LEGISLATIVE ASSEMBLY
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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Input to
ACT Legislative Assembly
Standing Committee on Environment, Climate Change and Biodiversity
inquiry into matters relating to renewable energy innovation in the Australian Capital Territory.

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Key Points:

- **Renewable energy innovation should aim at eliminating greenhouse emissions**
- **Electricity from renewable energy should be used to replace use of gas and for electrification of vehicle fleet as a fast priority**
- **Innovation is broader than technological development and includes improved government processes, collobarotation between stakeholders and assistance or policy signals to make transition to renewable energy**
- **Existing policies need better implementation and reporting**
- **More information needed on gas usage in order to target innovation and achieve a faster transition out of gas in the ACT**
- **ACT Government leadership should include ending its own use of fossil fuels such as gas heating in new buildings and internal combustion engines in government vehicle fleet and ACTION buses**
- **Renewable Energy Innovation should not support projects that will extend the use of gas**
- **The Government should provide systematic, balanced public commentary on all actions in it various Zero Emissions strategies including**
    - **The Climate Change Strategy 2019-2025**
    - **Living Infrastructure Plan**
    - **the ACT's Transition to Zero Emissions Vehicles Action Plan 2018-21**
- **The Government should provide information on how it is using the ACT Climate Change Council's advice to take account of the Social Cost of Carbon cost-benefit analyses of public investments or policy and regulatory decisions**
- **Renewable energy infrastructure should be generally aesthetically pleasing involving architects, designers and the community as well as engineers, and not impact on biodiversity values**

- **Public policy on climate change and ongoing use of natural gas should be formed on the basis of reducing greenhouse emissions and not on the basis of the Government's partnerships or investments in natural gas infrastructure.**
- **The Minister's Annual Reports as legislated under the *Climate Change and Greenhouse Gas Reduction Act 2010* should contain an itemised status update for each of the 82 actions of the ACT Climate Change Strategy 2019-2025 and for the 15 actions of the Living Infrastructure Plan**

I welcome the opportunity to present views to the Standing Committee on Environment, Climate Change and Biodiversity inquiry into matters relating to renewable energy innovation in the Australian Capital Territory. I congratulate the members of the Committee, all three of whom are in their first term of the Assembly and are therefore well-placed to produce a report based on an enthusiastic approach to clear thinking on policy matters.

The Committee at its private meeting on 23 February 2021 resolved to conduct an inquiry into renewable energy innovation in the ACT and this inquiry should be about addressing climate change and using renewable energy innovatively to address climate change. The Committee has a great opportunity and responsibility to help set the framework for how the ACT should be mitigating climate change through renewable energy.

It is useful to set some parameters as to what is in scope as renewable energy and what is not, and also to look at why there should be a focus on renewable energy.

Renewable energy, predominantly solar power and wind generation for the purposes of this discussion, is a preferred form of energy to non-renewable energy such as gas for heating or electricity or coal-fired electricity. Renewable energy's advantages include that it has a 'free' energy source, the sun, which has abundant energy and is relatively long-lasting.

The most important attribute of renewable energy in the current context is that it has almost negligible greenhouse gas emissions. Non-renewable energy (from fossil fuels such as gas and coal) relies on burning carbon-based materials which creates greenhouse gas emissions. Although natural gas (methane) is sometimes touted as a cleaner alternative than coal it still has emissions and we need to be at zero emissions, not lesser emissions.

While some might also include geothermal and hydro energy as renewable energy there are not significant resources of either in the ACT and they should not therefore be a major focus for the Committee's inquiry.

Biomass energy uses organic material from living organisms such as plants and animals and the energy from these organisms is generated by direct burning to create direct heat or to generate electricity or processed indirectly into biofuel. Biomass energy usually implies conversion of habitat or food-producing land in order to provide fuel. Further, given that energy from biomass creates greenhouse emissions biomass should not be regarded as renewable.

Renewable energy has already made a major contribution to reducing the ACT's emissions, now renewable energy needs to be used to reduce the emissions to zero.

Recommendation: That the Committee recognise that the best innovative use of renewable energy – solar and wind – is to use it to reduce and eliminate greenhouse gas emissions by reducing and replacing greenhouse emitting forms of energy use in the ACT.

The ACT Climate Change Council was established by the ACT Government in 2011 under the Climate Change and Greenhouse Gas Reduction Act 2010 and provides advice and recommendations to the Minister for Water, Energy and Emissions Reduction.

The ACT Climate Change Council's advice provides probably the most useful way of looking at the ACT's emissions: as a carbon budget. This is the amount of emissions the Australian Capital Territory can produce over time before the ACT's contributions would take us past a mean global temperature increase of 2 degrees Celsius.

In October 2017 the ACT Climate Change Council wrote to the Minister[1] including their advice on the need for mid-term greenhouse gas emissions targets; a science update on climate change impacts on the ACT; an updated carbon budget, ethical considerations, technical and economic considerations, and a 'no offsets' policy with a recommendation that in the event that the ACT fails to meet an emissions target, additional public investments be made to support a more rapid transition…".

There are two key points for Committee consideration arising from the Council's letter to the Minister. The first is that the ACT's emissions were on a path to exceeding our remaining carbon budget of about 13 million tonnes CO2 equivalent by 2030 (this might have been updated since) and therefore the Committee's report should be based on the imperative that we must reduce emissions in every way possible and therefore should assisting renewable energy to replace emitting energy.

[1]ACT Climate Change Council letter to Minister Rattenbury 19 October 2017 https://www.environment.act.gov.au/__data/assets/pdf_file/0004/1135876/20171019-Letter-from-ACT-Climate-Change-Council-to-Minister-Rattenbury-interim-targets.pdf

Recommendation: That the Committee request the Minister for Water, Energy and Emissions Reduction to provide an update of the ACT's carbon budget and the latest estimate of when it will be spent.

The second point from the ACT Climate Change Council's 2017 letter to the Minister is that it points to a potential source of funding for projects and activities that might arise from the Committee's report. This would depend on the how the Government has chosen to formalise the recommendations from the Climate Change Council. For example, it would be useful for the Government to take account of the impact on the ACT's carbon budget when considering policies and programs.

In the context of a carbon budget and the urgency of a response to climate change the Committee's inquiry and report should advocate for immediate actions to set the path to zero emissions through using renewable energy.

At the same time it is important to remember that while climate change is the predominant issue other environmental crises exist such as the loss of biodiversity particularly through loss of habitat, and depletion of the world's resources which end up as mountains of human-created waste.

Responses to climate change such as adoption of renewable energy should not be contributing to further environmental issues such as loss of habitat and increased depletion of resources and increased waste.

Recommendation: That the Committee provide a recommendation that innovation and use of renewable energy is not to be at the expense of the environment through habitat destruction or increased unmanaged waste.

There is also a need for timely, accurate and accountable details on the source and amount of greenhouse gas emissions in the ACT. The ACT Greenhouse Gas Inventory[2] is key to managing the ACT's greenhouse gas emissions. If we do not know the quantities and sources of our emissions it is very difficult to efficiently and effectively eliminate those emissions.

The 2019-20 Inventory was prepared by Strategy. Policy. Research. Pty Ltd and shows that, given that electricity is sourced from renewable energy with zero emissions, the main remaining sources of emissions are transport (mostly petroleum) and gas.

The focus of renewable energy innovation should therefore focus on eliminating emissions from transport and from use of gas.

[2] All previous inventories since 2010-2011 are at https://www.environment.act.gov.au/cc/measuring-act-emissions

However, as the authors of the ACT Greenhouse Gas Inventory point out, there are some areas where further data and detail is required.

> Emissions from natural gas decreased for the third successive year, by 1.5 per cent between 2018- 19 and 2019-20, which is larger than the 1.2 per cent increase in 2018-19. As noted in previous inventory reports, lack of more detailed data on gas consumption by different customer categories makes it very difficult to determine with any certainty the reasons for reduced consumption[3]
>
> As in the 2018-19 inventory report, we suggest that EvoEnergy be asked to use individual meter data to estimate annual gas consumption separated, as a minimum, into residential and non-residential consumers.[4]

This comment from Strategy. Policy. Research. Pty Ltd needs to be taken up as we need to know how and where gas is being used in order that some innovation in renewable energy in the ACT can be targeted at areas where there are emissions that can be eliminated.

Recommendation: That the Committee recommend that the ACT Government provide for better measurement of all aspects of greenhouse gas emissions in the ACT in order that these emissions can be targeted through innovative use of renewable energy. In particular, that EvoEnergy be asked to use individual meter data to estimate annual gas consumption separated, as a minimum, into residential and non-residential consumers.

a. opportunities and challenges to boost renewable energy research, technology development and new zero emissions industries in the ACT;

The ACT has achieved a target of 100 per cent electricity from renewable energy through innovative purchasing arrangements put in place over many years with all contracts committed in August 2016 before the 2016 ACT Legislative Assembly election. All three parties represented in the Assembly – ALP, ACT Greens and Canberra Liberals – supported the targets and their achievement. The ACT achieved 100 per cent renewable electricity in October 2019[5] based on the contracts signed before the 2016 election.

This tri-partisan support for renewable energy is a major opportunity and advantage for the ACT. It means that all parties can and should dispense with weaponising climate change discussion and politics. The discussion can now

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[3] Strategy. Policy. Research. Pty Ltd, ACT Greenhouse Gas Inventory for 2019-20, https://www.environment.act.gov.au/__data/assets/pdf_file/0008/1679075/ACT-Greenhouse-Gas-Emissions-Inventory-Report-2019-20.pdf p14

[4] Strategy. Policy. Research. Pty Ltd, ACT Greenhouse Gas Inventory for 2019-20, p15

[5] For example see '**ACT has '100 per cent renewable' electricity from today. But what does that mean?**' https://www.abc.net.au/news/2019-10-01/act-is-100-per-cent-renewable-but-what-does-that-mean/11560356 1 October 2019.

move to how best to respond to climate change and maintaining 100 per cent electricity from renewable energy.

The key opportunity for the ACT from this political consensus is that the ACT can develop examples of best practice decision-making processes for responses to reducing greenhouse gas emissions.

The ACT's main advantage is that there is no real argument about whether climate change exists or whether something needs to be done about reducing emissions. This advantage means that Governments can take steps based on whether measures are effective and efficient rather than on whether they are electorally palatable.

The work of this Committee could assist in developing a process for assessing initiatives that results in long-term support for projects. Such a process would include the range of usual assessment tools – economic, social and environmental – as well as being effective in reducing emissions.

Economic assessment should include assessment that policies and projects will provide value for money relative to other projects under consideration, noting that technological change will require reassessment over time. One example of such change is solar panels which have become much more economic very quickly as prices came down while efficiency has improved.

Given that the ACT is moving to reduce emissions to zero and that electricity is now sourced from renewable energy[6] will mean that we need to focus on the remaining major sources of emissions: gas and transport.

Since the ACT needs to cease use of gas, we need to start work to develop alternatives to use of gas in all areas.

The transition from gas – which is essentially used for space heating and cooking in the ACT – will require adjustment in a range of areas.

Space heating can be done with electricity and electricity has an advantage over gas in that it can also be used effectively for cooling. The ACT Government has demonstrated that it can operate from an all-electric building by becoming the major tenant for the Dksn building[7]. However, even though it is aware that electricity can replace gas in office buildings, the ACT

[6] Most of the ACT's electricity is from outside the ACT. A useful piece of work would be to develop ways of increasing local production of electricity and that will not happen in this footnote. However there could be regulations and incentives, e.g. rates relief, to encourage and support rooftop solar (including all commercial buildings) and community batteries. ACTPLA might have a significant role in assisting reaching targets for precinct-level renewable generation and storage.

[7] For example 'Canberra's first zero emissions office block to house ACT government' https://onestepoffthegrid.com.au/canberras-first-zero-emissions-office-block-to-house-act-government/ 16 July 2019

Government does not choose to only occupy all-electric buildings given that in 2021 it has taken a long-term contract of major tenancy of a gas-heated office block on London Circuit adjacent to the Legislative Assembly.

Recommendation: That the Committee recommend that the ACT Government only occupy gas-free buildings when moving to new buildings and as far as possible eliminate gas usage in all currently occupied buildings.

While cooking with gas was a widespread advertising slogan, electric ovens are equal or superior in domestic use and in most commercial uses. Stovetop cooking can also be done with electricity and while gas has some advantages these are being matched and might be overtaken by developing technology including induction.

The ACT Climate Change Council advised the Minister in its letter in 2017 that electricity is an alternative to gas in nearly all cases of use in the ACT. The Council then pointed to the opportunities that will follow.

> Transition from gas to electricity will require updating of home systems, and changing equipment in some commercial enterprises. For newly-built dwellings and suburbs, using electricity instead of gas may mean similar operating costs, but lower upfront costs for connections and distribution. Where gas is currently used, the regular turnover of equipment such as heaters and cooktops is the opportunity to make the switch at little or no extra cost. If gas prices rise relative to electricity prices, the transition will be more attractive to households and businesses.[8]

However, it is not clear who is using gas in the ACT. It will be difficult to assist elimination of burning gas and creating emissions if we do not know who are the major gas users.

Innovation through renewable energy will substantially involve use of renewably generated electricity to replace use of gas. The technology for replacing gas with electricity is available and capable in most cases. The innovation will be in making the transition.

In order to be most effective and to develop local industry there should be assistance to establish consultancy services to assist the major gas users to make the change.

Innovation through renewable energy will be obstructed by maintenance of gas as a fuel option through subsidies, punitive exit charges, and entering into long-term contracts.

[8] ACT Climate Change Council letter to Minister Rattenbury 19 October 2017 https://www.environment.act.gov.au/__data/assets/pdf_file/0004/1135876/20171019-Letter-from-ACT-Climate-Change-Council-to-Minister-Rattenbury-interim-targets.pdf, p3.

It should be noted that the gas supplier itself recognises that it has a long-term issue with gas. Senior staff, during a consultation on future network pricing, have mentioned the term "death spiral" in relation to the ongoing reduction in the number of customers – due to rising gas prices and electrical alternatives – but still needing to maintain the existing gas delivery network for remaining customers while also trying to build more network to expand into new areas to get more customers to pay for the existing network. Fewer customers are available to pay for the existing network and to build more network.

Evoenergy's pricing might reflect a response to the death spiral. Evoenergy does not charge customers to join the gas network[9], for a basic connection[10], but charges residents $670 and businesses $1,230 to leave the network[11]. Gas is also cheaper per unit the more gas you use.

Recommendation: That the Committee recommend that the ACT Government develop a mechanism for identifying the major gas users in the ACT in order that innovative renewable energy approaches might be developed as major case studies on reducing gas emissions to zero.

Recommendation: That the Committee recommend that the ACT Government establish an appropriately placed unit in Government or in partnership with business and community groups to assist major gas users in the ACT to adopt innovative renewable energy approaches to reduces gas emissions to zero.

Recommendation: That the Committee recommend that the ACT Government develop and publicise approaches used to reduce gas consumption to zero in order that the ACT can be a centre of excellence on greenhouse gas reductions.

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

The best opportunities for establishing the ACT as a leader and a national hub for renewable energy technologies and industries will come when the ACT wholly commits to renewable energy and does not continue to support non-renewable sources of energy. This provides clear policy certainty and also

[9] https://www.evoenergy.com.au/residents/pricing-and-tariffs/gas-network-pricing

[10] See the small print at https://www.evoenergy.com.au/-/media/evoenergy/documents/model-standing-offers/model-standing-offer-basic-connection-services.pdf?la=en&hash=0D20AF8E98C65F859917919AF2CDEB28186FBB19

[11] Access arrangement for the ACT and Queanbeyan-Palerang gas distribution network 1 July 2021 - 30 June 2026 https://www.evoenergy.com.au/-/media/evoenergy/documents/gas/access-arrangement-act-qbyn-pal-2021-26.pdf?la=en&hash=6017DC507509E24FE57CD99811F50E215C12CA14 p 58

increases stakeholder confidence that innovation will be considered and supported.

These opportunities will occur for two reasons: if the ACT is committed wholly to renewable energy then we will have to have solutions that work, and; a full commitment to renewable energy will mean broader use of renewable energy leading to system and process changes that can become services exports.[12]

The ACT Government does already provide some support for renewable energy innovation including through the Renewable Energy Innovation Fund which is described as a cleantech co-funding scheme - support for clean technology research, development and deployment. This seems to be setting out a good range of innovations that will be supported.

However the Renewable Energy Innovation Fund provides for ongoing support for gas through identifying biogas as supportable:

> Other emerging technologies such as hydrogen and biogas innovation[13]

The Renewable Energy Innovation Fund should not be supporting biogas as it will be used to maintain the existing natural gas (methane) network given that biogas is intended to be blended into the network and the burning of both or either will continue to produce greenhouse gas emissions.[14]

Hydrogen is in another category. When burned it produces water vapour which is not a gas of concern. However, it is again proposed as a blend with methane in the existing gas network, thus prolonging the gas network and the associated greenhouse gas emissions. The appliances do not yet exist that will burn pure hydrogen and hydrogen as a direct fuel might have safety issues in residential situations where a hydrogen explosion would have the potential to damage houses beyond the exploding house.

Hydrogen does, however, have some potential for use in fuel cells and these, combined with batteries, might allow for reduced reliance on the grid.[15] The

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[12] The Chief Minister Treasury and Economic Development document 'ACT services trade deficit widens in 2019-20' points out that the ACT's services trade deficit increased in 2019-20 and generally runs at a deficit https://apps.treasury.act.gov.au/__data/assets/pdf_file/0016/1008403/ITS.pdf/_recache

[13] Funding Scope, Renewable Energy Innovation Fund Cleantech Co-Funding Scheme - Support For Clean Technology Research, Development And Deployment Appendix A https://www.environment.act.gov.au/__data/assets/pdf_file/0009/1453680/renewable-energy-innovation-fund.pdf p7

[14] For example, the Evoenergy Hydrogen Test Facility includes "Phase 3: Appliance testing (for example, testing hydrogen and mixed gases in existing appliances such as gas continuous hot water systems)." https://www.evoenergy.com.au/emerging-technology/hydrogen-test-facility

[15] For example, a Finnish study found that if high peak power consumption can be limited then a combination of battery storage and a hydrogen energy storage system could make residential off-grid solar viable. The study also found "using only a battery would require an "impractically" large system for this kind of project and hydrogen production alone would be wasteful due to its low round-trip efficiency". Reported in Emiliano Bellini

ACT is more likely to obtain benefit from developing use of hydrogen in fuel cells or other storage mechanisms rather than developing hydrogen production for maintenance of a natural gas network producing greenhouse gas emissions.

Hydrogen has high energy content per unit of mass but it has lower energy per unit volume than natural gas. If hydrogen is added to a natural gas pipeline it does not provide the equivalent energy as gas. The maximum practical amount of hydrogen that could be added to gas pipelines at existing gas pressures is about 20% before appliances would need to be modified. The actual reduction in greenhouse emissions at this point would be about 7%.[16] Hydrogen also present other problems including that it is inefficient and expensive to transport, it reacts with many of the metals including welds in the current natural gas network, and given its size it is 'lossy'.[17]

Energy retailers, network operators and owners and governments might have significant financial reasons as to why they want gas to be an ongoing energy source. Given the massive investment in gas infrastructure biogas and hydrogen are both proposed as a solution to assist reducing emissions from natural gas.

For example ACT Chief Minister Andrew Barr provided some insights of the ACT Government's position to the Standing Committee on Environment, Climate Change and Biodiversity Inquiry into Annual and Financial Reports 2019-2020 and ACT Budget 2020-2021 in March 2021:

> We then come to gas, which clearly is a legacy item. We are, as a 50 per cent partner in an energy retail business, through ActewAGL, somewhat entangled in the business of selling natural gas as part of an energy product mix. In the short term, the best way to get emission reduction from our existing gas network is to inject biogas into the network. That will not require households to change their appliances but would contribute to emission reduction. The question of how much biogas is available, and what it would do to the price of gas et cetera, are things that need to be worked through over the next few years as we begin the transition away from the current gas supply arrangements.
>
> Hydrogen does offer a medium-term solution in terms of the, I think, around $3 billion asset that is the gas network that sits underneath this city. So it is not something that we can just turn off or divest from or privatise or do anything like that. We need to play a role in the transition, not just wash our hands of it. Fiscally, we cannot afford to wash our hands of it, so we do need to play an active role there. I am advised, at this point, that the expectation on hydrogen as a viable alternative is somewhere in the 2030s, so it is 10 years hence. Unless there is some further technological advance, it would require a change in household

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'Batteries and hydrogen to make residential off-grid PV technically feasible' *PV Magazine*, https://www.pv-magazine.com/2020/12/18/batteries-and-hydrogen-to-make-residential-off-grid-pv-technically-feasible/

[16] Rosie Barnes, *Hydrogen in the Natural Gas Network*, Engineering with Rosie, https://youtu.be/vrKvj2MHLVw

[17] Paul Martin, *Hydrogen to Replace Natural Gas- By the Numbers* https://www.linkedin.com/pulse/hydrogen-replace-natural-gas-numbers-paul-martin/ December 2020

> appliances in order to be able to utilise hydrogen gas through our existing network infrastructure.[18]

The government has a 50 per cent partnership in an energy retail business selling natural gas as part of an energy product mix and it has a role in a $3 billion gas network that it feels, fiscally, it cannot afford to give up. At the same time the Government has a range of climate change strategies to reduce emissions and it will be making future policy decisions including on how to support innovation on renewable energy. In an individual this would be a conflict of interest. In the case of the ACT Government it has a conflict between its financial considerations and good public policy.

Good policy to deal with climate change would be to eliminate use of natural gas as quickly as possible. Good policy would not be allocating resources for innovation to maintain gas infrastructure and the use of gas.

Recommendation: That the Committee recognise that public policy on climate change and ongoing use of natural gas should be formed on the basis of reducing emissions and not on the basis of the Government's partnerships or investments in natural gas infrastructure.

The ACT Government's Renewable Energy Innovation Fund might be used for projects that transition (reduce?) the use of gas but this criterion only focusses on residential use of gas.

> Projects that assist the transition pathway of natural gas use from residential applications and address the associated impacts on consumers and the grid[19]

However there is inadequate publicly available information as to who are the major users of gas in the ACT; those who are the highest points of emissions from gas. While support for transition pathways might be helpful in residential applications it could be that there are significant non-residential users who are actually more of an influence on the prolonging of use of gas and its infrastructure in the ACT.

As recommended above the major users of gas should be identified, even if they are government agencies, and these users should be assisted to eliminate their use of gas through innovative use of renewable energy.

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[18] Hansard, Legislative Assembly for the Australian Capital Territory Standing Committee on Environment, Climate Change and Biodiversity *Inquiry into Annual and Financial Reports 2019-2020 and ACT Budget 2020-2021*, 4 March 2021 p74

[19] Funding Scope, Renewable Energy Innovation Fund Cleantech Co-Funding Scheme - Support For Clean Technology Research, Development and Deployment Appendix A https://www.environment.act.gov.au/__data/assets/pdf_file/0009/1453680/renewable-energy-innovation-fund.pdf p7

The Renewable Energy Innovation Fund should be explicit in supporting projects that lead to zero emissions and not provide support to projects that will extend the use of gas with the resultant greenhouse gas emissions.

Recommendation: That the Committee recommend that the Renewable Energy Innovation Fund guidelines be amended to be explicit in supporting projects that lead to zero emissions and not provide support to projects that will extend the use of gas.

In relation to transport emissions, the ACT Climate Change Council has advised that:

> a zero emissions surface transport system is possible, through a mix of electric (or hydrogen) private and public transport, as well as active personal transport… Planning, regulation and economic incentives all have a role in fostering the transition.[20]

The ACT Government should be an exemplar in the use of electric vehicles with a rapid replacement of its fleet with electric vehicles. This has the advantage of not only putting more electric vehicles on the (crowded) roads but it also increases the size of the second-hand electric vehicle market.

There are already electric delivery vans available and some trucks, including garbage trucks. The big gap seems to be workable electric utes but some hybrids or all-electric utes have been announced and are expected in the next few years. There is no technical reason why the majority of the ACT Government vehicle fleet should not be electrified within a very short period.

The ACT Government should also be moving more rapidly to acquire electric buses, or even hybrid buses. The ACTION Euro6 buses acquired by ACTION created *more* greenhouse gases than the Euro5 buses they replaced. Given that ACTION looks after its buses very well they last for a long time, often 20 years or more, and it will be difficult to get to zero emissions if we have well-maintained but highly-emitting public transport. Perhaps ACTION should be leasing rather than purchasing buses until acceptable zero-emissions technology is available for buses.

It would probably also useful to engage with the bus drivers on acquiring electric buses for the fleet. If they are involved in the decision-making based on the need to meet the commitment to zero emissions, their advice will be useful in adjusting expectations of both the drivers and the passengers.

There are some regulatory measures that could assist the take-up of electric vehicles and other zero-emission vehicles (ZEVs) including mandating ZEV

[20] ACT Climate Change Council letter to Minister Rattenbury 19 October 2017 p3 https://www.environment.act.gov.au/__data/assets/pdf_file/0004/1135876/20171019-Letter-from-ACT-Climate-Change-Council-to-Minister-Rattenbury-interim-targets.pdf, p3.

delivery vehicles for built-up areas and areas near schools, childcare centres, hospitals and other health facilities.

Hydrogen vehicles (using hydrogen in a fuel cell) are under development and a demonstration Hyundai was brought to Canberra in 2015. The company was also looking at the possibility of developing hydrogen-powered buses but did not see a market in Australia or the ACT.

The ACT Auditor-General has reported in 2021 on the ACT Government's Vehicle Emissions Reduction Activities.[21]

While there has been initial work on implementing the ACT Government's stated or even legislated actions to reduce transport emissions, mostly through electrification of the fleet, there is insufficient public reporting of progress and not all directorates are fulfilling their role in implementing the Government's priorities.

The ACT Auditor–General's Report No. 4 / 2021 suggests that wider public reporting on the ACT's Transition to Zero Emissions Vehicles would aid wider public interest and public policy.

> There is extensive, in-depth public reporting of the Government's climate change intentions, challenges and progress located in the Environment, Planning and Sustainable Development Directorate's climate change webpages. However, there is insufficient public reporting on zero emissions vehicles activities. The only detailed commentary on the implementation of actions is contained in a non-publicly released report. The ACT's Transition to Zero Emissions Vehicles Action Plan 2018-21 is an award-winning plan, and there are several 'firsts' coming from the plan. Local (and wider) public interest is likely to be high but dedicated detailed reporting is not public. A systematic, balanced public commentary on all actions would aid wider public interest and public policy.[22]

Recommendation: That the Committee recommend that the Government provide quarterly systematic, balanced public commentary on all actions in the ACT's Transition to Zero Emissions Vehicles Action Plan 2018-21, and its successors.

The ACT Auditor–General also pointed out that while the policies were coordinated by the Climate Change Policy and Programs teams in the Environment, Planning and Sustainable Development Directorate, but there needed to be ongoing high-level engagement in the implementation across Directorates. The Auditor–General recommended:

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[21] ACT Auditor–General's Report ACT Government's Vehicle Emissions Reduction Activities Report No. 4 / 2021 https://www.audit.act.gov.au/__data/assets/pdf_file/0005/1746041/Report-No.4-of-2021-ACT-Governments-vehicle-emissions-reduction-activities.pdf

[22] ACT Auditor–General's Report ACT Government's Vehicle Emissions Reduction Activities Report No. 4 / 2021 https://www.audit.act.gov.au/__data/assets/pdf_file/0005/1746041/Report-No.4-of-2021-ACT-Governments-vehicle-emissions-reduction-activities.pdf p7

> ensuring the evolving versions of composite implementation plans developed to guide the implementation of the commitments have senior management (Executive) authorisation and are shared with other teams involved in implementation so that priority tasks and milestones are mutually understood and accepted[23]

The elected government is accountable through the elected Legislative Assembly for directing the ACT Public Service and responsibility for the ACT Public Service carrying out the directions of the elected government lies with the Directors-General. While the Committee could make a recommendation on this matter it is really the Government and Ministers who should be holding the Directors-General to account. It is, however, within the Committee's scope to get answers from Directors-General at Estimates and Annual Report hearings.

ACT Auditor–General pointed out that not all Directorates gave the zero emissions vehicles policies sufficient priority. In particular, the actions (or inactions) of Roads ACT were highlighted:

> Action 5 … relating to the use of transit lanes by zero emissions vehicles was given a lower priority by Roads ACT compared to the Climate Change Policy team. Legislation was amended on 1 July 2019, yet no signage was installed or public announcements made for more than 12 months.[24]

And

> Action 11 … relating to amending, announcing, installing signage for, and enforcing, the road rules to accommodate specific provisions for electric vehicles was given a lower priority by Roads ACT than by the Climate Change Policy team. As a result, progress has been slower and the full benefits envisaged by the action have not been realised in a timely way[25]

The ACT needs reduce its transport emissions so it needs its transport administration to be done by agencies that support electric vehicles (and a range of other transport options such as active travel, bicycling, and others). In the longer term it might be necessary to replace the narrowly-focussed Roads ACT with a broader agency such as a Transport ACT with a zero emissions target and a mandate to help people and goods move around the Territory by the most appropriate means.

The breakdowns in implementing the Government's zero emissions vehicles policies not only occurred between directorates but also within directorates. The Auditor-General highlighted that the Environment, Planning and Sustainable Development Directorate did not have a timely shared commitment to carrying out the Government's stated policies

> Action 3 in The ACT's Transition to Zero Emissions Vehicles Action Plan 2018-21 relating to amending the Parking and Vehicle Access General Code was not given equal priority by the

[23] *ibid,* p5
[24] *ibid,* p5
[25] *ibid*, p6

> three teams in the Environment, Planning and Sustainable Development Directorate involved in the action's implementation. A lower priority was given to it by the Strategic Planning and Territory Planning teams compared to the Climate Change Policy team. The three teams did not develop a shared understanding and commitment to the task at an early stage.

It is entirely within the Committee's bailiwick to seek answers as to what has changed within the Environment, Planning and Sustainable Development Directorate to ensure that the Government's policies are being implemented especially with regard to zero emissions vehicles.

c. opportunities and challenges to innovatively finance and/or manage renewable energy in the ACT;

The ACT Government has already received a recommendation from the ACT Climate Change Council that any overshoot of the ACT's emissions should result in funding of projects to reduce emissions.

> Should emissions targets fail to be met at any point in time, we recommend that the ACT invest in directly supporting and accelerating the Territory's path to zero net emissions by an amount no less than the social cost of carbon of the overshoot in emissions above the target.[26]

This investment could feasibly be directed towards renewable energy project while also noting that the ACT Climate Change Council recommends that projects and policies be assessed against the carbon budget.

In any case the overshoot of targets might not result in much funding especially if the ACT meets its targets including the interim emissions target of a 50-60 percent reduction on 1990 levels by 2025.

The Council noted that the 2017 best estimates put the Social Cost of Carbon at about $65 per tonne of CO2 equivalent emissions so any overshoot of the ACT's targets should be calculated and invested in reducing emissions. The Council further recommended that the Social Cost of Carbon be used in cost-benefit analyses of public investments or policy and regulatory decisions in the ACT.

Recommendation: That the Committee request the Minister for Climate Action and Treasurer to provide information on how the Government is using the ACT Climate Change Council's advice to take account of the Social Cost of Carbon in cost-benefit analyses of public investments or policy and regulatory decisions in the ACT.

d. strategies to address limitations to collaboration and innovation between renewable energy stakeholders;

[26] ACT Climate Change Council letter to Minister Rattenbury 19 October 2017 https://www.environment.act.gov.au/__data/assets/pdf_file/0004/1135876/20171019-Letter-from-ACT-Climate-Change-Council-to-Minister-Rattenbury-interim-targets.pdf, p7.

In my observation of various roundtables and consultations collaboration is often substantially assisted through networkers, people who join dots in official or unofficial roles while having broad knowledge of the area and a willingness to share information.

While such people exist in government, and there should be more of them, the importance of accountability in Government sometimes overrides the flexibility and agility required for networking and collaboration and the best work in this area often comes from non-government places.

Nonetheless, the Standing Committee on Environment, Climate Change and Biodiversity inquiry in itself might assist the development of collaboration and innovation between renewable energy stakeholders through highlighting areas of activity and interest among the submitters and the Committee could actively circulate draft comments and recommendations to known players.

The Committee might also consider convening a roundtable of key stakeholders for a one-off meeting to help identify further issues for consideration perhaps by the Committee and certainly by the Government.

Key renewable energy stakeholders would include all renewable energy suppliers to the ACT; the network operator; a range of small, medium and large businesses; particular Territory and Australian Government directorates and departments; neighbouring Council representatives and regional development authorities; educational facilities including all universities in the region; non-government organisations including the Canberra Business Chamber, the Electric Vehicle Council and relevant energy-related environment groups.

e. the effectiveness of administration and funding of Australian Capital Territory Government policy and regulatory settings relating to renewable energy, climate action and emissions reduction;

The ACT Auditor–General's Report No. 4 / 2021 (referred to above) points to several issues affecting the effectiveness of administration and funding of Australian Capital Territory Government policy and regulatory settings relating to renewable energy, climate action and emissions reduction.

In particular senior management, the Executive, must ensure that government commitments are understood and there is a shared understanding between and within directorates as to how evolving implementation plans are being

undertaken and shared. This might mean "that priority tasks and milestones are mutually understood and accepted".[27]

However, it also comes to Ministers to give clear directions and expectations to Directors-General and for Directors-General to deliver on behalf of Ministers.

All these matters would be assisted by clearer and more open public reporting of progress on implementation of action plans, strategies, policies and programs.

f. opportunities and challenges in battery storage including neighbourhood-scale batteries and vehicle-to-grid technologies; and

While there might be some technical issues the major challenges for battery storage, especially neighbourhood-scale batteries, will be the planning issues associated with siting the facilities.

It might be useful to consider making the battery facilities better looking with perhaps some innovative architecture.[28] This might assist community acceptance of the infrastructure if that is required.

Recommendation: That the Committee recommend that best efforts be made to make renewable energy infrastructure generally aesthetically pleasing by involving architects, designers and the community as well as engineers.

There are opportunities to store excess energy locally not only through batteries but also possibly with the production of local ammonia. Although it has only been demonstrated in the laboratory a technique has been developed that could be used for production of ammonia (NH4)[29]. While electrolysis for separating water into H2 and O is relatively straightforward, the storage and transport of hydrogen is more problematic. Ammonia is easier to handle, though not without challenges, and can be used as a component of fertiliser of for use of export

[27] ACT Auditor–General's Report ACT Government's Vehicle Emissions Reduction Activities Report No. 4 / 2021 https://www.audit.act.gov.au/__data/assets/pdf_file/0005/1746041/Report-No.4-of-2021-ACT-Governments-vehicle-emissions-reduction-activities.pdf p5

[28] For example, Walter Burley Griffin designed some very attractive municipal waste incinerators so we should similarly build attractive containers for batteries https://www.griffinsociety.org/australia-incinerators/

[29] https://www.pv-magazine.com/2021/01/21/green-ammonia-breakthrough-a-potential-boon-for-solar-powered-exports/

g. any other relevant matters.

The ACT achieved its first great reduction in greenhouse gas emissions by setting and achieving a target of 100 per cent renewable electricity by 2020. This was done with a target but without a developed pathway. Now the ACT's big reductions need to come from eliminating use of natural gas and driving down transport emissions to zero.

However, the ACT Government has only a very distant target of getting out of gas by 2045 and no target on transport, other than it being part of an overall target of zero emissions across the Territory by 2045. The distance of these targets means that the Government is continuing to invest in gas through measures such as moving into new gas-heated buildings on long-term contracts, and it continues to add to its long-lived diesel bus fleet.

Reporting the Greenhouse Gas Inventory is a key and vitally important tool in telling us how we are tracking in our emissions against our key emissions sectors: electricity, transport, gas, waste, land use. However at present it does not necessarily tell us the actions that are leading to changes in our emissions profile. We need greater reporting and data collection for the outcomes of particular actions in reducing greenhouse gas emissions and their effectiveness.

Clause 15 of the *Climate Change and Greenhouse Gas Reduction Act 2010* Act requires the Minister for Climate Change to prepare an Annual Report on progress.[30]

> 15 Annual report by Minister
>
> (1) For each financial year, the Minister must prepare a report on—
>
> (a) the actions the Minister has taken during the year in the exercise of the Minister's functions under this Act; and
> (b) the effectiveness of government actions taken to reduce greenhouse gas emissions during the financial year; and
> (c) the findings of a cost-benefit analysis of any government policies or programs implemented to meet the targets mentioned in part 2 during the financial year.

The ACT Climate Change Strategy 2019-2025 states:

> The Minister for Climate Change and Sustainability reports annually on action to achieve the emission reduction targets, emissions from Government operations, effectiveness of actions

[30] https://www.legislation.act.gov.au/DownloadFile/a/2010-41/current/PDF/2010-41.PDF

> and impacts on cost of living. This report will be used to provide a summary of this strategy's implementation progress including a status update for each action [31]

Likewise the Living Infrastructure Plan states: "

> Implementing this Plan is action 4.22 in the ACT Climate Change Strategy 2019–25 and reporting on implementation progress will be part of the monitoring, evaluation, reporting and improvement undertaken for the Strategy.[32]

However, the 2019-2020 Minister's Annual Report[33] does not contain an itemised status update for each of the 82 actions of the Strategy nor for the 15 actions of the Living Infrastructure Plan.

We actually cannot do very well at innovation or collaboration if we can not measure and monitor what actually is working or not working.

Recommendation: That the Committee requests the Minister to produce detailed reports as legislated under the *Climate Change and Greenhouse Gas Reduction Act 2010* from the 2020-21 financial year and forward.

It is important that there is open discussion about renewable energy and that flaws and problems are recognised and addressed. At least two renewable energy projects in the ACT have had significant impact on habitat. The Williamsdale Solar Farm DA was 'called in' by the Minister and it required the removal of about 120 mature eucalypts.

The proposed big battery will result in the loss of five hectares of the critically endangered ecological community White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (BGW) according to the proponent.

Renewable energy, specifically solar energy, uses panels with a limited lifespan and these will need to be managed at the end of their useful life. There will be opportunities for recovery of all the materials in solar panels and the ACT could look at industry possibilities in this area.

At the same time there needs to be recognition that compared to renewable energy electricity gas is not a clean fuel. However, gas is still promoted by Evoenergy as though it is cleaner than something.

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[31] ACT Climate Change Strategy 2019–25 https://www.environment.act.gov.au/__data/assets/pdf_file/0003/1414641/ACT-Climate-Change-Strategy-2019-2025.pdf/_recache (2019) p91,

[32] https://www.environment.act.gov.au/__data/assets/pdf_file/0005/1413770/Canberras-Living-Infrastructure-Plan.pdf p31

[33] 2019-20 Minister's Annual Report under the Climate Change and Greenhouse Gas Reductions Act https://www.environment.act.gov.au/__data/assets/pdf_file/0007/1670353/2019-20-Ministers-Annual-Report-under-the-Climate-Change-and-Greenhouse-Gas-Reduction-Act-2010.pdf

> When you choose Natural Gas, you're not just choosing a cleaner more efficient source of energy, but it's also the smarter choice for powering your home.[34]

Natural gas is not cleaner that renewable energy either in the emissions produced in using it or in its effect on the immediate environment where it is used where it produces contaminants such as NOx and PM2.5 particles. Also gas in Australia is coming more from coal seam gas obtained by fracking which in turn impacts on the environment affecting biodiversity and farming and water supplies.

I would welcome the opportunity to meet with the Committee to discuss these comments'

Biographical note:

I have been involved in environmental and climate change issues for some years in my roles in ACT Government especially with the Climate Change Unit (Environment and Sustainable Development Directorate), where my work included liaison and project management on the ACT Greenhouse Gas Inventory, coordination of implementation meetings on Action Plan 1 of the ACT's Climate Change Strategy Weathering the Change and work with NSW Government on cross-border coordination on climate change.

I worked as an adviser in the ACT Legislative Assembly to Caroline Le Couteur MLA and as Chief of Staff to Minister Shane Rattenbury.

I worked with the Conservation Council ACT and Region 2014-2018 including as Executive Director 2016-2018. In these roles I attended consultations on many matters including on gas pricing and network charges and spoke with a range of stakeholders in renewable energy and gas.

Larry O'Loughlin

[34] Natural Gas https://www.evoenergy.com.au/natural-gas