



ACT Climate Change Council

19 October 2017

Shane Rattenbury MLA
ACT Minister for Climate Change and Sustainability
GPO Box 1020
Canberra ACT 2601

Dear Minister Rattenbury,

The ACT Climate Change Council (the Council) commends the ACT government for its current leadership on climate change action, including its legislated targets of 100% renewable electricity by 2020, 40% reduction in greenhouse gas (GHG) emissions on 1990 levels by 2020, zero net emissions (carbon neutrality) by 2050, and peak per person emissions by 2013. The last target has been met.

The primary purpose of this letter is to update the ACT government on the importance of setting mid-term greenhouse gas emission targets for the Territory (cf. Council letter dated 7 July 2015) and to recommend particular targets for the years 2025, 2030 and 2040. Relative to 1990 levels, the Council recommends the following range for ACT emissions targets:

2025 -50% to -60%
2030 -65% to -75%
2040 -90% to -95%

The Council also proposes that the ACT achieve carbon neutrality by 2045 or earlier, and that the Territory not rely on purchased emissions offsets to achieve emission targets. Rather, Council proposes that any overshoot above an emissions target trigger government investment in accelerating the Territory's path to net zero emissions, to the value of the social cost of carbon of the shortfall.

Science Update

The science is clear that the Earth's climate is changing due to increased greenhouse gases in the atmosphere, primarily caused by human actions. In the last 2-3 years, scientific evidence has accumulated further, warning that more severe impacts and risks of climate change are likely to occur at lower increases in global mean temperature than earlier projected. Consequently, noticeable changes in the local ACT climate are expected by 2030¹, namely:

- nearly double number of days over 35°C,
- increased severe fire danger days,
- increased intensity of extreme rainfall events, and
- decreased winter and spring rainfall.

¹ CSIRO and BoM (2015). Climate change in Australia: Projections of Australia's NRM regions.



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These projections for the ACT are based on climate model simulations and are likely to be underestimates of the changes we can expect in the Territory. For example, the number of heatwave days that Canberrans are now experiencing has already more than doubled compared to the 1950-1980 average².

Updated “Carbon Budget”

An approximately linear relationship between the total amount of carbon dioxide (CO₂) emitted by human activity and the increase in global mean surface temperature allows scientists to calculate a “carbon budget” that must be respected to keep global warming below a particular temperature limit³. The carbon budget that is allowed to keep warming, with 2:1 odds, below the UN-agreed 2°C limit is 1,000 GtC (billion tonnes of carbon).

Accounting for non-CO₂ greenhouse gases such as methane and nitrous oxide reduces the budget to 790 GtC. Cumulative human emissions of CO₂ since the beginning of the industrial revolution through 2016 have cost about 565 GtC⁴. This leaves a global carbon budget of about 225 GtC if we are to have a reasonable chance of meeting the 2°C target.

Apportioning the remaining global budget by population (assuming an ACT population of 0.5 million in a global population of 8.5 billion in 2030-2040) yields a remaining ACT budget of 13 million tonnes (Mt) of carbon (or 48 Mt of CO₂) from now until the world reaches net zero emissions. At its current rate of emissions, the ACT will spend this budget by 2030.

Deeply reducing ACT emissions now and in the near future would instead allow this budget to be spent over a longer period, enabling a smoother transition to zero net emissions than if we were to slow or delay action. In fact, if the carbon budget is to be respected, any significant delay in action would make future emission reductions impossibly difficult because of the speed and magnitude of reductions required⁵.

Ethical Considerations

In addition to contributing to safer, more robust physical and economical environments in which ACT citizens can thrive, reducing GHG emissions quickly is supported by several ethical considerations.

First, ACT citizens have, for many decades, had large per capita emissions compared to most of the world’s population, contributing disproportionately to the current global warming. Second, with its relatively prosperous and well-educated populace, the ACT is better able to make a rapid transition to net zero emissions than are many other regions. Third, a rapid ramp down of emissions now allows future generations a “safety margin” in dealing with the shrinking carbon budget.

² Perkins S and Alexander L (2013). On the measurement of heat waves. *Journal of Climate* 26:4500-4517.

³ IPCC (2013). Summary for Policymakers. In *Climate Change 2013: The Physical Science Basis*.

⁴ Le Quéré, C. et al., Global Carbon Budget (2016). *Earth System Science Data* 8: 605-649.

⁵ Figueres, C. et al (2017), Three years to safeguard our climate,” *Nature*, 546: 593.



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Technical and Economic Considerations

The ACT's move to a 100% renewable electricity supply by 2020 will likely allow it to meet its legislated 40% emission reduction target in 2020, even though emissions from most other sources have increased significantly. In 2015-16, the electricity emissions attributed to the ACT from non-renewable sources on the grid were 2.2 Mt of CO₂, over half the total of 4.0 Mt.

Post 2020, road transport and gas used for heating and in industry will contribute the largest components of the Territory's GHG footprint. These currently account for around 60% and 20% of ACT non-electricity sector emissions, with industry accounting for around 10%, with most of the rest coming from waste. In order for the ACT to stay within the 2°C carbon budget on the way to zero emissions before 2050, decisions will need to be made with a view to substantially reducing emissions in all sectors, beginning immediately. Three areas are worthy of particular consideration in the nearer term: electricity consumption, gas and emissions from transport.

Electricity. ACT electricity consumption is likely to increase over time, including as a result of more electric transport and electricity used for heating. In order to retain zero electricity emissions in the future, the ACT will need to make further investments in renewables generation. As the costs of renewable energy generation continue to fall, the additional cost of renewable power relative to electricity from fossil fuel plants will further diminish. As the share of renewable power in the Australian grid rises, a true commitment to 100% renewables will also require investment in energy storage facilities to manage intermittent supply from wind and solar plants. Increased energy efficiency in current and new building stock will also remain a key component of managing electricity consumption in the Territory.

Transport. Emissions from road transport fuel in the ACT have been growing. In the longer term, 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. The transition to electric cars and buses is expected to get underway at scale in the 2020s, with the precise timing depending on uncertain vehicle supply options and costs. Recent experience suggests that progress in the development and commercialisation of electric vehicles may be more rapid than expected, as has been the case with renewable energy technologies and storage. Planning, regulation and economic incentives all have a role in fostering the transition.

Gas. Natural gas is used in heating, cooking and some industrial applications in the ACT, though electricity is an alternative in nearly all cases. 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.



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Proposed ACT Greenhouse Gas Emission Targets for 2025, 2030 and 2040

The ACT currently has legislated emissions targets only for the years 2020 and 2050. Mid-term targets, however, are important in setting expectations and to guide government and private decisions. By setting emissions targets for the years 2025, 2030 and 2040, the ACT government can provide a guardrail for government policy and operations, help private sector investment decisions, and express clear expectations for the community.

The Council has formulated a view on such mid-term targets for the ACT. Our advice takes into account: (1) the ambition to stay within the ACT's share of a 2°C carbon budget; (2) the government's ambition to be a leader in the low-carbon transition; (3) latest information and analyses, including a recent analysis on technical options to reduce the ACT's GHG emissions⁶; and (4) judgments about practical, feasible rates of emissions reductions. We have also assumed that, for the ACT, emissions from electricity will be zero after 2020.

At 2025, a 50% reduction (from 1990 levels) could be achieved, for example, if emissions from all non-electricity sources stay on their recent trajectory until 2020 (implying that the 40% reduction target at 2020 would be met almost exactly), and then declined by about 15% from 2020 to 2025. A 60% reduction could be achieved if non-electricity sector emissions (in particular transport) returned to their 2015 levels in 2020, and fell by around one-quarter from 2020 to 2025. Should the actual emissions reduction in 2020 be considerably greater than the legislated 40%, there may be an opportunity for a deeper reduction in 2025.

At 2030, a 65% reduction could be achieved by building on a 50% reduction at 2025 and reducing emissions across the board by one-third over the five-year period. A 75% reduction could be achieved from a starting point of 60% reduction at 2025 and a slightly faster reduction thereafter. Both scenarios require strong reduction in road transport emissions between 2025 and 2030, as well as rapid phase-out of natural gas.

At 2040, a target of 90% or somewhat higher would imply that only a small amount of emissions remain, probably from the transport sector, and miscellaneous small emissions sources. New negative emission technologies may be available by this time; early investment in their study and development may be appropriate for the ACT's knowledge economy.

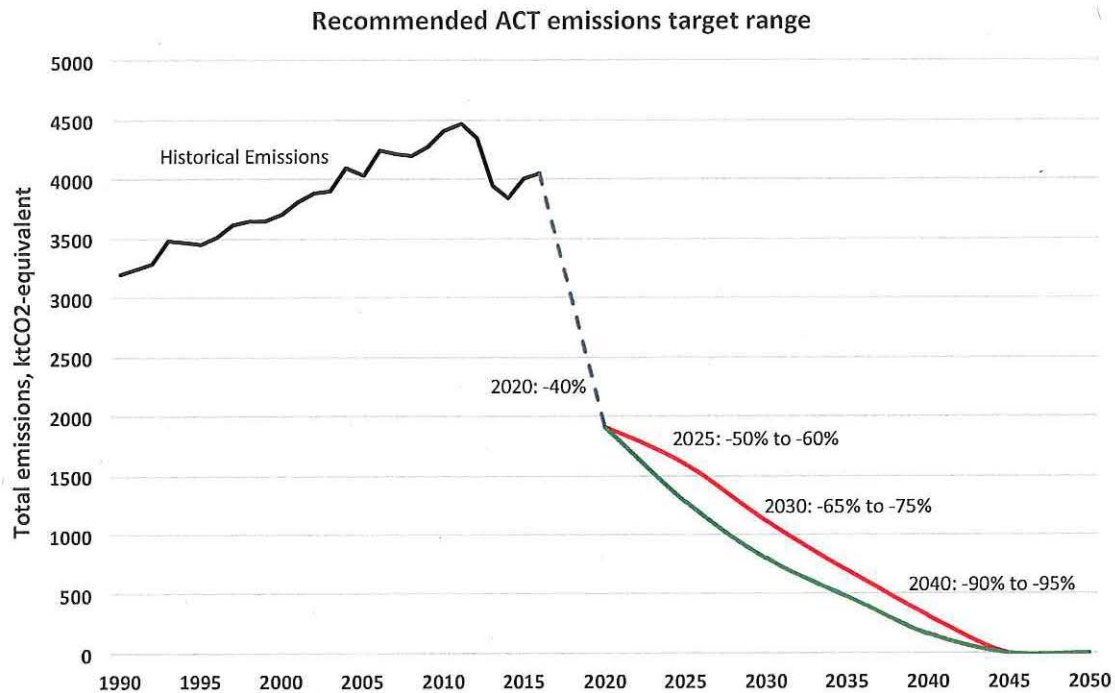
By around 2045, net emissions – taking into account continued and possibly accelerating increases in carbon stored in forests on ACT lands – could be zero.

Under any of these scenarios, the ACT's cumulative emissions from 2015 until emissions are zero – would meet the Territory's "2°C carbon budget" as laid out above. Specifically, the upper and lower emission trajectories of these scenarios correspond to cumulative ACT emissions from 2015 onward of 10 MtC (36 Mt CO₂, red line in figure) and 8 MtC (30 Mt CO₂, green line), respectively.

⁶ 'ACT Transition to Net Zero Emissions', report prepared for EPSDD by SPR, September 2017.



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In the figure above, ACT historical emissions (expressed as kt of CO₂-equivalent) are shown as the black line from 1990 to 2015-16. The dashed line represents a notional drop from 2015 to the legislated target of -40% by 2020, made possible through the sourcing of 100% renewable electricity by 2020. The target ranges for subsequent years recommended by Council correspond to emissions in the range between the red and green lines, with carbon neutrality achieved by 2045 or earlier.

Consequently, in order to inform further government consultation and decision-making, the Council proposes the following emission target ranges for the ACT, relative to the 1990 base year:

- 2025 -50% to -60%
- 2030 -65% to -75%
- 2040 -90% to -95%
- 2045 zero net emissions

Expressed relative to 2005 – the base for Australia’s national emissions target and that of most nation states – these target ranges equate to: -60% to -68% in 2025; -72% to -80% in 2030, and -92% to -96% in 2040.



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A “No Offsets” Policy for the ACT

The Council recommends that the ACT government adopt a position that emissions reductions purchased from offset projects outside of the ACT’s direct control not be used in fulfilling ACT emissions reductions targets. Such a policy would align with the Territory’s goal to be a leader in the domestic transition to a zero-emissions society. The characteristics of the ACT economy, in particular the absence of heavy industry and mining and the relatively small role of agriculture, make foregoing offsets a logical choice.

With respect to land-based offsets, we note that moving excess carbon from the atmosphere, most of which has come from the burning of fossil fuels, to the land by planting trees or other means cannot offset fossil fuel emissions. Unlike buried fossil fuels, which are locked away from the atmosphere, carbon stored on land is vulnerable to being returned to the atmosphere, for example, through bushfires, insect plagues and changes in land clearing policies. Storing carbon in land is not a permanent way of reducing atmospheric carbon, and therefore cannot offset emissions of carbon from the burning of fossil fuels.⁷ It is appropriate to increase land carbon in the ACT in order to recover previous losses of land carbon in the Territory resulting from deforestation or other land use.

Possible Target Overshoot: Direct Investments using the Social Cost of Carbon

In the absence of purchased offsets, provisions should be established for dealing with any possible future overshoot of emissions above the ACT’s emissions targets. The Council recommends that in the event that the ACT fails to meet an emissions target, additional public investments be made to support a more rapid transition with a magnitude that, at a minimum, is evaluated at the Social Cost of Carbon. The Social Cost of Carbon is an estimate of the total future economic damage of GHG emissions, and thus a suitable reference point.

Present best estimates⁸ put the Social Cost of Carbon at USD50 (approximately AUD65) per tCO₂. As an example, an overshoot of 5 percentage points of 1990 emissions would require a contribution of about \$10 million for every year that the target is exceeded. More broadly, we recommend that the Social Cost of Carbon be applied in any cost-benefit analyses used to inform public investments or policy and regulatory decisions in the ACT.

⁷ Mackey B et al. (2013) Untangling the confusion around land carbon science and climate change mitigation policy. *Nature Climate Change* 3: 552-557.

⁸ Revesz, R. et al (2017). Best cost estimate of greenhouse gases. *Science* 357(6352): 655.



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Summary of Council Recommendations

1. We recommend that **ACT GHG emission targets be established and legislated** for 2025, 2030 and 2040, **in the range of 50-60% at 2025, 65-75% at 2030, 90-95% at 2040**, on 1990 levels. We also recommend that the zero net emissions date be brought forward to 2045 or earlier, from the currently legislated year of 2050.
2. We recommend that in any accounting undertaken to drive local action or meet GHG targets, **the ACT enact a "No Offsets" policy**, stating that purchased GHG offsets will not be used to reduce any of the Territory's emissions unless they lie directly in the ACT's sphere of influence, remain the responsibility of the ACT, and are valued at the social cost of carbon.
3. **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.**

Sincerely,

A handwritten signature in black ink that reads "Penny D Sackett". The signature is written in a cursive style with a large, sweeping flourish at the end.

Professor Penny D Sackett
Deputy and Acting Chair, ACT Climate Change Council
On behalf on the full Council