SolarCitizens

A community voice for cleaner energy and transport

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Submission to COP30 Presidency Roadmap for Transitioning Away from Fossil Fuels in a Just, Orderly and Equitable Manner

Thank you for the opportunity to provide feedback to the COP30 President on the development of the Roadmap for Transitioning Away from Fossil Fuels in a Just, Orderly and Equitable Manner ("the Roadmap").

Solar Citizens is an independent charity based in Australia working to bring down bills and reduce carbon emissions by growing uptake of renewable energy and clean transport. Established in 2013, we have grown to have more than 200,000 active supporters, and we represent the 10 million Australians (one-third of the population) living in homes powered by rooftop solar, the 400,000+ who have adopted clean transport, and the many more who remain locked out of consumer energy resources (CER). Australia had the highest rooftop solar per capita in the world, and the only federal battery rebate.

Solar Citizens attended COP30 in Belém, Brazil, to champion scaling the implementation of rooftop solar and storage in other nations, through building a Rooftop Solar Alliance. This includes advocating for the Australian Government to commit to doubling rooftop solar with storage by 2035. At COP30, Solar Citizens formed a partnership with the Global Solar Council to support the 300 Million Solar Homes campaign, alongside the Global Covenant of Mayors for Climate & Energy. This campaign will allow Australia to use its experience to influence the rapid deployment of rooftop solar and storage globally, in order to mobilise communities around the world to deliver a democratic, citizen-driven energy transition away from fossil fuels.

In this submission we address the following points from the COP30 President's consultation questions:

(b) What potential levers, whether economic, financial, institutional, social or technological, exist for accelerating the implementation of the transitioning away commitment?

(c) What country, regional or sector roadmap experiences, best practices, and lessons learned can be shared?

The submission will demonstrate the potential of rooftop solar and household storage as levers that can be utilised to accelerate the transition away from fossil fuels. It will highlight Australia's experience in having achieved the highest density per capita of rooftop solar as a lesson that can be shared globally.

As a result of these experiences, we put forward the following **recommendations** for inclusion in the COP30 Presidency Roadmap and ongoing advocacy in UNFCCC processes:

- Embed the expansion of consumer energy resources (CER) like **rooftop solar and household storage as key pillars of the COP30 Presidency Roadmap** for Transitioning Away from Fossil Fuels in a Just, Orderly and Equitable Manner

- Use the Roadmap to **ensure government policies and programs support and incentivise the uptake of CER in an equitable way**, including targeted supports for vulnerable communities

- Support the COP31 President to focus the **COP31 Action Agenda on rooftop solar** as an actionable, people-powered solution to emissions reduction, making it the '**Rooftop Solar COP**' and utilising the COP30 President's Roadmap to facilitate further actions at COP31, such as a Joint Declaration to accelerate rooftop solar and household storage

- Ensure international climate finance mechanisms support Least Developed Countries (LDCs) to prioritise the scaling up of distributed renewable energy and storage, while reflecting the diverse development circumstances and investment capabilities of countries and households around the world

We welcome the opportunity to further discuss any aspect of our submission.

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Introduction

Solar Citizens supports the development of a Roadmap for Transitioning Away from Fossil Fuels in a Just, Orderly and Equitable Matter. Rooftop solar and distributed Consumer Energy Resources (CER)[1] are critical to a global pathway for transitioning away from fossil fuels and should form an integral part of the Roadmap.

Rooftop solar is one of the most successful and socially beneficial climate solutions globally - and an area where Australia leads the world. However, **rooftop solar and household battery storage remains under-recognised in global climate diplomacy**. Rooftop solar should be elevated as a climate and cost-of-living solution that can help accelerate people-powered clean energy around the world.

CER can help deliver Just Transition goals for the Roadmap by increasing clean energy **accessibility, affordability and reliability**, as well as **increasing the speed of clean energy implementation**. Rooftop solar can lower household energy bills, increase energy security by shielding consumers from price shocks and blackouts, strengthen national security by relying less on fossil fuel imports, and deliver local economic benefits to communities. Rooftop solar backed by storage offers immediate emissions reductions, greater energy autonomy, and avoids social license issues associated with large-scale energy generation.

Ensuring the transition is orderly requires active government leadership to plan, enable and support this shift—empowering households to participate directly in the energy transition.

Accelerating rooftop solar around the world

Without intervention, global deployment is projected to reach only around 150 million solar homes by 2030 — far short of what is needed to meet mitigation, adaptation and resilience goals in a 1.5°C world. Doubling that figure to 300 million solar homes by 2030 would deliver:

- **Over 500 GW of new distributed clean energy capacity** (equivalent to roughly 500 large coal plants replaced with solar + storage on homes and small businesses).
- Around **700 million tonnes of CO_2 emissions avoided annually** by 2030.

This demonstrates the potential of rooftop solar, complementing the scaling up of other renewable energy sources, to displace fossil fuel power generation within electricity markets, which can be replicated around the world.

[1] CER refers to Consumer-owned Energy Resources. CER are energy resources that are invested in and owned by customers and typically connected to the distribution network behind-the-meter. Originally, rooftop solar PV fell under the category of Distributed Energy Resources (DER), encompassing any energy source linked to the distribution network, including those in front of the meter (e.g., community batteries). However, the Australian industry's shift from DER to CER in the early 2020s signified a greater consideration of the consumer.

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Solar Citizens has partnered with the Global Solar Council and Global Covenant of Mayors to scale up national missions for citizen engagement in the clean energy transition through local deployment of rooftop solar and household storage.

Prioritising rooftop solar and household storage in the Roadmap for Transitioning Away from Fossil Fuels can also expand the numerous co-benefits of engaging households in the clean energy transition. The Roadmap is a key lever to accelerate small-scale renewable energy to billions of people around the world, displacing fossil fuels and increasing energy access, affordability and reliability. Australia's success in rooftop solar and household battery uptake can be drawn on as lessons for rolling out CER globally.

Australia's success story

Rooftop solar

Australia has the highest per capita rate of rooftop solar installations in the world - more than 1 in 3 Australian homes generate their own electricity with rooftop solar.[2] There are 4.3 million households and small businesses with rooftop solar, amounting to 29GW of installed capacity as of March 2026.[3] Rooftop solar contributed 14.2 per cent of the nation's energy mix in the second half of 2025, and more than 60 per cent of new renewable energy generation capacity.[4][5]

Collectively, rooftop solar in Australia is now the country's largest and most reliable power station.[6] This success has delivered huge cost-of-living benefits to Australians, reducing electricity costs in 2024-25 by over $2.1 billion USD ($3 billion AUD) or $87 USD ($125 AUD) per capita due to rooftop solar.[7]

Rooftop solar is the cheapest form of electricity generation in Australia and around the world.[8][9][10] Australia has seen $17.4 billion USD ($25 billion AUD) household investment into CER to date[11]. Household solar generation across the nation has doubled since 2020 and increased

[2] Australian Bureau Statistics (2025) Household solar electricity generation in the Australian national accounts
[3] Clean Energy Regulator (2026) Small scale installation postcode data
[4] Clean Energy Council (2025) Rooftop solar and storage report
[5] Solar Citizens (2025) Rooftop solar going strong - even more is possible!
[6] Clean Energy Council (2026) Op-ed: The most important power station in the nation is on our rooftops
[7] Australian Bureau Statistics (2025) Household solar electricity generation in the Australian national accounts
[8] CSIRO (2025) CSIRO releases final 2024-25 GenCost report following consultation
[9] Energy Tracker Asia (2025) UN and IRENA: Renewables the Cheapest Electricity Source in 2024
[10] The Renewable Energy Institute (2025) Solar Power Takes the Lead as the Cheapest Energy Source Worldwide
[11] IEEFA (2023) Growing the Sharing Energy Economy

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20-fold since 2010-11.[12][13] The scale of rooftop solar uptake in Australia has seen the cost of installations plummet - Australia now has some of the lowest solar PV costs in the world.[14] China's solar manufacturing capability, which exceeds 80 per cent of the global share, has played a key role in driving down costs for solar PV around the world.[15]

Australia's success was driven by clear federal policy signals that gave private investors and the solar installation industry long-term certainty. Solar uptake in Australia has been driven by Federal Government programs like the Small-scale Renewable Energy Scheme (SRES) introduced in 2011, which reduces up-front installation costs for households and small businesses by up to 30 per cent[16]. This has been supported by feed-in-tariffs to pay households for excess electricity they consume, and an array of state and territory incentives like rebates and interest-free loans.

The Australian Government is also helping deliver rooftop solar to government-owned housing across Australia through partnerships with State, Territory and Local governments.[17] State and Territory governments are starting to prioritise programs rooftop solar programs targeted at apartment buildings due to increased apartment-living in Australian cities, offering grants, rebates and zero-interest loans.[18][19][20] Programs like this utilise innovative technology like behind-the-meter solar sharing - developed in Melbourne, Australia and specifically designed for apartments.[21]

Local Governments receive funding to install rooftop solar on councils buildings and community facilities like libraries, aquatic centres, and community halls. Programs such as 'Solar our Schools' have helped to deliver clean energy access to primary and secondary schools around the country.

Home battery storage

Battery uptake in Australia has accelerated dramatically following the introduction of targeted government incentives. While behind-the-meter battery adoption lagged behind rooftop solar for many years, recent policy intervention has driven a step change in deployment.

In mid-2025, the Australian Government introduced the **Cheaper Home Batteries Program**, delivered through the existing Small-scale Renewable Energy Scheme. Initially funded at $1.6 billion USD ($2.3 billion AUD) and later expanded to $5 billion USD ($7.2 billion AUD) over four

[12] Australian Bureau Statistics (2025) Household solar electricity generation in the Australian national accounts
[13] Climate Council (2024) Seize the Sun: How to supercharge Australia's rooftop solar
[14] IRENA (2022) Falling Costs Drive Strong Demand for Australia's Residential Solar PV
[15] IEA (2022) Executive summary – Solar PV Global Supply Chains – Analysis - IEA
[16] Australian Government (2024) https://www.energy.gov.au/news/australia-hits-rooftop-solar-milestone
[17] Australian Government (2022) https://www.dcceew.gov.au/energy/programs/social-housing
[18] ACT Government, Solar for Apartments Program - Climate Choices
[19] NSW Government, Solar for Apartment Residents (SoAR) Grant Program | NSW Government
[20] Australian Government, Solar for Apartments | energy.gov.au
[21] ARENA (2020) SolShare technology invention smashes barriers to solar apartments - Australian Renewable Energy Agency

years due to strong demand, the program provides an upfront discount of around 30 per cent on eligible battery systems.[22]

This has significantly reduced cost barriers for households and is expected to support more than two million battery installations by 2030. The number of home batteries more than doubled from 2024 to 2025, with 454,473 home batteries installed across Australia.[23] In the second half of 2025, Australian households installed 183,245 batteries - as many batteries as in the total 2020-2025 period.[24] This is a huge increase in recent years, up from just 9,357 installations recorded in 2020[25]. This demonstrates how targeted government incentives can unlock rapid growth in consumer energy technologies.

Installing storage for renewables at the household level is critical to optimising the output of rooftop solar from Australian households. While millions of households generate solar energy during the day, without storage capacity much of this electricity is exported to the grid instead of used by households.

While it's a positive to share cheap, clean energy with the grid, solar households may not always get the best feed in tariff during the middle of the day when demand is lower – and this reduces the return on investment for their solar system. Furthermore, with so much solar available in the grid during the day, some states – such as South Australia - have enforced rooftop solar curtailment to prevent an excess of energy overloading the grid and causing problems. Curtailment completely prevents solar households from exporting their energy, and further reduces the return on investment.

Home batteries enable households to store excess solar generation and use it during peak periods, reducing reliance on grid electricity and further lowering energy bills. Increasing battery adoption also reduces pressure on the electricity system by smoothing demand and lowering the need for large-scale network and generation investment. This grid-stabilising capability can be scaled up as battery uptake increases, and with integration into Virtual Power Plants (VPPs) home batteries create a greater return on investment, stabilising the energy grid, replacing fossil fuels, and exporting energy to the grid during frequency imbalances and disruptions.[26]

Additional storage as part of CER uptake is important in reducing the scale of investment and infrastructure needed to maintain reliable and secure electricity supply across the national grid.[27] The Australian Energy Market Operator's (AEMO) 2024 modelling[28] outlined the need for one million home battery installations by 2030, yet at the time there was no government policy to

[22] Australian Government (2025) Six months of the Cheaper Home Batteries Program | energy.gov.au
[23] Clean Energy Council (2025) Rooftop solar and storage report
[24] Clean Energy Council (2025) Rooftop solar and storage report
[25] Clean Energy Council (2024) Rooftop solar and storage report
[26] ARENA (2021) What are virtual power plants and why do they matter?
[27] RenewEconomy (2024) AEMO dials back forecasts for home battery uptake, VPP participation, as push for rebate grows
[28] AEMO (2024) Integrated System Plan (ISP)

achieve this goal. Government policy is now expected to deliver two million new batteries by 2030.

This experience highlights the critical role of government in enabling an orderly and accelerated energy transition: with the right incentives, household technologies such as batteries can scale rapidly, complementing rooftop solar and supporting a more affordable, reliable and equitable energy system.

Lessons

Australia's experience in rooftop solar and battery uptake shows that government support and planning is critical in driving households' participation in, and benefit from, the clean energy transition.

For an orderly just transition, government management of the uptake of decentralised CER is critical. Households are increasingly becoming energy producers, as well as energy consumers. By 2050, operations in the National Electricity Market (NEM) - Australia's east coast and largest electricity market - will be bidirectional. This means a significant portion of daytime electricity generated by households will provide power backup and balancing for the electricity network when power is strategically exported back into the grid.[29]

Forward planning will allow governments to ensure that existing electricity grids are prepared for an increasing proportion of generation to happen at the household level and for excess electricity to be exported back into the grid.

Empowering households to use CER is a huge opportunity for the rapid deployment of clean energy, but new and existing grid infrastructure and technology must be managed for safety, fair returns on investment, and strong consumer protections.

While households are increasingly empowered to manage their own electricity generation and consumption, connected networks will still need a government body to ensure households are fairly rewarded for their contribution to a cleaner electricity network. Energy Catalyst, CSIRO and AEMO describe this as facilitating the "mutually beneficial participation of millions of distributed resources as an integral part of the future grid".[30]

[29] RenewEconomy (2025) Australia leads the world on rooftop solar, now it needs to catch up with how to manage it

[30] Energy Catalyst (2025) Navigating to Australia's Future Grid Report 4: Distribution System Operator (DSO) Models

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Solar and Storage for a Just Transition

Emissions reduction

Transitioning away from fossil fuels will require the substantial replacement of energy supply to billions of people around the world. Australia's ageing electricity grids have undergone significant modernisation with the uptake of renewable energy, in particular rooftop solar.

Emissions intensive coal-fired power stations once provided 90 per cent of electricity to the NEM but are now regularly being displaced by renewable energy.[31] In 2024, 40 per cent of total electricity generation was from renewable energy and rooftop solar was the largest category of new renewable energy generation capacity added.[32] For one week in January 2026, solar provided 30 per cent of all electricity in the NEM across day and night, 59 per cent during daylight hours - more than half of that, 37.6 per cent of the total, was from rooftop solar.[33]

Displacement of fossil fuels from Australia's electricity mix by rooftop solar, alongside expanded large-scale renewable energy sources, has played a significant role in decreasing greenhouse gas emissions from Australia's electricity sector. National electricity emissions in the year to September 2026 declined by 3 per cent, and the emissions intensity of electricity fell to its lowest ever level, all while electricity demand reached record high levels.[34] In the year to September 2025, NEM emissions were 31.9 per cent lower than in June 2005, "driven by the emergence and rapid expansion of renewable energy, particularly rooftop solar".[35] Coal-fired power generation declined over the same period, falling to record low levels in 2025 alongside the lowest recorded gas-fired generation output since 2000.[36]

CER like rooftop solar and household batteries can continue to displace fossil fuels from our energy system. It has been estimated that 75 per cent of coal capacity will retire in the next 10 years.[37] If Australia continues to scale up CER and take advantage of the significant potential of rooftop solar, our reliance on fossil fuels will continue to decline.

Global emissions from the electricity sector are expected to stay flat despite significant growth in demand, while emissions intensity is expected to decline, due to the uptake of renewable energy.[38] Renewable energy generation is expected to increase by 60 per cent from

[31] Clean Energy Council (2025) Clean Energy Australia Report
[32] Clean Energy Council (2025) Clean Energy Australia Report
[33] The Guardian (2026) Australia's grid now relies on renewable energy as much as coal
[34] Australian Government (2026) Speech at Powering our Suburbs forum, Blacktown, NSW | Ministers
[35] Australian Government (2025) Quarterly Update of Australia's National Greenhouse Gas Inventory - September 2025
[36] AEMO (2026) Quarterly Energy Dynamics Q4 2025
[37] RenewEconomy (2026) Three quarters of Australia's coal plants will close by 2035, even as governments step in with new subsidies
[38] IEA (2025) Electricity emissions

2024-2030.[39] Distributed solar (including residential, commercial and off-grid projects) account for 42 per cent of all solar PV expansion.[40]

While the early retirement of coal-fired power stations in Australia is expected, globally only 12 per cent of operating coal-fired power stations globally have planned closures that are in line with Paris Agreement goals.[41] The rapid scaling of rooftop solar and storage will be critical to fill generation gaps to allow existing fossil fuel power generation to be switched off.

Untapped Potential

There are 29GW installed rooftop solar capacity so far, mostly on residential houses, with the commercial and industrial (C&I) sector accounting for only 5 GW. There is a further ~100 GW of untapped rooftop solar potential.[42][43] Plus, with millions of new homes and new commercial developments planned in the next five-to-ten years, Australia's rooftop solar potential will only continue to grow.

Solar Citizens has been calling for an ambitious commitment from our Federal Government to maintain its global leadership on rooftop solar by pledging to double rooftop solar capacity to 54 GW by 2035, backed by storage. This will avoid an estimated 35 Megatonnes (Mt) CO_2 emissions annually. Unlocking the full potential of rooftop solar in Australia has the potential to reduce greenhouse gas emissions by approximately 785 Mt over 20 years.[44]

The rapid scaling up of rooftop solar has already delivered emissions reductions in other jurisdictions. India is likely to surpass China in coming years to become the largest fossil fuel power generator, but the uptake of renewables and the favourable economics for solar power have the potential to change that. In India, the cost of solar power fell by more than 90 per cent between 2010-2023.[45] India's solar power capacity is expected to quadruple over the next decade and reduce India's dependence on coal as a primary source of electricity generation to 49 per cent by 2035-36, from more than 70 per cent currently.[46]

This has been achieved through national government leadership and support from state and local governments at the sub-national level. In 2024, a new incentive was introduced to increase accessibility for rooftop solar by reducing upfront costs. The scheme has seen 4.9GW added, which accounts for almost 45 per cent of total rooftop solar capacity.[47]

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[39] IEA (2025) Renewable electricity
[40] IEA (2025) Renewable electricity
[41] Global Energy Monitor (2025) Global coal phaseouts: Tracking coal plant retirements
[42] Nexa Advisory (2025) Untapped Potential of Commercial & Industrial Energy Resources in the NEM
[43] UNSW (2024) Rooftop Solar Potential of Australian Housing Stock By Tenure and Dwelling Type
[44] UNSW (2024) Rooftop Solar Potential of Australian Housing Stock By Tenure and Dwelling Type
[45] Ember (2025) Global Electricity Review
[46] Reuters (2026) India solar to quadruple, wind to triple over a decade, power ministry adviser says
[47] IEEFA (2025) Residential rooftop solar grows under PM Surya Ghar Yojana but gaps persist

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The 5.8 million applications filed under the scheme demonstrates significant interest in rooftop solar,[48] which has the ability to reduce dependence on fossil fuel electricity generation. To accelerate residential rooftop solar deployment, several states have implemented financial incentives that either supplement the central subsidy or independently support consumers.[49]

Cost of living benefits

The rooftop solar revolution has delivered significant cost of living savings to energy consumers in Australia. Households with a home battery can see savings of up to 90 per cent compared to houses without solar and batteries[50]. The average household saves up to $1,600 USD ($2,300 AUD) a year when their rooftop solar is paired with a battery.[51] Additionally, unlocking rooftop solar potential on all of Australia's housing stock could generate total energy bill savings of $6.5 billion USD ($9.3 billion AUD) a year over the next 20 years.[52]

Historical increases in electricity prices in Australia can be attributed to Australia's reliance on fossil fuels. For Australia's two largest energy consuming states, Queensland and New South Wales, the Default Market Offer[53] has increased by 30-32 per cent over the past three years.[54] Increased renewable energy and battery storage is now seeing energy price forecasts fall.[55]

Australia's power prices are largely dictated by the most expensive form of generation - gas-fired power generation sets the electricity prices up to 90 per cent of the time, despite only providing 5 per cent of power.[56] Ageing coal-fired power stations also drive large spikes in electricity, often due to unplanned outages.[57] Without renewables, Australia's energy bills could have been 22 per cent higher in 2024.[58]

A just transition away from fossil fuels must centre vulnerable households and their access to affordable electricity - in Australia, that includes renters, low-income households and those living in government-owned housing. While rooftop solar and storage investment saves households money on their power bills over time, the up-front cost of investment is still too high for many low-income households, creating barriers to uptake.[59] Government policies and programs should be used to overcome these barriers so that access to clean, affordable energy is equitable.

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[48] IEEFA (2025) Residential rooftop solar grows under PM Surya Ghar Yojana but gaps persist
[49] IEEFA (2025) Advancing residential rooftop solar adoption in India under PM Surya Ghar Yojana
[50] Australian Labor Party (2025) Labor to deliver one million energy bill busting batteries
[51] Clean Energy Council (2026) Op-ed: The most important power station in the nation is on our rooftops
[52] UNSW (2024) Rooftop Solar Potential of Australian Housing Stock By Tenure and Dwelling Type
[53] The government-regulated maximum price that an electricity retailer can charge residential and small-business customers.
[54] The Guardian (2025) Are Australians really paying more for electricity than other countries?
[55] Solar Citizens (2026) East Coast electricity prices to fall
[56] Climate Council, Five reasons why your power bills are sky high–and how we can help bring them down
[57] Climate Council, Five reasons why your power bills are sky high–and how we can help bring them down
[58] Climate Council, Five reasons why your power bills are sky high–and how we can help bring them down
[59] Climate Council (2024) Seize the Sun: How to supercharge Australia's rooftop solar

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Since the COVID-19 pandemic, rising energy costs have placed huge pressures on Australian households. In the last year, more than one-in-three households reported at least one form of energy-related hardship, such as being unable to pay their electricity bill or unable to afford heating when needed.[60]

High electricity prices were seen around the world following the COVID-19 pandemic and the global energy crisis triggered by Russia's invasion of Ukraine. Average electricity prices in Europe doubled from 2021 to 2022, while spikes were also seen in the United States, Japan and India.[61]

Energy poverty, or having insufficient access to affordable and reliable energy, can lead to poor physical and mental health, and is more likely to impact renters, single parents, people with chronic illness and women.[62] It is estimated that there are 1.18 billion people living in energy poverty globally.[63]

Reliability & security

Energy reliability is becoming increasingly critical as climate change drives more extreme weather and places greater strain on Australia's electricity system. Recent extreme weather events highlight how vulnerable centralised grids can be when transmission lines fail. Power storms in the southern Australian state of Victoria in 2024 left half a million homes without electricity, followed by 2025, when Cyclone Alfred left 320,000 homes without power in Queensland, in Australia's north.[64]

Rooftop solar paired with household batteries is helping to strengthen resilience by enabling homes and communities to maintain power during disruptions through "islanding," where systems can operate independently of the grid. In recognition of this benefit, some jurisdictions in Australia are incentivising community microgrid and energy backup systems.[65] Home batteries can serve multiple functions to increase resilience and maintain electricity supply, including storing household-generated electricity for use during blackouts or while generation is low from rooftop solar, and can enable off-grid capability.[66]

Rooftop solar is also increasing the reliability of connected networks. Coal-fired power stations, which used to provide the majority of electricity to Australia's National Energy Market, break down regularly causing wholesale price spikes that flow directly to consumers' power bills.[67] As

[60] Monash University (2025) Air you can't breathe, energy you can't afford: Climate change is deepening energy hardship
[61] IEA (2023) Electricity Market Report
[62] First Nations Clean Energy Network (2021) Energy poverty: Inside Australia's growing problem
[63] United Nations Development Programme (2024) Beyond access: 1.18 billion in energy poverty despite rising electricity access,
[64] The Conversation (2025) When disasters strike, home batteries could be a lifeline
[65] Victorian Government, Microgrids
[66] The Fifth Estate (2025) Home batteries can keep the power on during blackouts but not all are created equal
[67] Clean Energy Council (2026) Op-ed: The most important power station in the nation is on our rooftops

parts of Australia struggled with heatwaves and electricity demand skyrocketed in January 2026, the energy grid was stable and able to cope with demand.[68] Rooftop solar supplied the majority of daytime electricity.[69] Batteries played an important role in managing demand during the transition from daytime to evening, when solar output reduced, meeting a substantial portion of evening peak demand.[70] This is important given the reliance of essential services on stable electricity, such as emergency services, medical clinics, evacuation centres and communications systems.

This role of CER providing reliability during extreme weather events has been seen in other jurisdictions. Solar and battery systems provided power to a children's hospital after Hurricane Maria in Puerto Rico in 2017, while micro-grids with battery storage kept essential services in California operating during 2025 wildfires.[71]

In the face of a global energy crisis triggered by war in the Middle East and the closure of the Strait of Hormuz, responsible for around one-quarter of global oil and a significant portion of Liquified Natural Gas (LNG) trade, countries around the world risk significant energy shortages.[72] There is potential for the crisis to push up energy prices in Australia given domestic gas prices are linked to international prices.[73] Speeding up electrification and empowering households to be more energy self-reliant, by increasing rooftop solar and household storage, can help shield communities in all countries from global energy shocks by insulating them from energy shortages and price spikes caused by global events.[74]

In March 2026, Cuba's whole electricity grid collapsed for the second time in one week after sanctions cut off foreign oil imports.[75] With support from Chinese investment, Cuba has been rapidly transitioning to renewable energy with generation capacity increasing 350 per cent in 2025.[76] Increasing storage capacity is required to support the rapid scaling up of renewable generation in Cuba.[77]

Energy access & democratisation

A coordinated consumer-led renewable energy transition can ensure the benefits of decarbonisation are equitably shared and empower households to participate directly in energy markets.

[68] The Guardian (2026) Australia's grid now relies on renewable energy as much as coal
[69] Clean Energy Council (2026) Op-ed: The most important power station in the nation is on our rooftops
[70] ABC (2026) Solar to the fore as grid sails through heatwave and record demand,
[71] The Conversation (2025) When disasters strike, home batteries could be a lifeline
[72] UN Trade & Development (2026) Strait of Hormuz disruptions: Implications for global trade and development
[73] The Energy (2026) IEA chief warns against sudden tax reform
[74] RenewEconomy (2026) Pressure mounts to power up energy efficiency, to unplug households from global energy shocks
[75] BBC (2026) Cuba's second power cut in a week leaves 10 million in darkness
[76] The Guardian (2026) US sanctions, power cuts, climate crisis: why Cuba is betting on renewables
[77] The Guardian (2026) US sanctions, power cuts, climate crisis: why Cuba is betting on renewables

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Energy poverty and access for vulnerable nations and communities around the world can be alleviated through government-driven uptake of CER. In Least Developed Countries (LDC), over 70 per cent of the population still lacks access to electricity and clean cooking.[78] Dialogues between LDCs and other groups hosted by the United Nations Industrial Development Organisation have highlighted that energy is "a broad enabler of development" and "treating energy access in isolation does not address the interlinked challenges of poverty, infrastructure gaps, urban-rural divides and economic informality".[79] This means that centering equity and self-determination, and recognising the diverse circumstances and capabilities of developing nations, is critical to ensuring the transition to clean energy systems reduces inequality and delivers broad social and economic benefits to communities.

In 2021, U.K.-based charity SolarAid set out to provide solar-powered electricity to every home in Kasakula, a rural, low-income village in Malawi with a population of 20,000. This was achieved by 2025. Each installation consists of a rooftop solar panel, a lithium iron phosphate (LFP) battery hub with USB outlets to charge cellphones, as well as a tube light and two LED lamps[80]. This demonstrates how quickly rooftop solar and battery storage can be scaled to provide new electricity access.

Pakistan has experienced one of the fastest surges in rooftop solar adoption globally, from very little solar power to almost 20 per cent of generation in 2026. In response to soaring electricity prices (which rose over 150 per cent in recent years), frequent blackouts, and falling global solar panel costs, consumers rapidly installed rooftop systems to secure cheaper and more reliable power.[81] While government incentives did not drive this transition, challenges are currently being faced due to the rapid and unplanned uptake such as grid integration and lack of storage, emphasising the importance of government involvement in the transition to significant CER generation.[82]

There has been a significant increase in renewable energy capacity globally in off-grid systems, where there is no connection to a main power grid. By 2025, 86 million people used off-grid renewable power, with solar providing 4.1GW, powering services across agriculture, health, education and communication.[83] While rooftop solar and storage can provide significant benefits for households connected to existing energy networks, expanding access to electricity globally contributes to many Sustainable Development Goals (SDGs).

[78] UNIDO (2025) At GGID, LDCs discuss locally-led and inclusive renewable energy acceleration
[79] UNIDO (2025) At GGID, LDCs discuss locally-led and inclusive renewable energy acceleration
[80] Mongabay (2025) In Malawi, a rural community shines bright with 100% solar power milestone
[81] World Resources Institute (2025) The Perfect Storm Fueling Pakistan's Solar Boom
[82] PV Time (2025) Pakistan Rooftop PV to Outpace Grid Demand in 2025
[83] IRENA (2025) Off-grid renewable energy highlights

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Large-scale renewable energy

Despite the need for large-scale renewable projects as part of the energy transition, there are mixed views amongst consumers and communities globally about large-scale renewable energy infrastructure. For example, nearly one-in-five Australians do not want to live near large renewable energy infrastructure, with transmission lines viewed the least favourably.[84]

These concerns must be addressed, given large-scale renewables will be needed to reach net-zero emissions. However, the widespread acceptance of CER that exists amongst communities globally should be harnessed to accelerate the energy transition, reducing emissions whilst maintaining social license amongst impacted communities.

Investment risk appetite and planning system delays have seen a slowing in large-scale project development. Investments in the second quarter of 2025 were deemed insufficient to meet Australia's 82 per cent renewable energy target by 2030.[85] Investments increased towards the end of 2025,[86] but fluctuations in investments and delays in existing project pipelines risk delay in transitioning fossil fuels out of our energy system.

Similar trends have been observed globally. Grid investment in Europe has increased rapidly in recent years but is still considered short of what is required to meet net zero targets.[87] Global investments in renewable energy have also slowed in recent years, with an annual increase of 7.3 per cent in 2024 compared to 32 per cent in 2023.[88]

Strong support for CER must be harnessed to ensure the clean energy transition continues quickly.

Methods and Technologies for Scaling Solar and Storage

VPPs

Virtual Power Plants (VPPs), a network of small, distributed energy resources (like solar batteries) that are linked and controlled using smart software, have enormous potential to completely reshape how we generate, use, and share electricity.

The Australian Energy Market Operator (AEMO) models that by 2030, 60 per cent of consumer storage capacity will be 'coordinated'.[89] VPPs can leverage distributed solar and batteries to optimise demand response, and load shifting to maintain balance in connected electricity

[84] CSIRO (2024) Australian attitudes toward the energy transition
[85] Clean Energy Council (2025) Time to put the pedal to the metal on planning and productivity reforms as clean energy investment slows in first half 2025 - Q2 Report
[86] Clean Energy Council (2025) Quarterly investment report: Large-scale renewable generation and storage
[87] Aurora (2025) Europe's three-fold solar and wind growth sparks urgent grid investment,
[88] IRENA (2025) Global landscape of energy transition finance
[89] AEMO (2024) Integrated System Plan (ISP)

networks.[90]

VPPs are increasingly being rolled out in Australia with government support. Some programs indicate potential savings of up to $209 USD ($300 AUD) per electricity bill from participating in a VPP.[91]

In the UK, a large energy supplier now manages over 100MW of car batteries, surpassing the largest battery on the UK grid.[92]

VPPs are becoming increasingly popular around the world and could be scaled up to provide additional benefits to consumers and electricity networks.

Urban Density

More than half of the world - 4 billion people - live in urban areas, overtaking the number of people living in rural areas around 2007.[93] According to the Australian 2021 Census, 2.5 million (or one in ten) Australians now live in an apartment. Apartment living increased by 78 per cent in the 20 years from 2006 and 2021, and high-rise living[94] in particular is becoming increasingly popular – making up 28 per cent of all apartment dwellings in 2021, compared to 18 per cent in 2006)[95].

Apartment residents, especially those living in high-rise buildings, face a complex set of challenges and barriers to electrification including the installation of CER. Compared to standalone dwellings and low to mid-rise buildings, high-rise apartments are often more challenging to electrify and decarbonise due to a number of barriers such as:

- high energy consumption from common property and shared facilities such as lifts, lighting, pools and gyms[96];
- technical or infrastructural constraints such as a lack of suitable roof space to install enough solar to serve the energy needs of the residents[97];
- challenges with shared ownership of buildings, strata and governance issues[98].

Without specific policy settings for this segment, high-rise apartment residents risk being left behind in the energy transition and the cost of living benefits that clean energy provides.

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[90] IEEFA (2022) What Is the State of Virtual Power Plants in Australia?
[91] NSW Government, Virtual power plants (VPP)
[92] Octopus Energy, Octopus Energy grows UK's largest virtual power plant
[93] Our World in Data, Urbanization
[94] Defined as being nine or more stories high.
[95] Australian Bureau Statistics, Census 2022 and 2016
[96] Melbourne Energy Institute (2013) Zero Carbon Australia Buildings Plan
[97] ASHRAE Journal (2017) Feasibility of ZNE by Building Type and Climate
[98] Solar Citizens (2023) Electrify Wolli Creek Report

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There are also new opportunities the Government can take advantage of, including enabling **Urban Renewable Energy Zones**, **balcony solar** and supporting **mid-scale strata batteries**. These measures would expand access to renewable energy in high-rise buildings and ensure apartment residents can fully participate in the clean energy transition.

Addressing challenges affecting solar installation for high-rise apartments would deliver broader benefits to low- and mid-rise buildings and households – including renters.

Urban Renewable Energy Zones

An Urban Renewable Energy Zone (UREZ) is a designated urban area that supports high levels of small and medium-scale renewable energy generation[99]. UREZs coordinate local generation, storage and demand within existing suburbs and town centres, rather than relying solely on large, remote renewable projects. In practice, this could include installing rooftop solar and batteries on large commercial, industrial and public buildings, enabling clean electricity to be shared locally with nearby homes and apartments through the existing distribution network.

This approach is particularly important for high-rise buildings. The Committee for Sydney[100] notes that high-rise buildings may only be able to meet around 5 per cent of their energy needs through rooftop solar due to limited roof space relative to demand. By contrast, large urban industrial buildings with maximum solar coverage can meet their own electricity needs, as well as generate excess energy (supplying as much as 1000 per cent of their energy needs) that can be shared with neighbouring buildings that lack sufficient access to clean energy.

UREZs work by unlocking the solar potential of large urban roofs — such as shopping centres, warehouses, factories and schools — so that energy can be generated at scale and distributed locally to renters and apartment dwellers who cannot install rooftop solar on their own building.

Establishing rooftop solar on all commercial and industrial (C&I) buildings throughout Australia's east coast alone could contribute 28 GW in renewable energy capacity and 18 MT CO_2 avoided annually.

Balcony Solar

Balcony solar systems are small solar panels designed to be mounted on apartment balconies and plugged directly into a standard power outlet. Plug-in batteries are portable storage units that can connect to these systems to store excess electricity for later use. These are "plug-and-play" devices that avoid complex hardwiring and do not require expensive electrical upgrades.

Balcony solar offers apartment dwellers and renters access to renewable energy without needing

[99] Race for 2030 (2022) Pathways for Urban Renewable Energy Zones
[100] Committee for Sydney (2025) Sydney as a Renewable Energy Zone Report

approval for major building works. While these systems generate less electricity than traditional rooftop solar, they provide a practical option for households who are otherwise excluded from solar uptake.

These compact, plug-in systems are already proving successful throughout Europe and in the United States.[101] In Germany, supportive policies have enabled more than 700,000 balcony solar installations, with renters able to purchase plug-and-play solar systems and plug-in batteries for around $487 USD ($700 AUD), install them in as little as 15 minutes, and take them when they move[102].

While balcony solar systems provide smaller bill savings than rooftop solar and behind-the-meter batteries, they represent a low-cost and scalable option for renters and apartment residents.

Mid-scale strata batteries

Medium to large-scale batteries installed in apartment buildings, commercial properties and industrial sites can deliver significant peak demand reduction and electricity system reliability benefits[103] – especially when charged during the day when grid electricity is abundant, and connected to VPPs, to allow energy to be exported when the sun goes down.

High-rise apartment buildings and large commercial buildings are well suited to this technology. They typically have higher energy demand which is supported by larger conductors and three-phase wiring allowing for higher currents to pass through. This allows for greater energy transfer without energy infrastructure overheating and thus higher export/import capability[104].

Installing batteries would help these large buildings absorb more rooftop solar during the day, to be either used or exported at night - thus helping to smooth out demand peaks and provide additional clean energy to be used during peak demand periods – as well as resulting in bill savings for apartment residents and commercial consumers.

Even where rooftop solar is limited, installing shared batteries in these buildings would allow them to absorb excess rooftop solar generated elsewhere during the day and use or export that energy later. This smooths demand peaks and can deliver bill savings to apartment residents and commercial tenants.

Supporting medium-scale batteries in dense urban areas would also strengthen the development of Urban Renewable Energy Zones.

[101] RenewEconomy (2026) Balcony solar is powering apartments from Berlin to Barcelona
[102] Deutsche Welle (2025) Cheaper, cleaner energy drives Germany's balcony solar boom
[103] NSW Government (2025) Energy Security Safeguard Rule change Consultation Paper
[104] Prolectrix (2024) Electrical distribution in high-rise-buildings

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Conclusion

As demonstrated in Australia and increasingly around the world, CER like rooftop solar and household battery storage can rapidly expand access to clean energy, reduce household costs, and improve energy reliability in the face of growing climate impacts. Countries like Pakistan and India are experiencing the beginnings of their own rooftop solar revolution – but smart policy, government investment, global leadership and the right technologies are needed to ensure that this next chapter of our energy systems is done well, in a way that benefits people as well as the planet.

Elevating rooftop solar within global climate frameworks such as the UNFCCC is essential to ensure governments unlock its full potential to accelerate the transition away from energy systems that are dependent on fossil fuels. Just Transition principles can be centred in the transition by using distributed energy to democratise energy generation and consumption, particularly for communities that are often left behind by traditional, centralised approaches to socio-economic change. By embedding CER into the COP30 Roadmap, supporting equitable access through targeted policies, and championing distributed solar in future COP processes, governments can accelerate a people-powered energy transition that delivers not only emissions reductions, but also lasting social and economic benefits.

Summary of Recommendations

- Embed the expansion of consumer energy resources (CER) like **rooftop solar and household storage as key pillars of the COP30 Presidency Roadmap** for Transitioning Away from Fossil Fuels in a Just, Orderly and Equitable Manner

- Use the Roadmap to **ensure government policies and programs support and incentivise the uptake of CER in an equitable way**, including targeted supports for vulnerable communities

- Support the COP31 President to focus the **COP31 Action Agenda on rooftop solar** as an actionable, people-powered solution to emissions reduction, making it the '**Rooftop Solar COP**' and utilising the COP30 President's Roadmap to facilitate further actions at COP31, such as a Joint Declaration to accelerate rooftop solar and household storage

- Ensure international climate finance mechanisms support Least Developed Countries (LDCs) to prioritise the scaling up of distributed renewable energy and storage, while reflecting the diverse development circumstances and investment capabilities of countries and households around the world

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