

**City of Melbourne
Climate Action Planning
Technical Assistance
Synthesis Report**

September 2018

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Climate Action Planning Technical Assistance: Synthesis Report

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1. Introduction

The City of Melbourne is developing a Climate Change Mitigation Strategy to 2050 to align with the ambition of the Paris Climate Change Agreement to keep global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 °C. City of Melbourne is one of eight C40 cities piloting an exemplar approach, with the aim of demonstrating that a 1.5°C compliant plan is achievable and to evidence the associated costs and benefits of maintaining this level of climate ambition.

Under C40's Climate Action Planning Technical Assistance Programme, EY was engaged to provide technical climate change abatement, social, and economic analysis to support the development of municipality-wide climate change actions that could achieve a 1.5°C compliant emissions reduction trajectory in line with the Paris Climate Change Agreement, as defined by C40's Deadline 2020 City Report¹.

This report synthesises the key findings of the abatement modelling, economic, and social impact analysis conducted as part of this work. It should be read in conjunction with the climate, economic and social impact reports (provided as Annexes to this report) and in conjunction with the Pathway Planning Tool which contains the calculations used to estimate the abatement potential of the City's proposed climate actions and summarises key findings of the economic and social impact analysis.

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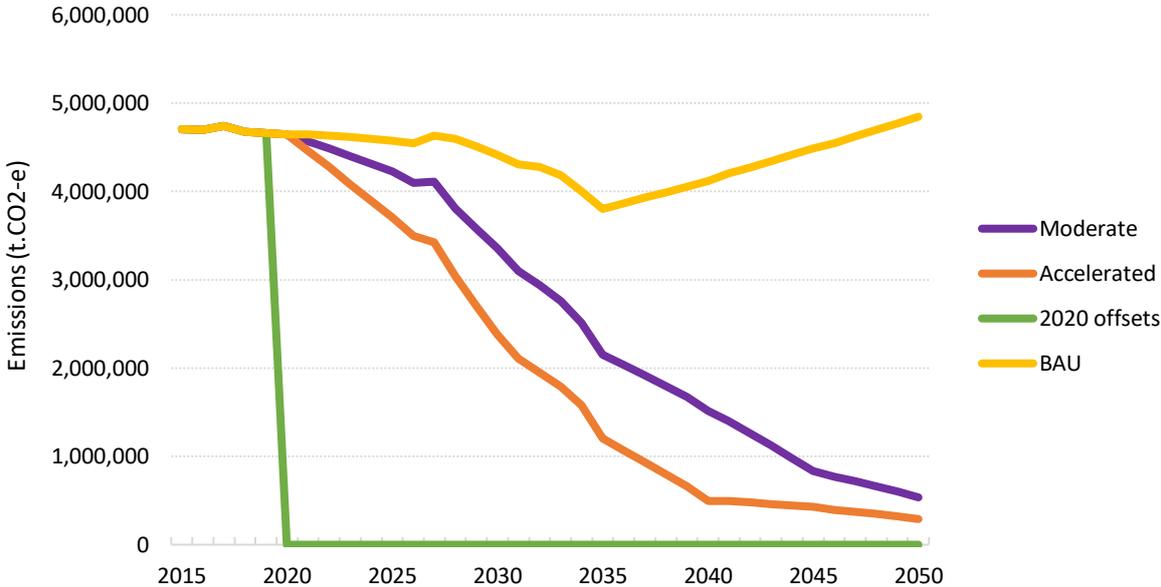
¹ C40 Cities, Arup, *Deadline 2020 City Report: Melbourne*. Provided by C40.

2. Climate Action Scenarios

To support the update of City of Melbourne’s climate action planning, three emissions reductions scenarios were modelled relative to a business-as-usual (BAU) baseline. These scenarios, illustrated in the chart below, are:

- ▶ Business-as-usual (BAU) - Existing and planned action
- ▶ Offsets Scenario - Zero Net Emissions by 2020
- ▶ Significant action
- ▶ Accelerated action

Absolute Emissions Trajectories to 2050



The BAU takes into consideration existing and planned policies. Specifically, it includes the impact of:

- ▶ Planned updates to the National Construction Code (NCC) due to take effect in 2019
- ▶ The Victorian Renewable Energy Target (VRET) of 40% by 2025
- ▶ A phase out of coal and transition to gas and renewables beyond 2025

The BAU forecasts annual emissions for the municipality in the range of 4 to 5 MTCO₂-e annually in the period to 2050. Under BAU City of Melbourne’s emissions decrease in the period to 2035 and then increase thereafter when the impact of increased population outweighs the impact of the existing and planned policies.

The Offsets Scenario’ assumes no further climate action will be taken but that the City of Melbourne will purchase offsets for its entire GPC inventory in a given year. As such the trajectory follows the BAU to 2020 and then drops to zero net emissions from that point. This scenario is not compliant with C40’s Climate Action Planning Framework which considers the use of offsets as a last resort only after a concerted effort has been made to reduce emissions. It is also projected that the costs

associated with this scenario are expected to increase over time in line with the number of offsets required and offset price².

The Significant and Accelerated Action scenarios represent varied levels of ambition across 12 priority actions identified to reduce emissions from energy supply, buildings, transport and waste. Both scenarios meet the targets proposed by C40's Deadline 2020 Melbourne City Report and as such, both could be considered compliant with a 1.5°C trajectory³. The Accelerated Action scenario represents an enhanced level of climate action ambition both in scale and pace of action. The Accelerated Action scenario therefore has a steeper emissions reduction trajectory and reaches near zero net emissions around 2040 (as opposed to the Significant Action Scenario which reaches near zero net emissions around 2050)

The economic and social impact of the Significant and Accelerated Action Scenarios was also modelled. The analysis found that, relative to the Significant Action Scenario, the Accelerated Actions Scenario delivered greater outcomes for the City of Melbourne community, provided that policy consideration is given to the affordability and inclusion of vulnerable groups as the detailed implementation plan is devised.

Relative to the Significant Action Scenario, the Accelerated Action Scenario delivers 17.7 MTCO₂-e more emissions reductions in the period 2020-2050. The cost-benefit analysis also indicates that the actions collectively have economic benefits greater than costs using the base assumptions in the model. Accelerated action delivers a higher BCR overall (2.96 compared with 2.38), although there are significant variations in the BCR for individual categories of action.⁴ Whilst the social impact analysis found that the Accelerated Action scenario was less affordable to city users, and may therefore be riskier for vulnerable groups, it also concluded that there would more co-benefit of the Accelerated Action Scenario, particularly in relation to health and quality of life benefits. The impacts of the moderation action and accelerated action scenarios are summaries in Table 1.

Table 1. Summary of climate, economic and social impacts for the Significant action and accelerated actions scenarios.

	Climate	Economic	Social
Significant Action Scenario	Near carbon neutral by 2050 703,714 TCO ₂ -e residual emissions in 2050 14.3 TCO ₂ -e per capita emissions in 2030	Overall BCR 2.38 Total jobs supported 32,110 in the period 2020-50 (1,035 jobs per year) Output \$13.2bn Value added \$5.2bn	Short-term costs per city user (2020-2030): \$382 Long-term savings (net costs/savings 2020-2050): \$2,940)
Accelerated Action Scenario	Near carbon neutral by 2040	Overall BCR 2.96	Short-term costs per city user (2020-2030): \$923

² There is high degree of uncertainty in relation to the costs associated with this scenario. Current carbon prices globally range between US\$1/TCO₂-e to US\$129/TCO₂-e and are expected to increase. This means that the potential cost to offset the municipality's emissions in 2020 could range from US\$186m to US\$372m. This would be an annual cost that would increase if forecasted carbon price rises occur. References: World Bank Group, *State and Trends of Carbon Pricing 2018*. Available at:

<https://openknowledge.worldbank.org/bitstream/handle/10986/29687/9781464812927.pdf?sequence=5&isAllowed=y> and Stiglitz & Stern, *Report of the High-Level Commission on Carbon Prices*, 2017. Available at: <https://www.carbonpricingleadership.org/report-of-the-highlevel-commission-on-carbon-prices/>

³ According to the Deadline 2020 Melbourne City Report, to comply with a global 1.5°C trajectory, City of Melbourne must reduce its per capita emissions to 14.6t.CO₂-e by 2030 with zero net emissions being achieved at or before 2050, with a carbon budget of 90 MTCO₂-e in the period 2017-2050. C40 Cities, Arup, *Deadline 2020 City Report: Melbourne*. Provided by C40.

⁴ Buildings actions account for a very high proportion of the quantifiable costs and benefits - these actions are therefore the main driver of the overall BCR.

	<p>430,331 TCO₂-e residual emissions in 2050</p> <p>10.7 TCO₂-e per capita emissions in 2030</p>	<p>Total jobs supported 40,422 in the period 2020-50 (1,395 per year)</p> <p>Output \$16.2bn</p> <p>Value added \$6.6bn</p>	<p>Long-term savings (net costs/savings 2020-2050): \$5,960.</p> <p>More health and quality of life outcomes (particularly from transport actions)</p> <p>Higher risk for vulnerable groups especially those such as women, elderly and those in poor health who are sensitive to domestic energy prices and private transport costs.</p>
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3. Climate Actions

Under the Accelerated and Significant Action scenarios, the potential abatement from 12 priority actions was modelled.

Priority Actions by Category

CATEGORY	ACTION
Energy Supply	▶ Advocate for a more ambitious renewable energy target
	▶ Facilitate and support corporate Power Purchase Agreements
	▶ Facilitate residential purchasing of renewable energy
Buildings	▶ Advocate for all new buildings to be carbon neutral by 2030
	▶ Advocate for all existing buildings to be carbon neutral by 2050
Transport	▶ Reallocate road space to cyclists and pedestrians
	▶ Implement higher charges for congestion and parking
	▶ Advocate for public transport to be powered by renewable energy
	▶ Advocate for lower intensity of motor vehicles and support transition to electric vehicles
Waste	▶ Increase diversion of commercial and industrial waste from landfill
	▶ Increase diversion of residential waste from landfill

In both the Significant and Accelerated Action scenario, the majority (c.80%) of the abatement potential relates to actions in the energy supply and buildings category. This is because the majority of City of Melbourne’s FY15 baseline emissions are related to these categories.

Neither scenario reaches zero net emissions due to residual emissions from activities that are not covered by the priority actions. This is consistent with C40’s ‘focussed acceleration’ strategy whereby a small number of high impact opportunities can yield better results than spreading effort over several lower impact opportunities. The residual emissions relate to the transport and waste sectors. For example, residual emissions may be attributed to emissions from landfill if diversion rates do not reach 100%. Residual emissions in the transport sector may relate to water-borne transport or emissions from ships docked in the port that use on-board fossil fuel powered generators.⁵

3.1 Energy Supply

Under both the Significant and Accelerated Action scenarios, the Energy Supply actions yield the most emissions reductions/abatement potential. The economic benefits of these actions also significantly outweigh the costs. This is because corporate PPAs deliver electricity prices below retail rates as well as stimulating an increase in renewables supply and delivering carbon abatement. As a result of this, the energy supply actions deliver substantial economic value (represented by a BCRs of 48.18 and 47.60 in the Significant and accelerated scenarios respectively).

Residential purchase of renewable energy is likely to create additional costs for those living in the city if green energy products remain more expensive than standard electricity products. This could disproportionately affect those who spend a large amount of time in a domestic setting such as women, older residents, unemployed and those with poor health. The switch from fossil fuel energy will however improve air quality close to fossil fuel power generators which will be a co-benefit primarily for wider Australians.

⁵ Institute for Sustainable Transport, *Transport, Greenhouse Gas Emissions and Air Quality*. 2018. Provided by City of Melbourne

3.2 Buildings

Buildings actions deliver the next highest amounts of abatement. Buildings actions account for a very high proportion of overall costs (> 95%) and benefits (> 70%) as a result of high energy demand and large area of building floor space in the Melbourne LGA. Carbon neutral building adjustments will bring health co-benefits due to improved ventilation and temperature management. This is good for many vulnerable groups who often spend larger periods of time indoors. There will be an upfront affordability challenge but in the long-term building improvements will save residents' money and build better resilience as events such as heatwaves worsen with climate change.

Actions to deliver carbon neutral buildings would provide a high economic contribution from the size of the construction stimulus. The BCR for this action indicates benefits in excess of costs under the base assumptions in the modelling (1.86 and 2.19 in the Significant and accelerated scenarios respectively). However, this is particularly sensitive to changing assumptions around costs. The modelling is also sensitive to the energy supply actions - high proportions of renewables in the grid limit the abatement potential of buildings actions, while buildings actions would be expected to deliver more benefit using the existing energy mix.

3.3 Transport

Emissions from transport account for approximately 15% of City of Melbourne's 2015 baseline emissions and also deliver a similar proportion of the abatement potential under both scenarios out to 2050.

Transport actions have a wide range of unquantified costs and benefits, which are borne by different groups (e.g. pedestrians, cyclists, drivers, and public transport users). As a number of the known costs for transport actions (e.g. parking and congestion charges) would be treated as transfers in cost-benefit analysis, and data availability restricts the potential for including other costs, the benefits from these actions have also been omitted from the results to avoid introducing bias. As such, the analysis has considered costs and benefits for which reliable sources are available primarily being investment in infrastructure costs to reallocate road space to pedestrian and cyclists. Accounting for the costs borne by the City of Melbourne in this area indicates a very high BCR (13.21 and 13.73 in the Significant and accelerated scenarios respectively). However, a holistic view is needed to aid decision making in this area and the accompanying qualitative analysis is of particular importance for transport actions.

In addition to benefits modelled in the BCR, transport actions will generate health co-benefits due to a more active population and a reduction in air pollution within the city. These health benefits are well evidenced in literature and have been modelled in relation to quality and length of life improvement (QALYs) value. The net value across the actions represents nearly \$5B under the Significant scenario and \$8.7B under an accelerated scenario.

3.4 Waste

Emissions from waste account for approximately 6% of City of Melbourne's 2015 baseline emissions and also deliver a similar proportion of the abatement potential under both scenarios out to 2050. Waste actions deliver substantial benefit for relatively low incremental costs (represented by BCRs of 12.22 and 10.36 in the Significant and accelerated scenarios respectively). If waste policies are implemented with a focus on user engagement and neighbourhood co-operation they could create approximately \$50M of additional social value.

3.5 Summary of action climate, economic and social impact

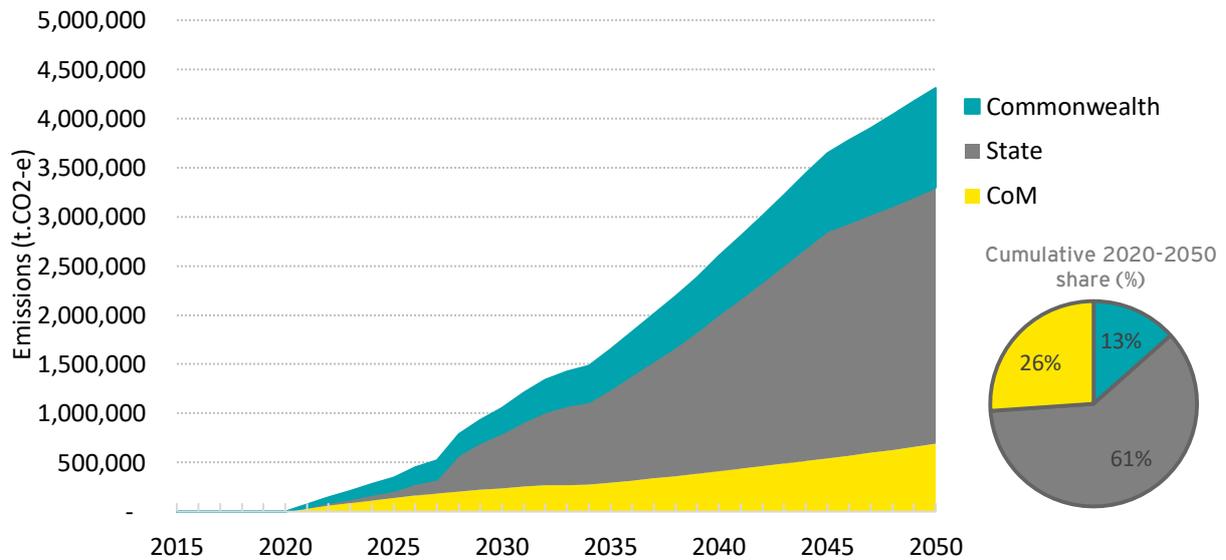
	Climate	Economic	Social
Energy supply	Under the Significant action scenario, the energy supply category represented 28.9 MTCO ₂ -e (49%) of cumulative abatement in the period 2020-2050 and 34.5 MTCO ₂ -e (38%) in the Accelerated Action Scenario.	Under both the Significant and accelerated scenarios the energy benefits outweighed costs (BRC 48.18 in the Significant Action Scenario and 47.60 in the Accelerated Action Scenario)	A shift to renewables will create physical health benefits by improving air quality close to fossil fuel generators (primarily realised by Australians living outside the City).
Buildings	Under the Significant action scenario, the buildings category represented 16.3 MTCO ₂ -e (28%) of cumulative abatement in the period 2020-2050 and 33.6 MTCO ₂ -e (37%) in the Accelerated Action Scenario	Under both the Significant and accelerated scenarios the buildings benefits outweighed costs (BRC 1.86 in the Significant Action Scenario and 2.9 in the Accelerated Action Scenario)	Carbon neutral buildings create health benefits driven by temperature and ventilation management. A carbon neutral building transition is expected to improve health for vulnerable groups due to the significant time spent indoors by these groups in better quality buildings.
Transport	Under the Significant action scenario, the transport category represented 9.7 MTCO ₂ -e (16%) of cumulative abatement in the period 2020-2050 and 14.7 MTCO ₂ -e (16%) in the Accelerated Action Scenario	Under both the Significant and accelerated scenarios the transport benefits outweighed costs (BRC 13.21 in the Significant Action Scenario and 13.73 in the Accelerated Action Scenario)	Under the Significant scenario, quality and length of life improvements (QALYs) represent up to \$3.6B from walking increases, \$528M from cycling increases and \$386M from \$825M from air pollution reductions. Under the accelerated scenario \$6.4B from walking, \$1B from cycling and \$1.2B from air pollution improvements.
Waste	Under the Significant action scenario, the waste category represented 4.3 MTCO ₂ -e (7%) of cumulative abatement in the period 2020-2050 and 7.5 MTCO ₂ -e (8%) in the Accelerated Action Scenario	Under both the Significant and accelerated scenarios the waste benefits outweighed costs (BRC 12.22 in the Significant Action Scenario and 10.36 in the Accelerated Action Scenario)	Under both the Significant and accelerated pathways neighbourhood co-operation (equivalent to \$26M) and civic or environmental engagement (equivalent to just under \$24M) will be created.

4. Actions by Actor

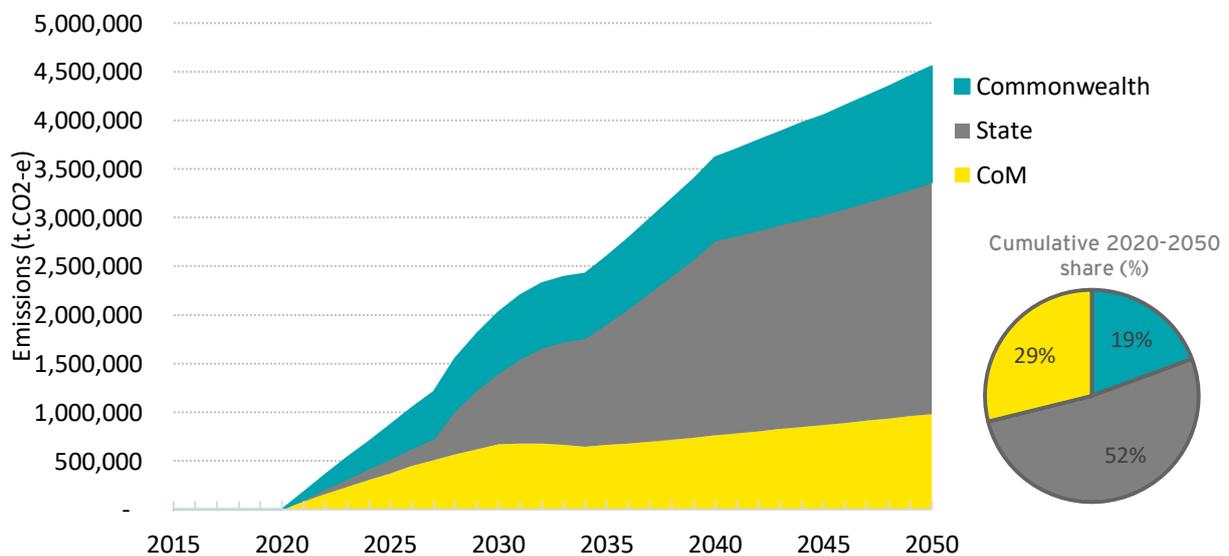
The abatement potential from the actions outlined above has been allocated to key actors who have the authority to realise the abatement. Identified key actors include: the Commonwealth Government, Victorian State Government, associated agencies and regulators and the City of Melbourne. The climate actions identified in climate analysis have been framed relative to the power of City of Melbourne to effect change. Advocacy related climate actions identified within the analysis of this report have been attributed to the relevant level of government to which City of Melbourne would be engaging with.

Whilst the majority (approximately 50% to 60%) of the potential abatement will be realised by Victorian State Government policy particularly the renewable energy target, City of Melbourne can make a significant contribution towards achieving the Victorian emissions related targets and goals (approximately 13% to 19% of the abatement potential modelled was associated with actions where City of Melbourne was nominated as the key actor). It also shows that approximately 26% to 29% of the cumulative abatement potential (2020-2050) was associated with actions where the Commonwealth Government was nominated as the key actor.

Significant Action Scenario by Key Actor



Accelerated Action Scenario by key Actor



5. Next Steps

Key next steps for City of Melbourne's climate action planning are recommended below:

- ▶ In line with the development of City of Melbourne's Climate Change Mitigation Strategy to 2050, the priority actions identified and analysed in this report are strategic in nature. To realise the abatement potential associated with these strategic actions a detailed implementation plan is required to determine how the actions can be achieved
- ▶ In order to be achieved, many of the climate actions identified in this report rely upon partnering or advocacy. To assess the likelihood of achieving the abatement potential associated with these actions, City of Melbourne should aim to secure commitments from potential partners including the Victorian state government and the private sector to advance towards its goal of aligning the Climate Change Mitigation Strategy to 2050 with the ambition of the Paris Climate Change Agreement.

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