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Reducing Australian motor vehicle greenhouse gas emissions

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ABSTRACT

Australians are one of the world's highest per capita emitters of greenhouse gases, yet the country's target for emissions reductions by 2030 remains modest. This paper looks at policy options for Australian cities to deliver faster emissions reductions than the national commitment level. The main focus is on an accelerated reduction in emissions from urban road transport, through technological improvements and behaviour changes. Targets are proposed for improved emissions intensities, to bring Australia much closer to US and EU performance expectations. A range of behaviour change measures is then tested on Melbourne and Sydney, the Sydney analysis using MetroScan-TI, an integrated evaluation framework, to explore how behaviour changes might enhance emissions outcomes. The potential contribution of public transport is a particular focus. The paper concludes that, with sufficient political will, Australia could reduce its 2030 road transport emissions to 40% below 2005 levels. This is a much larger reduction than the current 26–28% Australian target but is more consistent with longer term pathways to acceptable carbon budgets.

1. Context: the challenge

The 2015 UN Paris Climate Change Conference (COP 21) confirmed a target of keeping the global rise in temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit these increases to 1.5 °C. It saw 186 countries committing to reducing their national greenhouse gas (GHG) emissions towards this end. The total of those commitments was, however, still seen as being associated with global warming of 2.6–3.1 °C, well above the target (Rogelj et al., 2016).

Australia is one of the world's highest per capita emitters of GHG (Union of Concerned Scientists, nd), typically only exceeded by a small number of oil producing states. Australia's Paris commitment to lower its GHG emissions by 26–28% on 2005 levels by 2030 was well below commitments made be a range of other countries, as illustrated in Fig. 1. From a longer term perspective, we have previously argued that high emitting countries like Australia should be aiming for greenhouse gas emission reductions by 2050 of at least 80% (on 2000 levels), well above the current national target (of 60% reduction) (Stanley et al., 2011).

The scale of Australia's 2030 commitment has been seriously challenged by two members of the Australian Government's Climate Change Authority. Hamilton and Karoly (2016) argue that, based on the Authority's 2014 recommended Australian carbon budget of 10.1 $GtCO^2$-e for the period 2013–50, a 26–28% reduction by 2030 places an excessive burden on emissions reduction beyond 2030, to the point where Australia would need to reach net zero emissions by 2035. To ease this transition path, they recommend that the Australian 2030 target should be a reduction of 40–60% on 2005 levels, not 26–28%.

The primary purpose of the present paper is to assess the prospects for achieving a GHG emissions reduction outcome at the

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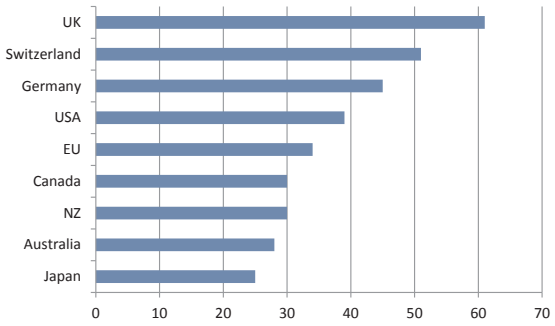

Fig. 1. GHG reduction committed by 2030, on 2005 levels (%)*. Note: *Where a country has nominated a range (e.g.,Australia and the US), the top of the range is shown.
Source: http://climatechangeauthority.gov.au/comparing-countries-emissions-targets.

bottom end of the 40–60% range for Australia's road transport sector by 2030, recognising that it is often thought that achieving transport emissions reductions is more difficult than achieving reductions from stationary energy sources. The paper summarises progress in Australia's efforts to reduce road transport GHG emissions. It then identifies the broad magnitude of changes that would be required if road transport was to make a proportionate contribution to a national reduction target of 40 + % by 2030, from a 2005 base, and assesses the feasibility of such changes, using some modelling applications.

Estimating future road transport GHG emissions requires, inter alia, assumptions about changes over time in

1. vehicle emissions intensities and
2. vehicle use (vehicle kilometres of travel or VKT).

These are, respectively, primarily about technological change and behaviour change, an organising framework that is used in the paper.

The paper is organised as follows. Section 2 discusses the general approach taken to develop a pathway for lower road transport GHG emissions, noting a number of similar approaches that have been taken for other countries or cities. Section 3 reviews trends in Australian road transport GHG emissions and in vehicle use. Section 4 looks at emissions intensities and asks whether reductions of 40 + % might be achievable between 2005 and 2030. Sections 5–7 then look at the question of vehicle use. A range of policy outcome areas are identified in Section 5 as potentially significant contributors to reducing growth in vehicle use, consistent with achievement of an overall reduction of road transport GHG emissions of around 40% by 2030. Sections 6 and 7 explore growth in VKT in Melbourne and Sydney respectively, these being Australia's two largest cities, and ways in which this growth might be slowed in coming years. Section 8 sets out the conclusions of the paper.

2. Approach

The research reported in this paper uses a scenario-based approach, similar to the approach taken in our earlier paper (Stanley et al., 2011) and to backcasting exercises undertaken by, for example, Åkerman and Höjer (2005) for Sweden, Hickman et al. (2010) for the UK and Hickman et al. (2014) for Auckland in New Zealand. Each of those applications identified the transport sector as lagging in terms of its contribution to GHG emission reductions and underlined the importance of both substantial technological change, to reduce emissions intensity, and behaviour change, to reduce VKT. We develop an aggregate scenario that is consistent with Australia meeting a 40% road transport GHG reduction target by 2030, against a 2005 base, and then consider the feasibility of delivering the various components of that scenario. Stanley et al. (2011) demonstrated that improvements in emissions intensity would need to make the major contribution to emissions reduction. Failure to achieve this, we showed, places demands on behaviour change that are almost certainly infeasible in terms of reaching aggregate target emissions reductions. Our scenario was thus developed with emissions intensity as the major contributor, as most similar studies agree (e.g., Hickman et al., 2010, 2014). European and US emission standards form the basis for our scenario in that regard, Australia not having mandatory standards. Having such a large part of the developed world with mandated standards in place makes the political task of achieving commitment in Australia more likely, in our view (one of us having been involved in these processes in a past life).

Behavioural components in our scenario draw on cities that we regard as best practice and having similar spatial and socio-demographic characteristics as Australian cities. Thus, for example, while we applaud, and envy, the cycling mode shares achieved in cities like Copenhagen, Amsterdam and Freiburg, these cities have little in common with Sydney and Melbourne. As Hickman et al. (2014) show, Western European cities generally have much higher densities, much lower rates of car ownership and much lower parking space availability than cities in Australia and New Zealand. One result is that European cities typically have per capita public transport boarding rates several times higher than their Australian counterparts. Cities like Vancouver and Portland (Oregon) are, we believe, more relevant for what might be achievable in terms of Australian behaviour change, with the European model cities as longer term guiding lights.

The scenario we assess is obviously not the only one that might achieve a 40% cut in Australian road transport GHG emissions by