Hawke's Bay

Meeting of the Climate Action Joint Committee

Date: 22 May 2023

Time: 1.30pm

Venue: Council Chamber
Hawke's Bay Regional Council
159 Dalton Street
NAPIER

Agenda

Hawke's Bay

Climate Action Joint Committee

22 May 2023

Subject: Climate Action Joint Committee - Terms of Reference and membership confirmation

Reason for Report

1. This item provides the opportunity for the Climate Action Joint Committee to confirm its Terms of Reference and its membership.

Background /Discussion

2. The desire to establish a Joint Committee to oversee climate mitigation and adaptation work first arose at the Hawke's Bay Local Government Leaders (and CEs) Forum meeting on 31 October 2022. It was agreed that a joint committee provides an effective vehicle for a coordinated response to climate change, identified in the Triennial Agreement as a significant cross-council priority affecting all communities in the Hawke's Bay region.

3. It also provides a platform for the work required of councils in meeting their statutory obligations to "have regard to" the *National Emissions Reduction Plan* and *National Adaptation Plan*, as well as meet obligations under the *Spatial Planning* and *Natural & Built Environments* legislation.

4. The TOR set out the membership, meeting frequency and purpose. It is proposed that meetings are held at least 3 times per year. Consideration could be given to holding meetings in different locations to reinforce regional representation.

5. The TOR was adopted by the HBRC on 25 January 2023, and subsequently adopted with minor amendments by Hastings District Council on 2 March 2023, Napier City Council on 16 March 2023, Central Hawke's Bay District Council on 23 March 2023, and due to be adopted by Wairoa District Council on 16 May 2023. These minor changes are incorporated into the Terms of Reference attached.

Membership

6. The following appointments have been made:

   6.1. Representing Hawke's Bay Regional Council:
      6.1.1. Chair Hinewai Ormsby appointed as Chair of the Joint Committee, Councillor Xan Harding, and Councillor Di Roadley as alternate

   6.2. Representing Hawke's Bay Regional Council's Māori Committee
      6.2.1. Taiwhenua representatives Dr Roger Maaka (Tamatea taiwhenua) and Paul Kelly (Wairoa taiwhenua), and Marei Apatu (Heretaunga Taiwhenua) as alternate.

   6.3. Representing the Regional Planning Committee PSGE appointers:
      6.3.1. Tania Hopmans (RPC Co-chair, Maungaharuru-Tangitū Trust) and Keri Ropiha (RPC Deputy Co-chair, Heretaunga Tamatea Settlement Trust)

   6.4. Representing Central Hawke's Bay District Council:
      6.4.1. Mayor Alex Walker and Councillor Tim Aitken, and Councillor Jerry Greer as alternate.

   6.5. Representing Napier City Council:
      6.5.1. Councillors Annette Brosnan and Hayley Browne, and Councillor Chad Tareha as alternate.

6.6. Representing Hastings District Council

6.6.1. Mayor Sandra Hazlehurst and Councillor Ann Redstone, and Councillor Tania Kerr as alternate.

6.7. Representatives of Wairoa District Council to be confirmed.

Technical Advice

7. A Technical Advisory Group (TAG) will comprise of staff members from the member councils who are working in climate mitigation and adaptation, and will involve subject matter experts as required to ensure linkages with other workstreams, such as the work of the Regional Transport Committee, and the Clifton to Tangoio Coastal Hazards and Napier-Hastings Future Development Strategy joint committees.

8. Chief Executives from each of the partner councils are asked to nominate one or more technical specialists in, for example, risk and/or asset management for climate adaptation, planners and transport specialists for emissions reduction to initiate the TAG. Taiwhenua and PSGE representatives are invited to nominate members as capacity allows.

Financial and Resource Implications

9. HBRC will be the administering authority for the Joint Committee and will cover the costs of administration and tangata whenua representatives' remuneration.

10. Funding for technical inputs will predominantly come from the existing HBRC budget with contributions on a case-by-case basis from member councils, as per the status quo.

11. Consideration could be given to sharing the costs for tangata whenua participation and technical inputs, similar to the Napier-Hastings Future Development Strategy Joint Committee, between all the member councils as part of the next LTP.

Decision Making Process

12. Council and its committees are required to make every decision in accordance with the requirements of the Local Government Act 2002 (the Act). Staff have assessed the requirements in relation to this item and have concluded:

12.1. The decision does not significantly alter the service provision or affect a strategic asset, nor is it inconsistent with an existing policy or plan.

12.2. The use of the special consultative procedure is not prescribed by legislation.

12.3. The decision is not significant under the criteria contained in Council's adopted Significance and Engagement Policy.

12.4. Given the nature and significance of the issue to be considered and decided, and also the persons likely to be affected by, or have an interest in the decisions made, Council can exercise its discretion and make a decision without consulting directly with the community or others having an interest in the decision.

Recommendations

That the Climate Action Joint Committee:

1. Receives and considers the *Climate Action Joint Committee- Terms of Reference and membership confirmation* staff report.

2. Accepts the Terms of Reference (attached) including amendments agreed today.

3. Confirms the membership of the Climate Action Joint Committee, being:

3.1. Chair Hinewai Ormsby appointed as Chair of the Joint Committee, Councillor Xan Harding, and Councillor Di Roadley as alternate – representing Hawke's Bay Regional Council

3.2. Taiwhenua representatives Dr Roger Maaka (Tamatea taiwhenua) and Paul Kelly (Wairoa taiwhenua), and Marei Apatu (Heretaunga Taiwhenua) as alternate – representing Hawke's Bay Regional Council's Māori Committee

3.3. Tania Hopmans (RPC Co-chair, Maungaharuru-Tangitū Trust) and Keri Ropiha (RPC Deputy Co-chair, Heretaunga Tamatea Settlement Trust) – representing the Regional Planning Committee PSGE appointers

3.4. Mayor Alex Walker and Councillor Tim Aitken, and Councillor Jerry Greer as alternate – representing Central Hawke's Bay District Council

3.5. Councillors Annette Brosnan and Hayley Browne, and Councillor Chad Tareha as alternate – representing Napier City Council

3.6. Mayor Sandra Hazlehurst and Councillor Ann Redstone, and Councillor Tania Kerr as alternate – representing Hastings District Council

3.7. To be confirmed – representing Wairoa District Council.

4. Recommends the Terms of Reference agreed today to each of the Partner Councils for adoption.
5. Requests that Chief Executives of partner councils nominate one or more technical specialists to be on the Technical Advisory Group.

Authored by:

Leeanne Hooper
Team Leader Governance

Pippa McKelvie-Sebileau
Climate Action Ambassador

Approved by:

Desiree Cull
Executive Officer to CE

Attachment/s

1⇩ 16 May 2023 Climate Action Joint Committee Terms of Reference for confirmation

Terms of Reference
for the
Climate Action Joint Committee

Adopted by resolution of:

Hawke's Bay Regional Council, 25 January 2023

Hastings District Council, 2 March 2023

Napier City Council, 16 March 2023

Central Hawke's Bay District Council, 23 March 2023

Wairoa District Council, 16 May 2023

1. Name and status of Joint Committee

1.1. The Joint Committee shall be known as the Climate Action Joint Committee.

1.2. The Joint Committee is a joint committee under clause 30(1)(b) of Schedule 7 of the Local Government Act (the Act).

2. Purpose

2.1. Climate mitigation and adaptation is core business for councils. It spans multiple council workstreams such as urban planning, land-use and resource management, transport, flood protection, coastal hazards and emergency management. Without duplicating effort, the purpose of the Joint Committee is to support a coordinated and collaborative response to address the complex challenge of Climate-Resilient Development[1] for the communities of Hawke's Bay.

2.2. The focus of the Joint Committee will be promoting action to mitigate climate change (emissions reductions and offsetting) and adapt to the changing regional climate.

2.3. The Joint Committee aims to support resilient communities and industries to become resilient to the effects of climate change and to thrive within boundaries of our natural environment.

3. Objectives

3.1. Oversee and guide the development and implementation of a Regional Emissions Reduction Plan including recommending actions for partner councils to consider for inclusion in their Long Term Plans.

3.2. Oversee and guide the development and implementation of a spatial Regional Climate Risk Assessment to deliver on responsibilities under the National Adaptation Plan to:

3.2.1. Reduce vulnerability to the impacts of climate change

3.2.2. Enhance adaptive capacity and consider climate change in decisions at all levels

3.3. Strengthen resilience

3.4. Support compliance with the statutory requirement to "have regard to" the National Emissions

[1] Climate Resilient Development is a framework developed in the Intergovernmental Panel on Climate Change 6th report – Impacts, Adaptation and Vulnerability. It combines strategies to adapt to climate change with actions to reduce greenhouse gas emissions to support sustainable development for everyone (FAQ 6: What is Climate Resilient Development? ipcc.ch)

Reduction Plan and the National Adaptation Plan in all RMA-related plans of partner councils[2].

3.5. Inform planning to drive climate-resilient development in the right locations within the Future Development Strategy required under the National Policy Statement on Urban Development, and the Regional Spatial Strategy and regional combined plan proposed under the Spatial Planning and Natural and Built Environments legislation.

3.6. Collaborate on the delivery key services for infrastructure impacted by climate change on respective councils.

4. Membership[3]

4.1. Up to two elected members from the Hawke's Bay Regional Council; being the Chair and one other elected member, and one alternate.

4.2. Up to two elected members from each Territorial Authority within the Hawke's Bay region; preferably the Mayor and one other elected member, and one alternate.

4.3. Up to two members and one alternate appointed to represent the Post [Treaty] Settlement Governance Entity (PSGE) representatives on the HBRC Regional Planning Committee[4].

4.4. Up to two members and one alternate appointed to represent the Ngāti Kahungunu Taiwhenua and Board representatives on the HBRC Māori Committee[5].

4.5. Under clause 30A(6) Schedule 7 of the Act, the power to discharge any member on the Joint Committee and appoint his or her replacement shall be exercisable only by the body that appointed the member.

5. Chairperson and Deputy Chairperson

5.1. The Chairperson of the Joint Committee will be the Chair of the Hawke's Bay Regional Council.

5.2. At the first meeting of the Joint Committee the members shall elect a Deputy Chairperson.

5.3. The mandate of the Chairperson and Deputy Chairperson ends if that person, through resignation or otherwise, ceases to be a member of the Joint Committee.

6. Delegated authority

The Joint Committee has delegated responsibilities for:

6.1. Guiding and monitoring climate mitigation and adaptation across the region with current and relevant technical inputs.

6.2. Leading regional emissions reduction plans including recommending actions for consideration to partner councils to include in their long term plans

6.3. Leading spatial regional climate risk assessments to deliver on responsibilities under the National Adaptation Plan

6.4. Setting targets, including interim goals, towards achieving carbon neutrality by 2050

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[2] From 30 November 2022 it is a legal requirement for local government to 'have regard to' the national adaptation plan and the emissions reduction plan when preparing or changing regional policy statements, regional plans and district plans. (Guidance note environment.govt.nz)

3 Membership will be reviewed at the end of the three-yearly cycle.

[4] HBRC Regional Planning Committee is a co-governance committee composed of an equal number of elected councillors and appointees from each of the Post Settlement Governance Entities (PSGEs) within the HB Region.

[5] HBRC Māori Committee has 13 tangata whenua representatives, 3 from each of the Taiwhenua (and Wairoa Kahungunu Executive) within the Hawke's Bay regional boundary and 1 from the Ngāti Kahungunu Iwi Inc Board.

6.5. Monitoring regional greenhouse gas emissions (community carbon footprint) on a regular basis and reporting annually on implementation of regional emissions reduction plans

6.6. Considering and recommending key emissions reduction actions to each of the partner councils and industry for consideration

6.7. Advocating for and/or advancing the objectives of regional climate action by submitting on and participating in processes, at the Joint Committee's discretion, including but not limited to:

6.7.1. Council long term plans

6.7.2. Council annual plans

6.7.3. District and regional plan and policy changes

6.7.4. Reserve management plans

6.7.5. Asset management plans

6.7.6. Notified resource consent applications

6.7.7. Central Government policy and legislation

6.7.8. Investigating and securing additional sources of funding to support regional decarbonisation, offsetting and protecting communities from the impact of climate change.

6.8. For the avoidance of doubt, the Joint Committee can only make recommendations to partner councils. Without legally binding subsequent council decisions, the partner councils agree to:

6.8.1. Have particular regard to the recommendations of the Joint Committee in developing policies, determining priorities, and allocating resource;

6.8.2. Progress, to the fullest possible extent, actions identified through joint planning and decision-making arrangements.

7. Powers not delegated

The following powers are not delegated to the Joint Committee:

7.1. Any power that cannot be delegated in accordance with clause 32 Schedule 7 of the Local Government Act 2002.

7.2. Decisions relating to the allocation of funding for undertaking investigations, studies and/or projects in climate adaptation, offsetting or climate mitigation and matters relating to consenting.

8. Meetings

8.1. The Hawke's Bay Regional Council standing orders will be used to conduct Joint Committee meetings as if the Joint Committee were a local authority and the principal administrative officer (Chief Executive) of the Hawke's Bay Regional Council or his or her nominated representative were its principal administrative officer.

8.2. The Joint Committee shall hold meetings at such frequency, times and place(s) as required for the performance of the functions, duties and powers delegated under this Terms of Reference, at least three times per year.

8.3. Notice of meetings will be given as far in advance a possible to all Joint Committee members, and in accordance with the provisions of the Local Government Official Information and Meetings Act 1987.

8.4. Meetings may provide for members' attendance by audio-visual link if required.

8.5. Members, or their confirmed alternates, will attend all Joint Committee meetings.

8.6. The quorum will consist of a majority of members.

9. Voting

9.1. In accordance with clause 32(4) Schedule 7 of Act, at meetings of the Joint Committee each member has full authority to vote and make decisions within the delegations of the Terms of Reference on behalf of the body that appointed them without further recourse to the appointing body.

9.2. Where voting is required, each member has one vote.

9.3. Best endeavours will be made to achieve decisions on a consensus basis.

9.4. The Chairperson at any meeting has a deliberative vote and, in the case of equality of votes, may use a casting vote.

10. Good faith

10.1. In the event of any circumstances arising that were unforeseen by the partner councils or their representatives at the time of adopting these Terms of Reference, the partner councils and their representatives hereby record their intention that they will negotiate in good faith to add to or vary these Terms of Reference so as to resolve the impact of those circumstances in the best interests collectively of the partner councils taking into account also the views of the Regional Planning Committee and Māori Committee appointed members in relation to those circumstances.

11. Remuneration

11.1. Each partner council shall be responsible for remunerating its representatives on the Joint Committee and for the costs of those persons' participation in the Joint Committee.

11.2. Hawke's Bay Regional Council as the Administering Authority shall be responsible for remunerating the Regional Planning Committee and Māori Committee representatives on the Joint Committee for travel and attendance as per its agreed meeting fees policy.

12. Technical Advisory Group and Reporting

12.1. A technical advisory group (TAG) will service the Climate Action Joint Committee.

12.2. The TAG will comprise of staff members from the partner councils who are working in climate mitigation and adaptation and will involve subject matter experts as required to ensure linkages with other workstreams, such as the work of the Regional Transport Committee and Napier-Hastings Future Development Strategy Joint Committee. The TAG will be led by the Hawke's Bay Regional Council Climate Action Ambassador along with the dedicated climate roles at Napier City Council and Hastings District Council.

12.3. Following each meeting of the Joint Committee, the TAG shall create a summary report of the business of the meeting which will be distributed, for information, to each partner council for inclusion in the agenda for the next available council meeting. Such reports will be in addition to any formal minutes prepared by the Administering Authority, which will be circulated to Joint Committee members.

13. **Variations to the Terms of Reference**

13.1. Any member may propose a variation, deletion or addition to the Terms of Reference by putting the wording of the proposed variation, deletion or addition to a meeting of the Joint Committee for recommending to the partner councils if agreed.

13.2. Amendments to the Terms of Reference must be agreed by all partner councils before taking effect.

14. **Recommended for Adoption**

14.1. The Climate Action Joint Committee, made up of the following members, confirms this Terms of Reference as adopted by the five partner councils and Regional Planning Committee and Māori Committee representative members.

Hawke's Bay Regional Council represented by:

Councillors Hinewai Ormsby and Xan Harding, and Di Roadley as alternate.

Councillor Hinewai Ormsby as Chairperson of the Climate Action Joint Committee

Appointed by HBRC resolution on 25 January 2023.

Hastings District Council represented by:

Mayor Sandra Hazlehurst and Councillor Ann Redstone, and Councillor Tania Kerr as alternate.

Appointed by HDC resolution on 2 March 2023.

Napier City Council represented by:

Councillors Annette Brosnan and Hayley Browne, and Chad Tareha as alternate.

Appointed by NCC resolution on 16 March 2023.

Central Hawke's Bay District Council represented by:

Councillors Alex Walker and Tim Aitken, and Jerry Greer as alternate.

Appointed by CHBDC resolution on 23 March 2023.

Wairoa District Council represented by:

Councillors _____ and _____, and _____ as alternate.

Appointed by WDC resolution on 16 May 2023

HBRC Māori Committee representatives Paul Kelly and Roger Maaka and Marei Apatu as alternate.

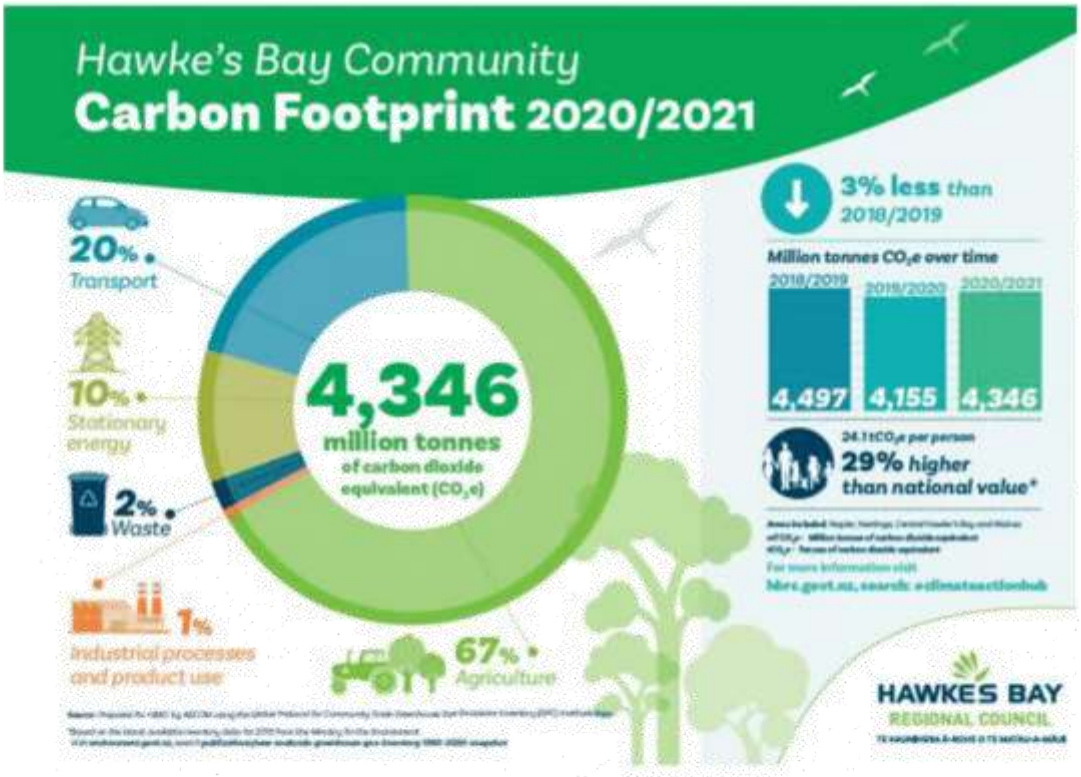
Appointed by Māori Committee resolution on 3 May 2023.

Regional Planning Committee representatives, Tania Hopmans and Keri Ropiha.

Appointed by RPC resolution on 17 May 2023.

Appendix A – Project Background

1. The Regional Council declared a climate emergency for the Hawke's Bay region on 26 June 2019. The declaration recognises that the climate crisis is an urgent and pervasive threat to human and ecological wellbeing and that we have a small window of time to act to avoid the most damaging effects of the climate crisis in the longer term. This climate crisis declaration was one of many declaration from councils across the country, with the Government declaring a climate emergency on 2 December 2020.
2. In 2022 HBRC, HDC, and NCC each invested in dedicated strategic climate change roles, an acknowledgement of the important leadership role councils can, and should, play in regional climate action.
3. There is a general acknowledgement that the transition to a low emissions future cannot be achieved by individual councils working in isolation and a regional approach is needed.
4. In 2022 the Ministry for Environment released Aotearoa's first Emissions Reduction Plan. A significant number of the actions in that plan involve Local Government.
5. In September 2022 the first Hawke's Bay Community Carbon Footprint was released, measuring greenhouse gas emissions from 2018-19 to 2020-21. Separate footprints were created for each Territorial Authority. The whole of region footprint established that our regional emissions for 2020/21 were made up of:
    5.1. Agriculture 67%
    5.2. Transportation 20%
    5.3. Stationary Energy 10%
    5.4. Waste 2%
    5.5. IPPU 1% (Industrial Processes and Product Use)



6. The next step for is to create a Regional Emissions Reduction Plan, with input from all Hawke's Bay councils, as well as significant engagement across expert, business, and community spheres.

Hawke's Bay

Climate Action Joint Committee

Monday 22 May 2023

Subject: Climate Action Joint Committee Election of Deputy Chairperson

Reason for Report

1. This item provides the means for the Climate Action Joint Committee to elect a Deputy Chairperson.

Background /Discussion

2. The Terms of Reference for the Joint Committee provide that at its first meeting the members shall elect a Deputy Chairperson.

3. The process to be followed for this election is:

   3.1. the Chair of the joint committee will call for nominations

   3.2. when there are no further nominations made, if there two or more nominees a vote will be carried out and the nominee with the most votes will be declared elected by resolution

   3.3. if there is only one nominee, that person will be declared elected Deputy Chairperson by resolution.

Decision Making Process

4. Councils and committees (including Joint Committees) are required to make every decision in accordance with the requirements of the Local Government Act 2002 (the Act). Staff have assessed the requirements in relation to this item and have concluded:

   4.1. Councils are required to (LGA sch.7 cl.19(1)) hold the meetings that are necessary for the good governance of its region

   4.2. Councils may appoint (LGA sch.7 cl. 30(1)(a)) the committees, subcommittees, and other subordinate decision-making bodies that it considers appropriate, including joint committees

   4.3. Given the provisions above, the Joint Committee can exercise its discretion and make these decisions without consulting directly with the community or others having an interest in the decision.

Recommendations

That the Climate Action Joint Committee:

1. Receives and considers the *Climate Action Joint Committee Election of Deputy Chairperson* staff report.

2. Agrees that the decisions to be made are not significant under the criteria contained in Hawke's Bay Regional Council's adopted Significance and Engagement Policy, and that the Joint Committee can exercise its discretion and make decisions on this issue without conferring with the community or persons likely to have an interest in the decision.

3. _____ nominates _____, seconded by _____

4. _____ nominates _____, seconded by _____

5. _____ nominates _____, seconded by _____

Either

6. There being no further nominations _____is declared elected Deputy Chair of the Climate Action Joint Committee.

Mover/Seconder
CARRIED

Or

7. There being no further nominations a vote was called, the results of which were:
   7.1. ___ votes for ___
   7.2. ___ votes for ___
   7.3. ___ votes for ___

and

8. As the result of voting _____ is declared elected Deputy Chair of the Climate Action Joint Committee.

Mover/Seconder
CARRIED

Authored by:

Leeanne Hooper
Team Leader Governance

Approved by:

Desiree Cull
Executive Officer to CE

Attachment/s

There are no attachments for this report.

Hawke's Bay

Climate Action Joint Committee

22 May 2023

Subject: Climate resilient development - purpose and objectives in a recovery context

Reason for Report

1. This paper provides context to support the verbal presentation by staff from HBRC, NCC and HDC on the role of climate resilient development in the recovery from Cyclone Gabrielle.
2. Background information on the global context and national legislative context are given in this paper to set the scene for the establishment of this joint committee for Climate Action.

Background

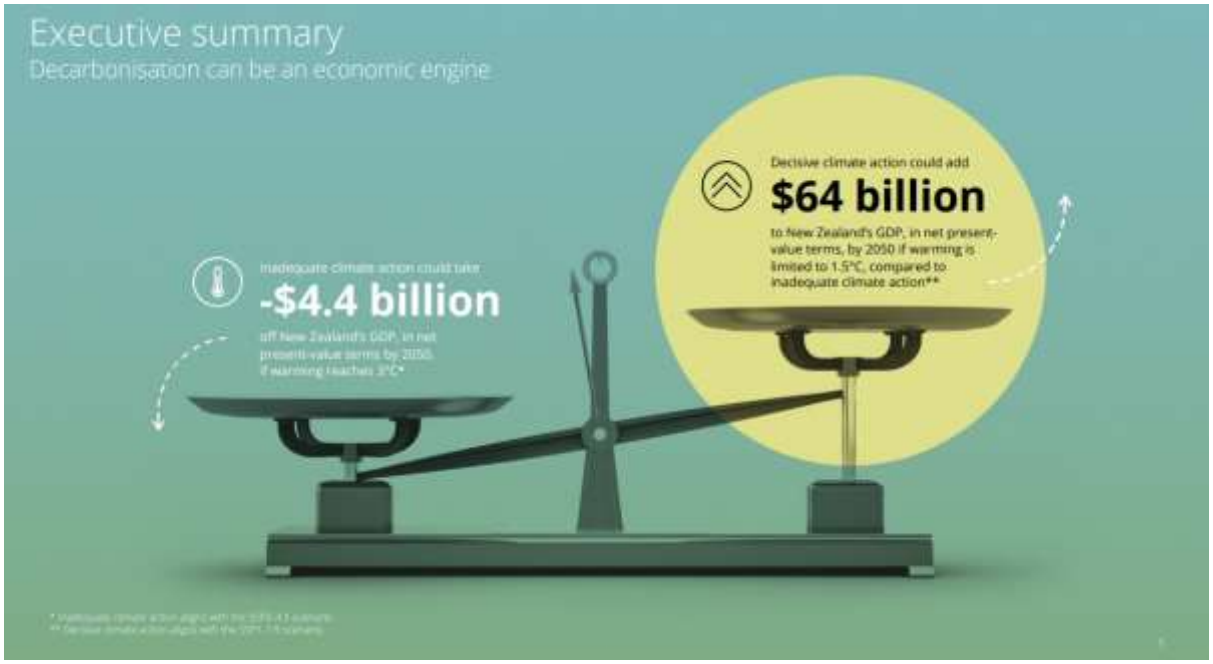
3. The purpose of the joint committee, as stated in the Terms of Reference is *to support a coordinated response to address the complex challenge of Climate-Resilient Development for the communities of Hawke's Bay*.
4. Climate Resilient Development is a solutions framework developed in the Intergovernmental Panel on Climate Change (IPCC) Impacts, Adaptation and Vulnerability report. It combines strategies to adapt to climate change with actions to reduce greenhouse gas emissions to support sustainable development. Climate-resilient development solutions integrate actions to reduce or avoid emissions with actions to protect people to advance sustainability. An example is health improvements that come from broadening access to clean energy while contributing to better air quality; another example is planting trees on highly erodible land to provide shade to stock, reduce soil erosion and landslide risk and sequester carbon.
5. To achieve climate-resilient development in Hawke's Bay there is a need to integrate robust climate risk analysis and locally appropriate resilience building and adaptation measures into national and local development policies, plans and strategies.
6. With warming currently at 1.1 degrees Celsius and set to reach 1.5 degrees by 2030 (IPCC estimates of current pathway), every increment of warming brings rapidly escalating hazards, exacerbating more intense heatwaves and floods, ocean warming and coastal inundation. These complex events are particularly severe for communities with high levels of socio-economic deprivation, children, the elderly, Māori and Pasifika.
7. In the context of regional recovery after Cyclone Gabrielle, a singular focus on climate change adaptation will not be sufficient to protect communities for the future. If emissions are not reduced and warming exceeds 3 degrees Celsius, humanity's ability to 'adapt' will be severely compromised, reaching hard limits to adaptation.

International and national context

8. The urgency for action has been well documented in previous papers to Council and in international reports such as the IPCC synthesis report signed and released by 195 member countries in March 2023. https://www.ipcc.ch/ar6-syr/
9. A recent report released by Deloitte Asia-Pacific's Turning Point demonstrates how direct climate action now links to future economic prosperity in New Zealand. Our unique position to become a leader in economic growth and prosperity through rapid decarbonisation is highlighted, with decisive action on climate change potentially adding $64 billion to New Zealand's economy by 2050.
10. At the same time, the Deloitte report cautions that inadequate action could cost $4.4 billion nationally between 2023 and 2050. By 2070, the losses could escalate to $48 billion with nearly

3,000 fewer job opportunities by 2050 due to the economic impacts of climate change. For example, if NZ falls behind on decarbonisation, key exports could be impacted as trading partners commit to net zero targets and start to focus on the sustainability of their imports. This is particularly important in a primary producing region like Hawke's Bay.

11. The modelling shows that New Zealand's turning point – the point at which the initial costs of decisive action on climate change are outweighed by the benefits of rapid decarbonisation – could occur in 2036.



National legislative context

12. The first national adaptation plan and national emissions reduction plan were released in 2022.

13. In November 2022, national legislation came into effect that, under the Resource Management Act, local government must *have regard to* the National Adaptation Plan and the National Emissions Reduction Plan. When developing RMA-related plans, local government must consider climate change issues and the role that RMA plans have in reducing greenhouse-gas emissions.

14. Some key regional activities under emissions reductions and adaptation are covered in the following sections.

Emissions reductions (mitigation)

15. **A Plan**. The development of a regional emissions reduction plan (see separate agenda item).

16. **Goal setting**. HBRC currently has a goal in its Strategic Plan for 2050 carbon neutrality: *By 2025, HBRC is carbon zero and plays a leadership role in the region's goal of net zero greenhouse gases by 2050*. This does not align with the split gas national approach that considers biogenic methane (primarily from ruminant animals) separately (giving a goal of 24-47% reduction). The Joint Committee could consider utilising a split gas approach in revising the regional goal and setting a more ambitious target with a stronger mandate since the establishment of the joint committee. Interim goals for regional emissions are also needed.

17. **Regional Community footprint.** In 2022 AECOM was commissioned to measure regional emissions for the first time. The purpose of the report was to identify areas of high emissions to inform the regional emissions reduction plan. By establishing this protocol (Global Protocol for Community Carbon Footprints) and identifying emissions data sources, and with increase scientific staff capacity at HBRC, we now have the ability to monitor regional emissions on an

annual basis as the data is released. We propose to have this information verified and audited by a third party every three years and to release a publicly available report at this time. Support for this approach is sought from the Joint Committee. It requires operational staff from each council to provide data on an annual basis, for example, waste tonnage to landfill, consents for coal burning, fuel tax collected.

18. **Emissions reductions considerations in recovery.** See separate agenda item (9) on the emissions reduction plan and the section on how transitioning to a lower carbon economy can be integrated into recovery and rebuilding.

Climate change adaptation

19. We recognise that climate change adaptation covers multiple workstreams (infrastructure, emergency management, spatial and district planning, cyclone recovery), and that these activities fall under the governance of multiple council structures (e.g. the future Joint Regional Planning Committee, Joint Committee for Coastal Strategy, HDC Eco districts committee, Recovery Committee, HB Regional Council). This paper does not attempt to cover the breadth of that work. Rather, it focuses on work underway on a regional climate change risk assessment following Ministry for Environment Guidance to local government.

20. Adaptation work must be informed by the most up-to-date scientific models that take into account predicted climate change pathways (greenhouse gas emissions pathways). A spatial-based climate change risk assessment was commenced in October 2022, covered in a separate agenda item and presentation from Urban Intelligence. Support for this approach and ongoing commissioning of risk modelling information is requested from the Joint Committee.

21. This work needs to align with risk modelling initiatives undertaken nationally (e.g. NIWA) and locally (HB Civil Defence Emergency Management Group Joint Committee) and requires a coordinated approach.

22. Building with future resilience to climate change events also means playing a part in reducing the speed of climate change. The impacts of climate change need to be considered holistically from tangible physical hazards such as fire, coastal inundation and river flooding to less tangible impacts on economy, community wellbeing, mana whenua and governance.

Locality plans

23. The establishment of the joint Committee enables a more coordinated approach to build climate change resilience for the region, particularly during cyclone recovery and rebuild.

24. While, at this time, it is natural for a large part of our focus to be on rebuilding regional infrastructure and flood management decisions, we cannot lose sight of other climate change risks (such as wildfires or drought). This requires us to lift our gaze from immediate recovery to long-term intergenerational planning and investment to ensure future resilience in a changed climate.

25. To facilitate a discussion on regional coordination, in this section, we summarise approaches to climate change and adaptation and mitigation concerns from each Council's locality plan submitted to the regional recovery agency on 28 April 2023.

HBRC environmental resilience plan

26. Environmentally-friendly and climate-resilient investment and development is one of five principles underpinning the resilience pathway. This includes planning for climate change adaptation and mitigation. The objective is to successfully combine these strategies to improve human interaction with nature and provide for a resilient environment that supports human well-being.

27. Some of the initiatives specifically relating to climate change work are:

    27.1. Understanding climate change vulnerabilities to inform future planning

27.2. managing emissions through a GHG inventory review and an emissions reduction plan to give effect to national direction

27.3. transport networks that support active and public transport.

28. Climate change is considered to be across all workstreams of the HBRC.

NCC locality plan

29. Overall objective is to create climate-resilient communities, with resilient lifelines, that take into account climate change. This involves changing our relationship with rivers and floodplains, rethinking where and how we rebuild, creating food resiliency and adequately funding community organisations, mana whenua, taiwhenua and iwi for delivering solutions for the climate and biodiversity crisis (amongst other actions).

HDC locality plan

30. Recognises that climate change is one of the biggest challenges facing our communities. There is a need for remodelling of climate change scenarios to ensure communities are appropriately placed to adapt. Recovery actions must include adaptation and mitigation and robust plans need to be developed. Funding requested to develop a climate change adaptation and resilience strategy that would include considerations of future land use planning, non-viable areas, and community appetite for risk.

CHBDC locality plan

31. Climate resilience and adaptation is one of six guiding principles. Across the district there has been an expectation that the community is not just rebuilding but building back with greater resilience and planning ahead for future climate change implications. This means ensuring homes are built in areas suitable for the future, sufficient steps are being taken to protect homes and people for the future, and taking a long-term approach. Focus on adaptation rather than mitigation.

Wairoa locality plan

32. In this early locality plan, immediate focus is on whānau wellbeing and economic recovery. However, climate change, our environment and the awa were also highlighted as concerns for community, along with having to travel for health services and our isolation. A key priority is to build resilience now and into the future to adapt to the natural hazards and changing climate impact across our district. Objective is to enable our whānau and whenua to build resilience to the impacts of climate change.

33. Unfortunately, there has not been enough time to consider all locality plans from mana whenua for this paper.

34. The above aspects of the locality plans will be presented to the meeting by Council staff for discussion.

Next steps

35. Seek support from the Joint Committee for the approach to update the regional emissions inventory annually through internal Council staff capacity and every three years using an external service to audit and verify.

36. Seek support for the approach to continue developing the spatial-based climate change and vulnerabilities assessment tool, and commissioning further data.

Decision-making Process

37. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Climate Action Joint Committee receives and notes the *Purpose and objectives in a recovery context* staff report.

Authored by:

Pippa McKelvie-Sebileau
Climate Action Ambassador

Louise McPhail
HBRC Recovery Manager

Approved by:

Desiree Cull
Executive Officer to CE

Attachment/s

There are no attachments for this report.

Hawke's Bay

Climate Action Joint Committee

22 May 2023

Subject: Spatial climate vulnerability assessment

Reason for Report

1. This item is to demonstrate the work undertaken as part of the regional spatial-based climate change risk and vulnerabilities assessment so far.
2. Dr Tom Logan from Urban Intelligence will present the online mapping tool during the committee meeting.

Background

3. The Climate Change Risk Explorer is a spatial-based regional risk assessment that layers hazards, assets and other information (e.g. socio economic deprivation) to identify exposure, vulnerabilities and consequences.
4. In October 2022, with support from climate staff at NCC and HDC, Regional Council engaged Urban Intelligence to undertake this work to inform the work of the Climate Action Ambassador and to provide the science for the climate change chapter of the Kotahi Plan as part of the Regional Council's review of its Regional Resource Management Plan.
5. UI spatial approach was collectively preferred over a more traditional risks register approach given its power to engage with the community about climate risks and its evaluation of societal consequences.
6. Since Cyclone Gabrielle it has taken on greater importance as a tool for recovery planning.

Stages of work / progress

7. Presently, stage 1 is almost complete. This stage has included all readily (publicly) available data on hazards in the region and establishing the online map of vulnerabilities. Exposure and vulnerability of infrastructure is included along with natural features and mapped socioeconomic data.
8. Infrastructure across 3 subdomains has been included: Natural, Built and Human.
9. This data has been loaded into the online maps which are currently password protected as the data has not been ground-truthed or checked systematically by Council officers.
10. The online maps will be demonstrated on screen to the Committee on 22 May.
11. The following table summarises the hazards data currently included in the model based on available city, district and regional data.

Overview of Currently Available Data

Hazard	District			
	Central Hawke's Bay	Hastings	Napier	Wairoa
Coastal Erosion	Minimal	Moderate	Moderate	Minimal
Coastal Flooding	Minimal	Moderate	Moderate	Minimal
Tidal Flooding	No known data	No known data	No known data	No known data
Tsunami	Minimal	Moderate	Moderate	Minimal
Groundwater Flooding	No known data	No known data	No known data	No known data
Fluvial Flooding	Minimal	Moderate	Moderate	Minimal
Pluvial Flooding	No known data	No known data	No known data	No known data
Landslide	Moderate	Moderate	Moderate	Moderate
Liquefaction	Minimal	Moderate	Moderate	Minimal
Earthquake Amplification	Moderate	Moderate	Moderate	Moderate
Fire	No known data	No known data	No known data	No known data
Climate Variability	High	High	High	High

Key

High	Hazard data is spatially complete and thorough. The supporting methodology is to a high standard and considers all reasonable contributing factors.
Moderate	Hazard data is spatially complete or near complete. The supporting methodology considers most reasonable contributing factors. The output data enables rigorous vulnerability assessment.
Minimal	Hazard data is spatially incomplete or covers less than 50% of the expected area. The supporting methodology is outdated or does not consider all reasonable contributing factors. The output data does not enable rigorous vulnerability assessment.
No known data	Hazard data could not be found through publicly accessible data sources or has not been received from private sources.

12. The following stages are planned:

    12.1. Stage 2: Gap filling: hazard and scenario modelling; asset data development. This stage is particularly important so that we can commission data for identified gaps in hazard information as well as include the asset / infrastructure information in the other 3 subdomains: Kaupapa Māori, Governance and Economic.

12.2. Stage 3. Second-pass risk assessment: updating the risk assessment with the new information.

12.3. Stage 4: Semi-quantitative risk assessment (workshops) to support adaptation planning and climate risk reporting.

12.4. Stage 5: Adaptation planning and community engagement.

12.5. Stage 6: Monitoring, reporting and risk iteration.

Strategic Fit

13. This work has been presented to climate change and strategy teams at NCC, HDC and CHBDC to potentially inform recovery work. Of note, it establishes vulnerabilities mapping of existing areas of infrastructure, but also for future development areas.

14. The tool will be used by the HBRC planners in the development of the spatial plan.

15. To note, there are several regional or national data sets that remain incomplete, as well as datasets that have been received by the HBRC and NCC, but are not yet approved for release into this tool.

Next Steps

16. The next step is to convene the TAG with appropriate staff from each council to consider the data gaps summarised in the table above and identified in the attached Hazard Data Gap Assessment and Recommendations and to prioritise the commissioning of further hazard modelling data to complete the gaps.

17. We have applied for recovery funding to increase scope and commission missing data modelling.

18. Feedback is sought from the Joint Committee on the role this tool could play in community engagement for recovery.

Decision Making Process

19. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Climate Action Joint Committee receives and notes the *Spatial climate vulnerability assessment*.

Authored by:

Pippa McKelvie-Sebileau
Climate Action Ambassador

Approved by:

Desiree Cull
Executive Officer to CE

Attachment/s

1⇩ Hazard Data Gap Assessment and Recommendations from Urban Intelligence, 27 April 2023

URBAN INTELLIGENCE

Hazard Data Gap Assessment and Recommendations

MEMO TO:

Hawke's Bay Regional Council

DATE:

27.04.2023

PREPARED BY:

Dr Tom Logan

Mitchell Anderson

Carolyne Nel

Summary

This memo reviews the known natural hazard information for the Hawke's Bay region, identifies gaps, and recommends areas for gap-filling. We suggest commissioning the following work to better understand the hazard environment of the Hawkes Bay Region, how it will change over time, and how this changes the region's risk profile:

1. Inland flooding. The existing fluvial flooding dataset is limited in its spatial coverage, it does not provide depth information for the flooding, and it does not include climatic changes (e.g., varying scenarios based on sea level rise). There are no known pluvial flooding models. We suggest, although we suspect this may already be underway, commissioning modelling that does this. In terms of climate change increments, we recommend not modelling RCP/SSP scenarios. Instead, to enable adaptive planning, we recommend modelling flood scenarios with different temperature rise increments, sea-level rise increments, and return intervals. This information can easily be converted to RCP/SSP scenarios, but it is challenging to go the other way as RCP/SSP scenarios are continually updated. NIWA or Aqualinc are two consultants that may be able to deliver this.
2. Coastal inundation. Coastal inundation modelling for a range of sea-level rise scenarios and return intervals already exists for the entire coast of New Zealand as it was developed by NIWA and funded by the Deep South Challenge. We suggest requesting this data from NIWA.
3. Tidal flooding. The high tidal extent modelled under different sea level rise scenarios.
4. Groundwater flooding. Shallow groundwater flooding will become increasingly prevalent as groundwater rises in response to sea-level rise. This information for the region does not exist and will need to be commissioned from Aqualinc or similar. High groundwater levels are also important to understand as they exacerbate flooding, threaten buried infrastructure, and exacerbate liquefaction risk.
5. Wildfire. Currently, no known data exists for wildfire hazards. We are meeting with the lead of the modelling team at Fire NZ and will provide an update to you then.
6. Landslides. Although a nationwide assessment of landslide risk exists, it does not account for changing climate. Chris Massey at GNS or John Dymond at Manaaki Whenua may be able to conduct modelling that does incorporate temperature change into these assessments.
7. Liquefaction. Although a regionwide assessment of liquefaction risk exists, it does not account for changing climate. GNS in conjunction with NIWA or Aqualinc may be able to conduct modelling that does incorporate groundwater rise (as a result of sea level rise) into these assessments.

Additionally, there are several datasets that the council has already received but the data remains inaccessible:

1. Coastal flooding. As part of the Clifton Tangoio Assessment, T+T provided data on the extent and depth of coastal flooding for 10, 100, and 200-year return periods for the years 2020, 2065, and

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2120. Can this data please be requested in raster format?

2. Tsunami. As part of the Level 3 Tsunami Modelling in Hawkes Bay, GNS provided data on the extent and inundation depth for 100, 500, 1000 and 2500-year return periods for sea level rise scenarios of 0.65, 1, and 1.99 m. We have been given preliminary access to view this data but cannot download the raster information until it is released for public communication.
3. Coastal erosion. We understand that HBRC may hold internal erosion models that are more up-to-date than that provided in the 2006 Regional Coastal Plan. Is it possible to investigate the availability of this information?
4. We are waiting on the review of the Napier City Council's recent inland flood model, which should be complete in July. At this point we'll upload this into the dashboard. We understand that this dataset is for a 1 in 50 year flood event and several sea-level rise increments.

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Overview of Currently Available Data

Hazard	District			
	Central Hawke's Bay	Hastings	Napier	Wairoa
Coastal Erosion	Minimal	Moderate	Moderate	Minimal
Coastal Flooding	Minimal	Moderate	Moderate	Minimal
Tidal Flooding	No known data	No known data	No known data	No known data
Tsunami	Minimal	Moderate	Moderate	Minimal
Groundwater Flooding	No known data	No known data	No known data	No known data
Fluvial Flooding	Minimal	Moderate	Moderate	Minimal
Pluvial Flooding	No known data	No known data	No known data	No known data
Landslide	Moderate	Moderate	Moderate	Moderate
Liquefaction	Minimal	Moderate	Moderate	Minimal
Earthquake Amplification	Moderate	Moderate	Moderate	Moderate
Fire	No known data	No known data	No known data	No known data
Climate Variability	High	High	High	High

Key:

High	Hazard data is spatially complete and thorough. The supporting methodology is to a high standard and considers all reasonable contributing factors.
Moderate	Hazard data is spatially complete or near complete. The supporting methodology considers most reasonable contributing factors. The output data enables rigorous vulnerability assessment.
Minimal	Hazard data is spatially incomplete or covers less than 50% of the expected area. The supporting methodology is outdated or does not consider all reasonable contributing factors. The output data does not enable rigorous vulnerability assessment.
No known data	Hazard data could not be found through publicly accessible data sources or has not been received from private sources.

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Detailed Hazard Availability

Coastal Erosion				
Description	Coastal erosion occurs when waves and storms wear down or carry away rock and sand along the coast.			
Authority	Central Hawke's Bay	Hastings	Napier	Wairoa
Sources	• HB Regional Coastal Environment Plan (2006)	• HB Regional Coastal Environment Plan (2006) • Clifton to Tangoio Coastal Hazards Strategy (2016)	• HB Regional Coastal Environment Plan (2006) • Clifton to Tangoio Coastal Hazards Strategy (2016)	• HB Regional Coastal Environment Plan (2006)
Availability	Public	Public	Public	Public
Spatial coverage	• Complete	• Complete • Clifton-Tangoio	• Complete • Clifton-Tangoio	• Complete
Climatic change	• Not detailed	• Not detailed • Included sea-level rise in their probabilistic simulation	• Not detailed • Included sea-level rise in their probabilistic simulation	• Not detailed
Available information	• Extent of erodible zone	• Extent of erodible zone • Probabilities of zones eroding (1, 5, 33, 66%)	• Extent of erodible zone • Probabilities of zones eroding (1, 5, 33, 66%)	• Extent of erodible zone
Indicative quality	Minimal	Moderate	Moderate	Minimal
Gold-standard	Gold-standard coastal erosion hazard data would be modelled over a range of sea-level rise increments and reported probabilistically for certain timeframes. For example, a certain stretch of a coastal cell may range from a 100%-0% likelihood of erosion by 2100 given 40cm of sea-level rise as the point of interest gets further away from the present-day tidal extent.			
Recommended action(s)	1. We understand that HBRC may hold erosion models that are more up-to-date than that provided in the 2006 Regional Coastal Plan. Is it possible to investigate the availability of this information?			

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Coastal Flooding				
Description	Coastal inundation/flooding occurs when low-lying land and near the coast is flooded from the sea during high tides or storms and floods that over-tops the beach.			
Authority	Central Hawke's Bay	Hastings	Napier	Wairoa
Sources	• HB Regional Coastal Environment Plan (2006)	• HB Regional Coastal Environment Plan (2006) • Clifton to Tangoio Coastal Hazards Strategy (2016)	• HB Regional Coastal Environment Plan (2006) • Clifton to Tangoio Coastal Hazards Strategy (2016)	• HB Regional Coastal Environment Plan (2006)
Availability	Public	Public	Public	Public
Spatial coverage	• Complete	• Complete • Clifton-Tangoio	• Complete • Clifton-Tangoio	• Complete
Return Intervals	• Short-term and 50 year	• Short-term and 50 year • 10, 100, 200 year	• Short-term and 50 year • 10, 100, 200 year	• Short-term and 50 year
Climatic change	• Not detailed	• Not detailed • Included a mid-range sea-level rise for 2065 and 2120	• Not detailed • Included a mid-range sea-level rise for 2065 and 2120	• Not detailed
Available information	• Extent of flood zone	• Extent of flood zone • Extent and depth of flooding	• Extent of flood zone • Extent and depth of flooding	• Extent of flood zone
Indicative quality	Minimal	Moderate	Moderate	Minimal
Gold-standard	Gold-standard coastal flood modelling considers a range of sea-level rise increments and annual return intervals. For example, this would detail a 100-year flood given 40cm of sea-level rise. The output would provide information on the depth and velocity of flooding throughout the flooding extent.			
Recommended action(s)	1. We have been unable to find the complete data that HBRC commissioned from Tonkin and Taylor as part of the Clifton to Tangoio Strategy. Is it possible to investigate the availability of this information so we can include flood depth for different years and return intervals? 2. NIWA was commissioned by the Deep South Challenge to produce nation-wide coastal flood maps for several return periods and 10cm increments of sea-level rise up to 3 metres. We suggest requesting this information from NIWA.			

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Tsunami				
Description	A tsunami is a series of often high velocity waves caused by earthquakes or volcanic eruptions under the sea.			
Authority	Central Hawke's Bay	Hastings	Napier	Wairoa
Sources	• GNS (2013) • GNS (2021)	• GNS (2013) • GNS (2021) • Clifton to Tangoio Coastal Hazards Strategy (2016) • Unspecified (nd)	• GNS (2013) • GNS (2021) • Clifton to Tangoio Coastal Hazards Strategy (2016) • Unspecified (nd)	• GNS (2013) • GNS (2021)
Availability	• Public • Private	• Public • Private • Public • Public	• Public • Private • Public • Public	• Public • Private
Spatial coverage	• Complete	• Complete	• Complete	• Complete
Return Intervals	• 100, 2500 year • 100, 500, 1000, 2500 year	• 100, 2500 year • 100, 500, 1000, 2500 year • 200, 750, 4000 year • 2000 year	• 100, 2500 year • 100, 500, 1000, 2500 year • 200, 750, 4000 year • 2000 year	• 100, 2500 year • 100, 500, 1000, 2500 year
Climatic change	• Not detailed	• Not detailed	• Not detailed	• Not detailed
Available information	• Extent of flood zone • Extent and depth	• Extent of flood zone • Extent and depth • Extent and depth • Extent and depth	• Extent of flood zone • Extent and depth • Extent and depth • Extent and depth	• Extent of flood zone • Extent and depth
Indicative quality	Minimal	Moderate	Moderate	Minimal
Gold-standard	Gold-standard tsunami modelling considers several annual return intervals and details the extent, depth, and water velocity.			
Recommended action(s)	1. Request from GNS the tsunami hazard data including depth information for 100, 500, 1000, and 2500 year return intervals and all possible SLR increments. 2. Provide the GNS (2013) tsunami hazard data in a format that includes water depth (and velocity if it exists). 3. Provide the data used for the Clifton Tangoio Coastal hazards Strategy modelled by HBRC and detailed in Section 7 of this report.			

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Fluvial Flooding				
Description	Fluvial inundation/flooding occurs when low-lying and nearby land is flooded from rivers or water bodies overflowing during high flow or storm events.			
Authority	Central Hawke's Bay	Hastings	Napier	Wairoa
Sources	• Unspecified (nd)	• Unspecified (nd)	• Unspecified (nd)	• Unspecified (nd)
Availability	Public	Public	Public	Public
Spatial coverage	• Minimal	• Moderate	• High	• Minimal
Return Intervals	100 year	• 50, 100 year	• 50, 100 year	• 100 year
Climatic change	• Not detailed	• Not detailed	• Not detailed	• Not detailed
Available information	• Extent, depth, and accuracy of flooding	• Extent, depth, and accuracy of flooding	• Extent, depth, and accuracy of flooding	• Extent, depth, and accuracy of flooding
Indicative quality	Minimal	Moderate	Moderate	Minimal
Gold-standard	Gold-standard fluvial flood modelling considers a range of annual return intervals for each catchment area. The output would provide information on the depth and velocity of flooding throughout the flooding extent with high spatial resolution. Further scenarios could consider future land use types, stopbank failures, land subsidence, sea level rise, etc.			
Recommended action(s)	1. Please provide the source report for the flood hazard layers from the Hawkes Bay Hazards Portal. 2. Consider commissioning further river flooding models.			

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Landslide				
Description	Landslide erosion is the shallow and sudden failure of soil slopes during storm rainfall.			
Authority	Central Hawke's Bay	Hastings	Napier	Wairoa
Sources	• Stats NZ (2012)	• Stats NZ (2012)	• Stats NZ (2012)	• Stats NZ (2012)
Availability	Public	Public	Public	Public
Spatial coverage	• Complete	• Complete	• Complete	• Complete
Return Intervals	• Not detailed	• Not detailed	• Not detailed	• Not detailed
Climatic change	• Not detailed	• Not detailed	• Not detailed	• Not detailed
Available information	• Extent and landslip type	• Extent and landslip type	• Extent and landslip type	• Extent and landslip type
Indicative quality	Moderate	Moderate	Moderate	Moderate
Gold-standard	In the context of completing a regional risk assessment, we recommend including the failure mechanism and extent (including runout where appropriate) for various climate conditions (temperature or rainfall based) and changes in land cover.			
Recommended action(s)	1. There are no scenarios for changing climate conditions. Chris Massey at GNS or John Dymond at Manaaki Whenua may be able to conduct modelling that does incorporate temperature change (as a physical driver indicative of change climate conditions) into these assessments.			

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Liquefaction				
Description	Liquefaction is the failure of soil under earthquake shaking, resulting in liquid like behaviour from a loss of strength and stiffness. Liquefaction risk can be exacerbated by saturated soils and therefore is affected by groundwater depth.			
Authority	Central Hawke's Bay	Hastings	Napier	Wairoa
Sources	• GNS Volume 1 (2017) • GNS Volume 2 (2017)	• GNS Volume 1 (2017) • GNS Volume 2 (2017)	• GNS Volume 1 (2017) • GNS Volume 2 (2017)	• GNS Volume 1 (2017) • GNS Volume 2 (2017)
Availability	Public	Public	Public	Public
Spatial coverage	• Moderate	• Complete	• Complete	• Moderate
Return Intervals	• Not detailed	• 25, 100, 500 years	• 25, 100, 500 years	• Not detailed
Climatic change	• Not detailed	• Not detailed	• Not detailed	• Not detailed
Available information	• Extent and uncertainty of liquefaction risk	• Extent and severity of liquefaction risk	• Extent and severity of liquefaction risk	• Extent and uncertainty of liquefaction risk
Indicative quality	Minimal	Moderate	Moderate	Minimal
Gold-standard	Gold-standard liquefaction modelling considers a range of annual return intervals for seismic events and climate variables such as groundwater rise. For example, the zones would detail risk for a 100-year earthquake given 10cm of groundwater rise.			
Recommended action(s)	1. There are no scenarios for changing climate conditions. GNS, in conjunction with NIWA or Aqualinc, may be able to conduct modelling that incorporates sea level rise (as a physical driver indicative of a change in ground water levels) into these assessments.			

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Earthquake Amplification				
Description	Earthquake amplification occurs when the shaking intensity of an earthquake is increased as it propagates through certain types of soils, potentially leading to more severe consequences.			
Authority	Central Hawke's Bay	Hastings	Napier	Wairoa
Sources	• GNS Volume 1 (1998) • GNS Volume 2 (1998)	• GNS Volume 1 (1998) • GNS Volume 2 (1998)	• GNS Volume 1 (1998) • GNS Volume 2 (1998)	• GNS Volume 1 (1998) • GNS Volume 2 (1998)
Availability	Public	Public	Public	Public
Spatial coverage	• Complete	• Complete	• Complete	• Complete
Return Intervals	• Not detailed	• Not detailed	• Not detailed	• Not detailed
Climatic change	• Not detailed	• Not detailed	• Not detailed	• Not detailed
Available information	• Extent and severity of amplification risk	• Extent and severity of amplification risk	• Extent and severity of amplification risk	• Extent and severity of amplification risk
Indicative quality	Moderate	Moderate	Moderate	Moderate

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Climate Variability				
Description	Climate variability refers to fluctuations in climate systems (temperature, precipitation, soil moisture content, etc) that occur over a range of timescales.			
Authority	Central Hawke's Bay	Hastings	Napier	Wairoa
Sources	• NIWA (2020)	• NIWA (2020)	• NIWA (2020)	• NIWA (2020)
Availability	Private	Private	Private	Private
Spatial coverage	• Complete	• Complete	• Complete	• Complete
Return Intervals	• Not detailed	• Not detailed	• Not detailed	• Not detailed
Climatic change	• Historical scenario 1989-2005 • Projected change for 2031-2050 under ○ RCP2.6 ○ RCP4.5 ○ RCP6.0 ○ RCP8.5 • Projected change for 2081-2100 under ○ RCP2.6 ○ RCP4.5 ○ RCP6.0 ○ RCP8.5	• Historical scenario 1989-2005 • Projected change for 2031-2050 under ○ RCP2.6 ○ RCP4.5 ○ RCP6.0 ○ RCP8.5 • Projected change for 2081-2100 under ○ RCP2.6 ○ RCP4.5 ○ RCP6.0 ○ RCP8.5	• Historical scenario 1989-2005 • Projected change for 2031-2050 under ○ RCP2.6 ○ RCP4.5 ○ RCP6.0 ○ RCP8.5 • Projected change for 2081-2100 under ○ RCP2.6 ○ RCP4.5 ○ RCP6.0 ○ RCP8.5	• Historical scenario 1989-2005 • Projected change for 2031-2050 under ○ RCP2.6 ○ RCP4.5 ○ RCP6.0 ○ RCP8.5 • Projected change for 2081-2100 under ○ RCP2.6 ○ RCP4.5 ○ RCP6.0 ○ RCP8.5
Available information	• Mean annual seasonal daily minimum temperature • Mean annual and seasonal daily maximum temperature • Mean annual and seasonal daily mean temperature • Mean annual number of Heatwave Days • Mean annual number of Frost Days	• Mean annual seasonal daily minimum temperature • Mean annual and seasonal daily maximum temperature • Mean annual and seasonal daily mean temperature • Mean annual number of Heatwave Days • Mean annual number of Frost Days	• Mean annual seasonal daily minimum temperature • Mean annual and seasonal daily maximum temperature • Mean annual and seasonal daily mean temperature • Mean annual number of Heatwave Days • Mean annual number of Frost Days	• Mean annual seasonal daily minimum temperature • Mean annual and seasonal daily maximum temperature • Mean annual and seasonal daily mean temperature • Mean annual number of Heatwave Days • Mean annual number of Frost Days

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	• Mean annual and seasonal rainfall total • Mean annual Max 1-day rainfall totals • Mean annual Max 5-day rainfall totals • Mean annual Potential Evapotranspiration Deficit (PED) Accumulation • Probability of mean annual PED exceeding 300 mm • Mean annual and seasonal number of Soil Moisture Deficit Days	• Mean annual and seasonal rainfall total • Mean annual Max 1-day rainfall totals • Mean annual Max 5-day rainfall totals • Mean annual Potential Evapotranspiration Deficit (PED) Accumulation • Probability of mean annual PED exceeding 300 mm • Mean annual and seasonal number of Soil Moisture Deficit Days	• Mean annual and seasonal rainfall total • Mean annual Max 1-day rainfall totals • Mean annual Max 5-day rainfall totals • Mean annual Potential Evapotranspiration Deficit (PED) Accumulation • Probability of mean annual PED exceeding 300 mm • Mean annual and seasonal number of Soil Moisture Deficit Days	• Mean annual and seasonal rainfall total • Mean annual Max 1-day rainfall totals • Mean annual Max 5-day rainfall totals • Mean annual Potential Evapotranspiration Deficit (PED) Accumulation • Probability of mean annual PED exceeding 300 mm • Mean annual and seasonal number of Soil Moisture Deficit Days
Indicative quality	High	High	High	High

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Hawke's Bay

Climate Action Joint Committee

22 May 2023

Subject: Examples of regional climate change strategies

Reason for Report

1. This paper introduces the Manawatū-Whanganui Climate Change Action Plan and Te Tai Tokerau Climate Adaptation Strategy as examples of regional collaboration on climate change.
2. Heather Bosselmann (NCC) will present an overview of these pieces of work.

Background

3. The Manawatū-Whanganui Climate Change Action Plan:
    3.1. This was adopted in early 2023 by their Climate Action Joint Committee (made up of Horizons Regional Council, the 7 Territorial Authorities in that region and 7 tangata whenua representatives).
    3.2. The Committee used their Regional Climate Change Risk Assessment, their regional emissions profile, and central government direction to consider their key climate change challenges and determine how they could work together more effectively.
    3.3. They drew on advice from tangata whenua and local youth councils.
    3.4. The Action Plan made recommendations for both adaptation and mitigation actions for councils to undertake both collectively and individually.
4. The Te Tai Tokerau Climate Adaptation Strategy:
    4.1. This was adopted in April 2022 by the Joint Climate Adaptation Committee (made up of Northland Regional Council, the three Territorial Authorities and four iwi/hapū representatives).
    4.2. The strategy outlines key ways climate change will affect council functions and services, lists some of councils' current adaptation actions, and proposes future actions that are likely to be required across councils to improve their response to climate change.
    4.3. The express aim of the strategy was to identify gaps and take advantage of opportunities to improve the councils' current capacity for adaptation decision-making, in preparation for new legislation. There is an acknowledgement that the strategy needs to respond to the voices of their community and of tangata whenua, and particularly to expand tangata whenua engagement beyond iwi/hapū partner representatives.

Discussion

5. The intention of this report is to provide examples of ways that the new Hawke's Bay Climate Action Joint Committee might set their strategic direction on climate action with a collaborative regional focus.

Decision Making Process

6. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Climate Action Joint Committee receives and notes the *Examples of regional climate change strategies*.

Authored by:

Heather Bosselmann
Senior Policy Analyst Climate Resilience
Napier City Council

Approved by:

Desiree Cull
Executive Officer to CE

Attachment/s

1	Manawatū-Whanganui Climate Change Action Plan 2023	Under Separate Cover
2	Te Tai Tokerau Climate Action Strategy 2022	Under Separate Cover

Hawke's Bay

Climate Action Joint Committee

22 May 2023

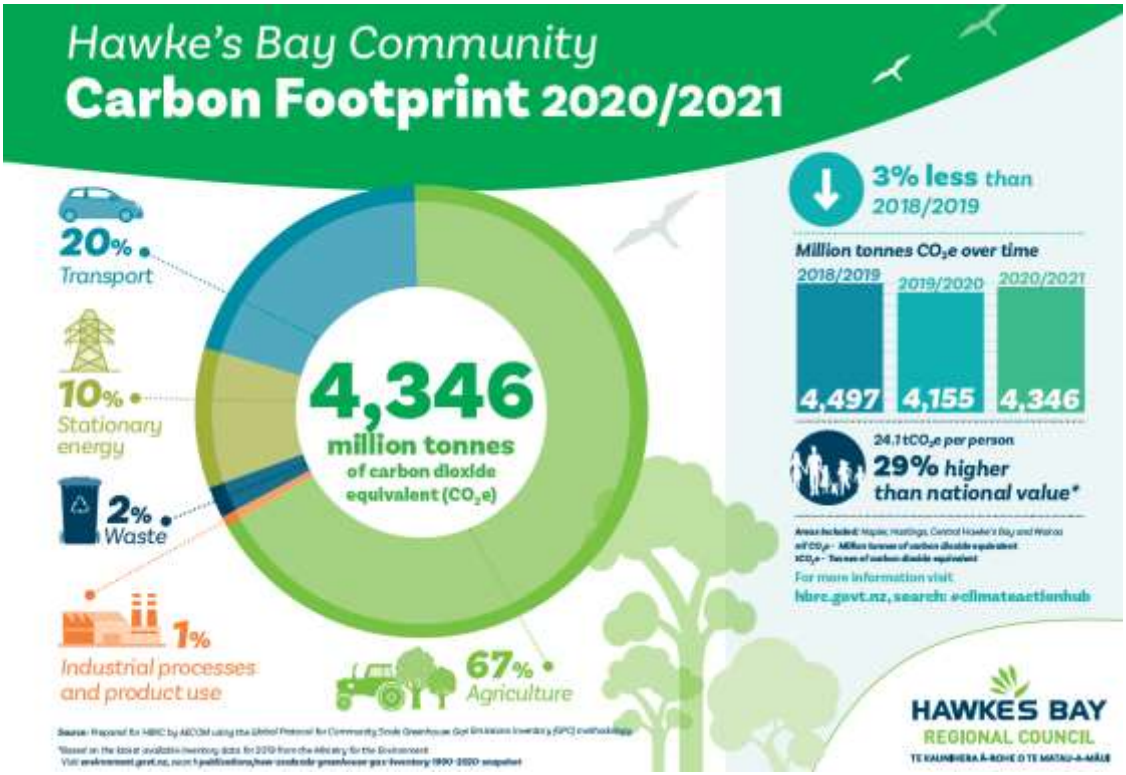
Subject: Update on the Emissions Reduction Plan

Reason for Report

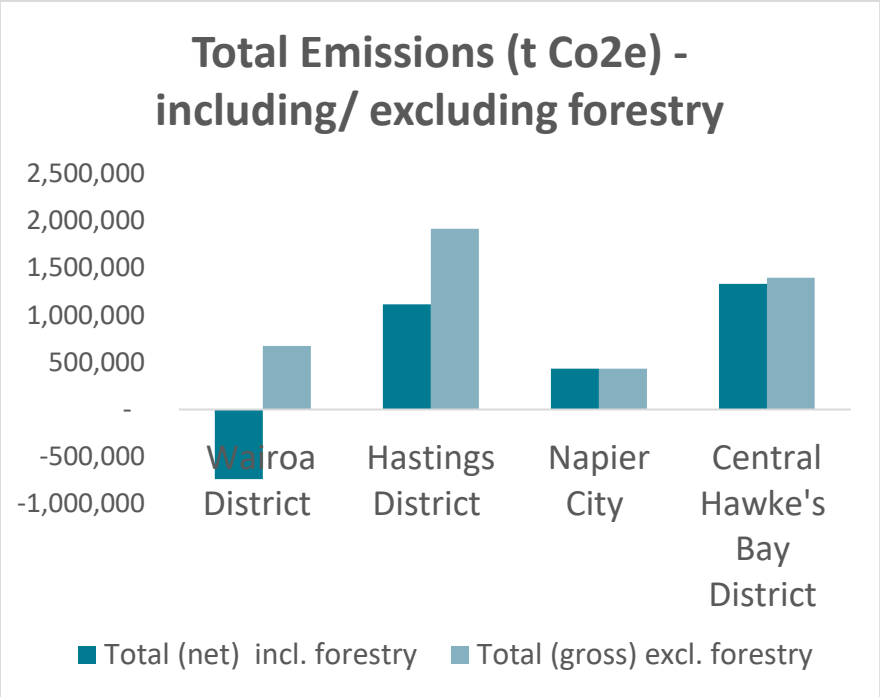
1. This paper seeks to inform the Joint Committee about work underway on the regional emissions reduction plan. This work began in 2022 with the establishment of the first city, district and regional greenhouse gas emissions profiles and aligns with the HBRC strategic goal for the region to be carbon neutral by 2050.
2. This paper seeks early feedback from the Joint Committee on the approach and content of the plan.

Background

3. New Zealand passed its Zero Carbon amendment to the Climate Change Response Act in 2019, setting *split gas* targets for:
   3.1. Long lived greenhouse gases (e.g. carbon dioxide, nitrous oxide): reduce to 50% below 2005 levels by 2030; net zero by 2050.
   3.2. Biogenic methane: reduce by 10% below 2017 levels by 2030 and 24-47% by 2050.
4. In May 2022, the first national Emissions Reduction Plan was released setting out actions across every sector of the economy including transport, energy and industry, building and construction, agriculture, forestry, waste and fluorinated gases.
5. From November 2022, under the Resource Management Act, local government must *have regard to* the National Adaptation Plan and the National Emissions Reduction Plan. When developing RMA-related plans, local government must consider climate change issues and the role that RMA plans have in reducing greenhouse-gas emissions.
6. HBRC currently has a goal in its Strategic Plan for 2050 carbon neutrality: *By 2025, HBRC is carbon zero and plays a leadership role in the region's goal of net zero greenhouse gases by 2050*. This does not align with the split gas national approach that considers biogenic methane (primarily from ruminant animals) separately (with a goal of 24-47% reduction). As mentioned in another agenda item, the Joint Committee could consider utilising a split gas approach in revising the regional goal and setting a more ambitious target with a stronger mandate since the establishment of the joint committee. Interim goals for regional emissions are also needed.
7. In 2022 AECOM was commissioned to measure regional greenhouse gases (GHG) emissions for the first time in Hawke's Bay. The purpose was to identify areas of high emissions to inform the regional emissions reduction plan. Five profiles are available: Napier, Hastings, Wairoa, Central HB and the HB region. Regional greenhouse gas emissions and trends are summarised in the Figure following.



8. District and city reports are available, outlining the sources of emissions and levels of carbon sequestration across each district and region. The overall gross and net emissions are illustrated in the figure below, however, caution should be applied in interpreting and comparing these profiles given the very different population, industry and geographical features of each district.



9. In this paper, we refer to region-wide GHG emissions relating to all activities, farming, industry and households. We differentiate between community and industry production and between consumption-based emissions and emissions relating to individual Council activities which are currently measured and managed by other Council teams, e.g. Corporate Services at HBRC.

10. The proposal to develop a regional emissions reduction plan was presented to the HBRC meeting of 28 September 2022.

11. In anticipation of a regional governance for climate action, a practitioners group was established to develop measurable and targeted actions by June 2023 under the following chapters:

    11.1. Building & Construction

    11.2. Transport

    11.3. Equitable Transition

    11.4. Planning and Infrastructure

    11.5. Working with Nature

    11.6. Waste

    11.7. Agriculture

    11.8. Housing.

12. In recognition of the complexity of emissions considerations in Agriculture and the significant work occurring through He Waka Eke Noa for this chapter, it was proposed that actions would support farmers in the region to adapt to the national emission reduction plan rather than any supplementary actions.

13. Two workshops had been held before Cyclone Gabrielle, inviting subject matter experts and practitioners to develop actions under: Waste and Working with Nature.

14. Due to the deployment into recovery activities of core members of the practitioners group from Councils and organisations such as the Environment Centre, subsequent workshops were cancelled and the scope of the chapters to be drafted by June was reduced to Waste, Working with Nature, Transport plus new chapter, Emissions Considerations in Recovery. The other chapters have been deferred until such time that a process for establishing a working group with adequate representation from the affected sectors and genuine mana whenua engagement can be established.

15. The next section of this paper gives a brief update on the types of actions and vision for this first iteration of regional emissions reductions actions.

Emissions reductions activities

Transport

16. Transport emission make up one fifth, or 20% of our regional emissions profile. This is a significant source of emissions. Of that 20%, over half come from diesel-powered vehicles. Most of the diesel emissions are from the heavy / commercial freight industry that supports the movements of goods and productive inputs for industry. A smaller portion comes from the public transport bus fleet. Currently, the public transport bus fleet is made up of ageing and higher emitting rolling stock. The commercial transport fleet is a mix of older rolling stock, particularly those used only in peak seasonal periods, and more modern rolling stock for those operators who have transport as their core business. Naturally, these types of vehicles emit significantly more per vehicle kilometre travelled that the light fleet / private cars.

17. While the light fleet, made up of private cars, have a low emissions profile on a per kilometre travelled basis, they are heavily represented on a total tonnes of CO2 emitted basis, marginally exceeding that of the commercial / freight industries. Most of the car fleet in Hawke's Bay uses petrol, with electrification minimally represented. Given that cars make up the largest portion of emissions, it can be concluded that some of the biggest emissions reduction wins will come from behaviour change and modal shift – that is, the creation of genuine and safe transport options across the region, supported and enabled by fit-for-purpose behaviour change.

18. Several early draft actions are proposed, noting that these have not yet been reviewed and finalised by the practitioners group, or in depth by the Regional Technical Advisory Group. However, they are proposed in alignment with the principle recently developed at the Regional Transport Committee Workshop – *Promote and apply climate smart solutions*.

    18.1. Implement the new Regional Public Transport Plan with a focus on low or no emissions buses for the new network

    18.2. Develop fit for purpose public transport infrastructure to support and enable multi-modal integration across all transport modes

    18.3. Investigate and advocate for new and innovative travel options and choices

    18.4. Advocate for increased electric charging and alternative fuel infrastructure both intra and inter-regionally

    18.5. Develop and implement a connected, integrated, and safe regional active transport strategy

    18.6. Work with industry and key stakeholders to advocate for and enable new and emerging fuels, such as dual fuel hydrogen trucks.

Waste

19. Waste-related emissions (solid waste and wastewater) account for around 4% of our national GHG emissions and around 2% of regional emissions. This includes waste in open landfill (60% of regional waste emissions), waste in closed landfills, composting, wastewater treatment plants and septic tanks.

20. Waste emissions have increased by 3% since 2018/19, with the largest increase in emissions from individual septic tanks.

21. A waste audit conducted in June 2022 by HDC on the diversion potential of waste in the Ōmarunui Landfill, identified that 34% of waste sent to landfill was organics that could have been composted. A kerbside waste diversion potential identified 48% of waste that could have been composted and 15% that could have been recycled.

22. Drafts actions proposed to monitor and reduce emissions from waste produced in Hawke's Bay (and align with the National Waste Strategy) include:

    22.1. Pilot food scrap / organics kerbside collections for all households in urban areas by 2026 in preparation for the national strategy making food scrap collection mandatory in urban areas by 2030.

    22.2. Audit of all sites of waste in the region, including council-managed landfills, private landfills (clean fills), waste disposal sites on private land and commercial composting facilities.

    22.3. Support specialist recycling with centralised depots for soft plastics, batteries, e-waste, and all types of plastics.

    22.4. Feasibility study for methane collection from landfills across the region.

    22.5. Support for more businesses working to divert from landfill, recycle, repurpose or reutilise.

Working with Nature

23. Climate change and biodiversity loss are inextricably intertwined. Considering emissions reductions and sequestration potential in biodiversity protection and enhancement work enables strong action in both areas.

24. Nature-based solutions are generally cost-effective and provide multiple environmental, social and economic benefits that enhance climate resilience.

25. General principles of nature-based solutions include rewilding, more room for rivers, urban greening, eco-system preservation and protection.

26. Of note, more greenhouse gas emissions are released into the atmosphere in the region from the harvesting of forestry (3.9 million tonnes annually), compared to, for example, 2.9 million tonnes from agriculture.

27. Drafts actions proposed to reduce regional emissions through nature-based solutions include:

    27.1. Community-led nature-based solutions: establish a central point for the community to access support and financial assistance for environmental preservation

    27.2. Monitoring and reporting: e.g. set goals at urban, peri-urban and rural zones and report against this; different goals for council-owned land, private land etc.

    27.3. Blue carbon / wetlands: further data required on the sequestration potential of wetlands; identify, expand, restore and prioritise wetlands and appropriate areas to widen rivers

    27.4. Urban greening: community based and council actions

    27.5. Restoration and protection of forests: increase pace of predator eradication and pursuits of predator-free 2050; incentivise pest control on private land

    27.6. Biodiversity in farming incentives that consider the full cost of these initiatives.

Recovery

28. The urgency of our transition towards a low emissions and climate resilient future has never been greater. Cyclone Gabrielle provided a stark reminder of the consequences of inaction and that climate action must be about protecting our communities from harm in the short and long-term future.

29. Effective recovery initiatives must prioritise opportunities to build resilience, reduce greenhouse gas emissions, and slow biodiversity loss.

30. A central dimension of effective recovery and resilience is ensuring that it is driven by and for hapori whānui (wider community) and remains focused on hauora (wellbeing), reduces inequality and improves inclusiveness. To this end, mana whenua as kaitiaki must be enabled to both lead and partner with local government to achieve the best outcomes within a resilient recovery framework and a transition to a future that protects and serves all within Te Matau-a-Māui.

31. Draft actions proposed to ensure recovery embeds the transition towards a low emissions and climate resilient future include:

    31.1. Rebuilding with intentionality – long-term intergenerational planning that considers the needs of our communities now and in the future and prioritises activities that will reduce emissions and build greater resilience.

    31.2. Avoid relaxing existing environmental regulations as longer-term vulnerability is more costly than short-term economic relief (see Deloitte report).

    31.3. Reduce reliance on fossil fuels by designing for reduced energy needs and investing in alternative energy sources.

    31.4. Ensure that waste minimisation principles are embedded in recovery work, specifically noting that construction waste contributes 40-50% of New Zealand's total waste going to landfill.

    31.5. Ensure that housing is energy efficient and designed in recognition of a future changed climate, so that homes are healthier and more affordable. This is an excellent example of climate-resilient development that both promotes a lower emissions lifestyle, enhances wellbeing and provides greater resilience for whānau and communities in future climate events.

31.6. Design procurement processes that include considerations of long-term resilience and carbon footprint over the asset lifetime (e.g. consider mandating a lifecycle carbon assessment for all Council procurement contracts over $250k).

32. In conclusion, while work is still underway to finalise the actions proposed as part of the first regional emissions reduction plan, the vision for this document and key actions have been summarised above. A final draft will be presented at the next joint committee in July.

33. On a final note, decarbonisation work must also focus on the opportunities presented by transitioning to a lower emissions economy, for example new crop possibilities, new industries and employment opportunities; this requires a coordinated regional approach.

Next Steps

34. Establish a technical advisory group for the Joint Committee for Climate Action (see separate agenda item).

35. Finalise the draft emissions reduction chapters as outlined above and present to the Joint Committee in July.

36. Establish the process to develop actions in the deferred chapters, reinstating the practitioner group or establishing a new representative group given changes in availability, and topics proposed.

37. Continue to seek genuine mana whenua engagement for the development of appropriate actions to ensure an equitable transition to a lower emissions regional economy.

Decision Making Process

38. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision making provisions do not apply.

Recommendation

That the Climate Action Joint Committee receives and notes the *Emissions Reduction Plan* staff report.

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Desiree Cull
Executive Officer to CE

Attachment/s

1	2022 Central Hawke's Bay Community Carbon Footprint	Under Separate Cover
2	2022 Hastings Community Carbon Footprint	Under Separate Cover
3	2022 Napier Community Carbon Footprint	Under Separate Cover
4	2022 Wairoa Community Carbon Footprint	Under Separate Cover
5⇩	2022 Hawke's Bay Region Community Carbon Footprint	


Prepared for
Hawke's Bay Regional Council
Co No.: N/A
AECOM
Hawke's Bay Community Carbon Footprint
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Delivering a better world

Hawke's Bay Community Carbon Footprint

Client: Hawke's Bay Regional Council

Co No.: N/A

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Revision 3 – 29-Nov-2022
Prepared for – Hawke's Bay Regional Council – Co No.: N/A

Quality Information

Document Hawke's Bay Community Carbon Footprint

Ref 60671688

Date 29-Nov-2022

Prepared by Adam Swithinbank and Tanya Milnes

Reviewed by Anthony Hume

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
1	27-Sept-2022	Final	Anthony Hume Team Leader - Sustainability	
2	13-Oct-2022	Final - includes updated infographics	Anthony Hume Team Leader - Sustainability	
3	29-Nov-2022	Final - includes updated infographic (Figure 1)	Anthony Hume Team Leader - Sustainability	

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Executive Summary

Greenhouse Gas (GHG) emissions for the Hawke's Bay Region (that is covered by the Hawke's Bay Regional Council) have been measured using the Global Protocol for Community Scale Greenhouse Gas Emissions Inventory (GPC) methodology. This approach includes emissions from Stationary Energy, Transport, Waste, Industrial Processes and Product Use (IPPU), Agriculture and Forestry sectors. This document reports greenhouse gas emissions produced in or resulting from activity or consumption within the geographic boundaries of the Hawke's Bay Region for the 2020/21 financial reporting year and examines greenhouse gas emissions produced from 2018/19 to 2020/21.

The Hawke's Bay Region is referred to hereafter as Hawke's Bay for ease. Greenhouse gas emissions are generally reported in this document in units of Carbon Dioxide Equivalents (CO_2e) and are referred to as 'emissions'.

Major findings of the project include:

2020/21 Emissions Footprint

- In the 2020/21 reporting year (1st July 2020 to 30th June 2021), **total gross emissions** in Hawke's Bay were 4,345,997 tCO_2e.
- **Agriculture** (e.g., emissions from livestock and crops) is the largest source of emissions, accounting for 67% of the Hawke's Bay's total gross emissions, with enteric fermentation from livestock accounting for 78% of Agriculture emissions.
- **Transport** (e.g., emissions from road and air travel) is the second largest emitting sector in Hawke's Bay, representing 20% of total gross emissions, with petrol and diesel consumption accounting for 90% of Transport emissions.
- **Stationary Energy** (e.g., consumption of electricity and natural gas) is the third highest emitting sector in the region, producing 10% of total gross emissions.
- Net **Forestry** emissions were -2,862,841 in 2020/21 as carbon sequestration (carbon captured and stored in plants or soil by forests) was higher than emissions from forest harvesting (e.g., the release of carbon from roots and organic matter following harvesting). Net **Forestry** emissions are not included in total gross emissions.
- The **total net emissions** in Hawke's Bay were 1,483,156 tCO_2e. The total net emissions include emissions and sequestration from forestry.

Changes in Emissions, 2018/19 to 2020/21

- Between 2018/19 and 2020/21, **total gross emissions** in Hawke's Bay decreased from 4,497,263 tCO_2e to 4,345,997 tCO_2e, a decrease of 3% (151,267 tCO_2e).
- Over this time the population of the Region increased by 4%, resulting in **per capita gross emissions** in Hawke's Bay decreasing by 7% between 2018/19 and 2020/21, from 25.9 to 24.1 tCO_2e per person per year.
- Emissions from **Stationary Energy** increased by 20% between 2018/19 and 2020/21 (69,806 tCO_2e), driven by a 45% increase in electricity consumption emissions (56,198 tCO_2e). This increase in electricity consumption emissions was due to a 4% increase in electricity consumption (kWh) coupled with a 41% increase in the emissions intensity of the national electricity grid (tCO_2e/kWh).
- Emissions from **Agriculture** decreased by 8%, between 2018/19 and 2020/21 (245,553 tCO_2e), due to a reduction in livestock numbers, particularly of sheep and non-dairy cattle.
- **Transport** and **Waste** emissions both increased by 3% (21,822 tCO_2e and 2,491 tCO_2e respectively).

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- Emissions from forest harvesting reduced by 3% (118,442 tCO_2e), while sequestration from forestry increased by 2% (102,706 tCO_2e) resulting in the net impact of **Forestry** changing by 8% from -2,641,693 tCO_2e to -2,862,841tCO_2e.

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Figure 1: Hawke's Bay 2020/21 Emissions Footprint

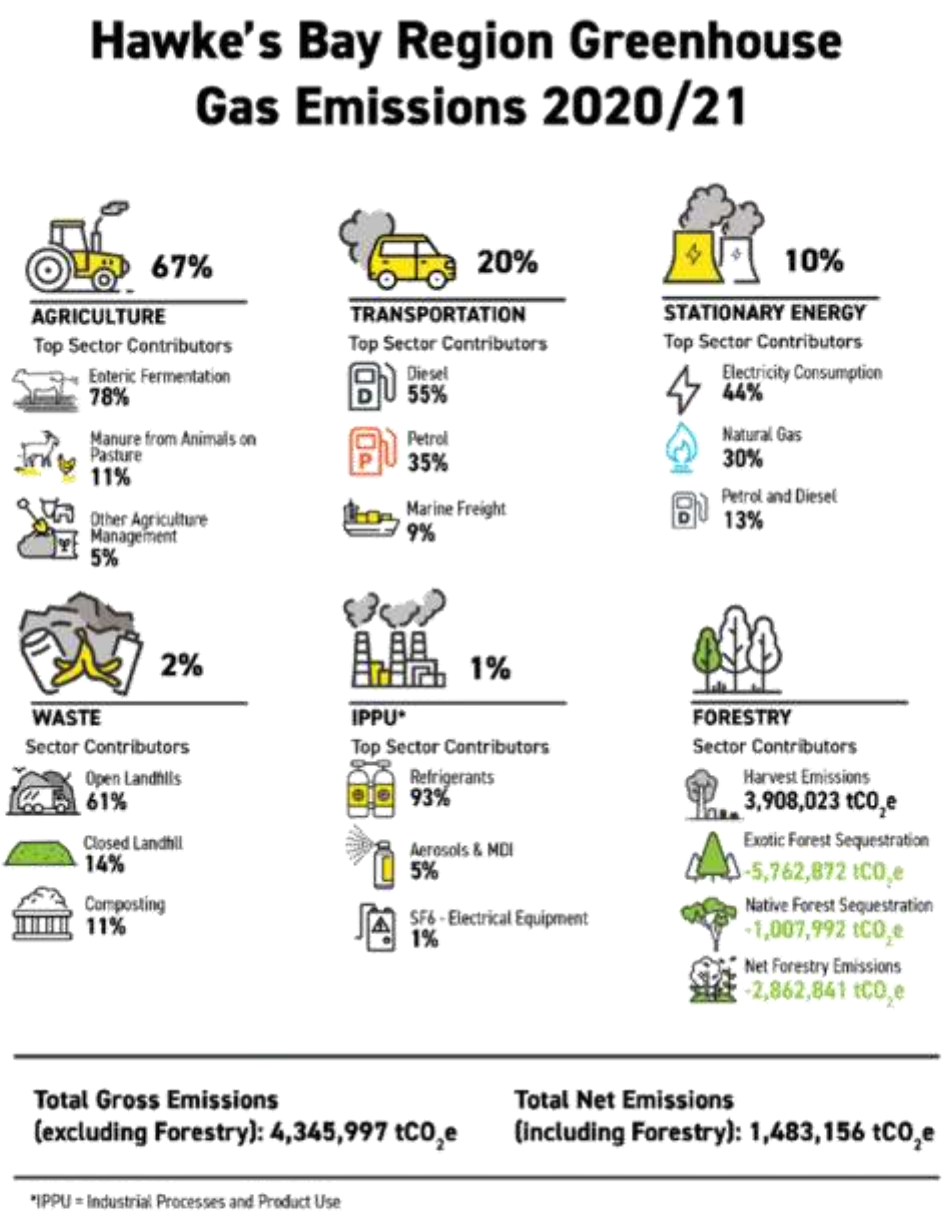
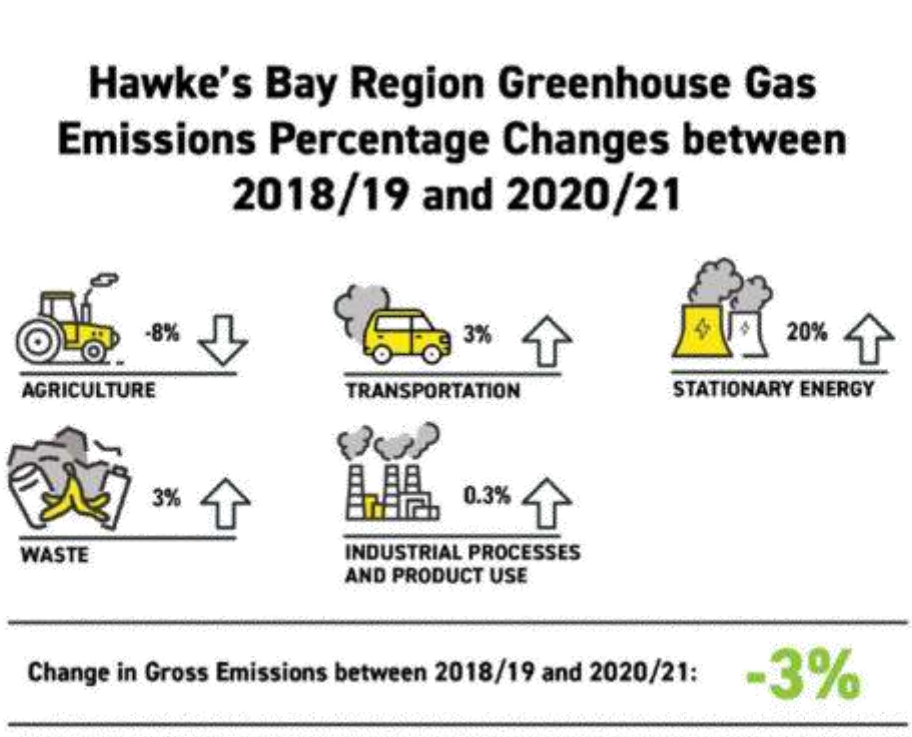


Figure 2: Change in Hawke's Bay Emissions Footprint between 2018/19 and 2020/21



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1.0 Introduction

AECOM New Zealand Limited (AECOM) was commissioned by the Hawke's Bay Regional Council to assist in the development of community-scale greenhouse gas (GHG) footprints for the Hawke's Bay for the 2018/19, 2019/20, and 2020/21 financial years. This is part of a wider study to develop community carbon footprints for each district within the Hawke's Bay region. Emissions are reported for the period from 1 July to 30 June for the respective years. The study boundary reported in the following pages incorporates the jurisdiction of the Hawke's Bay Regional Council.

The Hawke's Bay region is referred to hereafter as Hawke's Bay for ease. Greenhouse gas emissions are generally reported in this document in units of Carbon Dioxide Equivalents (CO_2e) and are referred to as 'emissions'.

2.0 Approach and Limitations

The methodological approach used to calculate emissions follows the Global Protocol for Community Scale Greenhouse Gas Emissions Inventory v1.1 (GPC) published by the World Resources Institute (WRI) 2021. The GPC includes emissions from Stationary Energy, Transport, Waste, Industrial Processes and Product Use (IPPU), Agriculture, and Forestry activities within the Region's boundary. The sector calculations for Agriculture, Forestry and Waste are based on Intergovernmental Panel on Climate Change (IPCC) workbooks and guidance for emissions measurement. The sector calculators also use methods consistent with GHG Protocol standards published by the WRI for emissions measurement when needed.

The same methodology has been used for other community scale GHG footprints around New Zealand, (e.g., Wellington, Auckland, Christchurch, Dunedin, and the Waikato region) and internationally. The GPC methodology[1] represents international best practice for city and regional level GHG emissions reporting.

This emissions footprint assesses both direct and indirect emissions sources. Direct emissions are production-based and occur within the geographic area (Scope 1 in the GPC reporting framework). Indirect emissions are produced outside the geographic boundary (Scope 2 and 3) but are allocated to the location of consumption. An example of indirect emissions is those associated with the consumption of electricity, which is supplied by the national grid (Scope 2). All other indirect emissions such as cross-boundary travel (e.g. flights) and energy transportation and distribution losses fit into Scope 3.

All major assumptions made during data collection and analysis have been detailed within **Appendix A – Assumptions**. The following aspects are worth noting in reviewing the emissions footprint:

- Emissions are expressed on a carbon dioxide-equivalent basis (CO_2e) including climate change feedback using the 100-year Global Warming Potential (GWP) values[2]. Climate change feedbacks are the climate change impacts from GHGs that are increased as the climate changes. For example, once the Earth begins to warm, it triggers other processes on the surface and in the atmosphere. Current climate change feedback guidance is important to estimate the long-term impacts of GHGs.
- GPC reporting is predominately production-based (as opposed to consumption-based) but includes some elements of consumption-based footprinting (e.g. indirect emissions from electricity consumption). Production-based emissions reporting is generally preferred by policy-makers due to robust established methodologies such as the GPC, which enables comparisons between different studies. Production-based approaches exclude globally produced emissions relating to consumption (e.g. embodied emissions relating to products produced elsewhere but consumed within the geographic area such as imported food products, cars, phones, clothes etc.).
- Total emissions are reported as both gross emissions (excluding Forestry) and net emissions (including Forestry).

[1] http://www.ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities
[2] https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf (Table 8.7)

- Emissions for individual main greenhouse gases for each emissions source are provided in the supplementary spreadsheet information supplied with this report.
- Where location specific data were not accessible, information was calculated based on national or regional level data.
- Transport emissions:
  - Transport emissions associated with air travel, rail, and marine fuel were calculated by working out the emissions relating to each journey arriving or departing the area based on data provided by the relevant operators. Emissions for these sources are then split equally between the destination and origin. Emissions relating to a particular point source (e.g. an airport or port) are allocated to the expected users of that source, not just the area that it is located in. For example, in the Hawke's Bay Region, it is expected that all territorial authorities will use the Port of Napier for imported and exported goods, so emissions from this source have been allocated to all territorial authorities in the region based on population. It is understood that freight imports moving through the Port of Napier do not exclusively serve the Hawke's Bay Region, and freight exports do not exclusively originate from the Hawke's Bay Region, this should be considered when examining these emissions.
  - All other transport emissions are calculated using the fuel sold in the area (e.g. petrol, diesel, LPG).
- Solid waste emissions:
  - Solid waste emissions from landfill are measured using the IPCC First Order Decay method that covers landfill activity between 1950 and the present day.
  - Emissions are calculated for waste produced within the geographic boundary, even if they are transported outside the boundary to be entered into landfill.
  - An additional assessment of transport emissions related to the transport of landfill waste and recycled/diverted waste has been included in this assessment, outside of the GPC requirements for Community Carbon Footprints. Emissions were estimated based on the amount of material, distance transported from transfer station to next processing location, and the vehicles used. Any onward transport of materials post-processing have not been included.
- Wastewater emissions:
  - Emissions have been calculated based on the local data provided, following IPCC 2019 guidelines. Where data is missing, IPCC and Ministry for the Environment (MfE) figures have been used. Wastewater emissions from both wastewater treatment plants, and individual septic tanks have been calculated.
  - Wastewater emissions include those released directly from wastewater treatment, flaring of captured gas, and from discharge onto land/water.
- Industrial Processes and Product Use (IPPU) emissions:
  - IPPU emissions are estimated based on data provided in the New Zealand Greenhouse Gas Emissions 1990-2020 report (MfE 2022). Emissions are estimated on a per capita basis applying a national average per person.
- Forestry emissions:
  - This emissions footprint accounts for forest carbon stock changes from afforestation, reforestation, deforestation, and forest management (i.e. it applies land-use accounting conventions under the United Nations Framework Convention on Climate Change rather than the Kyoto Protocol). It treats emissions from harvesting and deforestation as instantaneous rather than accounting for the longer-term emission flows associated with harvested wood products.
  - The emissions footprint considers regenerating (growing) forest areas only. Capture of carbon from the atmosphere is negligible for mature forests that have reached a steady state.

Overall sector data and results for the emissions footprint have been provided to the Hawke's Bay Regional Council in calculation table spreadsheets. All assumptions made during data collection and analysis have been detailed within **Appendix A – Assumptions**.

It is important to consider the level of uncertainty associated with the results, particularly given the different datasets used. Depending on data availability, national, regional, and local datasets are used across the different calculators. At the national level, New Zealand's Greenhouse Gas Inventory shows that for 2018 (the most recent national level inventory) an estimate of gross emissions uncertainty was +/- 9%, whereas a net emissions uncertainty estimate was +/- 12%. These levels of uncertainty should be considered when interpreting the results of this community carbon footprint (MfE, 2020).

StatsNZ Regional Footprint

Due to differences in emission factors and methodology used between the StatsNZ Regional Footprints and this community carbon footprint (based on the GPC requirements and available data), caution should be taken when making comparison of reported emissions. One example of this is where this footprint used updated emission factors for methane and nitrous oxide following guidance from the IPCC and in line with other Region and regional level GHG inventories in New Zealand. This difference is especially relevant for the Agriculture and Transport sectors.

Differences between the StatsNZ Regional Footprints and this community carbon footprint may be due to scope, coverage, data sources, and methods. The StatsNZ Regional Footprint approach is based on production, while the GPC methodology includes elements of consumption. The Stats NZ Regional Footprints use a residence approach, while GPC is based on the territory approach. The Stats NZ Regional Footprints also use global warming potentials from the IPCC Fourth Assessment Report, whilst this community carbon footprint uses global warming potentials from the IPCC Fifth Assessment Report.

Refer to the StatsNZ website for further information regarding StatsNZ Regional Footprint https://www.stats.govt.nz/methods/about-regional-greenhouse-gas-emissions-statistics/.

3.0 Community Carbon Footprint for 2020/21

The paragraphs, figures and tables below outline the Hawke's Bay's greenhouse gas emissions, referred to as 'emissions' in this assessment. This includes The Hawke's Bay's total emissions, emissions from each sector, and major emissions sources within each sector. The focus of emissions reporting is on gross emissions.

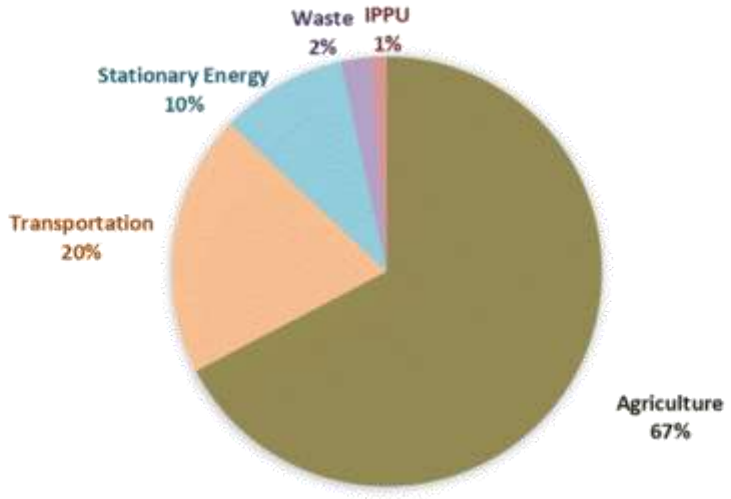
During the 2020/21 reporting period, Hawke's Bay emitted **gross** 4,345,997 tCO_2e. Note that gross emissions do not account for Forestry. Agriculture and Transport emissions are the largest contributors to total gross emissions for the Region.

The population of Hawke's Bay in 2020/21 was approximately 180,610 people, resulting in per capita gross emissions of 24.1 tCO_2e/person. Discussion of per capita emissions is limited to when it is useful for comparing emission figures against other territorial authorities. A breakdown of net emissions (i.e. including results from Forestry resources) is reported separately.

Table 1 Total net and gross emissions

Total emissions	tCO_2e
Total Net Emissions (including forestry)	1,483,156
Total Gross emissions (excluding forestry)	4,345,997

Figure 3: Hawke's Bay Region's total gross GHG emissions split by sector (tCO_2e).



During the 2020/21 reporting period, Hawke's Bay emitted **net** 1,483,156 tCO_2e.

Net emissions differ from gross emissions because they include emissions related to forestry activity (harvesting and planting) within an area. Forestry emissions are influenced by the cyclical nature of harvesting and planting regimes. In addition, with each subsequent planting of harvestable trees, there is a decreasing ebb and flow of sequestration.

Carbon sequestered by forestry can be viewed as a liability/risk that needs careful consideration. For example, if plantations are not replanted or other land use change occurs to exotic forested areas, then net emissions may rise quickly. Equally, if native forest is not protected from removal, and removal does happen, then net emissions may rise.

The community carbon footprint comprises emissions from six different sectors, summarised below:

3.1 Agriculture

The highest emitting sector in Hawke's Bay, Agriculture, emitted 2,925,915 tCO_2e in 2020/21. Table 2 provides the emissions, percentage of total gross emissions, and percentage of the sector total for each sector/emissions source. Agricultural emissions are the result of both livestock and crop farming and do not include emissions relating to fuel or electricity consumption (reported in the Transport and Stationary Energy sectors).

Enteric fermentation from livestock produced 78% of Hawke's Bay's Agricultural emissions (2,274,432 tCO_2e). Enteric fermentation GHG emissions are produced by methane (CH_4) released from the digestive process of ruminant animals (e.g. cattle and sheep). The second largest source of agricultural emissions was produced from nitrous oxide (N_2O) released by unmanaged manure from grazing animals on pasture (332,570 tCO_2e or 11% of the Agricultural sector's emissions).

Table 2 Agriculture emissions by emission source

Sector / Emissions Source	tCO_2e	% of Total Gross Emissions	% of Sector Total
Enteric Fermentation	2,274,432	52.3%	77.7%
Manure from Grazing Animals on pasture	332,570	7.7%	11.4%
Other Agriculture Emissions	132,079	3.0%	4.5%
Atmospheric Deposition	93,329	2.1%	3.2%
Manure Management	47,822	1.1%	1.6%
Agricultural Soils	22,614	0.5%	0.8%
Fertiliser used in Horticulture	23,070	0.5%	0.8%
Total	**2,925,915**	**67%**	**100%**

Livestock were responsible for 96% of the Agriculture sector's GHG emissions (1,796,732 tCO_2e) (Table 3). Sheep account for 49% of agricultural emissions in the Hawke's Bay and 33% of the Hawke's Bay's total gross emissions. Non-dairy cattle account for 37% of agricultural emissions in the Hawke's Bay and 25% of the Hawke's Bay's total gross emissions.

Table 3 Agriculture emissions by emission source

Sector / Emissions Source	tCO_2e	% of Total Gross Emissions	% of Sector Total
Sheep	1,427,404	33%	49%
Non-dairy Cattle	1,072,780	25%	37%
Dairy Cattle	293,306	7%	10%
Other livestock	65,709	2%	2%
Fertiliser (other)	43,646	1%	1%
Fertiliser for Horticulture	23,070	1%	0.8%
Total	**2,925,915**	**67%**	**100%**

Fertilisers used for livestock and horticulture represent 4% of Agriculture emissions. An additional breakdown of emissions from fertiliser use in horticulture is included based on land-use information provided by HBRC covering the Hastings and Napier area only. Fertiliser use in horticulture represented 0.8% of the sector emissions. The largest contributor to 'Fertiliser for Horticulture' emissions in Hastings was sweetcorn (12,643 tCO_2e, 1.1% of Agricultural emissions) (displayed in Table 4). There is some

potential for emissions double counting between the 'Fertiliser for Horticulture' and 'Fertiliser (other)' as these emissions have been calculated based on different datasets, where the 'Fertiliser (other)' category may also include some fertilisers used in horticulture. However, it is expected that the majority of the 'Fertiliser (other)' emissions are caused by fertiliser use for livestock land. Changes in soil carbon associated with horticulture have not been quantified due to absence of a defined appropriate method for assessing the carbon footprint associated with soil carbon change over time.

Table 4 Fertiliser for horticulture emissions by crop type

Sector / Emissions Source	tCO_2e	Hectares (Ha)
Sweetcorn	12,643	4,026
Pipfruit	2,380	4,829
Squash	2,188	1,736
Peas and Beans	1,479	2,791
Stonefruit	1,230	2,495
Beetroot	983	1,854
Grapes	910	5,351
Onions	839	482
Wheat	196	248
Kiwifruit	146	216
Grain	69	88
Tomato	7	82
Total	**23,070**	**24,197**

3.2 Transport

Transport, the second highest emitting sector in Hawke's Bay, produced 856,520 tCO_2e in 2020/21 (20% of the Hawke's Bay's gross total emissions). Table 5 provides the total emissions, percentage of the total gross emissions, and percentage of the sector total for each sector/emissions source.

Table 5 Transport emissions by emission source

Sector / Emissions Source	tCO_2e	% of Total Gross Emissions	% of Sector Total
Diesel	472,063	10.9%	55.1%
Petrol	300,868	6.9%	35.1%
Marine Freight	78,488	1.8%	9.2%
Jet Kerosene	2,635	0.1%	0.3%
LPG	1,546	<0.1%	0.2%
Rail	647	<0.0%	0.1%
Aviation Gas	272	<0.1%	<0.1%
Total	**856,520**	**20%**	**100%**

Most of the transport emissions can be attributed to on and off-road diesel and petrol use, which collectively produced 90% of the sector's emissions and 18% of total gross emissions. Diesel and petrol transport emissions are broken down into on-road and off-road use. On-road transport consists of all standard transportation vehicles used on roads (including cars, trucks, buses, etc.). Off-road transport consists of all fuel used for the movement of machinery and vehicles off roads (including agricultural

tractors and vehicles, forklifts, etc.). On-road transport produced 681,394 tCO_2e (80% of Transport emissions). Off-road transport produced 93,084 tCO_2e (11% of Transport emissions).

The next largest Transport emission source is marine freight, which contributed to 9% of the sectors emissions and 2% of Hawke's Bay's total gross emissions (74,488 tCO_2e). Marine freight emissions are the result of freight movements to and from the Port of Napier. Emissions from this source have been divided between all territorial authorities in the Hawke's Bay region based on relative population sizes. It is understood that the imports and exports through this port are not exclusively related to activities in the Hawke's Bay region, however, to ensure that these emissions are reflected in community carbon footprints as per the GPC requirements this approach is appropriate.

The remaining transport emissions are attributed to air travel (jet kerosene and aviation gas), rail freight emissions and LPG use for transport (e.g. forklifts).

3.3 Stationary Energy

Producing 414,152 tCO_2e in 2020/21, Stationary Energy was The Hawke's Bay's third highest emitting sector (10% of total gross emissions). Table 6 provides the total emissions, percentage of total gross emissions, and percentage of the sector total for each sector/emissions source.

Electricity consumption was the cause of 44% of Stationary Energy emissions (181,396 tCO_2e), and 4% of The Hawke's Bay's total gross emissions. Electricity consumption emissions increase to 198,058 tCO_2e when including transmission and distribution losses related to that consumption.

Natural gas consumption accounted for 33% of the sector's emissions (135,607 tCO_2e) when including transmission and distribution losses. Stationary petrol and diesel consumption generated 13% of the sectors emissions (52,339 tCO_2e). Use of LPG, and the burning of coal, biofuels and biogas produced the remaining Stationary Energy emissions.

Table 6 Stationary Energy emissions by emission source

Sector / Emissions Source	tCO_2e	% of Total Gross Emissions	% of Sector Total
Electricity Consumption	181,396	4.2%	43.8%
Natural Gas	125,465	2.9%	30.3%
Stationary Petrol & Diesel Use	52,339	1.2%	12.6%
Electricity Transmission and Distribution Losses	16,663	0.4%	4.0%
LPG	12,261	0.3%	3.0%
Coal	10,343	0.2%	2.5%
Natural Gas Transmission and Distribution losses	10,143	0.2%	2.4%
Biofuel / Wood	5,447	0.1%	1.3%
Biogas	96	<0.1%	<0.1%
Total:	**414,152**	**10%**	**100%**

Stationary Energy demand can also be broken down by the sector in which it is consumed. Stationary Energy demand is reported for the following sectors: commercial; residential and industrial.

- Industrial Stationary Energy consumption accounts for 51% of Stationary Energy emissions (209,500 tCO_2e) and 5% of total gross emissions. Industrial Stationary Energy is energy used

within all industrial settings (including agriculture, forestry and fishing, mining, food processing, textiles, chemicals, metals, mechanical/electrical equipment and building and construction activities).

- Residential Stationary Energy consumption accounts for 20% of Stationary Energy emissions (82,378 tCO_2e) and 2% of total gross emissions. Residential Stationary Energy is energy used in homes (e.g. for heating, lighting, and cooking).
- Commercial Stationary Energy consumption accounts for 17% of Stationary Energy emissions (69,839 tCO_2e) and 2% of total gross emissions. Commercial Stationary Energy is energy used in all non-residential and non-industrial settings (e.g. in retail, hospitality, education, and healthcare).
- The remaining 13% of Stationary Energy emissions (52,435 tCO_2e, 1% of gross emissions) were produced by diesel and petrol, and the burning of biogas, which were not allocated to the above categories. Stationary Energy uses of diesel and petrol include stationary generators and motors and for heating.

3.4 Waste

Waste originating in Hawke's Bay (solid waste and wastewater) produced 99,459 tCO_2e in 2020/21, which comprises 2% of Hawke's Bay's total gross emissions. Table 7 provides the total emissions, percentage of total gross emissions, and percentage of the sector total for each sector/emissions source.

Table 7 Waste emissions by emission source

Sector / Emissions Source	tCO_2e	% of Total Gross Emissions	% of Sector Total
Waste in open landfill sites	60,295	1.4%	60.6%
Waste in closed landfill sites	13,743	0.3%	13.8%
Composting	11,125	0.3%	11.2%
Wastewater treatment plants	7,673	0.2%	7.7%
Individual septic tanks	6,623	0.2%	6.7%
Total:	**99,459**	**2%**	**100%**

Solid waste produced the bulk of Waste emissions (74,038 tCO_2e), making up 74% of total Waste emissions. Solid waste emissions include emissions from open landfills and closed landfills. Both open and closed landfills emit methane from the breakdown of organic materials disposed of in the landfill for many years after waste enters the landfill. Waste from Hawke's Bay sent to open landfill sites contributed 60,295 tCO_2e. Emissions from closed landfill sites produced 13,743 tCO_2e. Annual emissions from closed landfill sites will decrease over time as no new waste enters these sites.

Wastewater treatment (treatment plants and individual septic tanks) produced 14,296 tCO_2e making up 14% of total Waste emissions. Most of the households in Hawke's Bay are connected to wastewater treatments plants, which produced total emissions of 7,673 tCO_2e. Due to the production of methane, septic tanks have a higher emissions intensity compared to the wastewater treatments plants in Hawke's Bay. Households connected to individual septic tanks produced 6,623 tCO_2e in wastewater emissions.

Wastewater treatment tends to be a relatively small emission source compared to solid waste as advanced treatment of wastewater produces low emissions. In contrast, solid waste generates methane gas over many years as organic material enters landfill.

Composing produced 11,125 tCO_2e making up 11% of total Waste emissions. Waste diverted from landfill for composting in the Hawke's Bay Region includes horticultural, animal waste products, green waste, bark and sawdust.

3.5 Industrial Processes and Product Use (IPPU)

IPPU in Hawke's Bay produced 49,950 tCO_2e in 2020/21, contributing 1% to Hawke's Bay's total gross emissions. This sector includes emissions associated with the production of GHGs for refrigerants, foam blowing, fire extinguishers, aerosols, metered dose inhalers and Sulphur Hexafluoride for electrical insulation and equipment production. IPPU emissions do not include energy use for industrial manufacturing, which is included in the relevant Stationary Energy sub-category (e.g. coal, electricity and/or petrol and diesel). These emissions are based on nationally reported IPPU emissions and apportioned based on population due to the difficulty of allocating emissions to particular geographic locations.

There are no known industrial processes (as defined in the GPC requirements) present in the Hawke's Bay (e.g. aluminium manufacture).

Table 8 provides the total emissions, percentage of total gross emissions, and percentage of the sector's total for each sector/emissions source. The most significant contributor to IPPU emissions is the use of refrigerants which produced 93% of IPPU emissions (46,441 tCO_2e).

Table 8 Industrial processes and product use emissions by emission source

Sector / Emissions Source	tCO_2e	% of Total Gross Emissions	% of Sector Total
Refrigerants and air conditioning	46,441	1.1%	93.0%
Aerosols	2,601	0.1%	5.2%
SF6 - Electrical Equipment	508	<0.1%	1.0%
Foam Blowing	220	<0.1%	0.4%
SF6 - Other	100	<0.1%	0.2%
Fire extinguishers	80	<0.1%	0.2%
Total	**49,950**	**1.0%**	**100%**

3.6 Forestry

Planting of native forest (e.g. mānuka and kānuka) and exotic forest (e.g. pine), sequesters (captures) carbon from the atmosphere while the trees are growing to maturity. Harvesting of forest releases emissions via the release of carbon from organic matter and soils following harvesting. When sequestration by forests exceeds emissions from harvesting, the extra quantity of carbon sequestered by forest reduces net Forestry emissions. Conversely when emissions from harvesting exceed the amount of carbon sequestered by native and exotic forests, then net Forestry emissions will increase.

Sequestration in 2020/21 was 6,770,864 tCO_2e (which was mostly from exotic forests) while harvesting emissions were 3,908,023 tCO_2e. This meant that Forestry in Hawke's Bay was a net negative source of emissions in 2020/21 (rather than a positive source of emissions, where harvesting exceeds sequestration). Total Forestry emissions in 2020/21 were -2,862,841 tCO_2e. It is noted that harvesting of exotic forest can be cyclical in nature where some years will have higher sequestration and some years will have higher harvesting emissions determined by age of forests, commercial operators, and the global market.

Table 9 Forestry emissions by emission source (including sequestration)

Sector / Emissions Source	tCO_2e
Total harvest emissions	3,908,023
Native forest sequestration	-1,007,992
Exotic forest sequestration	-5,762,872
Total	**-2,862,841**

3.7 Total Gross Emissions by Greenhouse Gas

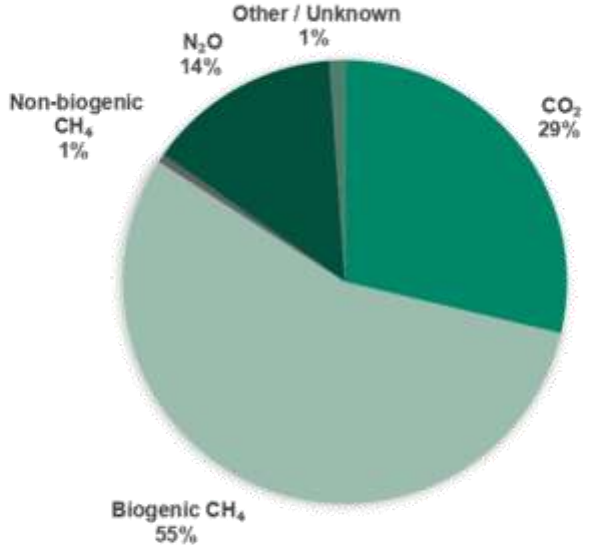
Each greenhouse gas has a different level of impact on climate change, this is accounted for when converting quantities of each gas into units of carbon dioxide equivalent (CO_2e).

Table 10: Hawke's Bay's total gross emissions, by greenhouse gas

Greenhouse Gas	Tonnes	Tonnes of CO_2e
Carbon Dioxide (CO_2)	1,248,710	1,248,710
Biogenic Methane (CH_4)	70,814	2,407,693
Non-biogenic Methane (CH_4)	795	27,030
Nitrous Oxide (N_2O)	2,060	613,673
Other / Unknown Gas (in CO_2e)	48,891	48,891
Total	**1,369,680**	**4,345,997**

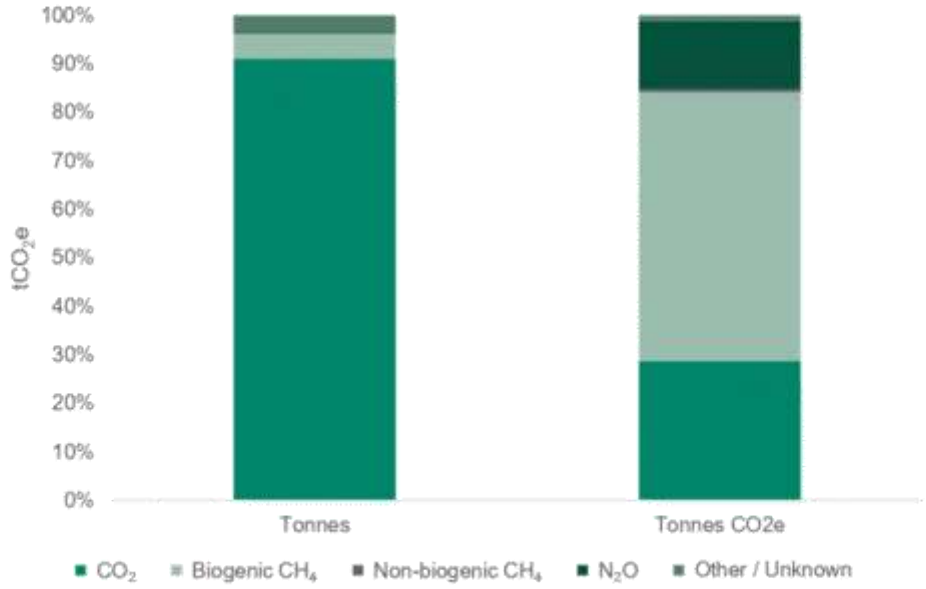
Figure 4 illustrates the Hawke's Bay's total gross emissions by greenhouse gas in units of carbon dioxide equivalents (CO_2e).

Figure 4: The Hawke's Bay Region's total gross emissions, by greenhouse gas (in tCO_2e)



Due to the greater global warming impact of methane, methane represents just 5% of the total tonnage of GHG emissions from the Hawke's Bay but represents 55% of CO_2e. Nitrous oxide represents 0.2% of the total tonnage of GHG emissions from Hawke's Bay but represents 14% of CO_2e. This effect can be seen in Figure 5.

Figure 5: Hawke's Bay Region's total gross emissions, by greenhouse gas in tonnes and in tonnes of CO_2e



https://aecom.sharepoint.com/sites/HBRCCCFFY19-FY21/Shared Documents/General/4. Deliverables/221129 Final V3 Reports/HBRC_CommunityCarbonFootprint_2022_HawkesBayRegion_221129_FinalV3.docx
Revision 3 – 29-Nov-2022
Prepared for – Hawke's Bay Regional Council – Co No.: N/A

3.8 Biogenic emissions

Biogenic carbon dioxide and methane emissions are stated in Table 11 and Table 12, respectively.

Biogenic CO_2 emissions are those that result from the combustion of biomass materials that store and sequester CO_2, including materials used to make biofuels (e.g. trees, crops, vegetable oils, or animal fats). Biogenic CO_2 emissions from plants and animals are excluded from gross and net emissions as they are part of the natural carbon cycle.

Table 11: Biogenic CO_2 in the Hawke's Bay (Excluded from gross emissions)

Biogenic Carbon Dioxide (CO_2) (Excluded from gross emissions)		
Biofuel	178,324	t CO_2
Combusted Landfill Gas	14,793	t CO_2
Total Biogenic CO_2	**193,117**	**t CO_2**

Biogenic CH_4 emissions (e.g., produced by farmed cattle via enteric fermentation) are included in gross emissions due to their relatively large impact on global warming relative to biogenic CO_2. Biogenic methane represents 5% of the gross total tonnage of GHG emissions in the Hawke's Bay but represents 55% of total gross GHG emissions when expressed in CO_2e. This is caused by the higher global warming impact of methane per tonne, compared to carbon dioxide. The total tonnage of each GHG and the contribution of each GHG to total gross emissions when expressed in CO_2e is shown in Table 10.

The importance of biogenic CH_4 is highlighted in NZ's Climate Change Response (Zero Carbon) Amendment Act. The Act includes specific targets to reduce biogenic CH_4 by between 24% and 47% below 2017 levels by 2050, and by 10% below 2017 levels by 2030. More information on the Act is available here: https://www.mfe.govt.nz/climate-change/zero-carbon-amendment-act.

Table 12: Biogenic Methane in the Hawke's Bay (Included in gross emissions)

Biogenic Methane (CH_4) (Included in gross emissions)		
Enteric Fermentation	66,895	t CH_4
Landfill Gas	2,177	t CH_4
Manure Management	1,407	t CH_4
Wastewater Treatment	404	t CH_4
Composting (Green Waste)	190	t CH_4
Biofuel	143	t CH_4
Total Biogenic CH_4	**71,217**	**t CH_4**

3.9 Territorial Authorities in the Hawke's Bay Region

The Hawke's Bay regional area contains several territorial authorities. Hastings District, Napier City, Central Hawkes Bay District, and Wairoa District are all exclusively within the boundaries of the Hawke's Bay region. Additionally, areas of Taupō District and Rangitīkei District are also part of the Hawke's Bay region. We estimate that 0.1% of Taupō's population and 12% of Taupō's area, and 0.3% of Rangitīkei's population and 14% of Rangitīkei's area are within the Hawke's Bay region.

Figure 6 shows the Hawke's Bay's total gross emissions divided by territorial authority. Figure 7 shows total gross emissions for the territorial authorities in the Hawke's Bay Region, split by sector. Both figures only include the emissions produced within the Hawke's Bay region for Taupō and Rangitīkei.

Hastings is the highest emitting territorial authority in the region, representing 43% of the Hawke's Bay's total gross emissions. Hastings' emissions inventory is predominantly agriculture-related emissions with the next largest emitting territorial authorities; Central Hawke's Bay and Wairoa, also containing significant agricultural emissions. Of the four territorial authorities entirely within the Hawke's Bay region, Napier has the lowest total gross emissions, with emissions mostly from Transport and Stationary Energy. The areas of Taupō and Rangitīkei contribute to 2% of the Hawke's Bay region's total gross emissions, almost entirely from Agriculture.

Figure 6 Hawke's Bay's total gross emissions divided by territorial authority (tCO_2e). *Taupō and Rangitīkei totals only include emissions produced in the Hawke's Bay region.

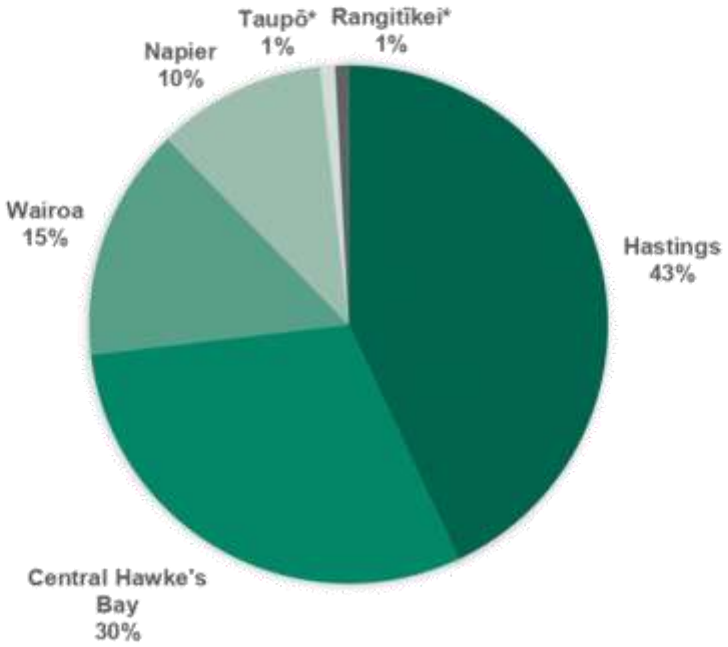
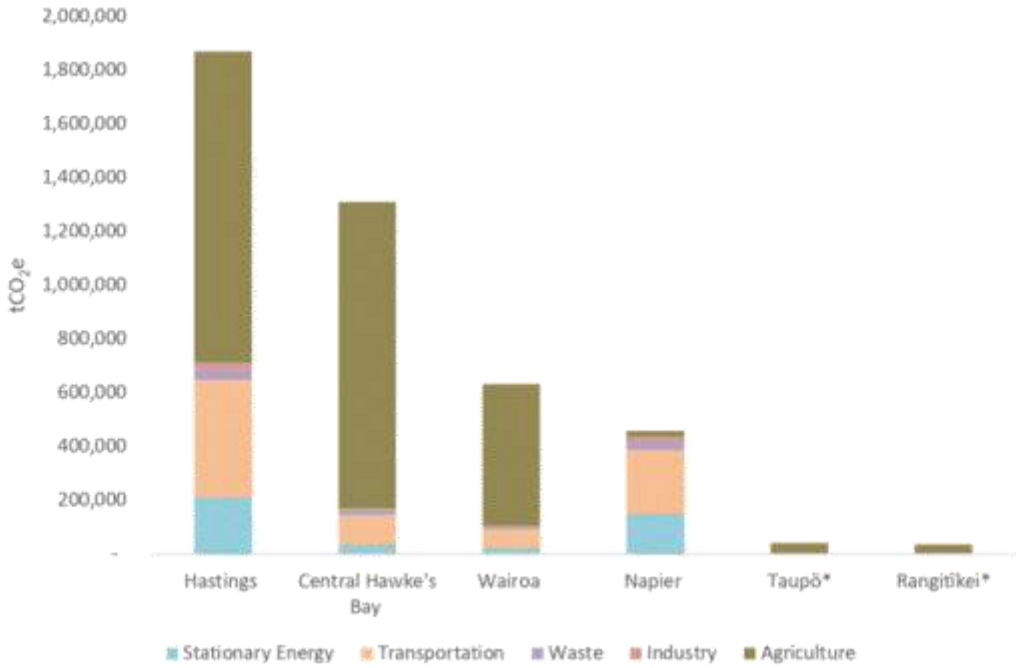


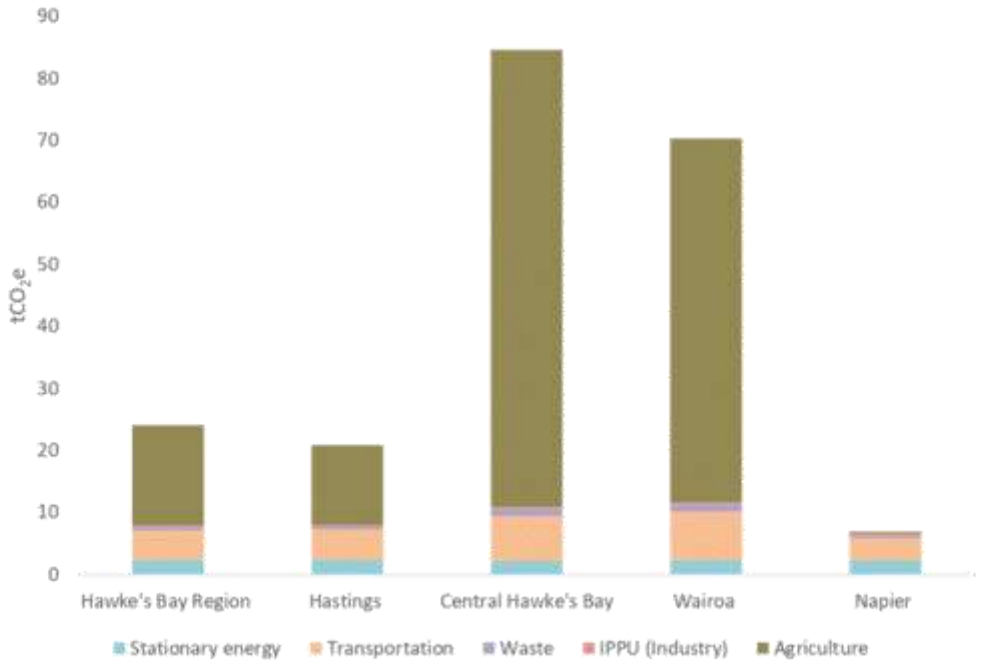
Figure 7 Total gross emissions by territorial authority in the Hawke's Bay region (tCO_2e). *Taupō and Rangitīkei totals only include emissions produced in the Hawke's Bay region.



When comparing emissions inventories from different areas, a per capita figure can be useful because it provides a common reference point to understand the difference in emissions. Figure 8 shows emissions per capita for the region and territorial authorities within the region. Taupō and Rangitīkei are excluded from this figure due to the tiny population and large agriculture within the small area in the Hawke's Bay creating very large per capita emissions (this is not the case for the entire Taupō or Rangitīkei district).

The Hawke's Bay region has a 24.1 tCO_2e/per capita figure for total gross emissions which is higher than the national value of 15.7 tCO_2e/per capita. Notably, Napier has the lowest per capita total emissions at 6.9 tCO_2e/per capita. Central Hawke's Bay and Wairoa have the largest per capita total gross emissions at 84.6 tCO_2e/per capita and 70.3 tCO_2e/per capita respectively, both due to high Agriculture emissions in the district. Hastings has the third highest per capita emissions at 20.9 tCO_2e/per capita, similar to that of the region.

Figure 8 Total gross emissions per capita for the region and territorial authorities within the region (tCO_2e). *Taupō and Rangitīkei areas not included



4.0 Emissions change from 2018/19 to 2020/21

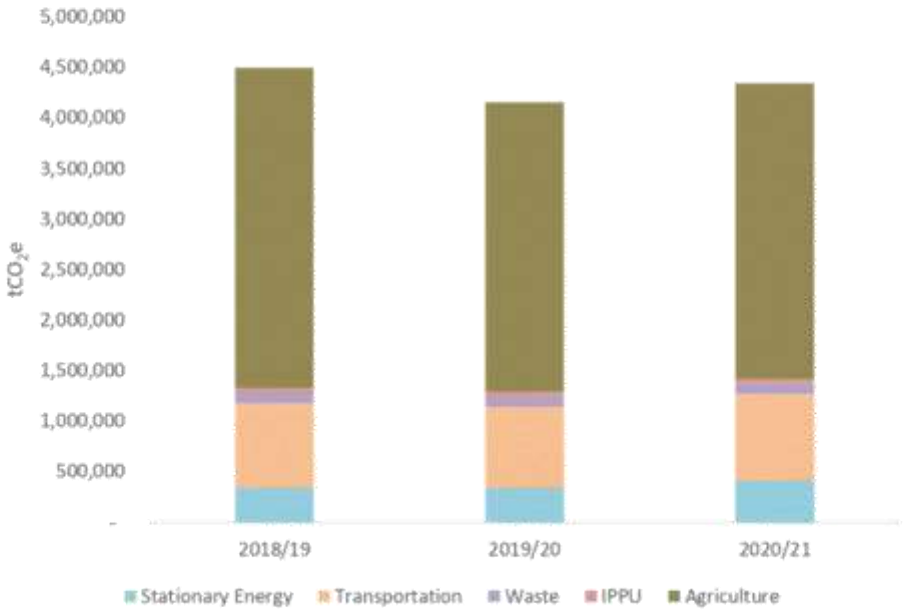
Alongside calculating The Hawke's Bay's emissions footprint for 2020/21, we have calculated the Hawke's Bay's emissions footprint for 2018/19 and 2019/20. This section displays the results of the 2018/19, 2019/20, and 2020/21 emissions footprints with a focus on Gross emissions and documents the change in emissions from 2018/19 to 2020/21.

This section displays the results of the 2018/19, 2019/20, and 2020/21 emissions footprints with a focus on Gross emissions and documents the change in emissions from 2018/19 to 2020/21.

Table 13 Change in The Hawke's Bay's Total Gross and Net emissions from 2018/19 to 2020/21

	2018/19 (tCO_2e)	2019/20 (tCO_2e)	2020/21 (tCO_2e)	% Change (2018/19 to 2020/21)
Total Net Emissions (including forestry)	1,855,570	1,413,954	1,483,156	-20%
Total Gross Emissions (excluding forestry)	4,497,263	4,155,767	4,345,997	-3%

Figure 9 Change in The Hawke's Bay's total gross emissions from 2018/19 to 2020/21



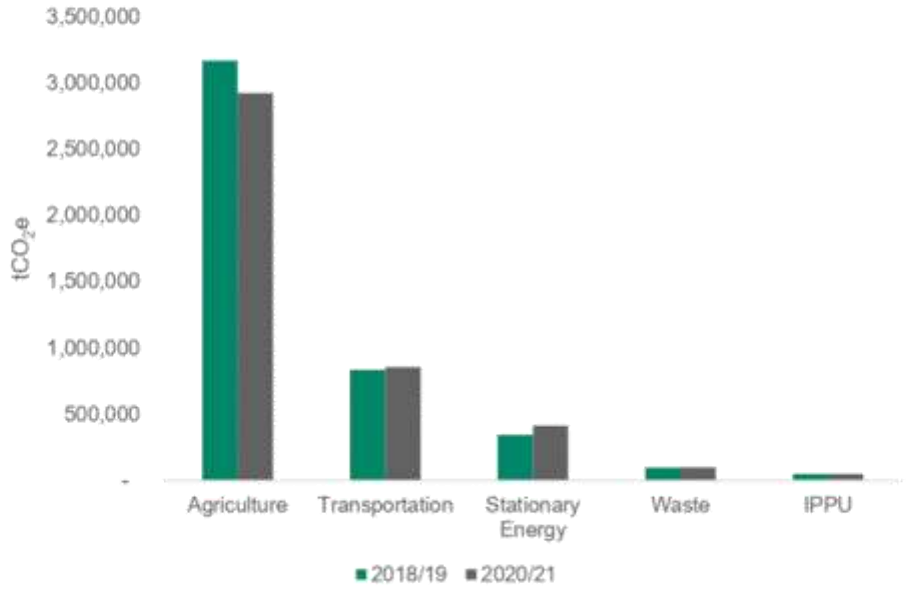
Total gross emissions per year decreased by 3% from 4,497,263 tCO_2e in 2018/19 to 4,345,997 tCO_2e in 2020/21. This was driven by a decrease in Agricultural emissions of 8%, between 2018/19 and 2020/21 (245,553 tCO_2e), due to a reduction in livestock numbers, particularly of sheep and non-dairy cattle.

Total net emissions in Hawke's Bay decreased by 20% from 1,855,570 in 2018/19 to 1,483,156 tCO_2e. This decrease was predominantly due to a decrease in annual forest harvesting emissions. This is discussed further below under the 'Forestry' heading.

The population of Hawke's Bay grew by 4% during this time, resulting in a 7% reduction in per capita gross emissions between 2018/19 and 2020/21, from 25.9 to 24.1 tCO_2e per person per year. A discussion of the decoupling of gross emissions from population growth and economic growth is found in Section 5.0.

The sections below outline the change in emissions between 2018/19 and 2020/21 for each sector and emissions source, highlighting the changes that have had the largest impact on total gross emissions.

Figure 10 Emissions for each sector of The Hawke's Bay's gross emissions footprint for 2018/19 and 2020/21



4.1 Agriculture

Table 14 Change in Hawke's Bay's Agriculture emissions from 2018/19 to 2020/21

Sector / Emissions Source	2018/19 (tCO_2e)	2019/20 (tCO_2e)	2020/21 (tCO_2e)	% Change (2018/19 to 2020/21)
Enteric fermentation	2,457,058	2,219,534	2,274,432	-7%
Manure from Grazing Animals	360,412	324,471	332,570	-8%
Other Agriculture Emissions	147,558	132,002	132,079	-10%
Atmospheric Deposition	101,881	91,618	93,329	-8%
Manure Management	51,814	47,881	47,822	-8%
Agricultural Soils	29,657	25,712	22,614	-24%
Fertiliser used in Horticulture	23,070	23,070	23,070	*N/A*
Total	**3,171,449**	**2,864,287**	**2,925,915**	**-8%**

Agriculture is the most significant contributor to the Hawke's Bay's community carbon footprint. The sector's emissions decreased by 8% between 2018/19 and 2020/21 (245,533 tCO_2e). This decrease is driven by a reduction in total livestock numbers, especially of dairy cattle and sheep (see Table 15 and Table 16.

Emissions related to sheep decreased by 149,172 tCO_2e due to a reduction in the number of sheep (272,146 sheep). Emissions related to non-dairy cattle decreased by 60,255 tCO_2e due to a reduction in the number of non-dairy cattle (30,490 cattle). The number of dairy cattle also reduced, reducing dairy cattle emissions by 20,394 tCO_2e.

Table 15 Change in The Hawke's Bay's livestock numbers from 2018/19 to 2020/21

	Number of animals (2018/19)	Number of animals (2020/21)	Change in number of animals (2018/19 to 2020/21)
Sheep	2,876,262	2,604,116	-272,146
Non-dairy Cattle	448,764	418,274	-30,490
Dairy Cattle	78,002	72,208	-5,794
Other livestock	71,257	71,414	157
Total livestock	**3,474,285**	**3,166,012**	**-308,273**

Table 16 Change in the Hawke's Bay's livestock-associated Agriculture emissions from 2018/19 to 2020/21

	2018/19 emissions (tCO_2e)	2020/21 emissions (tCO_2e)	Change in emissions, 2018/19 to 2020/21 (tCO_2e)
Sheep	1,576,576	1,427,404	-149,172
Non-dairy Cattle	1,133,035	1,072,780	-60,255
Dairy Cattle	313,700	293,306	-20,394
Other livestock	67,427	65,709	-1,718
Total livestock	**3,090,738**	**2,859,199**	**-149,172**

4.2 Transport

Table 17 Change in Hawke's Bay's Transport emissions from 2018/19 to 2020/21

Sector / Emissions Source	2018/19 (tCO_2e)	2019/20 (tCO_2e)	2020/21 (tCO_2e)	% Change (2018/19 to 2020/21)
Diesel	433,808	421,738	472,063	9%
Petrol	301,531	281,543	300,868	0%
Marine Freight	90,698	90,634	78,488	-13%
Jet Kerosene	3,820	3,293	2,635	-31%
Rail	3,160	861	647	-80%
LPG	1,460	1,477	1,546	6%
Aviation Gas	222	265	272	23%
Total:	**834,698**	**799,813**	**856,520**	**3%**

Transport emissions increased by 3% between 2018/19 and 2020/21 (21,822 tCO_2e). This was driven by a 5% increase in on-road fuel emissions (30,363 tCO_2e) combined with a 13% decrease in marine freight emissions (12,210 tCO_2e).

It is noted the impact of the COVID-19 pandemic can be seen in Transport emissions where emissions decreased by 4% between 2018/19 and 2019/20 due to reductions in road and air transport fuel use. Aviation emissions continued to reduce in the 2020/21 reporting year, reflective of ongoing COVID-19 impacts to the industry.

4.3 Stationary Energy

Table 18 Change in Hawke's Bay's Stationary Energy emissions from 2018/19 to 2020/21

Emissions Source	2018/19 (tCO_2e)	2019/20 (tCO_2e)	2020/21 (tCO_2e)	% Change (2018/19 to 2020/21)
Electricity Consumption	125,197	129,010	181,396	45%
Natural Gas	120,436	117,023	125,465	4%
Stationary Petrol & Diesel Use	48,276	46,850	52,339	8%
Coal	12,690	13,259	10,343	-18%
LPG	11,573	11,713	12,261	6%
Electricity Transmission and Distribution Losses	10,931	11,308	16,663	52%
Natural Gas Transmission and Distribution Losses	9,737	9,461	10,143	4%
Biofuel / Wood	5,414	5,424	5,447	1%
Biogas (landfill)	92	93	96	4%
Total:	**344,347**	**344,141**	**414,152**	**20%**

Emissions from Stationary Energy increased by 20% between 2018/19 and 2020/21 (69,806 tCO_2e). This was driven by a 45% increase in electricity consumption emissions (56,198 tCO_2e). This rise in electricity consumption emissions was caused by a 3% increase in electricity consumption in the Hawke's Bay coupled with a 41% increase in the emissions intensity of the national electricity grid (tCO_2e/kWh). The emissions intensity of the national grid has increased in recent years due to the increased use of fossil fuels during years with low hydro electricity generation.

4.4 Waste

Table 19 Change in Hawke's Bay's Waste emissions from 2018/19 to 2020/21

Sector / Emissions Source	2018/19 (tCO_2e)	2019/20 (tCO_2e)	2020/21 (tCO_2e)	% Change (2018/19 to 2020/21)
Waste in open landfill sites	57,126	58,590	60,295	6%
Waste in closed landfill sites	15,380	14,533	13,743	-11%
Individual septic tanks	5,655	6,199	6,623	17%
Wastewater treatment plants	7,682	7,240	7,673	0%
Composting	11,125	11,125	11,125	0%
Total	**96,968**	**97,686**	**99,459**	**3%**

Waste emissions increased between 2018/19 and 2020/21, by 3% (2,491 tCO_2e). Total solid waste in landfill emissions increased by 2%. Emissions from closed landfills decreased due to no extra waste being added, the existing waste in landfill releases fewer emissions over time. Emissions from waste in

open landfills increased as the volume of waste entering the landfill increased, and waste recently deposited in landfill reaches peak emissions per year (this is after approximately two years in landfill). Due to data only being available for one singular year, no change in composting emissions is recorded.

Total wastewater emissions increased by 7%, due to the increase in emissions from individual septic tanks (968 tCO_2e). Better data on the number of households connected to centralized wastewater treatment would improve the accuracy of the emissions calculations. Due to the production of methane, septic tanks have a higher emissions intensity compared to a wastewater treatment plant.

4.5 Industrial Processes and Product Use (IPPU)

Table 20 Change in Hawke's Bays IPPU emissions from 2018/19 to 2020/21

Sector / Emissions Source	2018/19 (tCO_2e)	2019/20 (tCO_2e)	2020/21 (tCO_2e)	% Change (2018/19 to 2020/21)
Refrigerants and air conditioning	46,065	46,242	46,441	1%
Aerosols	2,899	2,707	2,601	-10%
SF6 - Electrical Equipment	457	493	508	11%
Foam Blowing	202	219	220	9%
SF6 - Other	99	99	100	1%
Fire extinguishers	80	80	80	0%
Total	**49,802**	**49,840**	**49,950**	**0.3%**

IPPU emissions remained stable between 2018/19 and 2020/21. There was a decrease in aerosols emissions (298 tCO_2e) and an increase in refrigerants and air conditioning (376 tCO_2e). Note that national level data is used for this sector and is portioned out using a population approach; exact emissions for the Region are unknown.

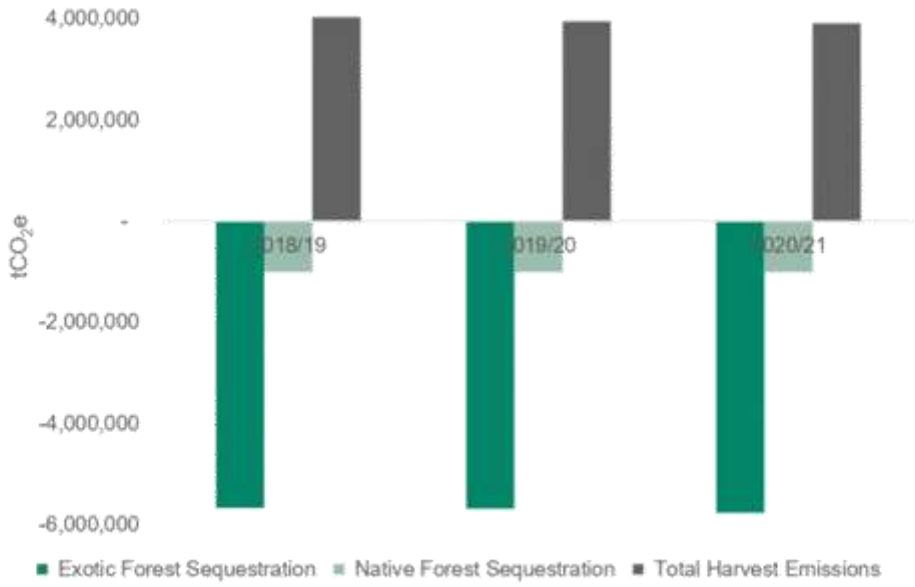
4.6 Forestry

Table 21 Change in Hawke's Bays Forestry emissions from 2018/19 to 2020/21

Sector / Emissions Source	2018/19 (tCO_2e)	2019/20 (tCO_2e)	2020/21 (tCO_2e)	% Change (2018/19 to 2020/21)
Total harvest emissions	4,026,465	3,945,810	3,908,023	-3%
Native forest sequestration	-1,007,992	-1,007,992	-1,007,992	0%
Exotic forest sequestration	-5,660,165	-5,679,631	-5,762,872	2%
Total	-2,641,693	-2,741,813	-2,862,841	8%

Forestry emissions decreased by 221,148 tCO_2e (8%) between 2018/19 and 2020/21. This decrease was driven by a decrease in total harvest emissions (118,442 tCO_2e) and an increase in exotic forest sequestration during this time. Forestry emissions are influenced by the cyclical nature of harvesting and planting regimes where some years will have higher sequestration and some years will have higher harvesting emissions. This is dependent on age of forests and the demand for lumber and timber. Improved and updated data sources may impact the estimation of emissions from this source in the future.

Figure 11 Forestry sequestration and harvesting emissions from 2018/19 to 2020/21



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5.0 Decoupling of GHG emissions from population growth and GDP

Figure 12 shows the change in gross emissions when compared to changes in other metrics of interest between 2018/19 and 2020/21. For example, total gross emissions have decreased by 3% as the population has grown by 4%, resulting in a 7% decrease in per capita gross emissions.

When emissions grow less rapidly than Gross Domestic Product (GDP) as a measure of regional income then this process is known as decoupling. The term decoupling is an expression of the desire to mitigate emissions without harming economic wellbeing. A full discussion of decoupling of emissions is beyond the scope of this project. However, the changes in emissions and GDP illustrated in Figure 12 suggest at a high-level decoupling has occurred between 2018/19 and 2020/21. GDP increased by 7% while gross emissions decreased by 3%, resulting in a 10% decrease in the GHG emissions ratio to GDP.

The exact drivers for the decoupling of emissions from GDP are difficult to pinpoint. New policies, for restructuring the way to meet demand for energy, food, transportation, and housing will all contribute. In this case, both direct local actions including reducing the emissions from landfill gas and indirect national trends (e.g. reduction of emissions from electricity generation) will have contributed to the trends noted.

Figure 12 Change in total gross emissions compared to other metrics of interest

6.0 Impact of the COVID-19 pandemic on GHG Emissions

COVID-19 impacted New Zealand and the entire world during 2020 and 2021, causing widespread government-imposed restrictions on businesses and individuals and huge shifts in behaviours and economic markets. Restrictions in New Zealand relating to COVID-19 began in mid-March 2020 with many personal and business restrictions continuing past the end of 2019/20 and throughout 2020/21.[3]

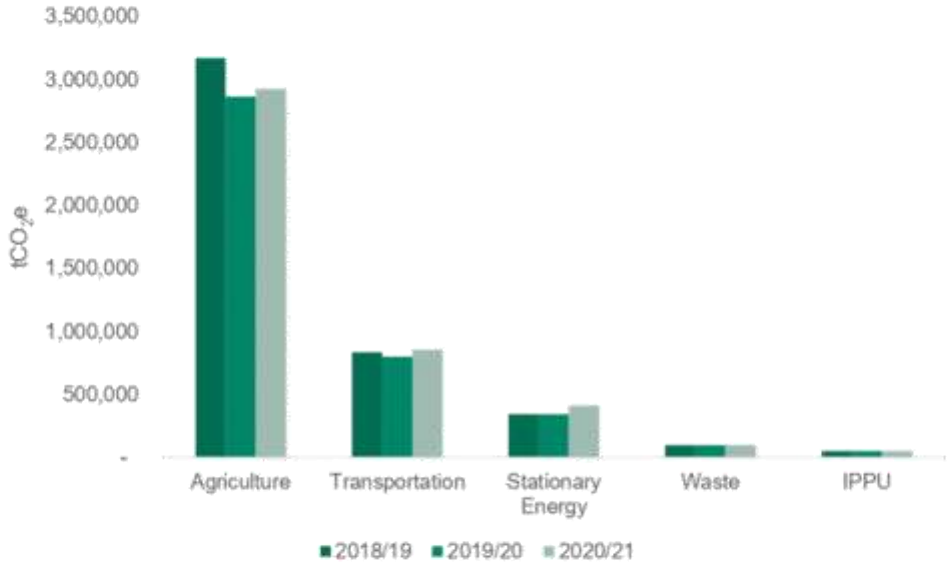
Globally, carbon dioxide emissions from fossil fuels (the largest contributor to greenhouse gas emissions) in 2020 decreased by 7% compared to 2019[4]. Emissions from the transportation sector account for the largest share of this decrease. Surface transport, e.g. car journeys, fell by approximately half at the peak of COVID-19 restrictions in April 2020 (when restrictions were at their maximum, particularly across Europe and the U.S. Globally, emissions recovered to near 2019 levels in 2021 and are expected to continue to increase.

In New Zealand, national daily carbon dioxide emissions are estimated to have fell by up to 41% during the level 4 lockdown in April 2020[5]. National gross emissions decreased by 3% from 2018/19 to 2019/20, which was largely driven by a decrease in fuel use in road transport due to COVID-19 pandemic restrictions, a decrease in fuel use in manufacturing industries and construction due to COVID-19 restrictions, and a decrease in fuel use from domestic aviation also due to COVID-19 restrictions.

Total gross emissions in the Hawke's Bay decreased by 341,496 tCO_2e (8%) between 2018/19 and 2019/20. Total gross emissions then increased by 190,229 tCO_2e (4%) from 2019/20 to 2020/21, however this is still lower than the pre-covid-19 2018/19 year.

The impact on emissions in different sectors varied. Notably, Transport emissions reduced by 4% between 2018/19 and 2019/20, driven by reduced on-road and off-road transport fuel use. Agriculture emissions reduced between 2018/19 and 2019/20, potentially due to impacts on transport and global supply chains. Despite changes in Stationary Energy emissions, this sector is not judged to have been significantly affected by COVID-19. Waste and IPPU emissions were relatively unchanged between 2018/19 and 2019/20.

Figure 13 Hawke's Bay emissions per sector for 2018/19, 2019/20, and 2020/21 (tCO_2e)



[3] https://covid19.govt.nz/alert-system/history-of-the-covid-19-alert-system/
[4] Pierre Friedlingstein et al. - Global Carbon Budget 2020 (2020)
[5] Corinne Le Quere et al. – Temporary Reduction in Daily Global CO_2 Emissions During the COVID-19 Forced Confinement

7.0 Closing Statement

The Hawke's Bay GHG emissions footprint provides information for decision-making and action by the council, stakeholders, and the wider community. We encourage the council to use the results of this study to update current climate actions plans and set emission reduction targets.

The emissions footprint developed for the Hawke's Bay region covers emissions produced in the Stationary Energy, Transport, Waste, IPPU, Agriculture, and Forestry sectors using the GPC reporting framework. Sector-level data allows the Hawke's Bay Regional Council to target and work with the sectors that contribute the most emissions to the footprint.

Understanding of the extensive and long-lasting effects of climate change is improving all the time. It is recommended that this emissions footprint be updated regularly (every two or three years) to inform ongoing positive decision making to address climate change issues.

The accuracy of any emissions footprint is limited by the availability, quality, and applicability of data. Areas where data could be improved for future footprints include forestry (forest cover and harvesting), agriculture (especially livestock numbers), solid waste and wastewater, and on and off-road transport fuel use.

https://aecom.sharepoint.com/sites/HBRCCCFFY19-FY21/Shared Documents/General/4. Deliverables/221129 Final V3 Reports/HBRC_CommunityCarbonFootprint_2022_HawkesBayRegion_221129_FinalV3.docx
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8.0 Limitations

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Appendix A

Assumptions and Data Sources

Sector / Category	Assumption and Data Sources
General	
Geographical Boundary	LGNZ local council mapping boundaries have been applied. The emissions footprint for the Hawke's Bay Region covers the entirety of the Hawke's Bay Region (this excludes some of the Rangitikei and Taupō territorial authorities). Emissions footprints for each territorial authority covers the entirety of the territorial authority area.
Population	Population figures are provided by StatsNZ. Financial year populations have been used, these are based on the average population from the two calendar years (e.g. the average of 2018 and 2019 calendar year populations for FY19). The population of Taupo and Rangitikei Districts within the Hawke's Bay geographical boundary has been calculated.
Transport Emissions	
Petrol and Diesel:	Petrol and diesel sales data provided by Napier City Council for Napier, Central Hawke's Bay and Hastings. Combined sales data for Gisborne and Wairoa provided by Gisborne District Council and allocated to a region based on Waka Kotahi emissions data. Sales have been divided between territorial authorities based on the number of kilometres travelled by vehicles on roads (VKT) in each territorial authority. VKT data provided by Waka Kotahi. The division into transport and stationary energy end use (and within transport into on-road and off-road) has been calculated using fuel end use data provided by the Energy Efficiency and Conservation Authority (EECA) from the 2019 database. Biofuel sales information provided directly by the supplier.
Rail Diesel	Emissions from fuel use have been calculated and provided by Kiwi Rail. The following assumptions were made: - Net Weight is product weight only and excludes container tare (the weight of an empty container) - The Net Tonne-Kilometres (NTK) measurement has been used. NTK is the sum of the tonnes carried multiplied by the distance travelled. - National fuel consumption rates have been used to derive litres of fuel for distance. - Type of locomotive engine used, and jurisdiction topography, have not been incorporated in the calculations. The trans-boundary routes were determined, and the number of stops taken along the way derived. The total amount of litres of diesel consumed per route was then split between the departure district, arrival district and any district the freight stopped at along the way. If the freight travelled through but did not stop within a district, no emissions were allocated. This data is subject to commercial confidentiality.
Jet Kerosene (Scheduled Flights) Aviation Gas (General Aviation)	Calculated from information provided by Hawke's Bay Airport. Aviation fuel and jet kerosene fuel volumes were provided and emissions have been calculated using these volumes. Emissions have been divided between territorial authorities based the relative population of each territorial authority.

Marine Freight	Shipping schedules have been provided by the Port of Napier. Emissions have been calculated based on ship weight and distance from the origin/destination to Napier. This figure does not include fishing vessels, or vessels with destination to be confirmed. Emissions from freight and international shipping are allocated equally between the origin and destination area emissions footprints. It is expected that imports and exports travelling through the Port of Napier service the entire Hawke's Bay Region. Emissions relating to freight and international shipping emissions have been divided between all Hawke's Bay territorial authorities based on population size.
Marine Fuel (Local)	Non-freight marine fuel use has not been included in this study. Fuel use by Port of Napier-controlled vessels has not been included due to a lack of available information. Most private marine vessels use fuel purchased at vehicle fuel stations. Petrol and diesel used in private marine vessels is included in off-road transportation.
LPG Consumption	North Island LPG sales data (tonnes) has been provided by the LPG Association. 'Auto' and 'Forklift' sales represent transport uses of LPG. Sales have been divided between territorial authorities on a per capita basis.
Stationary Energy Emissions	
Electricity Demand	Electricity demand has been calculated using grid exit point (GXP) data from the EMI website (www.emi.ea.govt.nz). Reconciled demand has been used as per EMI's confirmation. The territorial authorities serviced by each GXP have been confirmed by the respective electricity suppliers. The breakdown into sectors (Residential, Commercial, and Industrial) is based on NZ average consumption per sector as per Ministry for the Environment (MfE) data.
Electricity Generation	Electricity generation has been calculated using data from the EMI website (www.emi.ea.govt.nz). Small electricity generation has not been included in this data (e.g. domestic solar generation). This figure only includes electricity that is connected to the national electricity grid, direct users of electricity are not included.
Coal Consumption	National coal consumption data has been provided by MBIE. Regional industrial coal data has been provided by EECA. National residential and commercial coal consumption has been divided between territorial authorities on a per capita basis. Regional industrial coal consumption has been divided between territorial authorities on a per capita basis.
Coal Production and Fugitive Emissions	Not Calculated: There are no active coal mines within the region.
Biofuel Consumption	National biofuel consumption data has been provided by the Ministry for Business, Innovation and Employment (MBIE). Biofuel consumption has been divided between territorial authorities on a per capita basis. Biofuel emissions are broken down into Biogenic emissions (CO_2) and Non-Biogenic emissions (CH_4 and N_2O)

LPG Consumption	North Island LPG sales data (tonnes) has been provided by the LPG Association. 'Auto' and 'Forklift' sales represent transport uses of LPG. All other sales represent stationary energy uses of LPG. Sales have been divided between territorial authorities on a per capita basis. The breakdown into sectors (Residential, Commercial, and Industrial) is based on NZ average consumption per sector as per MfE data.
Natural Gas Consumption	Natural gas consumption data has been provided by FirstGas. Territorial Authorities supplied by gas from each Point of Connection (POC) have been confirmed by FirstGas. Natural gas consumption has been split into residential, commercial, and industrial consumption based on information provided by PowerCo and national statistics from MBIE. Some POCs supply gas to particular industrial users exclusively, these have been taken into account.
Oil and Gas Fugitive Emissions	Not Calculated: There are no gas or oil processing plants within the region.
Agricultural Emissions	
General	Territorial authority livestock numbers and fertiliser data taken from the Agricultural Census (StatsNZ). The last territorial authority census was in 2017. Regional agricultural data from StatsNZ (2021) has been used to estimate the change in livestock and fertiliser use since 2017. Territorial authority land-use data provided by HBRC covering horticulture land-use.
Solid Waste Emissions	
Waste in Landfill	Landfill waste volume and end location information has been provided by the respective council departments. Where information is not available, waste volumes have been estimated based on historical national data on a per capita basis. Emissions are allocated to territorial authorities based on where the waste was produced, even if the waste is disposed in landfill outside the territorial authority.
Wastewater Emissions	
Wastewater Volume and Treatment Systems	Information on treated wastewater, and treatment plants has been provided by the respective council departments. Where information is not available, reasonable assumptions have been made and the WaterNZ database has been consulted. The population connected to septic tank systems have been estimated by the respective council departments. Where the population covered by Wastewater treatment plants and septic tanks does not account for the entire population, the remaining population is assigned to septic tanks. Emissions are allocated to territorial authorities based on where the wastewater was produced, even if the wastewater is treated outside the territorial authority.
Industrial Emissions	
Industrial processes	It is assumed that there are no significant non-energy related emissions of greenhouse gasses from industrial processes in the Region (e.g. aluminium manufacture).
Industrial Product Use	National data covering industrial product use (e.g. fire extinguishers, refrigerants) has been provided by the MfE. Emissions have been allocated to territorial authorities on a per capita basis.

Forestry Emissions	
Exotic Forestry Harvested	Harvested forestry, and forest cover information for each territorial authority has been derived from Landcare Research data. It has been assumed that only 70% of the tree is removed as roundwood and that the above ground tree makes up approximately 74% of the total carbon stored.
Exotic Forest	Exotic forest land area for each territorial authority has been provided by Landcare Research.
Emission Factors	
General	All emission factors have detailed source information in the calculation tables within which they are used. Where possible, the most up to date, NZ-specific EFs have been applied. AR5 Global Warming Potential (GWP) figures for greenhouse gases have been used accounting for climate change feedbacks.

Appendix B

Additional Transport Emissions Analysis

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Additional Transport Emissions Analysis – Hawke's Bay Region

This section details the additional analysis undertaken to further breakdown the Hawke's Bay Region's transport sector GHG emissions. The focus of this additional analysis addresses on-road and off-road transport emissions which together represent 18% of Hawke's Bay total gross emissions. Within on-road and off-road transport emissions this assessment looks at the relative contribution of each vehicle type (Cars, Commercial Vehicles, Buses) to the region's transport emissions.

Key findings:

- Cars represent 51% of Hawke's Bay on-road transport emissions, and 8% of Hawke's Bay total gross emissions.
- Light commercial vehicles represent 22% of Hawke's Bay's on-road transport emissions and 3% of Hawke's Bay's total gross emissions.
- Heavy commercial vehicles represent 24% of Hawke's Bay's on-road transport emissions and 4% of Hawke's Bay's total gross emissions.
- Electric vehicles currently represent less than 106 tCO_2e (0.02%) of Hawke's Bay on-road transport emissions based on emissions related to the electricity consumed.
- Cars represent 73% of all Vehicle Kilometres Travelled (VKT) in Hawke's Bay but represent 51% of all on-road emissions in Hawke's Bay. This is due to the relatively low average tCO_2e per VKT of cars compared to heavier vehicles.
- 25-50+ tonne heavy vehicles represent 4% of all Vehicle Kilometres Travelled (VKT) in Hawke's Bay but represent 18% of all on-road emissions in Hawke's Bay.
- Diesel is the predominant fuel for off-road transport use, representing 95% of off-road transport emissions in Hawke's Bay.
- Nationally, agriculture is the highest producing sector of off-road transport emissions, producing 27% of all off-road transport emissions. The next largest off-road transport producing sectors are building and construction, commercial, and industrial uses. Data specific to Hawke's Bay was not available at the time of writing.

1.0 Methodology

The basis for this assessment is the results presented in the Hawke's Bay Community Carbon Footprint for the financial year 2020/21 (July 1st to June 30th). The emissions for on-road and off-road transport have been calculated directly based on the sale of petrol and diesel in Hawke's Bay, and then these have been broken down by sector and vehicle type using data provided by Waka Kotahi and the Energy Efficiency and Conservation Authority (EECA).

Data provided by Waka Kotahi covering Vehicle Kilometres Travelled (VKT) and emissions (by gas) for each territorial authority by vehicle class in 2018/19 has been used to assess the relative contribution of vehicle class types to on-road transport emissions in Hawke's Bay.

Emissions related to energy use from electric vehicles (EVs) in the Community Carbon Footprint is included in the Stationary Energy sector and not included in transport emissions, due to lack of available data at the time of calculation. Total emissions presented here include the EV emissions contribution. These emissions have been calculated using an average electricity consumption per km travelled and based on the carbon intensity of the national electricity grid in 2020/21.

All calculated emissions have been converted to tonnes of CO_2 equivalent (tCO_2e) to allow direct comparison with the results of the Community Carbon Footprint.

Off-road transport data is limited at the local level, so this assessment utilises national data provided by the EECA to determine the relative contribution of emission sources within the on-road transport emissions source.

2.0 Key Limitations

On-road transport

- The data underlying the breakdown of on-road transport emissions is based on calendar year 2019 data, not financial year 2020/21. There may be some differences between these years regarding the vehicle fleet make-up, but it expected that the proportions used are representative.

Off-road transport

- Calculations have been based on national-level data resulting in a lower level of confidence in their applicability to the territorial authority's off-road emissions given the variation in off-road transport uses across the country.
- In the Community Carbon Footprint, recreational marine fuel usage is included in 'off-road transport' due to the lack of data able to separate this marine fuel consumption from other on-land fuel consumption. This recreational marine fuel is estimated and included in 'off-road transport' here for consistency.

Marine freight transport, air travel, and rail

- These emissions sources have not been broken down further. Additional work could be done to separate cruise ships from marine freight (although there is limited available and reliable data to do so). Additional work could also assess the relative contribution of the origin and destination of marine and air travel movements. These are beyond the scope of this study.

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3.0 Transport Emissions Summary

The paragraphs, figures and tables below outline Hawke's Bay greenhouse gas emissions from transport. During the 2020/21 reporting period, transport in Hawke's Bay emitted 856,520 tCO_2e, representing 20% of Hawke's Bay total gross emissions.

On-road transport is the largest contributor to Transport emissions, representing 80% of Transport emissions and 16% of Hawke's Bay total gross emissions. This is followed by off-road transport and marine transport (all relating to marine freight).

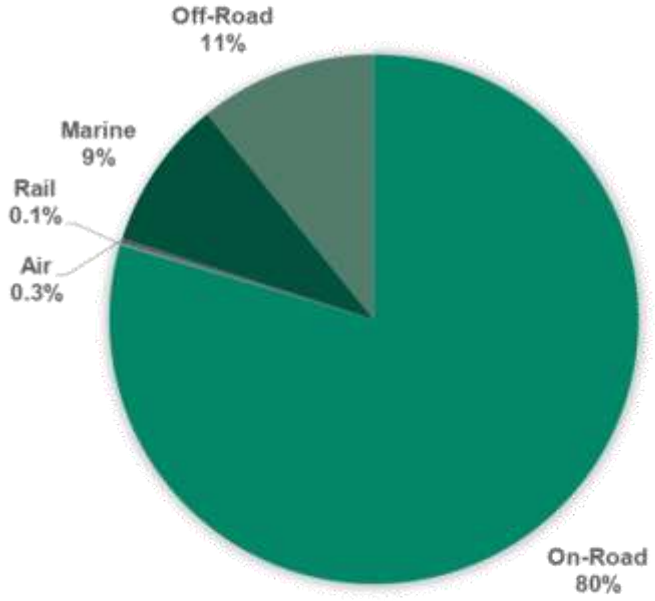

Figure 1 Hawke's Bay – transport emissions (tCO_2e)

4.0 On-Road Transport Emissions Breakdown

4.1 Hawke's Bay Region

On-road transport emissions are those relating to cars, commercial vehicles (including utes, trucks, and large commercial vehicles), and buses on-roads.

Table 1 and Figure 2 detail on-road transport emissions per vehicle category. The results show that cars in Hawke's Bay tend to be fuelled by petrol while Commercial Vehicles and Buses almost exclusively use diesel.

Low emission Electric Vehicle (EV) use is currently minimal within the Hawke's Bay resulting in an extremely small contribution to on-road transport emissions (140 tCO_2e). Note that sales and use of electric vehicles have likely increased since 2018/19 (the most recent year available for the dataset used), however emissions will likely still represent an extremely small contribution to on-road transport emissions.

In Hawke's Bay, the largest contributor to on-road transport emissions are cars, representing 51% of on-road transport emissions, and 8% percent of Hawke's Bay's total gross emissions. Commercial vehicles represent 46% of on-road transport emissions, and 7% percent of Hawke's Bay total gross emissions. A further breakdown of commercial vehicle types is provided below.

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Table 1 On-road transport emissions by vehicle type and fuel type (tCO_2e)

Vehicle Type	Petrol	Diesel	Electric	Total	% of Total
Cars	295,523	52,210	138	**347,871**	**51%**
Commercial Vehicles	18,171	293,527	0	**311,698**	**46%**
Buses	-	21,824	2	**21,825**	**3%**
Total	**313,693**	**367,561**	**140**	**681,394**	
% of Total	**46%**	**54%**	**0.02%**		

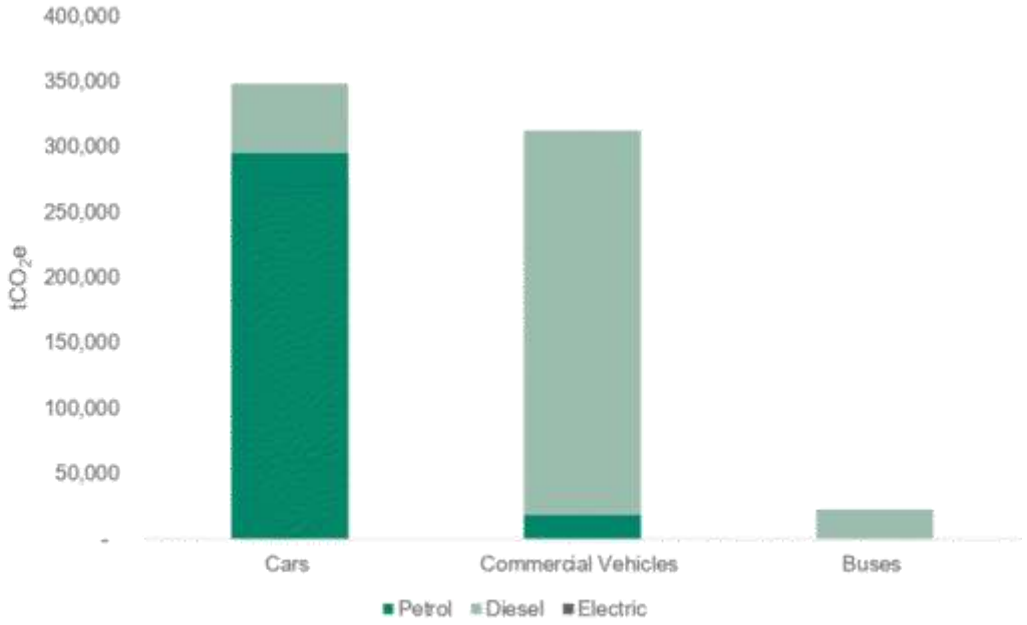

Figure 2 On-road transport emissions by vehicle type and fuel type

In Hawke's Bay, 85% of total car emissions are from petrol, while commercial vehicles are primarily diesel (94% of total commercial vehicle emissions). Buses are almost entirely diesel fuelled and contribute 3% of total vehicle emissions for the region. The busses category includes all busses including public transport, school busses, and private commercial busses (including tourist coaches).

Emissions from these vehicle types can be broken down further by vehicle class. Table 2 and Figure 3 detail on-road transport emissions per vehicle class.

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Table 2 On-road transport emissions by vehicle class (tCO_2e)

Vehicle Class	GHG Emissions (tCO_2e)	% of Total
Cars	347,871	51%
Light Commercial Vehicles <3.5 Tonne	151,209	22%
Heavy Vehicles 3.5-25 Tonne	35,460	5%
Heavy Vehicles 25-50+ Tonne	125,029	18%
Bus Urban 15-18 Tonne	19,852	3%
Bus Coach >18 Tonne	1,974	<1%
Total	**681,394**	

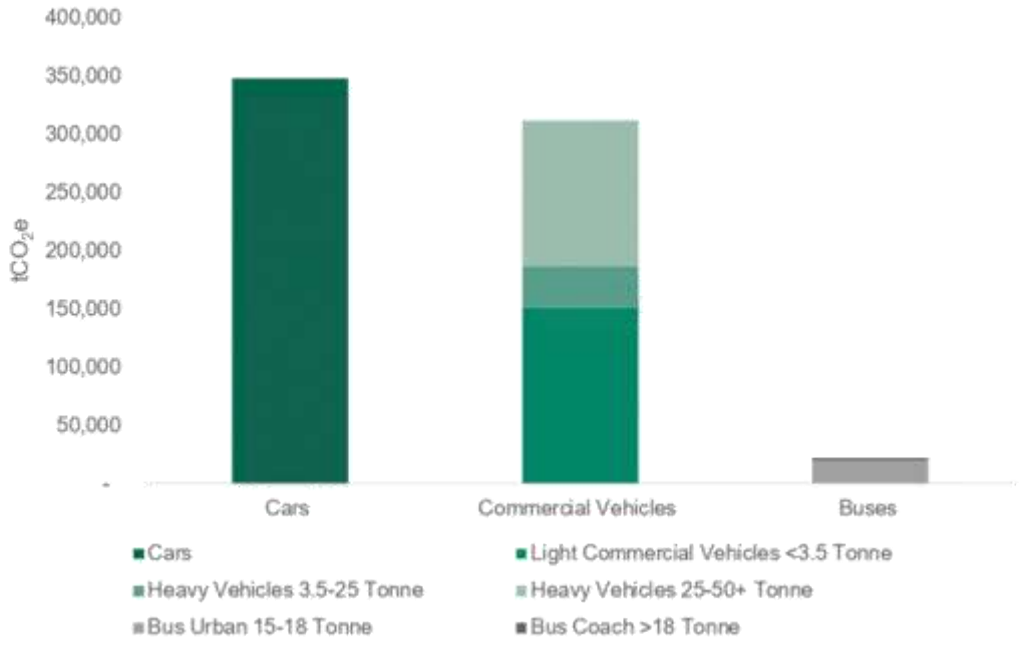

Figure 3 On-road transport emissions by vehicle class

Alongside total transport emissions, we can also look at emissions compared to distance travelled by different vehicle types. Table 3 shows the emissions per vehicle class as above but also includes the Vehicle Kilometres Travelled (VKT) by each vehicle class in Hawke's Bay and shows the average GHG emissions per VKT for each vehicle class. The average GHG emissions per VKT figure was calculated from the distance travelled (as per the Waka Kotahi data) and reported emissions (calculated from fuel sales and broken-down using Waka Kotahi emissions data).

Cars represent 73% of all VKT in Hawke's Bay but represent 51% of all on-road emissions in Hawke's Bay. This is due to the relatively low average tCO_2e per VKT of cars compared to heavier vehicles (which is also partly due to the use of petrol rather than diesel for cars). Despite 25-50+ tonne heavy vehicles representing 4% of all VKT in Hawke's Bay these vehicles represent 18% of all on-road emissions in Hawke's Bay. It is important to note that these figures do not take into account the weight of freight, or the number of people, being moved per vehicle, where larger vehicles may be more efficient per tonne of freight moved than smaller vehicles, or where busses may be more efficient per person than cars.

Efforts to reduce the kilometres travelled by all vehicles should be considered to reduce emissions from on-road transport. This could include enabling and encouraging increased public transport use, or

diverting freight from roads onto rail and marine transport options. Efforts to improve the fuel efficiency of all vehicles should also be considered.

Table 3 On-road transport vehicle class VKT, emissions, and calculated average emissions per VKT

Vehicle Type	Vehicle Kilometres Travelled (VKT)	GHG Emissions (tCO_2e)	Average tCO_2e per VKT
Cars	1,261,391,621	347,871	0.0003
Light Commercial Vehicles <3.5 Tonne	339,983,103	151,209	0.0004
Heavy Vehicles 3.5-25 Tonne	38,335,525	35,460	0.0009
Heavy Vehicles 25-50+ Tonne	71,355,816	125,029	0.0018
Bus Urban 15-18 Tonne	9,975,917	19,852	0.0020
Bus Coach >18 Tonne	1,504,270	1,974	0.0013
Total	**1,722,546,252**	**681,394**	

4.2 Territorial Authorities in Hawke's Bay Region

This section briefly presents the main results of this assessment at the territorial authority level. All calculations and results have been provided to Hawke's Bay Regional Council in excel format.

Due to the differences in geographic boundaries between the territorial authorities and the region, the sum of GHG emissions from the territorial authorities covered here does not equal the emissions for the Hawke's Bay Region.

Table 4 On-road transport emissions by vehicle type and fuel type for the territorial authorities in Hawke's Bay (tCO_2e)

Vehicle Type	Hastings District	Napier City	Wairoa District	Central Hawke's Bay District
Cars	179,692	100,583	24,872	45,264
Commercial Vehicles	157,912	78,847	29,281	42,613
Buses	10,728	5,375	2,247	3,051
Total	**348,332**	**184,805**	**56,400**	**90,928**

Table 5 Proportion of on-road transport emissions by vehicle type and fuel type for the territorial authorities in Hawke's Bay

Vehicle Type	Hastings District	Napier City	Wairoa District	Central Hawke's Bay District
Cars	52%	54%	44%	50%
Commercial Vehicles	45%	43%	52%	47%
Buses	3%	3%	4%	3%

Hastings has the largest amount of GHG emissions across each vehicle type, while Wairoa has the lowest across each vehicle type.

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Regarding the proportion of emissions by vehicle type, notably Napier has the highest proportion of car related GHG emissions compared to the other territorial authorities, while Wairoa and Central Hawke's Bay have the highest proportion of commercial vehicle GHG emissions.

On a per capita basis, the lowest on-road car, commercial vehicle and bus emissions are found in Napier while the highest per capita car, commercial vehicle and bus emissions are found in Wairoa and Central Hawke's Bay. Per capita emissions for on-road transport in Hastings and the entire Hawke's Bay region are similar to that of the entirety of New Zealand.

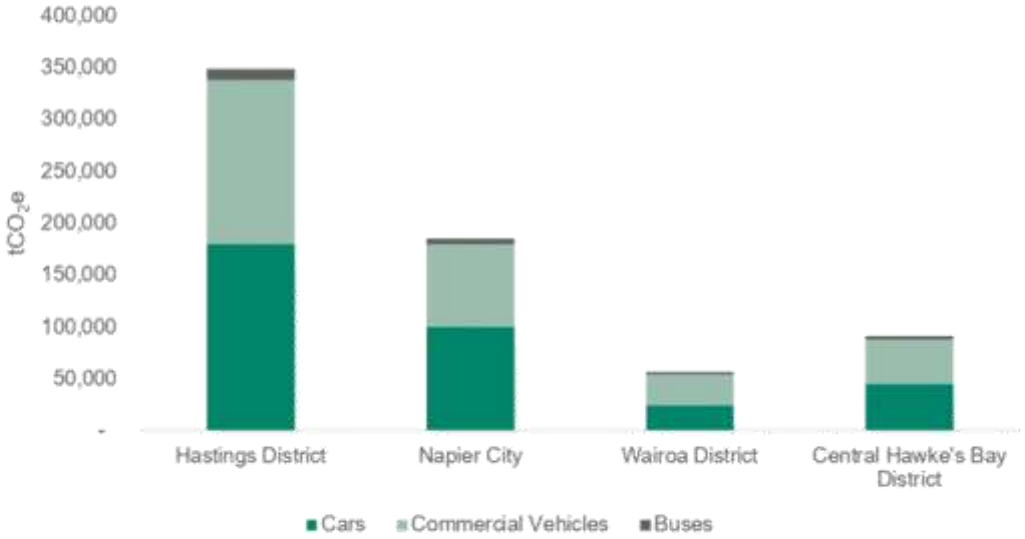

Figure 4 On-road transport emissions by vehicle type for the territorial authorities in the Hawke's Bay Region

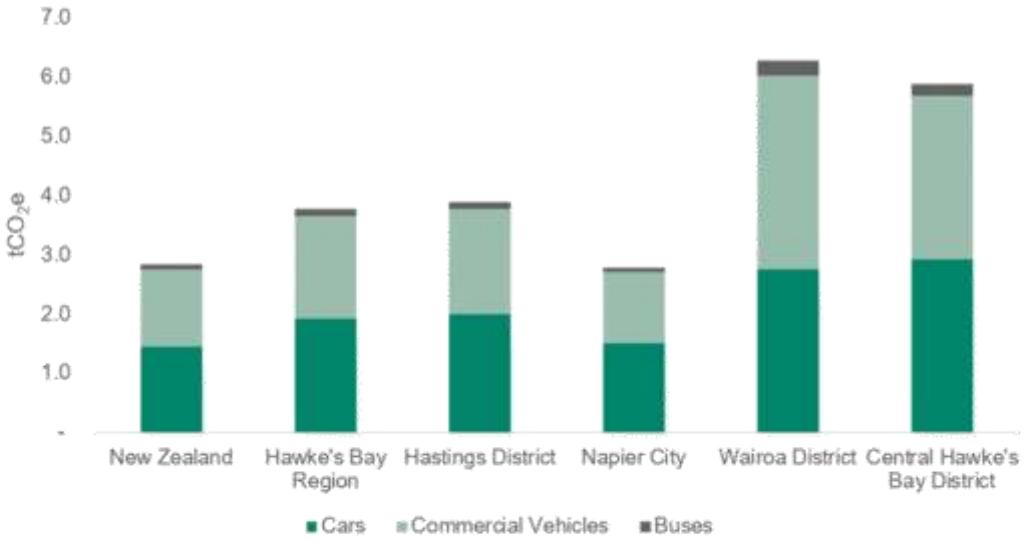

Figure 5 Per capita on-road transport emissions by vehicle type for the territorial authorities in the Hawke's Bay Region and New Zealand

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5.0 Off-Road Transport Emissions Breakdown

The off-road transport emissions breakdown by sector is presented in Table 6 and Figure 6. The total off-road petrol and diesel figures are based on the Community Carbon Footprint for Hawke's Bay. These totals have then been allocated to sectors based on the *Off-road liquid fuel insights- Quantifying off-road diesel and petrol use in New Zealand*, July 2021 produced by the Energy Efficiency and Conservation Authority (EECA). It is important to note that the EECA figures used are from 2019 and are based on values for the entirety of New Zealand and are therefore not specific to uses of off-road transport fuels in Hawke's Bay.

The allocation of petrol and diesel to these sectors should be used for context only as they are not robustly reflective of fuel use in Hawke's Bay.

Diesel is the predominant fuel for off-road transport use, representing 95% of off-road transport emissions. Nationally, agriculture is the highest producing sector for off-road transport emissions, producing 27% of all off-road transport emissions. The next largest off-road transport producing sectors are building and construction, commercial, and industrial uses. These figures would likely be significantly different if data for Hawke's Bay was available.

Table 6 Off-road transport emissions by sector type and fuel type (tCO_2e)

Sector Type	Diesel	Petrol	Total	% of Total
Agriculture	24,584	346	**24,930**	**27%**
Fishing & Hunting	3,833	3	**3,837**	**4%**
Forestry & Logging	6,584	1	**6,585**	**7%**
Building & Construction	16,084	2	**16,086**	**17%**
Mining	6,834	-	**6,834**	**7%**
Industrial	11,750	20	**11,770**	**13%**
Commercial	12,417	220	**12,637**	**14%**
Recreational marine	4,167	4,019	**8,186**	**9%**
Marina Refuelling Stations	2,167	52	**2,219**	**2%**
Total	**88,419**	**4,665**	93,084	
% of Total	**95%**	**5%**	-	

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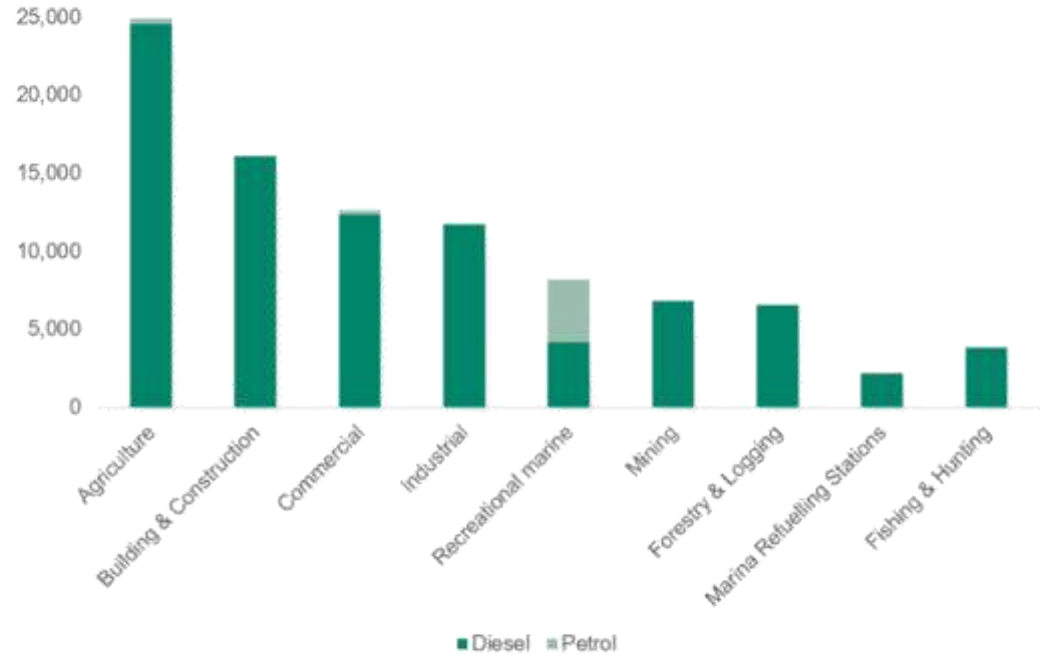

Figure 6 Off-road transport emissions by sector type and fuel type (tCO_2e)

Hawke's Bay

Climate Action Joint Committee

22 May 2023

Subject: Climate Mitigation workstream update

Reason for Report

1. This agenda item provides the means for a verbal update on community engagement and communication initiatives underway including:
   1.1. Fortnightly Kia Rite column in Hawke's Bay Today
   1.2. Future Fit personal carbon footprint measurement tool
   1.3. the new Climate Action Hub on hbrc.govt.nz https://www.hbrc.govt.nz/environment/climate-actionhb
   1.4. HB Climate Action Network for businesses
   1.5. Other engagement events.
2. This is an opportunity for the Joint Committee to provide their ideas and thoughts for future engagement under the guidance of a coordinated governance approach to climate action in the region.

Decision Making Process

3. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision making provisions do not apply.

Recommendation

That the Climate Action Joint Committee receives and notes the *Climate Mitigation Workstream update* staff report.

Authored by:

Pippa McKelvie-Sebileau
Climate Action Ambassador

Approved by:

Desiree Cull
Executive Officer to CE

Attachment/s

There are no attachments for this report.

Hawke's Bay

Climate Action Joint Committee

22 May 2023

Subject: The World Weather Attribution study on Cyclone Gabrielle

Reason for Report

1. This agenda item introduces Dr Sam Dean, Principal Scientist for Climate at NIWA, the National Institute of Water and Atmospheric Research, who will be attending by MS Teams to present his team's recent research.
2. Dr Sam Dean is one of New Zealand's leading experts on climate change science. His research has been able to identify the contribution of human-induced warming to intensifying current New Zealand weather extremes, including droughts and floods. He has contributed to our fundamental understanding of how the atmosphere responds to climate change, as well as improving our understanding of Antarctic sea ice and its influence on Southern Hemisphere climate.
3. Dr Dean is part of a team of 23 international researchers in the World Weather Attribution group, who have undertaken a rapid study to understand the role climate change played in the severe weather of Cyclone Gabrielle.
4. The team analysed weather observations and modelled past, present and future climates to look at the influence of climate change on the extreme rainfall delivered by Cyclone Gabrielle. They concluded that a warming world is increasing the likelihood and severity of these rainfall events.

Next Steps

5. Dr Dean will present this work in more detail and answer questions during the meeting.
6. For further information: https://spiral.imperial.ac.uk/handle/10044/1/102624

Decision-making Process

7. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Climate Action Joint Committee receives and notes *The World Weather Attribution Study on Cyclone Gabrielle*.

Authored by:

Pippa McKelvie-Sebileau
Climate Action Ambassador

Dr Kathleen Kozyniak
Team Leader Marine Air & Land Science

Approved by:

Desiree Cull
Executive Officer to CE

Attachment/s

There are no attachments for this report.