The Social Cost of Carbon and public investment to reduce ACT greenhouse gas emissions

Briefing prepared by the ACT Climate Change Council for the ACT Government

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In its recommendations about interim emissions targets for the ACT government (letter to Minister Rattenbury, 19 Oct 2017) the ACT Climate Change Council recommended the use of the Social Cost of Carbon (SCC) as a minimum measure for public investments to make up for any possible future overshoot in emissions above targets. The Council recommended that the ACT not rely on emissions offsets to cover any possible future emissions overshoot. The Council also recommended 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.

This briefing provides further explanation of the rationale for the Council's recommendations. It also provides background on the concept and estimation of the SCC.

Additional ACT-based effort to compensate for potential emissions overshoot

The Council recommended that "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."

The rationale for this recommendation is to provide a defined way for the ACT to "make up" for any possible shortfall in achieving emissions targets, and to do so in a way that accords with the overall objectives of the ACT including furthering economic growth, modernisation, and meeting future emission targets without shortfall.

It is important to provide a clear sense of what is to occur in the event that the ACT emissions targets are not met at any point in the future. Doing so helps signal that the targets are more than a declaration of intent and thus fosters business confidence that underpins private investment in low-emissions assets. It assists in ensuring the community that the emissions targets do not imply an open-ended and potentially overly-costly commitment.

Investment approach

The proposed approach to cover any shortfall by "investing in directly supporting and accelerating the Territory's path to zero net emissions" means that any shortfall in meeting emissions target would trigger additional government investment within the ACT, to help achieve targets in following years. This approach has decisive advantages compared to the alternative of buying offsets from other jurisdictions (discussed further below).

The 'investment' approach provides greater policy integrity than alternative proposals, and keeps benefits of public expenditure within the ACT. It is in keeping with the fundamental objective of the ACT's climate change policy, namely to lead Australia in urban development towards zero-emissions systems. The overarching goal is to modernize ACT infrastructure and economic structures, and to demonstrate what is possible. This in turn will help attract leading businesses and high-skilled individuals to Canberra, as is already the case on the back of the ACT's renewables policy.

The approach allows additional fiscal resources to be deployed in a targeted way to achieve public policy objectives of the ACT, and to do so in a way that stimulates economic activity in the ACT.

Finally, the proposed approach will likely find significantly greater public support compared to an approach that would see ACT financial resources transferred to other jurisdictions.

'No offsets' recommendation

The obvious alternative to the proposed approach is to make up for any shortfall in emissions reductions by purchasing emissions reductions credits (or "offsets") from other jurisdictions. The goal under an offsets approach would be to claim that a specific emissions target is fulfilled in overall terms, by a combination of action within the ACT and by financially supporting action elsewhere.

This approach has a clear logic in cases where the fulfilment of a particular emissions target at least direct cost is the primary policy objective, and where achieving a given target is inherently more difficult or costly than in other jurisdictions. But generally this is not the case for the ACT where achieving the shift to zero-emissions systems within the Territory is the primary objective.

An important further consideration is the nature and credibility of emissions credits/offsets that would be available. If implemented at present, then the (possibly only) obvious source of emissions credits would be from the Federal government's Emissions Reductions Fund (ERF). This mechanism – like any project-based emissions reduction mechanism – suffers from inherent difficulties of ensuring that the claimed emissions reductions are in fact additional to what would have happened anyway, and their credibility and effectiveness is beyond the Territory's influence.

Further, most offset projects under the ERF are from land-based projects, e.g. commitments to either not clear existing vegetation, or afforestation. These activities, while generally beneficial if additional, cannot in principle and in the long run substitute for the decarbonisation of energy, transport and housing systems, and suffer from the increased risk of having the opposite of the intended effect in the case of wildfire.

Numerical example

To illustrate the magnitude of the proposition, consider a hypothetical overshoot in ACT emissions at 2025 of 5% above the 50% upper range of the target range. Given base year (1990) emissions levels of 3.2Mt of CO2, this would equate to an overshoot of 0.16 MtCO2 per year. Evaluated at a social cost of carbon of $70/tCO2, this would call for additional investments by the ACT government in the ACT economy of $11.2m per year that the overshoot persisted. These investments directly benefit the ACT, and address the source of the emissions overshoot itself.

Covering the same overshoot through purchased emissions credits priced at, say, $35/tCO2 in 2025 would imply a payment from the ACT government to businesses or governments elsewhere of $5.6m per year, again, for every year that the overshoot persisted.[1]

[1] It is unclear what future sources of offset credits may be available. The general expectation is that such credits may be available but at higher prices than the current going rates under the ERF (around $13/tCO2), and to the extent that credible international emissions units are available, that these would come at higher prices than the current EU ETS price (about 15 euros or $24/tCO2).

Appendix: Background on the Social Cost of Carbon concept

The concept of the SCC

The SCC is an estimate of the long-term economic damage caused by a tonne of carbon dioxide emissions in a given year.[2] The SCC therefore represents the value of damages avoided by a one tonne reduction in carbon dioxide emissions, or the marginal benefit from reducing emissions.

Economics suggests that to achieve efficient climate change mitigation, the marginal cost of reducing emissions (compared to economic cost of reducing the last ton of carbon dioxide emissions after lower-cost options have been exhausted) should be equal to the marginal benefit of doing so, that is the SCC. The SCC can therefore be used as a "shadow price of carbon."

In practice this is rarely achieved, because national and sub-national goals are usually set in terms of quantity of emissions (emissions targets) and because typically a range of different policy instruments are applied that come at different costs. However, public policy analysis and public investments offer an opportunity for such efficient investment choices.

SCC estimates

Estimating the SCC in practice is difficult and uncertain, because a wide variety of likely future climate change impacts need to be projected and assessed in terms of their presumed future economic effect. This involves judgments about the nature of future impacts and about the way these will affect future economies, which are globally connected, as well as monetization of non- market impacts. The time preferences or discount rates applied to longer-term climate change impacts strongly affect estimates of the SCC, as does the way in which risk of severe or catastrophic climate change impact is treated; both of these aspects include ethical considerations.

The SCC is usually estimated using "integrated assessment models", numerical models of the world economy with representation of climate change impacts. Representation of future impacts, physical climate feedback loops and valuation of non-market impacts tends to be conservative in these models, and often do not take special account of society's aversion to the risk of catastrophic impacts. This suggests that "mainstream" estimates on the whole are lower-bound rather than upper-bound estimates.[3] In other words, the real cost to society is even larger than most SSC estimates.

The standard set of SCC estimates used in recent years is from a multi-model comparison exercise conducted by the US Environmental Protection Agency. For carbon dioxide emissions in 2020 (2030) the EPA parameters show an SCC of US$(2007) 42 (50) per ton of carbon dioxide using a 3%pa discount rate, and US$ 62 (73) using a 2.5% discount rate. Evaluation at a 3% discount rate and at the 95th percentile of damages has the SCC at US$ 123 (152), while applying a 5% discount rate to median damages yields an SCC of US$12 (16). It has been established in the scientific literature and confirmed by the IPCC that there is no justification for applying discount rates as high as 5% p.a. for climate change analysis.[4]

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[2] As the US Environmental Protection Agency put it, "[t]he SCC is meant to be a comprehensive estimate of climate change damages and includes, among other things, changes in net agricultural productivity, human health, and property damages from increased flood risk". US EPA 2016, "EPA Fact Sheet: Social Cost of Carbon"

[3] Garnaut, R. 2007, The Garnaut Climate Change Review.

[4] Kolstad, C., Urama, K., Broome, J., Bruvoll, A., Olvera, M.C., Fullerton, D., Gollier, C., Hanemann, W.M., Hassan, R., Jotzo, F. and Khan, M.R., 2014. Social, economic and ethical concepts and methods. IPCC 5th Assessment report, Working Group III, Chapter 3.

A wide range of estimates for the SCC exists in the literature. However a recent high-profile publication[5] confirmed that most recent research and modelling suggests that the best estimate for the SCC remains around US$ 50 per ton of carbon dioxide.

The Council suggests that this estimate – equating to around A$ 70 per ton of carbon dioxide at present exchange rates – is a suitable basis for considerations by the ACT government. However, alternative values can be justified and could be used in ACT, and revised over time as better information becomes available.

Alternative valuations as future costs of emissions reductions

It is also possible to evaluate emissions in terms of expected future marginal costs of emissions reductions, under assumptions about what emissions reductions will be achieved. Again, estimates differ widely, but they are in the same broad order as mainstream estimates of the SCC. Most estimates would put longer-term marginal costs of global emissions reductions for a 2-degree outcome between $50/tCO2 and $150/tCO2.

Use of SCC in public and private investment analysis

SCC was and has been used in regulatory and public policy analysis in a number of jurisdictions, including the United States under the Obama administration, and the UK. (Details can be provided separately.)

Using SCC in ACT analysis for public investment and regulatory decisions

Beyond the provisions for investments in response to any potential shortfalls relative to emissions targets, there is a case for evaluating all relevant ACT regulatory and public investment decisions at the social cost of carbon as a proxy for the future cost of greenhouse gas emissions. This could take the form of including an estimate of the shadow cost of future emissions in cost-benefit analysis of public investments such as transport infrastructure and buildings, and in analysis of the impact of regulatory action such as zoning, building codes, fees and levies and so forth.

Excerpt from ACT CCC letter to Minister Rattenbury of 19 Oct 2017

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.

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