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Embodied Greenhouse Gas Emissions Target

For decision: For noting:

Te tūtohunga / Recommendation

That the Auckland Transport (AT) Board (board):

- (a) Adopts the Auckland Transport Embodied Greenhouse Gas Emissions Target of 50% by 2031 (from 2021/22 baseline).

Te whakarāpopototanga matua / Executive summary

1. AT, as a responsible organisation and as part of the community, must act to reduce its greenhouse gas emissions and prepare for the impacts of climate change. To show commitment to reducing emissions, AT should publicly adopt an embodied emissions reduction target of 50% by 2031, using the Regional Land Transport Plan (RLTP) 2021 emissions in 2021/22 as the baseline (needed to keep global temperature increases below 1.5°C by 2100).
2. Embodied emissions include emissions from the materials and methods that AT uses to construct and maintain the transport network. While it excludes the emissions associated with the construction of third-party developments, it does include the maintenance of new roads for example, once vested to AT. Embodied emissions represent a significant proportion of emissions compared to AT operational emissions (about fifteen times greater), and these targets are of reputational importance and essential to our social license to operate. The embodied emissions target *complements* existing targets that address other sources of transport emissions AT operational and public transport operational emissions.
3. Auckland Council through its C40 obligations and the Auckland Climate Plan, has committed to a 50 per cent reduction by 2030 of the entire regions 2016 emissions (needed to limit global temperature increases to within 1.5°C by 2100); a reduction contributing to the Climate Change Response (Zero carbon) Amendment Act 2019 target of net zero emissions by 2050. The Emissions Reduction Plan (ERP) budget requires an average total reduction of 21% by 2030 (on 2019). However, neither of these targets specifically identify or suggest a target for embodied emissions.
4. Reduced embodied emissions will require more than just the implementation of low carbon materials and technologies. A target of 50% would require a carbon cost management (CCM, similar to whole of life) approach to understand the relationship between carbon emissions and cost associated with infrastructure delivery. Building less and building “clever” through efficient design, reducing material quantities and minimising construction operations leads to less carbon and less cost. AT would require a shift to “building less” with increased efficiency. ATs contractors would implement many of the low carbon technologies on the network as they seek to reduce their own emissions, reducing

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the cost implications for AT. As the market and supply chain for low carbon materials evolves, low carbon solutions will become less expensive and contribute to achieving the proposed target.

5. The Science Based Target Initiative (SBTI) target of 46% reduction by 2031 is required to keep warming below 1.5°C by 2100. This is the aspirational target required for AT to maintain its Climate Leaders Coalition (CLC) membership. The SBTi target of 27% reduction by 2031 is required to keep warming below 2°C by 2100. Adoption of this more achievable target would require AT to give up its CLC membership. The recommendation is to maintain membership of CLC and adopt the higher aspirational target of 46% (rounded to 50%).

Ngā tuhinga ō mua / Previous deliberations

Date	Report Title	Key Outcomes
15 February 2023 Design and Delivery Committee (committee)	Embodied Greenhouse Gas Emissions Target	The committee recommended the adoption of the Embodied Greenhouse Gas Emissions Target by the board.

Te horopaki me te tīaroaro rautaki / Context and strategic alignment

Context

6. The past several years has seen growing global, national and local urgency in the need to address climate change. AT, as a responsible organisation and as part of the community, must act to reduce its greenhouse gas emissions and prepare for the impacts of climate change. If AT does not act, growing expectations from stakeholders will soon create pressure to react – reactive responses to climate change will be ineffective, given the scale of the issue. To have the best possible outcome for Auckland and AT, continuing to act proactively on climate change is critical.
7. The first step in being proactive was shown through setting operational emission reduction targets based on what is needed to limit the impact of climate change. To show commitment, in 2018, AT (together with Auckland Council, Eke Panuku, and Watercare) joined the CLC,¹ which required a public commitment to an organisational emissions reduction target that will keep the planet within 2°C of warming by 2100 – this

¹ The Climate Leaders Coalition (<https://www.climateleaderscoalition.org.nz/>) was launched in July 2018 to promote leadership and collective action on climate change among organisations. Currently, 93 members across all sectors of the economy collectively represent 60% of New Zealand's emissions.

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translated to a 30% emissions reduction by 2030. In 2020, AT has established an 50% reduction target for the operational emissions by 2030. More recently Auckland Council and AT approved the Transport Emissions Reduction Plan (TERP) to proactively reduce enabled emissions by 64%. The next step in being proactive is to commit to an embodied emissions reduction target.

8. Embodied carbon emissions refer to the total emissions caused by the extraction, manufacture and supply of construction products and materials, as well as the construction, maintenance, and end of life disposal processes. All the embodied emissions associated with AT assets fall under scope 3² emissions and include:
 - Materials such as asphalt, concrete, steel used in the road corridor and the energy/fuel used to deliver the materials to site and construct (by contractors).
 - Maintenance activities such as rehabilitating a road pavement or repairing a footpath and lamppost includes both AT constructed roads and those vested to AT by developers.
9. Embodied emissions represent a significant proportion of emissions relative to the operational emissions of the transport assets that AT owns and operates, approximately fifteen times higher (156,000 tonnes of carbon dioxide compared to 10,407 tonnes of operational emissions in 2021/22). The embodied emissions target *complements* existing targets that address other sources of transport emissions.
10. While operational emissions targets are increasingly common, those for embodied emissions have yet to be widely adopted, reflecting the complexity of measuring these emissions. In New Zealand, MBIE has established a target for the residential building industry (20% reduction), Watercare has set a 40% “less” target for its network (from 2024) and The Infrastructure Sustainability Council of Australia (ISCA) has selected a target of 30% for a Level 3 or “leading” sustainability rating (Central Rail Link achieved 15%).
11. CLC¹ signatories are required to set scope 3² reduction target(s) aligned with 1.5°C and/or supplier or customer engagement target(s) for scope 3 emissions within two years of signing up to the Statement or by September 2025 (whichever is soonest). The target must account for at least two-thirds of the organisations embodied emissions – acknowledging the complexity of assessing 100%. The Auckland Climate Plan (2020) identifies embodied carbon in both the built environment and transport priorities and refers to low carbon materials but does not establish a numerical target. Waka Kotahi is currently measuring the embodied emissions associated with the highway network and will look to follow ATs approach.

² Scope 3 emissions are the result of *activities* on assets that AT owns or controls but indirectly delivers – for example, contractor activities and materials consumed as part of a road rehabilitation. The scope 3 emissions for one organization are the scope 1 (operational) and 2 (electricity) emissions of another organization. Scope 3 emissions, also referred to as value chain emissions, often represent the majority of an organization’s total GHG emissions. Although these emissions are not under the organization’s *direct* control, AT is able to impact/influence the activities that result in the emissions through procurement practices with suppliers/vendors.

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12. Adoption of an embodied emissions target would establish AT as a leader in this area and send a strong signal to industry and supply chain organisations. The target would incentivise AT contractors to reduce their scope 1 emissions.
13. Any embodied emissions reduction target adopted by AT will have the status of an AT policy position. Aside from that, based on legal advice provided previously for the operational emissions target, adopting the target does not have any particular legal implications; nor are there implications if the target is not met.

Ngā matapakinga me ngā tātaritanga / Discussion and analysis

14. Waka Kotahi recently developed a PEET (Project Emissions Estimation Tool) model to estimate the embodied emissions associated with their transport network. Through collaboration with Waka Kotahi, AT has expanded the tool to include the elements found in local roads such as different pavements, lampposts, traffic signals, footpaths, catchpits and cycle lanes. In agreement with Waka Kotahi, this updated (and open source) model will be made available to other road controlling authorities around New Zealand, to support smaller Councils in estimating the emissions associated with their local networks.
15. To estimate ATs embodied emissions, 17 projects or programmes based on the breadth of assets AT constructs or maintains in the RLTP 2021 were selected and the elements, quantities of materials and emission factors of each material were assessed. The modelled embodied emissions were then extrapolated across the remaining project/programmes in the RLTP to estimate the total emissions associated with the 10-year programme. The total embodied emissions of the RLTP were estimated at 1,532,691 tCO₂e. The modelled projects contributed 901,332 tCO₂e, with the predicted projects having 631,539 tCO₂e. This contrasts with the road system emissions (total) of 4,400,000 tCO₂e in 2018.
16. The annual embodied emissions across the RLTP programmes based on relative spend allocated across the 10-years are presented in Attachment 1. The main contributors are highlighted; with the renewals and maintenance programme being the largest embodied emissions source. Scenario modelling has identified the use of concrete and steel and the energy use associated with transport of materials/construction works on site as the largest contributors to embodied emissions.
17. Three reduction targets are illustrated in Attachment 2: 23% reduction by 2031 (from the 21/22 baseline average) achieved with the uptake of low carbon material options and supplier transport changes; 27% reduction by 2031 required to keep warming below 2°C by 2100 and 46% reduction required to keep warming below 1.5°C by 2100. The latter two targets have been calculated using the Science Based Target Initiative (SBTI) assessment methodology required by CLC. Membership of CLC requires AT to seek the higher target of 46% (or rounded to 50%).
18. To achieve the target of 50% AT has to move towards a “carbon cost management” approach as illustrated in Attachment 3. Such an approach focusses on reducing carbon emissions ahead of cost reduction. If less is constructed, less carbon is emitted by default, and it costs less to build. Over the next 8-10 years this would involve efficient design of the capital programme, using less materials to build new infrastructure and building *clever* (construction efficiency). The CCM approach seeks to utilise the existing infrastructure to its maximum extent. This approach is considered international best practice and is currently underway in both Sweden and the United Kingdom. It is also the approach Watercare is

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taking to achieve 40% less carbon emissions from 2024. Maintenance of existing infrastructure is still important and should be completed “efficiently” to ensure adaptive capacity/resilience of network (Objective INF3 of the National Adaptation Plan 2022).

19. AT currently under delivers the capital programme each year relative to the baseline identified in the RLTP (2021). This alone contributes in the order of a 20% embodied emissions reduction. While the use of low carbon materials is important, alone, it would not provide the substantial reduction in embodied emissions that AT is required to achieve to meet the 46 or 50% target. Further, widescale use of such materials on the network would currently increase the cost of construction/maintenance (by approximately 20%+) as these materials are not yet widely available and supply chains have yet to be formally established (see Attachment 3 for Carbon Cost Tipping Point). Most large contractors working on the AT network also have scope 1 and 2 (operational) reduction targets and will seek to implement low carbon construction methods to achieve their own target requirements, benefiting AT by default. To facilitate the uptake of low carbon methods and materials, AT currently supports trials on the network through renewals and maintenance contracts, requiring AT to share the risk associated with these changes (and also the cost at times). Adoption of the 46% (50%) target (relative to the 21/22 baseline) would send a strong signal to supply chain and industry partners that AT wants to drive development and innovation across the materials and supply chain markets.
20. The embodied emissions may be expressed in two different ways to recognise the limited control AT has over the scope 3 emissions associated with third party developers. Projects or programmes where AT has influence over the materials and construction methods would use the 50% reduction target (to be established as a requirement through the procurement process, for example). Where AT has less opportunity to influence (such as the increasing length of the road network due to construction and vesting by developers), the embodied emissions could be expressed X tCO₂e/km of new network. Such an approach would enable AT to separate the emissions directly attributable to AT programmes and projects from those vested by third parties when reporting progress.

Ngā tūraru matua / Key risks and mitigations

Key risk	Mitigation
Supply chain delays or insufficient recycled materials available.	Collaborate closely with supply chain market and industry leaders to support establishment of new supply lines and forward programming.
Innovation and technological advancements not forthcoming.	Collaborate with research partners, industry, and suppliers to investigate alternative products and international best practice.
Insufficient support within AT for building less and clever.	Align project decision making with AT strategic direction, emissions targets, and funding.

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Ngā ritenga-ā-pūtea me ngā rauemi / Financial and resource impacts

21. A 50 per cent target would likely require a commitment to build less and clever – utilising the existing network to its fullest extent. This is expected to cost less than the current capital programme. Building less saves money and supports the uptake of new materials/technologies without increasing the overall funding envelope.

Ngā whaiwhakaaro o te taiao me te panonitanga o te āhuarangi / Environment and climate change considerations

22. Meeting the recommended target will reduce emissions of greenhouse gases.

Ngā whakaaweawe me ngā whakaaro / Impacts and perspectives

Mana whenua

23. Mana whenua engagement has confirmed their support for an embodied emissions target and increased efficiency in delivering our transport system.

Ngā mema pōti / Elected members

24. These stakeholders have not been directly consulted but there are increasing expectations from many stakeholders to commit to targets publicly.

Ngā rōpū kei raro i te Kaunihera / Council Controlled Organisations

25. Discussions with Watercare have been on-going and our different approaches reflect the different networks AT/Watercare are responsible for.

Ngā kiritaki / Customers

26. These stakeholders have not been directly consulted but there are increasing expectations from many stakeholders to commit to targets publicly.

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Ngā whaiwhakaaro haumarū me ngā whaiwhakaaro hauora / Health, safety and wellbeing considerations

27. The impacts of climate change have potentially significant impacts on health, safety and wellbeing. Committing to and meeting a target will contribute to lowering the effects of climate change.

Ā muri ake nei / Next steps

28. Apply PEET tool to AT projects during scheme development and detailed design phases to identify opportunities to reduce embodied emissions through ensuring the fullest use of our network capacity.

29. Collaborate with industry, research partners and supply chain representatives to drive greater innovation and opportunity.

30. Develop an AT operating model for climate change and environment related decisions to align strategic direction of investments and programmes with the carbon cost management approach (required to achieve the target).

31. Develop a board reporting tool using carbon cost management approach to report on emissions “payback” time of proposed projects/works


Ngā whakapiringa / Attachments

Attachment number	Description
1	Annual estimated embodied emissions for 2021 RLTP
2	Embodied emissions reduction targets
3	Carbon reduction potential over time

Te pou whenua tuhinga / Document ownership

Submitted by	Dr Cathy Bebelman Environment Programme Director	
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