest impact for every dollar of taxpayer resources. This approach delivers a clear, consistent and long-term view providing certainty across the industry and to investors.

- **Supporting faster market entry for local solar manufacturers and reaching economies of scale.** Production credits support local solar manufacturers as they scale, bridging the gap as they compete against cheap foreign imports. Enabling local businesses to accelerate their growth, gain market share and build sufficient size to reach the required economies of scale to drive down costs for businesses and consumers.

An Australian Advanced Manufacturing Production Credit scheme could be further strengthened by being capped or including eligibility criteria that would limit the budget impact while continuing to stimulate investment in domestic advanced manufacturing.

Regarding the Committee's Terms of Reference, SunDrive notes the following:

(a) the economic opportunities of household electrification, including but not limited to:

- (i) long-term reduction of energy price inflation,**
- (ii) long-term employment opportunities, and**
- (iii) the scaling up of domestic capacity;**

The creation of a domestic solar manufacturing industry and solar PV manufacturing supply chain would increase the uptake in household electrification by providing locally produced, lower-cost, more efficient solar while increasing Australia's domestic energy security and creating thousands of skilled and well-paid jobs, particularly in the regions - 1,300 direct jobs per 1GW produced.

(b) the macro-barriers to increasing the uptake of home electrification;

As Australia and the world strives towards Net Zero, significant solar capacity will need to be added every year. Australia has the opportunity to meet this increasing demand through the introduction of production linked credits to stand up a local industry that can both power residential homes, as well as the utility scale required to support the generation of clean energy such as green hydrogen.

(c) the total upfront cost and longer-term benefits of household electrification and alternative models for funding and implementation;

SunDrive has produced the world's most efficient commercial size solar cell. For confined spaces such as residential rooftops, apartment, or commercial buildings, this increases return on investment by producing more energy per square metre. SunDrive's technology is also well suited to Australia's hot climate as it is less impacted by heat than other technologies, meaning even more power can be produced. By encouraging the development of locally manufactured, cheaper, high-efficiency solar, and its associated domestic supply chain, the Federal government can encourage the uptake of household electrification through the improved return on investment.



(f) the impacts and opportunities of household electrification for domestic energy security, household energy independence and for balance of international trade;

Supporting the establishment of a domestic solar manufacturing industry through Federal Government policies such as a production linked incentive would increase Australia's domestic energy security through greater sovereign manufacturing capacity, ensuring supply for the nation's increasing demand for solar PV. In addition, it would create an enormous economic opportunity to go beyond our own needs to create a solar export market, and turn Australia into a renewable energy superpower.

(i) the effectiveness of existing Australian Federal, state and local government initiatives to promote and provide market incentives for household electrification;

Federal and State policies play a pivotal role in the increased uptake of household electrification, and the flow-on economic benefits that come from the stimulated development of domestic renewable energy industries and export opportunities for domestically manufactured products.

The introduction of production linked solar credits by the Federal Government would create the necessary settings to create a domestic solar manufacturing industry which would promote significant private sector investment. Since the announcement of the IRA just over a year ago, over 51 solar manufacturing facilities have been announced or expanded, investing nearly US\$20billion in local communities and adding 155GW production capacity.

A domestic solar PV advanced manufacturing industry would help foster a diverse and sustainable supply chain, increasing options for consumers and providing the local market with Australian made products, utilising Australian developed technology, best suited to Australia's environmental conditions.

SunDrive thanks the Senate Economics References Committee for the opportunity to make this submission to the Residential Electrification Inquiry and welcomes the chance to provide any further assistance to the Committee.