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FOR THE AUSTRALIAN CAPITAL TERRITORY

STANDING COMMITTEE ON ENVIRONMENT, CLIMATE CHANGE AND BIODIVERSITY

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Submission Cover Sheet

Inquiry into Renewable Energy Innovation
in the Australian Capital Territory

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Minister for Climate Action
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Dear Dr Paterson ^{Marisa} ~~Paterson~~ MLA

Thank you for the opportunity for the ACT Government to make a submission to the Standing Committee on Environment, Climate Change and Biodiversity's Inquiry into Renewable Energy Innovation in the ACT (Inquiry).

Canberra is an internationally recognised centre for renewables research and innovation and continues to deliver world-leading renewable energy policies and programs. The ACT Government has achieved and will maintain our commitment to 100% renewable electricity in 2020 and beyond. We are also recognised for our world-leading emissions reduction targets, and have already achieved our legislated greenhouse gas emissions reduction target of 40% below 1990 levels by 2020, driven largely by our investment in renewable electricity.

Nevertheless, there are challenges to promoting renewable energy innovation in the ACT, including competition from other jurisdictions with larger budgets to attract renewable energy companies, ensuring consistent and ongoing funding for renewable energy projects, promoting collaboration between entities across the renewable energy ecosystem, and slow progress in the national regulatory environment.

In the 10th Legislative Assembly, the ACT Government will continue to take action to phase out fossil fuel gas by 2045 at the latest, support energy grid stability and support vulnerable households. We will also act to significantly expand the number of zero emissions vehicles in the ACT. Implementing these commitments will have implications for the ACT's ongoing transition to renewable energy, and present new opportunities for renewable energy innovation.

The ACT Government welcomes the Inquiry as an important opportunity to further explore these issues.

Yours sincerely



Andrew Barr MLA
Chief Minister



Shane Rattenbury MLA
Minister for Water, Energy and
Emissions Reduction



INQUIRY INTO RENEWABLE ENERGY INNOVATION IN THE ACT

ACT Government Submission

CMTEDD
Chief Minister, Treasury and
Economic Directorate

April 2021

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ACT GOVERNMENT SUBMISSION

INQUIRY INTO RENEWABLE ENERGY INNOVATION IN THE ACT

1. Introduction

The Australian Capital Territory (ACT) Government is pleased to make a submission to the Standing Committee on Environment, Climate Change and Biodiversity Inquiry into Renewable Energy Innovation in the ACT (the Inquiry).

Canberra is an internationally recognised centre for renewables research and innovation and continues to deliver world-leading renewable energy policies and programs. The ACT Government has achieved and will maintain our commitment to 100% renewable electricity in 2020 and beyond. We are also recognised for our world-leading emissions reduction targets, and have already achieved our legislated greenhouse gas emissions reduction target of 40% below 1990 levels by 2020, driven largely by our investment in renewable electricity.

The ACT's renewable energy policies benefited from a significant early mover advantage from 2012 to 2015 while the national renewables industry was at a standstill due to national policy uncertainty. Accordingly, the ACT was able to attract and sustain the attention of the national renewables industry and in-bound foreign businesses. This was instrumental in stimulating local renewables investment activities.

The ACT's 2014 *Renewable Energy Local Investment Framework* articulated a vision of Canberra as an 'internationally recognised centre of renewable energy innovation and investment' and set out the ACT's priorities for local investment under its renewable electricity reverse auctions. This was complemented by the 2015 *Renewable Energy Industry Development Strategy (REIDS)*, which set out the actions the ACT would take (and has since taken) in partnership with industry and academia to accelerate the development of its vibrant, export-oriented, renewable energy industry for the benefit of participating businesses, institutions and the ACT community.

The ACT's ambitious renewable electricity target has attracted over \$2 billion worth of investment in large-scale renewables and demonstrated the Territory's national and international leadership as a renewable energy and climate action capital. Our award winning reverse auctions also leveraged significant local investment outcomes, worth \$500 million over 20 years.

As a result, Canberra is developing a national and international reputation as host to a renewable energy innovation cluster, with world-leading capabilities in renewable energy asset management, wind and solar resource analysis and forecasting, innovative policy and project design, smart and data-driven energy storage integration, and clean fuels.

2. ACT Government Commitments

The ACT Government has set out an ambitious agenda for climate action in the ACT, including commitments in the *Parliamentary and Governing Agreement* for the 10th Legislative Assembly (PAGA) and related strategies including but not limited to the *ACT Climate Change Strategy 2019-2025* and *Canberra's Living Infrastructure Plan: Cooling the City*.

In the 10th Legislative Assembly, the ACT Government will continue to take action to phase out fossil fuel gas by 2045 at the latest, support energy grid stability and support vulnerable households. We will also act to significantly expand the number of zero emissions vehicles (ZEVs)

in the ACT. The implementation of these commitments will have implications for the ACT's ongoing transition to renewable energy, and present new opportunities for renewable energy innovation.

Key commitments that will be implemented as part of this agenda include but are not limited to:

No.	Commitment
A1.i	Implement a program of zero-interest loans of up to \$15,000 for households and not-for-profit community organisations
A1.v	Deliver at least 250MW of new 'large-scale' battery storage distributed across the ACT
A1.ii	Progress a project with relevant asset owners and key stakeholders to reduce the emissions intensity of the existing ACT gas network as much as is possible, by injecting zero-emissions gas alternatives
A1.vii	Legislate to prevent new gas mains network connections to future stages of greenfield residential development in the ACT in 2021-22
A1.viii	Commence a transition project, working with industry and other stakeholders, to advance all- electric infill developments
A1.ix	Ensure all new ACT Government buildings and facilities are fossil-fuel-gas free, including new leases
A2.ii	Provide financial incentives for the purchase of zero emission vehicles. This includes free vehicle registration for new zero emission vehicles for two years, introduced as soon as practical
A2.iv	Implement a pathway for the ACT to use only zero emissions public transport, garbage trucks, taxi and rideshare vehicles by the mid 2030s
A2.v	Build at least 50 electric vehicle recharging stations across Canberra and the region, holding a reverse auction for their construction in 2021-22
A2.vi	Enact regulation in conjunction with the Territory Plan Review to require charging infrastructure for new multi-unit residential and commercial buildings, and investigate measures to support retrofitting of charging infrastructure in existing buildings
A2.viii	Research and pilot further Vehicle2Grid and Vehicle2Home projects to improve energy efficiency and grid reliability

3. Opportunities and challenges to boost renewable energy research, technology development and new zero emissions industries in the ACT

Opportunities

With established renewables enterprises and a well-educated population, the ACT's innovation ecosystem is well placed to capitalise on the significant expansion of the renewables sector that is now underway in Australia and the wider region. The ACT is home to tertiary institutions with world-class research capabilities and experience in clean energy technology, economics and policy. Additionally, our CIT Renewable Energy Skills Training Centre provides an excellent platform from which to skill the growing renewables trades sector.

Challenges

Renewable Energy Sector Skills and Trades Training

As the ACT's renewable energy sector continues to grow, so will the need for skilled and qualified workers to meet industry needs. This will require the ACT Government and academic institutions to understand the needs and priorities of energy businesses and the knowledge gaps to be addressed.

A lack of appropriate and contemporary education and training opportunities could stifle economic development and miss opportunities to attract talented people to the ACT energy industry.

Through partnerships with tertiary and vocational institutions such as the Canberra Institute of Technology's Renewable Skills Centre of Excellence and the Australian National University's (ANU) Climate Change, Energy and Disaster Resilience Institute, the ACT Government will periodically assess industry needs and support development of opportunities that are up to date and relevant.

This will include training related to ZEVs and hydrogen; other new trade training capabilities; digital skills for a more ICT-based energy system of the future; research and development; entrepreneurship; and policy innovation skills. Creation of internship pathways and mentoring opportunities for students and young professionals in the energy sector will be examined, as will opportunities for capacity building, such as the \$1.5 million funding from Global Power Generation to support the ANU's hydrogen economy research cluster.

This action will maintain the ACT's reputation as a knowledge capital for renewable energy. We will continue to attract and retain talented people and ensure that they are equipped with the knowledge and skills to be fully engaged with the energy transition.

The Renewable Energy Skills Centre of Excellence

The Renewable Energy Skills Centre of Excellence was established at the CIT in late 2015 to lead trades training and development of practical technical skills for work-ready graduates across a range of renewable industries across Australia and internationally.

CIT provides outstanding focused courses adapted over time to meet the need of the renewable energy industry. The current suite of training focuses on the training requirements of the Wind Sector, Solar/PV, and Renewable Battery skills development.

CIT has dedicated infrastructure in the ACT to ensure training is delivered to industry standards in simulated facilities. Students undertake 'real life' installations of equipment and activities to ensure they develop skills that are equal to industry best practice.

CIT is a leader in the delivery of wind industry technical skills and is only one of four providers in the Southern Hemisphere certified to deliver Global Wind Organisation (GWO) accredited training.

Skills Transferability

Funding of research co-operatives generally aims to develop practical solutions to real-world problems, and the commercialisation of innovative technologies. Projects transitioning from research and development and venture capital or angel investment through to becoming successful companies requires a broad base of support, education, mentoring and development of business skillsets. Some of these knowledge sets will be unique to renewables industries and will not complement a transient workforce with a focus on transferable skills.

4. Opportunities and challenges to establish the ACT as a national hub for renewable energy technologies and industries including zero emissions vehicles

Opportunities

In early 2019, the Australian Energy Market Commission (AEMC), Australia's independent energy market rule maker, recommended introducing 'regulatory sandboxes' into the National Electricity Market (NEM). New technology develops rapidly in the energy sector and sometimes it can be difficult for existing regulations to keep up with the pace of change. The opportunity exists for the ACT Government to set the regulatory agenda that allows innovative research, technology, business models, products and services to be trialled under more relaxed regulatory requirements. To manage any risks, trials can be run at a small scale and for a limited time, with safeguards in place as needed.

The ACT Government has one of the largest fleets of electric vehicles (EVs) in Australia, which provides a testbed for industry to learn from. Budget funding was provided on 9 February 2021 for measures to support the objective of a self-sustaining ZEV sector in the ACT. A ZEV industry development policy is being developed to provide a framework that will look to maximise the benefits to the ACT. The ACT Government also has an existing network of relationships with EV manufacturers. Many of the challenges of integrating EVs into the electricity grid also provide opportunities for industry research and the development of innovative solutions.

Transition to Zero Emissions Vehicles Action Plan 2018-21

The ACT's *Transition to Zero Emissions Vehicles Action Plan 2018-21* was the first step in directing ACT Government action to support the uptake of ZEVs. Its range of actions included but was not limited to the following:

- Supporting new and innovative businesses in the ZEV sector to maximise job creation and economic development in the ACT.
- Working with local and state governments to facilitate the installation of charging stations on major routes to and from Canberra.
- Amending road rules and the Parking and Vehicle Access General Code to promote ZEV uptake.
- Ensuring all newly leased ACT Government fleet passenger vehicles are ZEVs in 2020-21, where fit for purpose.
- Trialling financial incentives to encourage the uptake of ZEVs and electric bikes.

The ACT has Australia's most generous financial incentives for the purchase and registration of ZEVs. In 2014, the ACT was also the first Australian jurisdiction to introduce a variable motor vehicle duty scheme.

ACT Government Commitments relating to ZEVs

To further incentivise the purchase of ZEVs, the ACT Government has announced free registration for new or used ZEVs (including grey imports) that are registered in the ACT between 24 May 2021 and 30 June 2024 for the first two years of registration.

In addition to free registration, the Government has committed to providing households with interest free loans of up to \$15,000 to assist with the upfront cost of investing in ZEVs and home ZEV charging infrastructure. The details of the loans, including the eligibility criteria for items and the registration of providers, are currently being developed.

The ACT Government has made further commitments relating to ZEVs in the PAGA. This includes but is not limited to:

- Engaging with the ZEV industry and adopting a sales target for new ZEVs..
- Providing financial incentives for the purchase of new and used ZEVs.
- Constructing 50 publicly accessible EV charging stations.
- Establishing a fleet advisory service to support Canberra businesses and community organisations transitioning their fleets to ZEVs.

Through such commitments, the ACT is demonstrating to the ZEV industry that it is ready and willing to support business innovation to overcome barriers to ZEV uptake and support the development of a self-sustaining ZEV sector.

Challenges

Competition for Resources

Other jurisdictions are aggressively exploring and developing their own renewable energy generation projects and will vie for resources (people, companies) for their own industries. Being larger jurisdictions with greater budgets, the relocation of companies, skilled resources and projects is a significant risk the ACT will have to manage. This is especially important with universities being under greater financial stress due to the COVID-19 pandemic. Equal challenges exist when trying to attract companies to set-up in or relocate to the ACT.

5. Opportunities and challenges to innovatively finance and/or manage renewable energy in the ACT

Renewable Electricity Reverse Auctions - Developing Local Enterprise

The foundation of the ACT Government's success to date in renewable energy innovation is our unique and innovative renewable electricity reverse auctions.

Under a reverse auction, companies compete to offer renewable energy at the lowest cost (but biggest benefit) to Canberra, rather than the usual auction process where the highest price is considered. Auction bids are evaluated on their overall value for money by considering the feed-in tariff (FIT) price, risk, community engagement and local investment benefits.

Under the ACT's renewable electricity reverse auctions, generation can be anywhere in the NEM (covering Tasmania, Victoria, South Australia, New South Wales and Queensland, as well as the ACT), provided the projects demonstrate exceptional economic development benefits to ACT renewable energy industries.

As of April 2021, three solar farms are located in the ACT: Mugga Lane Solar Farm, Williamsdale Solar Farm and Royalla Solar Farm. Additional supply is sourced from South Australia, NSW and Victoria.

In total, over 800MW of renewable energy has been contracted for. The latest reverse auction was held in 2019 and resulted in agreement for an additional 200MW of wind power from the Goyder South Stage 1 Wind Farm in South Australia and the Berrybank 2 Wind Farm in Victoria.

Starting from the second round of renewable electricity reverse auctions in 2014, successful auction proponents make cash contributions aimed at developing and supporting the renewable energy industry in the ACT. REIDS provides a framework for how these contributions are used across four main areas:

- Direct grants supporting local national and international businesses chasing innovative opportunities in the renewables sector in the ACT.
- Ecosystem development, including providing a community space where businesses of all sizes can work and share ideas.
- Stimulate productive research partnerships to build capacity and recognition, with our world leading tertiary academic institutions.
- As the Knowledge Capital, build Canberra’s standing as a home for skills development across trade and research in the renewables sector.

In addition to cash contributions to support renewables innovation through the REIF and NextGen battery program (discussed in more detail below), the agreements with the successful auction proponents required them to open offices in the ACT, bringing business, technical, and project management expertise to Canberra.

Windfarm giants Global Power Group (GPG) and Neoen have located their Australian headquarters in Canberra, while renewables developers CWP Renewables and Windlab are also headquartered in Canberra. This has led to successes well beyond expectations; for example, Neoen delivered South Australia’s (Tesla) Big Battery, and CWP is developing the massive 26 GW wind and solar “Asian Renewables Hub” in WA’s Pilbara region, from their ACT-based businesses. Around 2 Gigawatts (GW) of renewable energy is currently managed from Canberra’s renewable energy precinct, and this is expected to grow to an estimated 8GW.

The auction deeds have allowed for proponents to make contributions to the ACT renewables industry in other direct ways. Deeds include innovative projects aimed at developing local social initiatives, ACT skills and training enhancement, research partnerships and community projects.

Local Industry Development examples from Reverse Auction Program

The ACT Government has partnered with Neoen, Hyundai and ActewAGL on a hydrogen mobility demonstration project. Launched in late March 2021, this includes hydrogen refueling infrastructure and the integration of 20 hydrogen fuel cell electric vehicles into the ACT Government fleet.

GPG is contributing to the Liquid Organic Hydrogen Storage Project. This innovative technology uses organic compounds to store hydrogen. The project is in conjunction with the ANU and Evoenergy (among others) and is looking to expand and validate the performance, safety, and scale-up potential of this new technology.

Neoen is identifying opportunities to integrate indigenous land care practices and education opportunities in their solar farms in NSW and Victoria.

The Renewable Energy Skills Centre of Excellence was established at the Canberra Institute of Technology (CIT) in late 2015 to research, develop and support skills training programs to foster careers in renewables energy technologies in the ACT. GPG, Neoen and Windlab are working with the CIT to support the Centre of Excellence in their programs.

Renewable Energy Innovation Fund (REIF)

The REIF is the vehicle which allows cash contributions from successful renewable electricity auction winners to be disbursed to the renewables industry in the ACT. The five winners from the 2014 and 2015 auctions contributed a total of \$12 million to the fund.

A Business Advisory Board comprising leaders in the ACT renewables industry was established to undertake independent and objective analysis of grant proposals from ACT based organisations, awarding 14 direct grants. The two direct grants rounds delivered against the first pillar of the REIDS Framework, addressing an identified shortfall in private sector funding sources for early-stage entrepreneurs and start-up businesses. A number of highly successful projects have resulted from the funding from these REIF grants.

REIF Grants

REIF Direct Grants Round 1 – Opened: December 2016		Total Granted: \$1.1m
Grant Recipient	Project title	Grant Amount
PV Lab Australia	A Potential Induced Degradation Test for Australia	\$63,070
ITP Thermal	Advancing Solar Energy Storage with Ammonia	\$95,000
IT Power (Australia)	Pathways to a Low-Carbon National Energy Market	\$60,000
Reposit Power	Next Generation Reposit Box	\$250,000
Solar and Storage Modelling	Short-Range Solar Farm Output Forecasting via Disruptive Integration of Sky Imager Technology	\$287,000
Ecospectral	A Pilot Smart Green City	\$110,000
BEAST Solutions	Biogas for Canberra	\$235,000
REIF Direct Grants Round 2 – Opened: December 2019		Total Granted: \$1.1 m
Grant Recipient	Project Title	Grant Amount
Everengi	EVSIM Heavy Vehicle Performance Simulation Platform	\$235,000
Evoenergy	Ginninderry Stage 1 Residential Battery Trial	\$250,000
Flex-G	Driving Uptake of Electric Vehicles by Reducing Charging Time	\$135,000
ITP Thermal	Large Scale Hydrogen Storage in Vertical Shafts	\$130,000
IT Power (Australia)	Batter Storage Optimisation	\$88,040
PV Lab Australia	The 'Acclab': An Accredited PV Module Test Laboratory of Australian National Significance	\$219,830
Smart Blox	Solar Blox Pilot Program and Certification	\$50,441

Online Platforms Optimising Renewable Technologies: Reposit Power, Solcast and Everergi

With funding from the REIF, Reposit Power designed, prototyped, tested, iterated, verified and certified hardware technology to produce a sleek and productised “bolt on” system to domestic sustainable energy systems. The system analyses owner electricity usage patterns and weather predictions and optimises them with wholesale electricity market opportunities. The technology allows the company to manage one of the world’s largest virtual power plants of aggregated smart battery storage.

Levering off funding from REIF Direct Grants, Solcast, a former resident business of the ACT Renewables Innovation Hub, secured commercial partnerships in conjunction with ARENA, to develop the most sophisticated global live and forecast solar irradiance data delivery system available. High resolution satellite imagery is used to detect and characterise cloud cover, and with industry-leading models, delivers a platform that allows grid operators to balance fluctuating solar plant output with their existing assets.

Everergi has established itself as a leader in small electric vehicle (EV) performance and cost comparison. REIF funding will allow the company to develop software modelling electric heavy vehicle performance. Internally prototyped sensors and telemetry systems are installed on a number of heavy electric vehicles around Australia. Vehicle performance collected by the company informs mathematical models and algorithms. Project completion will see an extension module on their flagship “GridFleet” online vehicle platform.

Challenges

Ongoing Funding

While the REIF program provides some funding for projects, accessing significant ongoing funding can be challenging for renewables projects. Ideally, the networks formed within a tight knit industry will lead to collaboration on projects and accessing higher order funding from entities such as ARENA, the Clean Energy Finance Corporation and venture capital. Policy and program platforms promoting collaboration can strengthen opportunities.

6. Strategies to address limitations to collaboration and innovation between renewable energy stakeholders

The 2 Degrees Renewables Innovation Hub

The 2 Degrees Renewables Innovation Hub (Hub) was established in late 2016 with a physical presence in Moore St, close to the city CBD. The establishment of the Hub addressed the second pillar of the REIDS Framework. Providing affordable office facilities for local renewables entrepreneurs, the aim of the Hub was to provide a co-working nexus from which an organic ecosystem could develop. The Hub supported 30 businesses employing 80 people and became the go-to premises from which to hold sustainability related events, hosting over 150 events and 3000 attendees.

By mid-2019, several competing market offerings for co-working office accommodation had emerged in the Canberra market since the Hub was established in late 2016. On advice from the independent REIF Business Advisory Board, the Hub moved to an online platform in late 2019, with the Smart Energy Council (SEC) winning a competitive procurement process to manage the virtual hub. Responsibilities of the SEC include continued development of the Hub as a renewables ecosystem, growing the Hub’s brand status, and developing the Hub to be a self-funded business.

The SEC has seen the opportunity through this platform to mentor export opportunities for businesses and provide almost direct connections to countries through Canberra's unique access to embassies in the ACT.

Challenges

While there are currently multiple active players in the ACT across research, start-ups and larger corporate sectors, further work is needed to build better interconnections among these players to facilitate wider collaboration. Innovation and collaboration across traditional and non-traditional realms of knowledge and practice are also required.

By building on the successes of the Hub in connecting the start-up community and other cluster players in Canberra such as SERREE and Energy Lab, there is an opportunity to continue to grow this innovation ecosystem to include the complete spectrum from knowledge through to delivery, thus encompassing academics, start-up ventures, small to mid-sized entities and large national and international firms.

7. The effectiveness of administration and funding of ACT Government policy and regulatory settings relating to renewable energy, climate action and emissions reduction

As discussed in the above sections of this submission, the ACT's renewable energy policies benefited from a significant early mover advantage from 2012 to 2015 while the national renewables industry was at a standstill due to national policy uncertainty. Accordingly, the ACT was able to attract and sustain the attention of the national renewables industry and in-bound foreign businesses.

The ACT has set world-leading emission reduction targets that are legislated under the *Climate Change and Greenhouse Gas Reduction Act 2010*. These targets were first introduced in October 2010 and were revised in 2016 to increase ambition. They were again revised in 2018 based on advice from the ACT Climate Change Council. The current target is to achieve net zero emissions by 2045. By adopting interim targets in 2025, 2030 and 2040, the ACT Government will be able to monitor progress and ensure we are on track to achieving net zero emissions.

There is significant and ongoing work on ACT Government policy and regulatory settings relating to renewable energy. Now that the *Sustainable Energy Policy 2011-2020* has finalised, there is a need for new strategic approaches to be developed to guide future development of the renewable energy ecosystem.

The implementation of key commitments in the PAGA will also set the regulatory framework and expectations for the ACT's renewable energy ecosystem, including but not limited to:

- Developing the Molonglo Commercial Centre as an all-electric commercial centre (no new connections to gas mains network, but allow transition gas arrangements such as tanks), in partnership with expert stakeholders, and using lessons from this project to assist the phase out of fossil-fuel gas in the ACT, and demonstrate national best practice.
- Legislating to prevent new gas mains network connections to future stages of greenfield residential development in the ACT in 2021-22. Future stages of Jacka and Whitlam will be all-electric.
- By 2021, implementing the ACT ICRC recommendations to make it simpler for ACT consumers to get better energy deals by requiring electricity retailers to provide customers with a reference bill for a typical consumer, and notifying customers if they have a plan that could reduce a customer's bills.

Through the 2020-21 budget, the ACT Government will invest \$307 million over five years to take the next steps to transition the ACT to net zero emissions. The delivery of these initiatives will provide further opportunities to support renewable energy innovation in the ACT.

- \$150 million fund for the Sustainable Household Scheme to offer zero-interest loans of up to \$15,000 to help households with the upfront costs of investing in rooftop solar panels, household battery storage, ZEVs and ZEV charging infrastructure, and efficient electric appliances.
- \$100 million over five years, including the 2020-21 financial year, to deliver a Big Canberra Battery of at least 250MW of new 'large-scale' battery storage distributed across the ACT.
- Waive registration fees on new ZEVs for the first two years of registration from May 2021 to encourage more Canberrans to purchase electric vehicles.
- \$5 million Building Energy Efficiency Upgrade Fund to support community clubs to undertake energy efficiency upgrades through initiative like water and ventilation audits, partial grants for certain energy and water efficiency upgrades and no-interest loans for certain upgrades such as rooftop solar.
- \$50 million Vulnerable Household Energy Support Initiative to improve building efficiency and sustainability for social and public housing, low income owner occupiers and low performing rental properties.
- Initial funding of \$855,000 to support phasing out fossil fuel gas through continuing work on the ACT's sustainable energy policy actions and developing legislation to prevent new gas mains network connections to future stages of greenfield residential development in the ACT.
- Invest \$915,000 over two years to establish an Office of the Coordinator General for Climate Action to coordinate government efforts and oversee major projects to keep our Climate Action commitments on track.

8. Opportunities and challenges in battery storage including neighbourhood-scale batteries and vehicle-to-grid technologies

The ACT has excellent knowledge to leverage for future battery storage developments, with two battery large scale installations from the Renewables Auction 5, a proposed battery for the Ginninderry suburban development and the ACT Government's commitment for to provide a further 250MW of battery storage. Additionally, the NextGen Energy Storage Program (discussed further below) is capturing significant battery operational data, providing the opportunity for detailed optimisation modelling.

Large neighbourhood scale batteries (NSB) also provide new opportunities for market participants such as industry investors, retailers and technology operators. They increase community confidence in delivering innovative trials and provide communities with limited storage options (tenants and multi-unit developments for instance) with access to 'virtual' storage. NSBs improve grid reliability and encourage ongoing research to inform policy and regulatory reforms.

NextGen Energy Storage Program

Funds contributed by successful bidders from renewable electricity reverse auction 4 in 2016 allowed the ACT Government to develop its NextGen Energy Storage program. \$25 million of funding was contributed primarily against the industry development assessment criterion by two winning bids. The \$25 million program is supporting the roll out of up to 36MW of smart battery

storage, allowing businesses and households to access emerging battery storage technologies and capture excess rooftop solar production.

Aimed at supporting up to 5,000 systems in ACT homes and businesses via Clean Energy Council (CEC) accredited, and ACT Government vetted, solar and battery installers, around 1630 systems have been installed under the program to date. Over 700 of these smart systems have combined to enable one of the world's first and largest 'virtual power plants' to help manage peak electricity demand, improve grid security and potentially avoid excessive investment in electricity infrastructure.

As part of the program, real-time (5-minute interval) data is captured from each battery system installed under the scheme for a continuous period of 5 years following the installation of all the battery systems. This data is then used nationally for research, regulatory planning and industry development purposes. The data is located at <https://www.energydata.act.gov.au/>.

Realising Electric Vehicle-to-Grid Services

The ACT is hosting the Realising Electric Vehicle-to-Grid Services (REVS) project, one of the largest electric vehicle (EV) vehicle-to-grid (V2G) trials in the world.

The REVS project includes the deployment of 51 Nissan LEAF EVs across the ACT to test V2G services. The EVs form part of the ACT Government fleet and when plugged in provide Frequency Control Ancillary Services (FCAS) to the National Electricity Market (NEM).

In the PAGA, the ACT Government has committed to research and pilot further V2G and Vehicle2Home projects to improve energy efficiency and grid reliability.

Big Canberra Battery

The Big Canberra Battery will provide 250 MW of power to the ACT with the aim to reduce pressure on the grid, reduce electricity prices in the ACT as more households move to renewable energy and EVs, and generate new revenue opportunities for the ACT.

A market sounding commenced in April 2021 for industry to contribute ideas and innovative solutions for how the Big Canberra Battery could be built in the ACT.

The market sounding process is a pre-procurement process to inform the design and development of a preferred procurement process that delivers a value for money outcome for the Territory.

The procurement may deliver several batteries with a variety of capacities through one or many organisations. This may include a small number of large-scale batteries (50 MW+), as well as a larger number of smaller, 'precinct-scale' batteries. Batteries could be connected to the ACT's transmission or distribution network, located at government sites such as bus depots or co-located with large-scale renewable generation in the ACT.

The Australian National University (ANU) Battery Storage and Grid Integration Program (BSGIP)

Recognising the future role and importance of energy storage in an energy system dominated by variable renewable electricity generation sources, the ACT Government worked with the ANU to establish a nation-leading research group based in Canberra. This objective was well-aligned with the ACT's comparative advantage in research and education, and the ACT Government's established leadership position on renewable energy.

BSGIP was established in 2018 through a grant of funding from the REIF and the ANU, with the REIF's contribution comprising \$5 million out of a total of \$8 million. Dr Lachlan Blackhall was appointed as the inaugural Director of the program and ANU entrepreneurial fellow, reflecting Dr Blackhall's experience as former Chief Technology Officer and co-founder of Reposit Power.

BSGIP is now comprised of 34 researchers, staff and post-degree level students and has rapidly established itself as a nationally and internationally recognised centre of excellence in battery storage research and grid integration, having developed project partnerships with every electricity distribution network operator in Australia and leveraged its foundation funding several times over.

BSGIP was established to deliver against four objectives - leadership, research, commercialisation, and outreach/engagement.

BSGIP Highlights

BSGIP is currently pursuing several large projects which include:

- **Battery chemistry lab:** The research focuses on benchmarking of battery materials against established industry standards, assisting in the development of the battery materials industry in Australia.
- **Realising Electric Vehicle-to-Grid Services (REVS):** The project focuses on understanding the vehicle-to-grid (V2G) services from economic, technical, and social implications, identifying opportunities and challenges to support the scaling of the V2G services.
- **Community scale storage:** Community and suburb scale batteries are an emerging class that complements household and utility-scale batteries. BSGIP performed an analysis of community scale storage from a technical, regulatory, economic, and social perspective to identify a range of ownership and operation models.
- **Evolve:** Australia's electricity system faces major challenges to integrate intermittent 'distributed energy resources' (such as household solar and batteries) in the electricity network. The project aims to develop smart software for the orchestration of 21st century electricity systems while maintaining reliability of the network.
- **VOICES:** The project focuses on social research into customer's experience with technologies such as solar, batteries and electric vehicles (EV's) to ensure consumer protection frameworks remain fit-for-purpose.

Challenges

National Regulation

National markets and regulations are yet to catch up with battery technology - network tariffs can only be updated every five years and many of the services batteries provide cannot currently be monetised. Competition from other governments (NSW's Renewable Energy Zones, for example) is expected to compete with ACT batteries for share of national market revenues. Large neighbourhood scale batteries have only been installed in limited numbers, leading to many challenges for the ACT: higher capital costs, revenue uncertainties (including battery focused tariff trials) and appropriate siting within grid systems requiring complex stakeholder liaison to meet community expectations.

9. Conclusion

The ACT Government is committed to retaining its status as an internationally recognised centre for renewables research and innovation. Significant progress has been made to date, and there are both opportunities and challenges to further promoting renewables innovation in the ACT.

The ACT Government welcomes the Inquiry and looks forward to the Inquiry's views on how the ACT's current renewables leadership status can not only be maintained, but enhanced.



CMTEDD
Chief Minister, Treasury and Economic
Directorate

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