

Discussion document

Review of the 2050 emissions reduction target

April 2024

Haere mai – welcome

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Correction

In Chapter 3, the section 'Aotearoa New Zealand's obligations under relevant international agreements' (p. 64) refers to a Russell McVeagh report on international law, and previously stated that it was published on our website. This was not correct. We have not proactively published this report as it is legally privileged.

Disclosure statement

As anticipated by the appointment criteria, the Climate Change Commissioners come from varying fields such as adaptation, agriculture, economics, te ao Māori and the Māori-Crown relationship. While a number of board members continue to hold roles within these fields, our advice is independent and evidence based. The Commission operates under its Interests Policy, which is derived from the Crown Entities Act 2004. You can read more about our board members on the Climate Change Commission website. The Commission regularly updates and publishes on its website a register of relevant board interests.

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Takamua

E tono ana mātou ki Aotearoa New Zealand ki o whakaaro mō ētahi mahi rerekē e toru nei otiia, hono tonu ana, kia tautoko mai i a mātou ki te whakawhanake he tohutohu mā te Kāwanatanga. Ka whai pānga āu kōrero mai kia whakamātauhia tā mātau arotakenga me a mātau kitenga anō hoki. I tēnei e tautoko ai te whakatūturutanga o ā mātou tohutohu e whai take nei ka whai mōhiotanga ai i āu hiahia, tirohanga, āwangawanga anō hoki. Whakamahia ai e te Kāwanatanga i ēnei tohutohu e toru kia whai whakatau me pēhea rā te whenua nei e whakamimiti i ngā haurehu tūkino taiao.

Āu whakahoki kōrero

He mea hira koe ki tā mātou tukanga, ā, kei te hiahia rongo mātou i o whakaaro.

Nā te whakarongo, titiro me te whakaaro ka puta mai i te kōrero.

He mea nui ia, ko a mātou tohutohu e whai reo ai i ngā whakaaro maha kē atu me ngā whakaarotau puta noa i te motu. Ko te whakawhitinga atu ki tētahi ao tukuwaro iti, ki tētahi ao manawaroa hoki e hua ai he angitūtanga, he hua, he wero, he utu anō hoki. Ko ngā pānga – pai mai, kino mai – e rongo ai i a tātou katoa atu.

E kimi ana mātou i ngā taunakitanga, ngā whakaaro kē, ngā whakamōhiotanga me ētahi pārongo kē atu e whakamātautia ai tā mātou ara mahi arotakenga hoki, ā, ka tautoko mai i a mātou kia tomo i ngā whiringa kē. Nā konei e whakapai ake ai ā mātou tohutohu whakamutunga ki te Kāwanatanga me ahu pēhea atu te whenua, ā, ka pēhea rā te āhua o te ao mō ngā uri o inamata, ā, anamata ake nei.

He aha rā tēnei uiuinga e kapi nei?

Koia tēnei tētahi anake o ngā puka uiui e toru, ko tēnā me tēnā he tohutohu e whakawhanakehia ana e mātou. Ko ngā tohutohu e toru nei, he noho wehe otiia, ka whai hononga (**whika 1**). He hira ēnei katoa kia whakamahere tā Aotearoa New Zealand kokenga kia whakatutukitia ai te whāinga tukuwaro whakamimititanga i mua mai i te tau 2050, ā, ki tua atu.

He whakawhanaketanga tēnei puka uiui i ngā mahi i mua, tae ake ki tā mātou rīpoata 2021 *Ināia tonu nei*, ā, ko ngā *Tohutohu 2023 mō te ahunga atu o te kaupapa here mā te Kāwanatanga whakamimititanga tukuwaro mahere tuarua*. I whai mōhiotanga mai anō hoki nā tā mātou karanga ki te tūmatanui mō ngā taunakitanga i te tau 2023.

Koia kei ēnei puka:

- **Ngā puka matapakina e rua** – ko tētahi o tā mātou arotakenga o tā Aotearoa New Zealand whāinga whakamimititanga tukuwaro; ā, ko tērā atu i tā mātou arotakenga mēnā rānei me whai wāhi mai ki tēnei whāinga anō hoki ko ngā tukuwaro nā te kawē ō ā-ao mā te poti, mā rererangi rānei, ā, mēnā rānei āe, me pēhea hoki.
- **Ko tētahi tohutohu hukihuki** – mō te tahua tukuwaro tuawhā (2036-40), ā, mēnā rānei ko ngā tahua tukuwaro tahi, rua me te toru me whakahou.

Ko te whāinga whakamimititanga tukuwaro 2050 (**whika 2**) he mea whakatakoto nā te Paremata kia aro ai a Aotearoa New Zealand ki ngā hohenga manaaki taiao. Ka whakaratohia he tohu toitū ki te kāwanatanga me ngā hāpori e taea ai e rātou te whakamahere hohenga pae tawhiti, haumitanga anō hoki. Kua herea te Kōmihana kia tātaringia ai te whāinga i ia rima tau ki ētahi paearu, ā, ka whakarato tohutohu mēnā rānei me panoni e noho tonu ai te whenua ki te ara tika.

Kei te rangahau hoki mātou i ngā tukuwaro o te ao waka rererangi, poti anō hoki i Aotearoa New Zealand, ki Aotearoa nei hoki, ā, mēnā rānei me whai wāhi mai ki te whāinga whakamimititanga tukuwaro – mēnā āe, me pēhea hoki.

Ko ngā arotakenga e rua tahi nei e whai whakaaro ana mēnā rānei me whai panonitanga mai te whāinga nei.

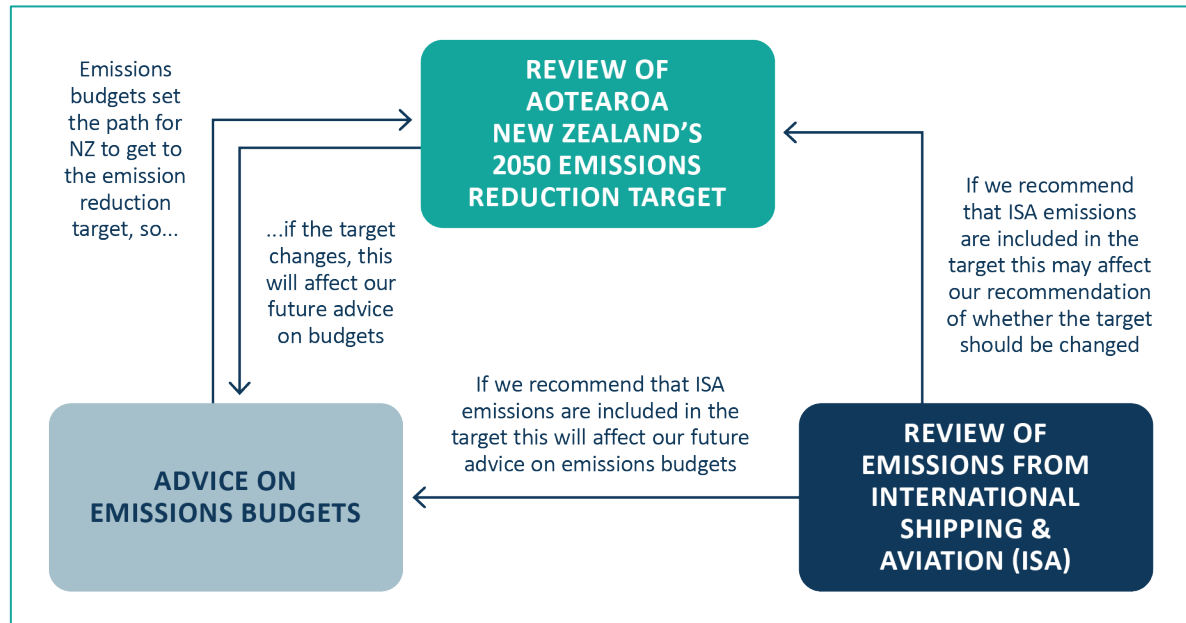
Ko ngā tahua tukuwaro he wāhanga pakupaku kau iho o tā Aotearoa New Zealand whāinga nui. Ka whakatakoto mai te nui o ngātukuwaro haurehua kati mahana e whakaaetia ana a i ia wāhanga rima tau te roa, ā, ka paku iho i ia tahua, o tō mua mai, e whakamimiti ai ngā haurehu Tūkino taiao takahanga o te wā. Ko tā te tahua tukuwaro hukihuki tohutohu he whakarato mai i tā te ināia nei whāinga tukuwaro 2050.

Ko ngā whakatau a te Kāwanatanga mō ā mātou tohutohu whakamutunga me panoni rānei te whāinga, ā, kei te tuawhā o ngā tahua tukuwaro e whakatakoto ai he terenga mō ngā kaupapa here taiao mō ngā tekau tau te taka mai nei. Me tere tika ai ā te Kāwanatanga kaupapa here ki ngā hiahia e whakatutuki ai a Aotearoa New Zealand i tōna oati whakamimiti tukuwaro (**whika 3**). Mā tēnei mahi e whakarato ai ngā taunakitanga ki te Kāwanatanga e hiahitia ana kia mahi whakatau tika. He mea whakaatu mārama nei, e taea ai e te tūmatanui te whakaheretia te Kāwanatanga. Ko te ara whakawhiti tōkeke ki ngā tukuwaro iti me āta whakahaere puta i ngā tari kāwanatanga maha, waihoki ki ngā iwi me te Māori anō hoki.

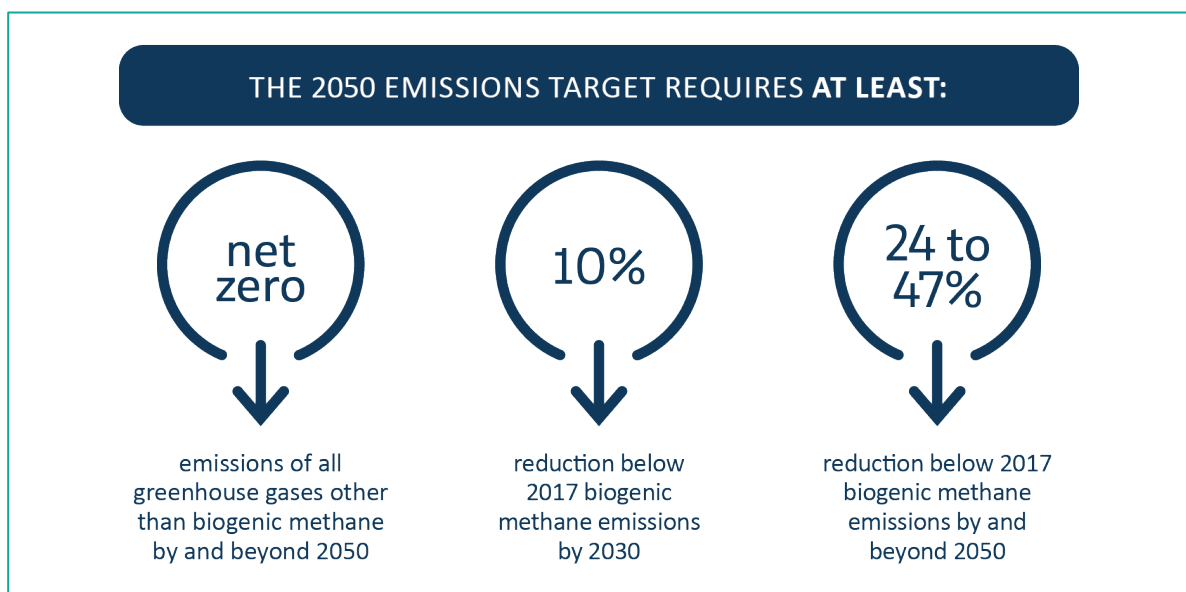
Ko tā mātou he whakatakoto tohutohu motuhake, tōkeke anō hoki. Ko tā mātou he tiro ki ngā pūtaiao, ka mahi kia whai māramatanga o te oranga wheako, ā, ka whakawhitiwhiti whakaaro ki ngā tāngata e whai mōhiotanga ai ki a mātou tohutohu.

He whiringa kei te Kāwanatanga ka aha rā. Ko a mātou tohutohu he whakarato māramatanga ki ngā whiringa rerekē, ā, ka pēhea te whai pānga. Ehara i te mea me manaaki mai te Kāwanatanga a mātou tohutohu otiia, ki te kore, ka kōrero pea ka aha kē rā. Ko te taunga o tēnei waka he mea hira – waihoki, te pēheatanga e ū ai ki reira.

Whika 1. Te honotanga o ēnei mahi e toru. Ko te whāinga whakamimititanga tukuwaro 2050 tērā e arongia ana e te motu. Ko ngā tahua tukuwaro ka whakaritea mai te ara – tēnā, ki te panoni te whāinga, ka whai pānga tērā ki ngā tohutohu anamata ka tukuna e mātou mō ngā tahua tukuwaro. Mehemea ka whaikuputia e mātou kia whai wāhi atu anō ngā tukuwaro ngā kawenga ō poti me ngā rererangi ā-ao ki te whāinga 2050, tēnā pea ka whai pānga tēnei ki tā mātou whaikupu mēnā rānei me panoni te whāinga, ā, ka whai pānga ki a mātou whaikupu anamata mō ngā tahua tukuwaro.



Whika 2. Te whāinga whakamimititanga tukuwaro 2050. He whāinga ‘wehenga haurehu’ tā Aotearoa New Zealand mō ngā tukuwaro ā-whenua nei, ā, koia tēnei he whakawehe mewaro rauropi ora i ērā atu haurehu kati mahana. Ka whakaaturia tēnei ngā pānga rerekē o tērā tā te mewaro ki ētahi haurehu kati mahana kē atu pēnā me te hauhā. E toru ngā wāhanga o te whāinga. Tuatahi ake, he whakamimiti i ngā haurehu kati mahana (hāunga te mewaro rauropi ora) kia heke ki te kore heke iho rānei i mua i te 2050 ki tua haere ake. Ko ngā toenga wāhanga nei e rua e arongia ana kia whakaheketia ngā mewaro rauropi ora kia 10% te itinga iho i ngā taumata o te tau 2017 i mua mai i te 2030; ā, 24-47% i raro iho i ngā taumata 2017 i mua mai i te tau 2050 ki tua haere ake.



Whika 3. Ko ngā oati whakamimititanga tukuwaro me te pūnaha e whakatutukihia ai ēnei.

Nā te waitohu i te Whakaaetanga Pārihi, kua ngākau titikaha a Aotearoa New Zealand kia pupuri “te toharite o te pikinga mahana ki rawa raro i te 2°C nui ake i tērā o ngā taumata i mua mai i te whānautanga ahumahitanga” me whai atu i te “herea te pikinga mahana kia 1.5°C nui ake i tērā o ngā taumata i mua mai i te whānautanga ahumahitanga.” Tā ia waitohu me whakarite mai he rouroutanga ā-whenua (NDC) e haere ai i te tekau tau mai i te 2021-2030. Ko ngā NDC ka whai ake e kapi ai kia rima tau te roa, ā, me poto ake ai haere nei te wā. Ka whakatutukihia atu ngā NDC mā te whakamimiti haeretanga o ngā tukuwaro ā-whenua, waihoki mā te utu tukuwaro i rāwāhi – ina koa mā roto mai i te haupūtanga atu i ngā hinonga i whenua kē atu. Ko te whāinga 2050 me te tahua whakamimiti (tahi nei me ngā mehene whakamimiti tukuwaro) he wāhanga o tā Aotearoa New Zealand pūnaha mō te whakamimiti tukuwaro ā-whenua nei.

PARIS AGREEMENT

Limit average global temperature increases

NDC

Each signatory sets an NDC.

This can be met by:

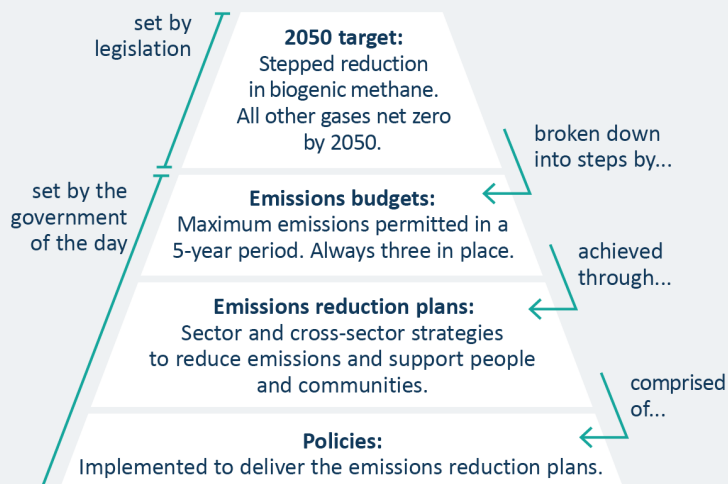
- domestic action
- supporting international action

Climate Change Commission's role: at the request of the Minister of Climate Change, the Commission:

- 2021: Provided advice for the first NDC (period 2021–2030)
- 2024: We have been asked to provide advice for the second NDC (for the period 2031–2035)

DOMESTIC ACTION

AOTEAROA NEW ZEALAND'S SYSTEM FOR REDUCING DOMESTIC EMISSIONS



The Climate Change Commission's work includes:

- Providing the government of the day with independent expert advice on the 2050 target, emissions budgets, and emissions reduction plans
- Monitoring the country's progress at reducing emissions

SUPPORTING INTERNATIONAL ACTION

PAYING FOR EMISSIONS REDUCTION OVERSEAS
eg. funding clean energy projects in other countries

Tā mātou tūranga

Ko ngā kāwanatanga kē o te wā i oati nei kia whakamimiti i ngā haurehu tūkino taiao o Aotearoa New Zealand. Ko tā mātou mahi nei he whakarato tohutohu motuhake, tōkeke hoki mō ngā whiringa kei te kāwanatanga o te rā kia uruparehia te whakamahanatanga o te ao. Ko tā mātou motuhaketanga he whakaūtanga ki Aotearoa – ā-ao anō hoki – mō te kaha o tā Aotearoa New Zealand hohenga mō te whakamahanatanga o te ao.

Tā te Ture Urupare Whakamahanatanga Ao e whakatakoto ai he aha ia ngā mea tā te Kōmihana me tuku tohutohu, ā, me whai whakaaro anō mātou nō mātou e mahi nei i tēnei mahi. He mea whakatakoto paearu me whai ai e a mātou tahua tukuwaro, ā, he whakarite mai anō te whānuitanga o a mātou arotakenga e rua o te whāinga 2050 me ngā tukuwaro i ngā poti ā-ao me ngā rererangi.

Ka herea anōtia e te Ture kia āta whai wāhi ki a mātou tohutohu. Ko te rongō i ngā whakaaro o te hunga whaipānga pēnā i a koe tonu he hira tonu mā mātou hei whakawhanake tohutohu e whai pānga ana ki te ao tūturu, ngā wheakotanga o ngā whānau, ngā hapori me ngā pakihi puta atu i te motu. Ko te whai wāhitanga he mana nui ki a mātou mahi. Mā āu whakahoki kōrero mai me ngā whakamōhiotanga mai e pakari ake anō ai a mātou tohutohu.

Ko āu whakaaro mai ki tēnei uiui e tautoko ai i a mātou ki te whakamātau i te āhua o tā mātou i tātaringia ai ngā taunakitanga, ka whakamātau anō a mātou kitenga, waihoki he whakaatu tauira mō te āhua o urupare e panoni ki tētahi, ki ngā arotakenga e rua rānei.

He aha e take nui ai a mātou mahi

Ko Aotearoa New Zealand, ki te taha o ētahi anō whenua 195, kua oati atu ki te ao kia tautoko te here whakamanatanga ao. E whakawhiti ana te ao ki tētahi anamata tukuwaro iti, me te aha, e hua mai ai he angitūtanga ohaoha hou me ētahi mahi hou kē atu. Me tīmata mai a Aotearoa New Zealand kia whai hua i ēnei angitūtanga, waihoki kei noho hei kaitukuwaro nunui. He tokomaha ngā kiritaki i te ao e tirohia ana te ‘whakaritenga tukuwaro’ i a rātou ake hanganga me ā rātou kaiwhakarato. Ko ngā hohenga e mahia ana e Aotearoa New Zealand aia nei me ngā whakatau hira te hou mai nei, he mea nui tonu mō tō tātou rongonuitanga i te ao, ā, tā tātou tomo ki ngā māketē o te ao.

Ko te tikanga o tēnei mahi he whakaū e whakawhiti tere ai a Aotearoa me ngā panga iti e taea ana ā-oaoha, ā-hapori, ā-taiao, ā-ahurea anō hoki – ka mutu, ka whai hua nui ai ngā angitūtanga i aua mea anō rā i runga i te tōkeke mā te hunga katoa o Aotearoa. Ina koa, ko a mātou tohutohu hukihuki ki te tahua tukuwaro tuawhā e whakaaturia ana ko te whakawhitinga ki ngā waka hiko me te whakamimiti i te hautū wakatanga, kei te takiwā o te \$23 miriona e penapenatia ai i mua i te 2040 mā te whakamimiti i ngā utu Hauora tūmatanui me te whakapaipā ake i ngā mahi whakaputaputa. Waihoki, he whakapai ake i oranga tangata.

Kua rongo kē ngā pānga taiao i ngā hapori puta i te motu, ā, ka kaha ake nei te auautanga mai me te kinotanga o ēnei pānga. Kāore te ao i te ara tika kia herea te paemahana ki te 1.5°C. Ki te kore tēnei āhuatanga e arongia ai, ka tahuri kia hoki tere rawa atu nei ki raro ake i te 1.5°C. Tā ia hautanga te karo nei, te tahuri nei rānei e whai pānga tonu.

Ko te tahua whāinga me te tukuwaro 2050 e tautoko a Aotearoa New Zealand ki whakamimiti i ngā tukuwaro. Tā te whāinga he whakarato mahere pae tawhiti e tohua ai te anga whakamuatanga. Ko te tahua tukuwaro e whakawāhangatia te haerenga ka whakaaweawe ai ngā whakataunga pae tata me ngā hohenga. Ko ngā hohenga pae tata me tautoko ake i te whāinga pae tawhiti.

He rangirua te anamata otiia, kei whakatokangia ngā hohenga ina hoki ki te kore e arongia ai ka kikino kē atu ngā putanga. He mahi whakatau kei te Kāwanatanga hei ngā marama 20 te haere ake nei e whai pānga ai ki tā te whenua e whakamimiti iho hei ngā tau 5-30 te taka mai nei. He utu tā ēnei whakatau. Ko a mātou tohutohu e toru e toe nei e tautoko ake i te Kāwanatanga te whakaine tūraru me ngā angitūtanga kei ēnei whiringa e taea ai ngā whakatau mōhio.

Ko ngā tūraru e noho tahi nei ki te whakamahanatanga ao he nui kē, manohi anō ngā angitūtanga. Ko ngā whakatau mārama nei e aru whai whakaaro ana e tautoko ake he whakawhitinga pai atu, tōkeke atu anō hoki. Ko te tikanga o tēnei, ko te whakawhitinga e whakahaere pai nei i ngā pānga ki te tangata me te taiao heoi anō e whai hua nui ai i ngā angitūtanga i runga i te āhua e puta mai he hua ki te hunga katoa o Aotearoa.

Tā mātou kokenga

Ko te tūāpapa o tā mātou he taunakitanga otiia, ehara i te mea ko ngā raraunga inenga kau anake. Ka kitea e mātou te nui o ngā momo tohungatanga me ngā mātauranga kē atu. Kua tātaringia e mātou ngā raraunga hou rawa, kua whai whakaaro ki ngā take e herea ana mātou e te Ture kia arongia ai, ā, kua tohua ngā whakamōhiotanga me ngā taunakitanga i ngā whai wāhitanga ki ngā iwi.

Ka whai whakaaro ai mātou ki te hononga i waenga i te Karauna me te Māori, te ao Māori me ngā pānga tonu iho ki ngā iwi me te Māori anō hoki. Ko ā mātou arotakenga, whai wāhitanga atu anō ki ngā hapori e whakaaturia ana e tautoko ai tēnei he whakamimititanga tere ake nei me te tautoko mai anō he whakawhitinga tōkeke mō te hunga katoa o Aotearoa te hua.

Ko ā mātou arotakenga, tohutohu anō hoki he ‘tirohanga pūnaha’ te kawewe, me te aha, ka whai whakaaro ai mātou ki te tūhonotanga o ngā kaupapa here a te Kāwanatanga, te ao ohaoha, te ao ahumahi, te papori me te taiao. Ko te whai wāhi atu ki te tangata me ngā hapori pēnā me koe he whakarato taunakitanga, arotakenga me ngā whakamōhiotanga i ngā whakaaro maha rerekē, ā, he mea nui tonu hei whakaū kia hāngai, kia taea ai te whakatinana, ā, he māramatanga pai o roto i a mātou tohutohu whakamutunga.

Ko te tikanga o tēnei tirohanga pūnaha nei e whaiwhakaaro anō mātou mō te urutau ki te whakamahanatanga o te ao ki te taha anō o ngā whakamimititanga tukuwaro. Me whaiwhakaaro anō ngā Kaupapa Here Whakamahanatanga Ao kaha nei te hanga, kia whakapaetia mā te aro ki tētahi take Kotahi kau nei e kikino ake ai ko tētahi take kē atu.

He uaua kia whakapaetia he aha rā kei te anamata. Whakamahia ai e mātou he tauira kia whai mōhiotanga he aha rā ngā pānga o ngā tū whakatau rerekē.

Ko tō tātau tauira whānui ā-ohaoha nei kua whakawhanakehia e ngā mātanga hou te rongo o te ao, ā, kua arotakengia motuhaketia ai. Ko a mātou tauira kua whakahoungia, kua arotakengia tāruatia hei wāhanga o te pūnaha tātaringa.

Ka whakamahia e mātou he tauira tūāhua kia whai māramatanga ki ngā momo hohenga me ngā taumata taha e whakatutukihia e Aotearoa New Zealand te whāinga 2050. I pēnei ai mātou nātemea he ara maha e taea ana e Aotearoa. He rerekē ngā ara me ngā tūāhua ki ngā whakapae e whai take ai pea i te wā tata nei otiia, ka hē ana i a mātou ka whaiwhakaaro ai ki ngā whai pānga e mōhio pū ana mātou te hou mai nei, ā, ka whai pānga ki ō mātou āheinga kia whakamimiti iho i ngā tukuwaro, te urutau rānei ki ngā pānga.

Ka whai whakaaro ai mātou ki ngā utu, ngā hua me ngā pānga o ngā ara kē atu. Ka kore mātou e whakahaere tātaringa mō ngā hua utu hei wāhanga ki ā mātou tohutohu; koia tēnei te wāhanga o te pūnaha e ao kē ana mā te Kāwanatanga e mahi nō te wā ka waihanga kaupapa here nei e hāngai ana. He pēnei mai nātemea me whiri e te Kāwanatanga ko ēhea kaupapa here e whakamahi ana, ā, ko ngā kaupapa here kē he utu kē, he hua kē.

Hei muri i te uiuinga

Ka whai whakaaro ai mātou ki ngā whakahoki kōrero ka whakahokia mai ki a mātou. Ka whakamahia e mātou hei tōna wā e tika ana, kia arotake tāruatia tō mātou tūāpapa taunakitanga, tā mātou kokenga me ngā kitenga.

Ka whakarato mātou a mātou tohutohu e toru whakamutunga ki te Minita Whakamahanatanga Ao i mua i te 31 o Hakihea 2024.

I konei whai whakaaro ai te Kāwanatanga ki a mātou tohutohu, tae ake anō ki ngā whaikupu i mua i tana whakatau whakamutunga hei tēnei taha mai o te tau 2025.

Ki te hiahia whakawhiwhi whakahoutanga koe mō ēnei mahi, waitohu mai ki: bit.ly/TandB2024

Me pēhea koe e tuku tāpaetanga ai

Mutu ana i a koe te pānui mai i ngā puka uiuinga, ā, kua rite mai koe ki te whakahoki kōrero mai, he ara kē atu kia tuku mai ai tō tāpaetanga. Me tae ai ki a mātou i mua i te paunga o te Paraire 31 o ngā rā o Mei 2024.



Mā te ipurangi

E taea ana e koe te tuku tāpaetanga mai mā tā mātou atamira: haveyoursay.climatecommission.govt.nz

Ko te whakamahi i te atamira nei e taea ana e koe te whakarato whakahoki kōrero mai mā te whakautu pātai ki tētahi uiuinga ipurangi.



He whiringa kē atu anō

E taea ana e koe te tuku mai āu whakahoki kōrero ki:

- **Īmēra:** haveyoursay@climatecommission.govt.nz
- **Mā te pouaka:** Uiuinga – Whāinga me ngā tahua, Te Komihana Whakamahanatanga Ao, PO Box 24448, Wellington 6142

Kia mōhio mai: Ina taea ana, e tono ana mātou kia tuku ai a koutou tāpaetanga mā te atamira ipurangi. Nā konei, e āhei ai mātou ki te pupuri rekoata o āu whakapānga, he whakarato anō māu he pārongo matatapu hira, ā, he tono i tō whakaaetanga kia whakamahia, kia tāia i tāu nā tāpaetanga. Mēnā rā kāore koe e taea ana te tuku mai i āu whakahoki kōrero mā te ipurangi ka hiahia ai kia tuku mā te Īmēra, mā te pouaka rānei, tēnā whakakīia te pepa whakapā me te whakaaetanga ka noho tahi mai ai ina tuku mai koe i tō tāpaetanga. Ki te kore koe e hōmai i ēnei pārongo, e kore e taea ana e mātou te kī mārika e whakaae ai tō tāpaetanga.



Whakapā mai

Ki te tono pepa whakapā me te whakaae, mehemea rānei he pātai āu mō tēnei uiuinga, he hiahia tomonga rānei āu kāore e whakaea ana i ngā whiringa o runga ake nei, tēnā Īmēra mai ki a mātou ki haveyoursay@climatecommission.govt.nz

Foreword

We are asking Aotearoa New Zealand for your thoughts on three different but related pieces of work to help us develop advice for the Government. We will use what you tell us to test our analysis and findings. This will help ensure that our final advice is **relevant**, **practical** and **informed** by your needs, views and concerns. The Government will then use these three pieces of advice to make decisions on how the country can reduce climate polluting gases.

Your feedback

You are an important part of our process, we want to hear your thoughts.

Nā te whakarongo, titiro me te whakaaro ka puta mai i te kōrero.

Through listening, looking and thinking we receive wisdom to speak.

It is important that our advice reflects different perspectives and priorities from across the motu. The transition to a low emissions and climate resilient society brings a mix of opportunities and benefits, challenges and costs. The effects – good and bad – will be felt by all of us.

We are looking for evidence, perspectives, insights and other information that tests our approach and analysis, and helps us to assess the different options. This will improve our final advice to the Government on where the country should be heading, and what the future could look like for current and future generations.

What does this consultation cover?

This is one of three consultation documents, each about a piece of advice we are developing. These three pieces of advice are separate, but connected (**Figure 1**). They are all essential to plan Aotearoa New Zealand's journey get to the emissions reduction target by 2050, and beyond.

The consultation documents build on our previous work, including our 2021 report *Ināia tonu nei* and 2023 *Advice on the direction of policy for the Government's second emissions reduction plan*. They have also been informed by our public 'call for evidence' in 2023.

These documents include:

- Two **discussion documents** – one on our review of Aotearoa New Zealand's 2050 emissions reduction target; and another on our review on whether emissions for international shipping and aviation should be included in that target, and if so, how.
- One piece of **draft advice** – on the fourth emissions budget period (2036–40), and whether emissions budgets one, two, and three should be revised.

The 2050 emissions reduction target (**Figure 2**) was set by Parliament to focus Aotearoa New Zealand's efforts on climate action. It provides a consistent signal to government, businesses and communities so they can plan long-term action and investment. The Commission is required to review the target every five years against a set of criteria, and provide advice on whether it needs to change to keep the country moving in the right direction.

We are also looking at whether emissions from shipping and aviation to and from Aotearoa New Zealand should be included in the emissions reduction target – and if so, how.

Both these reviews are considering whether changes to the current target are needed.

Emissions budgets are stepping stones towards Aotearoa New Zealand's 2050 target. They set out how much greenhouse gas emissions are allowed in each five-year period, and each budget is smaller than the one before so that climate polluting gases decline over time. The emissions budgets draft advice is about delivering the current 2050 emission reduction target.

The decisions the Government makes following our final advice about whether to change the target, and on the fourth emissions budget, will set the pace for climate policy over the coming decades. Government policy needs to keep pace with what is required to meet Aotearoa New Zealand's emissions reduction commitments (**Figure 3**). This work will provide the Government with the evidence it needs to make decisions. It also provides transparency so the public can hold the Government to account. An equitable transition to low emissions will require coordination across a wide range of government agencies and levels of government, as well as with iwi/Māori.

Our role is to provide independent, impartial advice. We look at the science, work to understand lived experience, and talk to people to inform our advice.

The Government has choices on how to act. Our advice helps it understand different choices, and how they add up. The Government does not have to take our advice, if it does not then it must say what it will do instead. Where we are going is important – so is how we get there.

Figure 1. How these three pieces of work are connected. The 2050 emissions reduction target is what the country is aiming for. Emissions budgets set the path to the target – so if the target changes, this will affect the future advice we give on emissions budgets. If we recommend that emissions from international shipping and aviation are included in the 2050 target, this may affect our recommendation of whether that target should be changed, and will affect our future advice on emissions budgets.

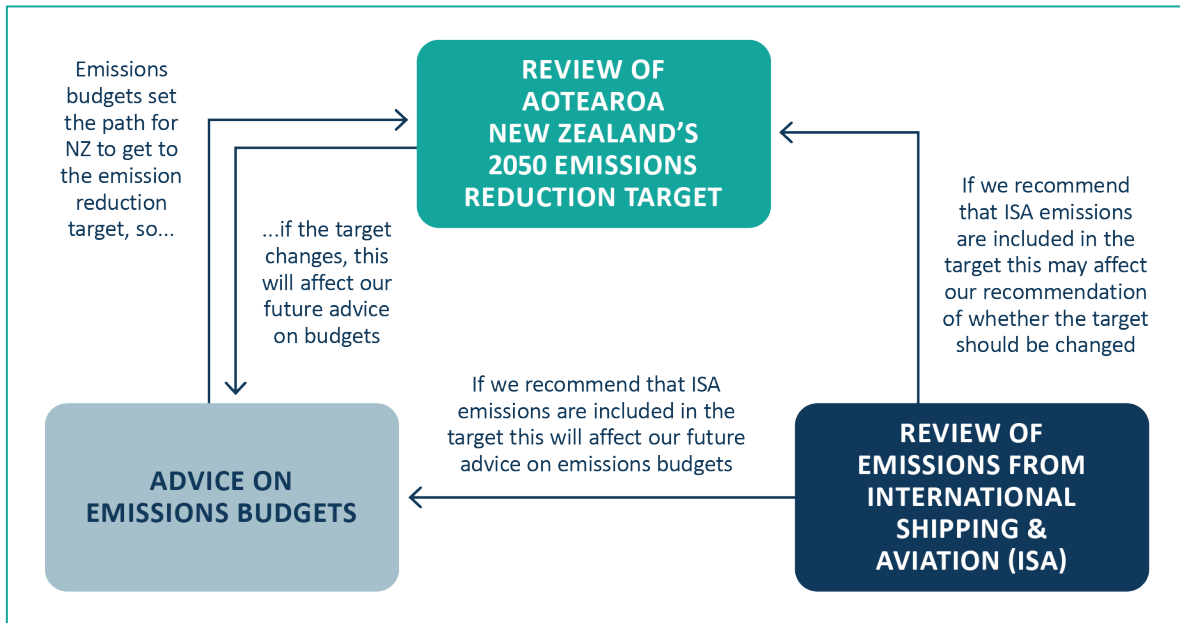


Figure 2. 2050 emissions reduction target. Aotearoa New Zealand has a 'split gas' target for domestic emissions, which considers biogenic methane separately from all other greenhouse gases. This reflects the different impact that methane has compared with other greenhouse gases, such as carbon dioxide. The target has three components. The first is to reduce emissions of greenhouse gases (other than biogenic methane) to net zero or lower, by 2050 and beyond. The other two components are focused on lowering biogenic methane emissions by at least 10% below 2017 levels, by 2030; and 24–47% below 2017 levels, by 2050 and beyond.

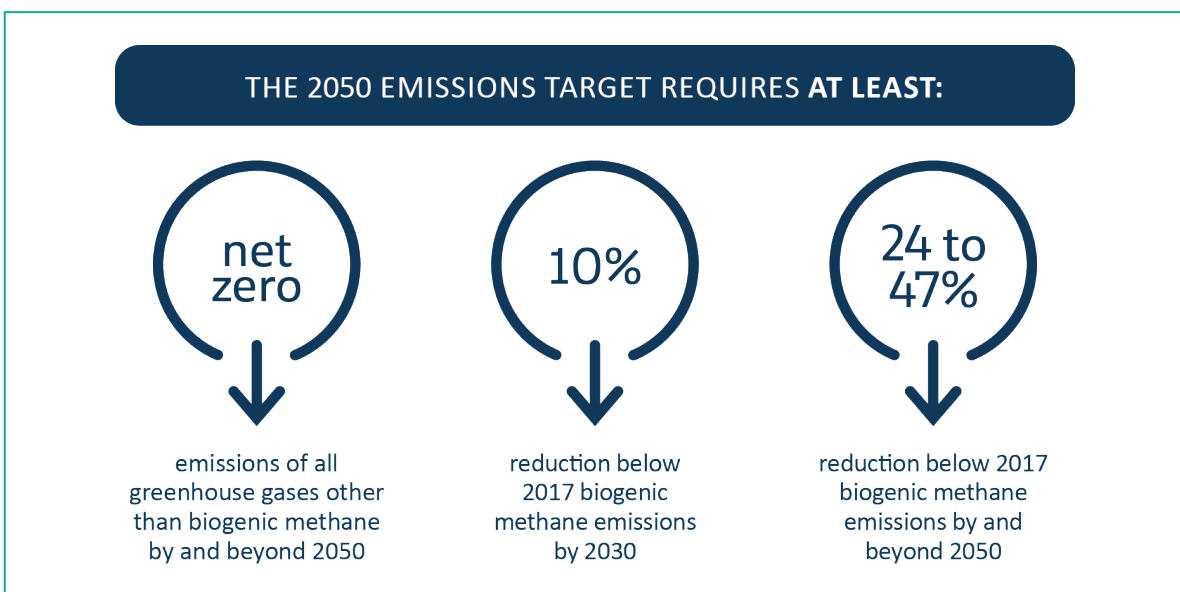
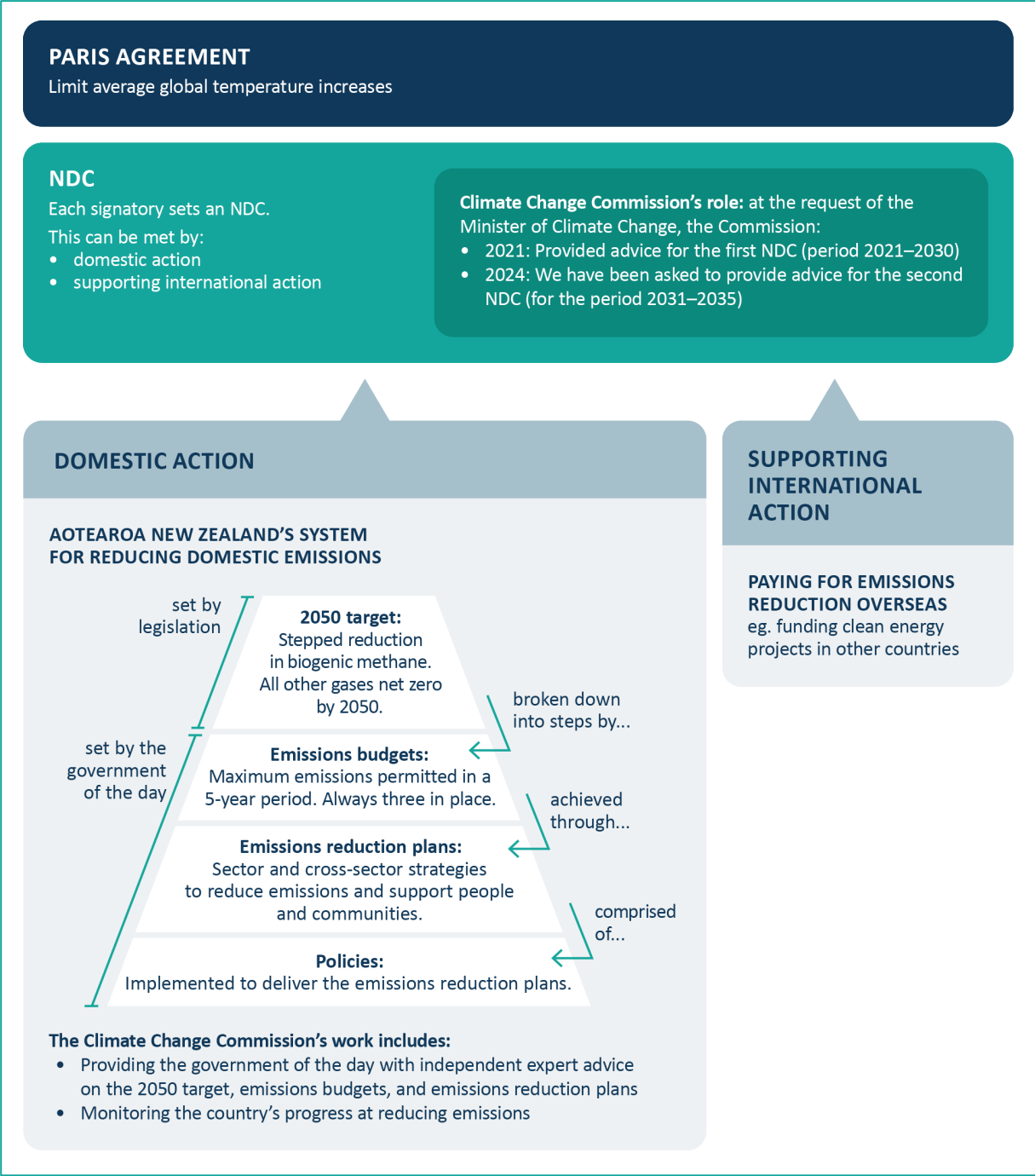


Figure 3. Emissions reduction commitments and the system for meeting them. By signing the Paris Agreement, Aotearoa New Zealand committed to holding “the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursuing efforts “to limit the temperature increase to 1.5°C above pre-industrial levels”. Each signatory had to set a nationally determined contribution (NDC), covering the decade 2021–2030. Following NDCs will cover five-year periods, and must get more ambitious each time. An NDC can be achieved by reducing domestic emissions, and by paying for emissions reductions overseas – for example through funding clean energy projects in other countries. The 2050 target and emissions budgets (together with emissions reduction plans) are part of Aotearoa New Zealand’s system for reducing domestic emissions.



Our role

Successive governments have committed to reducing Aotearoa New Zealand's climate polluting gases. Our role is to provide independent, impartial advice about the choices the government of the day has to respond to climate change. Our independence provides assurance to New Zealanders – and internationally – about the credibility of Aotearoa New Zealand's action on climate change.

The Climate Change Response Act sets out what the Commission has to give advice on, and what we have to consider as we do. It sets criteria that our emissions budgets work has to follow, and sets the scope of our two reviews of the 2050 target and of emissions from international shipping and aviation.

The Act also requires that we proactively engage on our advice. Hearing the views of stakeholders such as yourself is critical for us to develop advice that reflects the real-world, lived experience of whānau, communities and businesses across the motu. Engagement is so valuable to our mahi. Your feedback and insights make our advice more robust.

Your input into this consultation will help us to test the way we have analysed the evidence, test our findings, and to present examples for how the target could be changed in response to one or both reviews.

Why this work matters

Aotearoa New Zealand, alongside 195 other economies, has made a global commitment to help limit climate change. The world is transitioning to a low emissions future, which brings new economic opportunities and new kinds of jobs. Aotearoa New Zealand needs to act to benefit from these opportunities, and to avoid being stranded as a high emissions producer. Many international customers are looking at the 'emissions profile' of their products and their suppliers. The actions Aotearoa New Zealand takes now, and in the important decisions to come, are important for our global reputation – and our access to global markets.

This package of work is about ensuring that Aotearoa New Zealand makes this transition in a timely way and with minimal economic, social, environmental, and cultural impact – and maximises opportunities for the same, in an equitable way for all New Zealanders. For example, our draft advice on the fourth emissions budget shows that transitioning to electric vehicles and reducing vehicle use could save \$23 billion by 2040 by reducing public health costs and improving productivity. It would also improve quality of life.

Climate impacts are already being felt by communities across the motu, and will become more frequent and severe. The world is not on track to limit warming to 1.5°C. If this is not urgently addressed, then the impetus will be to ensure a return to under 1.5°C will be as quickly as possible. Every fraction of a degree averted or reversed makes a difference.

The 2050 target and emissions budgets help focus Aotearoa New Zealand's efforts to reduce emissions. The target provides a long-term goal that signals the direction of travel. The emissions budgets break the journey into steps and influence short-term decisions and actions. These short-term actions need to add up to the long-term goal.

The future is uncertain, but that cannot paralyse action because doing nothing will lead to worse outcomes. The Government has to make decisions in the next 20 months that will affect how the country reduces emissions over the next 5–30 years. These choices will have consequences. Our final three pieces of advice will help the Government assess the risks and opportunities around these choices, so it can make informed decisions.

The risks that climate change brings are significant, but so are the opportunities. Well-informed and considered decisions can support a smooth and more equitable transition. This means a transition that manages the impacts for people and the environment, while making the most of the opportunities in a way that benefits all New Zealanders.

Our approach

Our work is evidence based, but that doesn't just mean quantitative data. We value different types of expertise and forms of knowledge. We have analysed the latest data, considered the issues the Act requires us to address, and drawn on insights and evidence from engagement with people.

We consider the Crown–Māori relationship, te ao Māori and specific effects on iwi/Māori. Our analysis and engagement with communities shows this will support faster emissions reduction and help achieve an equitable transition for the benefit of all New Zealanders.

Our analysis and advice takes a 'systems view', which means we consider how government policies, economy, industry, society and the environment are all connected. Engaging with people and communities like you who can provide evidence, analysis and insights from different perspectives is essential to ensure our final advice is relevant, practical and well-informed.

This systems view means that we also consider adaptation to climate change alongside emissions reduction. Robust climate policy needs to take both into account, or action to tackle one problem could make another issue worse.

It's difficult to be certain what the future will look like. We use models to understand what the impacts of different choices might be.

Our economy-wide models have been developed by internationally renowned experts and independently reviewed. Our models have been updated, and re-reviewed, as part of this analysis.

We used scenario modelling to understand what types of actions and what budget levels could get Aotearoa New Zealand to the 2050 target. We did this because there are several pathways that Aotearoa New Zealand could take. Scenarios and pathways are different from forecasts and predictions which might be useful in the short term but will be wrong as we consider impacts that we know are coming and will affect our ability to reduce emissions or adapt to the impacts.

We consider the costs, benefits and impacts of different pathways. We do not conduct cost-benefit analysis as part of our advice; this is more appropriately done by the Government as part of its process when developing specific policies. This is because the Government needs to choose which policies it uses, and different policies have different costs and benefits.

After consultation

We will consider each piece of feedback we receive. We will use it, where appropriate, to re-evaluate our evidence base, approach and findings.

We will deliver our three pieces of final advice to the Minister of Climate Change by 31 December 2024.

The Government will then consider our advice, including any recommendations, before making its decisions by the end of 2025.

If you would like to receive updates on this mahi sign up to: bit.ly/TandB2024

How you can make a submission

Once you have read the consultation document(s) and are ready to provide your feedback, there are multiple ways to send us your submission. These need to be received by the end of Friday 31 May 2024.



Online

You can make a submission via our online engagement platform:

haveyoursay.climatecommission.govt.nz

Using this platform, you can provide your feedback by answering questions in an online survey.

Alternatively, you can upload your submission as a file, such as a PDF, Word document or spreadsheet.



Other options

You can send us your feedback via:

- **Email:** haveyoursay@climatecommission.govt.nz
- **Post:** Consultation – Target and budgets, Climate Change Commission, PO Box 24448, Wellington 6142

Please note: Wherever possible, we ask that you send your submission using our online engagement platform. This allows us to keep a record of your contact details, provide you with important privacy information, and ask your permission to use and publish your submission. If you cannot submit your feedback online and wish to send it by email or post, please complete the contact and consent form and include it when you send in your submission. **If you do not provide this information, we cannot guarantee that your submission will be accepted.**



Get in touch

To request the contact and consent form, or if you have questions about this consultation, or if you have accessibility requirements not met by the submission options above, please email us at haveyoursay@climatecommission.govt.nz

Chair's message

The impacts of climate change are increasingly being felt, both here and overseas. Stronger climate impacts are happening earlier than anticipated. In Aotearoa New Zealand, communities and businesses in Tāmaki Makaurau and Hawke's Bay are still dealing with the aftermath of Cyclone Gabrielle, while others across the motu are recovering from numerous – and repeated – flooding events and people in the Port Hills are again dealing with the impact of wildfires.

It has become clear that global action and targets are not sufficient. Global emissions have yet to peak. For the first time, global warming has exceeded 1.5°C across an entire year – and the longer term averages (typically calculated over 20-year periods) continue to increase.

It's important to note that a successful transition needs both 'removals' (soaking up climate polluting gases via trees) *and* 'gross emissions reductions' (stopping climate polluting gases in the first place, for example by changing how industry is powered and how we transport goods and people). The key consideration for both is that they are well managed.

Planting trees gives Aotearoa New Zealand the opportunity to go further with our long-term climate goals. As a country, we are fortunate to have options that are much more cost-effective than 'carbon storage solutions' being chased around the world. Both native and exotic forests will play a role in meeting our climate targets.

We've been clear in all our advice that clarity on the role of forestry is critical for Aotearoa New Zealand's climate response. The Government has committed to setting restrictions on the types of land that can be registered for forestry in the NZ Emissions Trading Scheme, although the details are not yet available.

Climate change, and actions to address it, affect us all. They affect the way we live our lives and how we earn our livelihoods, the state of our communities and the natural environment, the return on investments we make and the relative cost we pay for goods and services. Reducing gross emissions will result in positive economic impacts such as new economic opportunities and savings from lower public health costs and savings from energy efficiency. There are also significant co-benefits, such as better quality of life due to cleaner air, and the greater energy security provided by domestically produced renewable energy – these are a vital part of what will contribute to a thriving, low emissions and climate resilient future for all New Zealanders.

The Government, business and communities all have choices to make about what climate action to take. These choices affect who benefits – and who bears the burdens of reducing emissions and of living with the impacts of a changing climate.

Aotearoa New Zealand's 2050 emissions reduction target guides the Government's decisions on how to deal with climate polluting gases, and signals the direction of travel. This signal helps businesses and communities to plan and invest for the future. Sense-checking that our destination (the target) is still appropriate helps ensure that investment and planning is sound. Sharing what you know with us through this consultation helps us ensure our advice will properly inform the Government about what is possible to keep the target ambitious yet achievable. To do this, we need robust evidence, an understanding of different perspectives, and an understanding of the likely benefits and impacts.

The pathway, or *how* Aotearoa New Zealand gets to the 2050 target and beyond, matters because the path we choose influences whether the country can stay on course for the long term. The economic cost of a pathway matters, but there are also other important factors that we must consider when providing advice, and that the Government must consider when making its decisions. Among others, these factors include the effects on iwi/Māori, communities and the environment; new technology and the opportunities it provides; and how the benefits, costs and risks will affect future generations.

Societies around the world are transitioning to producing, and consuming, low emissions goods. This means there are economic and reputational risks if international customers think Aotearoa New Zealand is not ambitious enough – but there are economic and social risks if we push too far too fast. Striking the balance is a judgement call. Our final advice, informed by your feedback, will help inform the Government to make this call, as it will include a recommendation on whether or not the 2050 target should be changed.



Dr Rod Carr, Chair

Chief Executive's message

The 2050 emissions reduction target is Aotearoa New Zealand's guiding star for climate action – so it is essential to regularly check that it is still fit for purpose to keep the country moving in the right direction. This is why the Commission is required to review it every five years, and provide the government of the day with independent expert advice on whether any changes should be made. This is our first such review.

Target setting is a matter of judgement. There is no formula that can determine what the 'right' target is. There are different factors to consider, such as what is technologically and economically possible. There are also different impacts to consider and weigh up. All targets have strengths and weaknesses, and people have different views on what is fair and appropriate.

Much of the information around warming is highly technical. There is consensus that different gases have different warming effects. However, there are value judgements that get applied through different ways of counting, or where you start counting from. There are also value judgements to be made on the appropriate balance between removing carbon pollution already in the air, and stopping it being created in the first place.

The Commission is not driven by commercial requirements, or by politics. This independence is essential to ensure that the government of the day gets the impartial, evidence-based advice it needs. The Government has choices about how the country will achieve the emissions reduction target, and our advice will help it understand how those choices add up and where value judgements need to be made.

During this consultation period, our expert staff will be out talking to people across Aotearoa New Zealand to help support the submissions you may wish to make to inform our mahi.

We want to hear what you think about where the right balance sits. You know your sectors and communities. You know what practical actions are possible, how quickly new practices and technologies can be adopted, and what the likely impacts are. This is why consultation is a crucial part of our process. Sharing what you know will help us to ground truth our mahi.

There is a high bar for change. The legislation details the factors we have to consider when reviewing the target. We can only recommend a change to the target if certain conditions are met.

This work has already been informed by our evidence-gathering, analysis and engagement over the last four years, and by our specific 'call for evidence' in 2023. In particular, submissions from the farming community have led us to increase our focus on methane and warming from different greenhouse gases. Ngā mihi to everyone who has already contributed to this mahi, and to all who provide a submission in this consultation.

This consultation is your opportunity to tell us what you think about the evidence-base, and our approach, analysis and initial findings. Your engagement is so valuable to our mahi. Your feedback and insights make our advice more robust, and your submissions will inform our final advice and recommendations to Government at the end of the year.



Jo Hendy, Chief Executive

Executive summary

Under the Climate Change Response Act 2002 (the Act), He Pou a Rangi Climate Change Commission (the Commission) is required to review the 2050 target every five years, beginning in 2024. By the end of this year, we will advise the Government on the outcome of our first review, including whether any changes should be made to the target's timeframe, level, structure or rules.

This document sets out our initial thinking about the different factors the Government will need to weigh up when deciding whether to amend the 2050 target, and if so, how.

The 2050 target was established as Aotearoa New Zealand's domestic contribution to global efforts to limit global warming to 1.5°C above pre-industrial levels, which evidence shows will help avoid the worst impacts of climate change.

Our initial review suggests that some key circumstances have changed since the target was set in 2019, and the Government might be justified in considering strengthening it.

However, these initial findings do not necessarily mean the 2050 target should be changed. Setting or deciding to amend a target requires thinking about a range of factors, including Aotearoa New Zealand's national circumstances.

There is no such thing as a 'perfect' target. In setting the 2050 target, Parliament made a judgement call that came with a balance of benefits and trade-offs. The decision of whether to amend the target (and if so, how) will also be a matter of judgement for the Government.

We have not yet made a judgement about whether amending the 2050 target is justified. Before we do, we want to hear from you about the issues, impacts and evidence you want the Commission, and eventually the Government, to consider and prioritise.

Your input will inform the next stages of our work, which will include determining whether we think a change to the 2050 target is justified. The Government will receive our final advice and recommendations at the end of this year and then have 12 months to provide a response.

Why it is important to review the 2050 target

The worsening effects of climate change are being felt around the world and here in Aotearoa New Zealand. 2023 was the warmest year on Earth since records began in 1850, driven in large part by human activity. To avoid the worst effects of climate change, urgent and sustained action is needed to reduce greenhouse gas emissions and limit global warming.

The 2050 target makes clear what we are driving towards as a country. It sets clear, long-term requirements for what emissions must reduce and by when, guiding the Government's climate change policies, decisions and actions, and providing clarity for households, businesses and communities.

Reviewing the 2050 target every five years means we can check it is leading Aotearoa New Zealand in the right direction.

Our task is to provide the Government with independent, expert advice so it can make decisions on the 2050 target based on evidence and informed of the opportunities and risks Aotearoa New Zealand faces. This will involve applying our judgement across a range of factors, including Aotearoa New Zealand's contribution to limiting global warming under the 2050 target, what has changed since the target was set, and the potential impacts of change.

The Government has affirmed Aotearoa New Zealand's continuing commitment to the Paris Agreement and to achieving the 2050 target. The coalition agreement between the National Party and the ACT Party commits the Government to "*maintain a split-gas approach to methane and carbon dioxide through to 2050 and review the methane science and targets in 2024 for consistency with no additional warming from agricultural methane emissions.*" While we acknowledge that context, we are performing our review of the 2050 target due to our obligations under the Climate Change Response Act 2002.

What this consultation is about

This document provides our initial answers to two questions.

- Under the current 2050 target, what is Aotearoa New Zealand's contribution to global efforts to limit warming to 1.5°C?
- Has significant change occurred, or is it likely to occur, since the 2050 target was set by Parliament in 2019?

In our final advice to the Government, we will answer two more questions.

- If we have found significant change, does that change justify amending the 2050 target?
- If amendments to the 2050 target are justified, what should those changes be?

If we find that amending the 2050 target is justified, our final advice can recommend a change to the target's:

- **timeframe** – the timeframe for achieving the target (or components of the target)
- **level** – the amount of emissions reductions required by the target (or components of the target)
- **structure** – the greenhouse gases, emissions, and carbon dioxide removals to which the target (or components of the target) applies
- **rules** – how the target (or components of the target) may be met, including limits on removals and offshore mitigation.

This process sets a high bar for recommending change, as any amendments to the 2050 target would likely have wide-reaching implications for households, businesses and communities across the motu.

Before we complete our analysis and determine whether changes to the target are justified, we want to hear from you. Do you agree with our overall approach and our initial findings? Have we missed any important information or evidence? Do you think changes to the target's timeline, level, structure or rules are justified?

This is one of three separate but connected pieces of advice we are consulting on at the same time. For more information on this consultation and how to provide your feedback, see the *Foreword*.

Chapter 1: Introduction

About the 2050 target

Targets are important tools used to identify and achieve shared, quantifiable and time-bound goals. They help galvanise and focus collective action by converting a vision for the future into tangible and attainable outcomes.

Aotearoa New Zealand's 2050 target sets requirements for how much emissions must reduce, and by when. It encompasses all domestic sources of greenhouse gases reported in the New Zealand Greenhouse Gas Inventory (GHG Inventory) and has three distinct components that require different levels of emissions reductions across different timelines and gases.ⁱ

- Emissions of all greenhouse gases other than biogenic methane must be net zero by 2050 and in each subsequent calendar year.
- Gross emissions of biogenic methane must be at least 10% below 2017 levels by 2030.ⁱⁱ
- Gross emissions of biogenic methane must be at least 24–47% below 2017 levels by 2050 and in each subsequent calendar year.

Emissions of long-lived greenhouse gases like carbon dioxide stay in the atmosphere for hundreds to thousands of years after they have been emitted. Biogenic methane, on the other hand, is a short-lived greenhouse gas – it has a strong warming effect that lasts between several decades and hundreds of years. Because methane decays more quickly in the atmosphere, the warming it causes will decrease if emissions decrease.

The target's split gas structure reflects these differences in warming impact, as well as uncertainties around the availability and affordability of options to reduce them. Targeting the gases separately allows Aotearoa New Zealand to take actions tailored to those different effects.

ⁱ **Gross emissions** are the total amount of greenhouse gases produced from the energy, agriculture, industry and waste sectors. **Net emissions** take into account how much carbon dioxide has been emitted and removed from the atmosphere from forests, subtracting that amount from gross emissions calculations. In Aotearoa New Zealand, **removals** are currently achieved through planting trees, which take in and store carbon dioxide from the atmosphere as they grow.

ⁱⁱ **Biogenic methane** is methane emitted in the agriculture and waste sectors, mainly from ruminant animals and decomposing waste.

The 2050 target is the guiding star for Aotearoa New Zealand’s climate change policies, which need to add up to meeting the target. These climate change policies affect energy costs, global market opportunities, the cost and availability of electric vehicles and other low emissions transport, the degree of burden on future generations, and many other aspects of Aotearoa New Zealand’s society, economy and environment. The 2050 target also matters for Aotearoa New Zealand’s international reputation as a country focused on sustainability and protecting the environment, which in turn benefits tourism and export industries.

Our approach to reviewing the 2050 target

As an independent Crown entity, we base our advice on research, evidence and modelling, and draw on the expertise of our Board of Commissioners, He Pou Herenga (a Māori advisory body to the Board), and staff. We are informed by evidence and insights gathered by engaging with people on the ground.

We provide all of our advice within the context of the purpose of the Act to:

“provide a framework by which New Zealand can develop and implement clear and stable climate change policies” and “contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5° Celsius above pre-industrial levels.”

As we develop our advice, we consider a wide range of matters as required by the Act, including current available scientific knowledge, existing and anticipated technological developments, likely economic effects, the distribution of costs and risks between generations, te ao Māori, and global action.

Our initial review of the 2050 target has also been informed by what we heard through the call for evidence we ran from 31 March to 31 July 2023. We heard from a mix of individuals and organisations who provided a range of evidence and perspectives. We heard strong views from submitters who wanted to be sure the Commission was thinking about the distinct warming effects of different greenhouse gas emissions in our review.

In response to these submissions, we looked carefully at how best to assess the warming effects of different gases. Where possible, we compare the effects of different gases by looking at how they directly affect warming. We also increased our focus on the split-gas target. *Chapter 1: Introduction* discusses the 2050 target’s specific requirements for emissions of biogenic methane, which reflect the different impact they have on warming, compared to emissions of long-lived gases. *Chapter 4: Looking at the impacts of change* highlights our initial finding that the 2050 target could be strengthened without making changes to its split-gas structure.

We are now inviting further input from the public before we finalise our advice and recommendations to the Government. We look forward to engaging with people across the motu to test and strengthen our analysis through this public consultation process.

Chapter 2: Assessing the current 2050 target's contribution to limiting global warming

This chapter asks: **What is Aotearoa New Zealand's contribution to global efforts to limit warming to 1.5°C?**

Our first step in reviewing the 2050 target is to look at its role in fulfilling one of the purposes of the Act: to contribute to global efforts under the Paris Agreement to limit warming to 1.5°C above pre-industrial levels. In this discussion document, we use the term 'warming' to mean the amount by which Earth will be warmer with, compared to without, the greenhouse gases emitted by human activity.

The global effort to limit warming

There is strong evidence the world is not on track to meet the 1.5°C goal. According to modelling from the United Nations *Emissions Gap Report 2023*, if the world achieved all existing commitments and pledges to reduce emissions, temperatures would still likely rise more than 1.5°C. The longer the world spends above this threshold, the greater the risks are of irreparable harm to economies, societies and environments.

This means the world will likely need to reduce emissions to lower than net zero for long-lived greenhouse gases, and to continue reducing emissions after 2050 to bring temperatures back down below 1.5°C.

Aotearoa New Zealand's efforts to limit warming

Our initial review shows the current 2050 target will likely result in Aotearoa New Zealand continuing to emit in a way that contributes to warming after 2050.

The 2050 target requires emissions of long-lived greenhouse gases to be net zero by 2050 and in each subsequent calendar year – it has no requirements for these emissions to be reduced beyond net zero. The target does not require emissions of biogenic methane to reach net zero, and there is no requirement to compensate for the warming from remaining emissions of biogenic methane through deeper reductions of other greenhouse gases before or after 2050. This means that it is possible to achieve the 2050 target and still have net positive emissions of 700–1,000 KtCH₄ⁱⁱⁱ – and the associated contribution to global warming – in 2051 and every year after.

From multiple perspectives, the 2050 target may not represent an equitable contribution to global efforts to limit warming

We have also looked at the 2050 target's contribution to global efforts to limit warming from four perspectives used by the Intergovernmental Panel on Climate Change (IPCC) to consider how the burden of reducing emissions is shared across different countries and economies:

- **equal per capita emissions** – this perspective assumes everyone in the world has an equal right to use the atmosphere
- **capacity/ability to pay** – this perspective looks at the technical, financial and economic ability of each country or economy to contribute to reducing emissions

ⁱⁱⁱ 19–28 MtCO₂e

- **responsibility for warming** – this perspective holds countries responsible for the total amount of warming caused by both historical and future greenhouse gas emissions
- **the right to sustainable development** – this perspective assumes that meeting basic needs is a global priority before contributing to emissions reductions.

Our initial finding is that, as a whole, the current 2050 target is not compatible with any of these international burden sharing perspectives.

This initial finding alone is not a reason for changing the target, as setting or amending a target requires weighing up the benefits of change with other factors. To get a full picture of Aotearoa New Zealand's contribution to global efforts to limit warming requires considering national circumstances and how they affect what the country can and should do to reduce emissions. These considerations will inform our eventual judgement about the 2050 target's contribution to these efforts, and whether the target should change. We are seeking your feedback about how we should think about Aotearoa New Zealand's national circumstances, including whether they justify departing from the IPCC's international burden sharing perspectives.

Chapter 3: Checking for significant change

This chapter asks: **Have there been significant changes since the 2050 target was set by Parliament in 2019?**

With any long-term target, circumstances will change over time. Parliament recognised that some changes in circumstance could affect the 2050 target's ability to serve its intended purpose. To address this possibility, it identified nine topics for the Commission to check every five years to see if significant change had occurred, or was likely to occur, since the target was first set. These checks help keep Aotearoa New Zealand on a steady course of reducing emissions while still allowing the country to adjust when necessary along the way.

As part of our initial review of the 2050 target, we looked for significant change using three criteria:

- **Is the change important?** Is the change directly relevant to the 2050 target? Could the change impact Aotearoa New Zealand's ability to achieve it?
- **Is the change consequential?** Could the change impact the 2050 target's ability to achieve its purpose as set by Parliament?
- **Is the change notable?** Was this change reasonably foreseeable in 2019, when the target was first set?

We only considered a change to be '**significant**' if we found evidence that it was, or was likely to be, important, consequential, and notable for the 2050 target.

Change is constant and to be expected. Almost no aspect of society, the economy, the environment, or the climate remains completely unchanged from 2019. Our task is to look for long-term changes that merit re-thinking the current 2050 target.

Regardless of whether there has been significant change, or if the Government ultimately decides to amend the 2050 target, a transition that is well-paced, well-planned, and well-signalled is needed to ensure efforts are not wasted and people can take advantage of the opportunities of a thriving, low emissions economy. This includes addressing existing inequities, providing targeted support for people less able to transition to low emissions, and working in partnership with iwi/Māori under Te Tiriti o Waitangi/The Treaty of Waitangi.

Four topics appear to have changed significantly

We have found initial evidence of significant change in four of the topics identified by Parliament. Together, these changes point us to our initial finding that changes in circumstances mean there may be reason to strengthen the 2050 target.

Global action – Since 2019, the likelihood that global warming will exceed 1.5°C has increased, while the time available for the world to act has decreased. This means that avoiding the most severe impacts of climate change will likely require greater action before and after 2050 to bring temperature rise back down to 1.5°C.

When Aotearoa New Zealand set its 2050 target, it was a relative global leader. Since then, other countries and economies, including Australia, Canada, the European Union, Israel, Japan, Norway, and the United States, have followed suit and set long-term emissions reduction targets that are more ambitious than Aotearoa New Zealand's current 2050 target.

Scientific understanding of climate change – Scientific understanding of the the impacts, risks, and implications of global warming has improved since 2019. Evidence now shows that the risks from climate change – including more frequent and severe impacts on human and natural systems – are greater than previously known, and that these impacts will occur at lower temperatures than expected in 2019.

Technological developments – While not yet usable in Aotearoa New Zealand, a methane inhibitor capable of reducing methane emissions from animals like cows and sheep by around 30% is now widely available overseas. This increases the likelihood that a similar technology could be developed and/or used domestically.

The principal risks and uncertainties associated with emissions reductions and removals – Forests, which remove and store carbon dioxide from the atmosphere, are critical for any path to achieving the net zero component of the 2050 target. They also provide Aotearoa New Zealand with options to reach net negative emissions in the long term. Since 2019, some rural and iwi/Māori communities have experienced negative impacts related to forests, including impacts from slash and erosion in extreme weather events, and changes in employment opportunities.

Five topics do not appear to have changed significantly

Aotearoa New Zealand's economic or fiscal circumstances – Since 2019, COVID-19 and inflation have caused significant economic disruption and increased the cost of living. These changes have had a high degree of impact for many people across the motu. However, our initial analysis shows Aotearoa New Zealand's economy is still in a strong position over the long term.

Aotearoa New Zealand's obligations under relevant international agreements – Aotearoa New Zealand's recent international agreements, such as new free trade agreements with the United Kingdom and the European Union, have been consistent with the country's existing obligations to reduce emissions.

Distributional impacts – Aotearoa New Zealand's actions to reduce emissions will likely have different impacts across industries and regions and involve some reallocation between industries. Changes to overall employment because of climate policy are expected to be minimal. Households and businesses who transition to using low emissions goods and services will experience fewer impacts from climate policies and experience long-term benefits including warmer, healthier homes. Some will have less access to these alternatives and may require targeted support to fully participate in the transition to low emissions.

Equity implications (including generational equity) – For Aotearoa New Zealand to achieve a thriving, low emissions future, people need to be able to fully participate in emissions reductions while maintaining intergenerational economic, environmental, social, and cultural wellbeing. This includes policy being developed in a manner that honours Te Tiriti o Waitangi/The Treaty of Waitangi. There is, however, a historical context of policies that have resulted in poor outcomes for some. Our initial analysis and insights from engagement and previous consultations suggest these equity dynamics predate the setting of the 2050 target in 2019 and have not significantly changed in the years since.

Social, cultural, environmental, and ecological circumstances – Indicators of social and cultural change, such as public concern about climate change, either did not experience change or changed in line with expectations. As many indicators of environmental and ecological change are measured over long timescales, it is likely too early to assess the extent and significance of changes to indicators such as water quality.

Chapter 4: Looking at the impacts of change

This chapter asks: **What are the potential impacts of changing the target?**

Our final advice to the Government will include our assessment of whether changes to the 2050 target are justified. To make this determination, we – and eventually the Government – will need to weigh up the benefits and potential impacts of change and make a judgement call.

In this chapter, we look at the many ways the 2050 target could be amended in response to findings of significant change, and how a change to the target could influence climate policy, with implications for Aotearoa New Zealand’s society, economy, environment and future generations.

The target could be strengthened without changing its structure

The target’s split-gas structure reflects the differences between biogenic methane and long-lived greenhouse gases. In our initial review of the 2050 target, we have not found any cause to alter the current target’s structure.

Our initial analysis shows that the 2050 target’s timeframe and level have the greatest impact on Aotearoa New Zealand’s role in helping to limit warming – specifically, how quickly Aotearoa New Zealand reduces its emissions of long-lived greenhouse gases or increases removals of carbon dioxide from the atmosphere, and how much the country reduces emissions of biogenic methane.

This means the 2050 target could be strengthened through combinations of changes to its timeframe and level, without amending its split-gas structure.

Looking at what strengthening the current target could mean for people and the climate

Many impacts of change experienced by people and the climate are determined by policy, and policy can also help manage impacts. The 2050 target sets the country’s long-term goal for reducing emissions – it does not dictate the exact policies needed to achieve it. These decisions sit with the Government, and through careful consideration it can make choices that help achieve a transition to a thriving, low emissions future to the benefit of all living in Aotearoa New Zealand.

To understand the types of potential positive and negative impacts that could result from strengthening the 2050 target, we used scenario modelling. Scenarios can help us understand what some aspects of life in Aotearoa New Zealand could look like under different circumstances.

For this work, we looked at a scenario that provides insight into how technologies and systems might change under a strengthened 2050 target, modelled as part of our work preparing draft advice on the fourth emissions budget (for more information on that draft advice and how it relates to this review, see the *Foreword*). Under this scenario, the economy would continue to grow, and Aotearoa New Zealand's contribution to global warming would reduce by about a third, compared to the current target, by 2100.

This scenario shows life under a strengthened 2050 target could involve changes such as:

- rapidly electrifying transport options, including cars, trucks, ferries and aircraft
- speeding up the phase out of fossil gas for process heat and in buildings
- using methane-reducing technologies for cows and sheep
- changing modes of travel, including increasing the use of active and public transit, and reducing air travel
- increasing the use of electric arc furnaces for steel production.

Our approach to determining whether changes to the 2050 target are justified

Following the close of this public consultation, we will consider the evidence, perspectives and insights we receive through submissions, including your feedback on our approach to our initial review and whether changes to the current target are justified. This information will inform the next steps of our review.

To determine whether changes are needed to the 2050 target, we will confirm where we found significant change, and identify possible alternative targets that would respond to that change.

Our next step will be to look at whether the change presented by an alternative target is justified. This will involve thinking about the benefits of strengthening Aotearoa New Zealand's contribution to limiting warming and the potential impacts of change, taking into account a range of matters including the likely economic effects, the distribution of impacts across generations, and te ao Māori.

We will also consider the possible implications of changing the 2050 target on one of the purposes of the Act to provide "*a framework by which New Zealand can develop and implement clear and stable climate change policies.*"

Our initial analysis shows that the certainty a target provides is closely tied to its ability to guide and coordinate action, with implications for whether and when to make changes. On the other hand, if a target is no longer serving its intended purpose, the benefits of making a change may outweigh the consequences. If a change to the target is needed, making that change sooner rather than later will increase the time that people and systems have to respond and adjust.

Introduction

This chapter provides an overview of the 2050 target and the approach we have taken in our initial review.

The 2050 target is Aotearoa New Zealand's long-term emissions reduction target. It sets out the amount by which domestic emissions of greenhouse gases must be reduced, and by when, providing clarity on the course ahead for households, businesses and communities.

The 2050 target's influence is wide-reaching, affecting Aotearoa New Zealand's society, economy and environment. It serves as a guiding star for a range of Government decisions, including, via emissions budgets, on the total amount of greenhouse gases the country can emit in a five-year period, and what actions Aotearoa New Zealand will take to reduce emissions. These decisions impact air quality, global market opportunities, the number of warm and healthy homes, the cost and availability of electric vehicles (EVs) and other low emissions transport, and the degree of burden on future generations.

The 2050 target also matters for Aotearoa New Zealand's international reputation as a country focused on sustainability and protecting the environment, which in turn benefits tourism and export industries.

For any target to be effective, it needs to be relevant, achievable and timely. Over time, circumstances can change which affect a target's impact and influence.

Under the Climate Change Response Act 2002 (the Act), He Pou a Rangi Climate Change Commission (the Commission) must review the 2050 target every five years, beginning in 2024. The Minister of Climate Change may also request a review at any time. These reviews enable Aotearoa New Zealand to work towards a stable and well-understood goal while making course-corrections along the way.

This document outlines our approach and initial findings in our first review of the 2050 target. We are seeking your feedback on our work so far, so your input can inform the next stages of our analysis. This will help ensure our advice is effective, practical and relevant, and informed by the different needs, perspectives and concerns of people from across the motu. We will deliver our final advice and recommendations to the Government at the end of 2024.

You can find more information on this consultation, including how this work relates to two other documents we are consulting on at the same time, in the *Foreword*.

This chapter discusses important context about the current 2050 target and our approach to reviewing the target.

Important context about the 2050 target

The 2050 target was established by Parliament in November 2019 to help achieve the purposes of the Act: “provide a framework by which New Zealand can develop and implement clear and stable climate change policies” and “contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5° Celsius above pre-industrial levels.”

The 2050 target sets requirements for how much Aotearoa New Zealand must reduce emissions of all domestically emitted greenhouse gases reported in the New Zealand Greenhouse Gas Inventory (GHG Inventory), and by when.

Although it is called the ‘2050 target’, it has requirements that apply to every year after 2050. The target has three distinct components – a net zero component, and two components related to biogenic methane, which is methane produced by living things and process (in other words, from agriculture and waste). Because the target splits out biogenic methane in this way it is often referred to as a ‘split-gas’ target.

The target requirements are:^{iv}

- Emissions of all greenhouse gases other than biogenic methane must be net zero by 2050 and in each subsequent calendar year.
- Gross emissions of biogenic methane must be at least 10% below 2017 levels by 2030.
- Gross emissions of biogenic methane must be at least 24–47% below 2017 levels by 2050 and in each subsequent calendar year.

There are several design features that are important context for the analysis in this report:

- The 2050 target requires all other gases than biogenic methane to reduce to net zero by 2050 and requires no additional emissions reductions beyond net zero. This is important when comparing to required global efforts to limit warming to 1.5°C, as discussed in *Chapter 2: Assessing the current 2050 target’s contribution to limiting global warming*.
- Splitting out biogenic methane reflects how methane acts differently from other gases in the atmosphere. Targeting the gases separately allows Aotearoa New Zealand’s response to be tailored to those different effects. This is important when considering whether any changes to the structure may be justified, as discussed in *Chapter 4: Looking at the impacts of change*.
- The target does not require emissions of biogenic methane to reach net zero, nor does it require any remaining emissions of biogenic methane to be offset by deeper reductions of other greenhouse gases before or after 2050. This means that it is possible to achieve the 2050 target and still have net positive emissions of 700–1,000 KtCH₄^v – and the associated contribution to global warming – in 2051 and every year after. This is important for assessing Aotearoa New Zealand’s contribution to limiting warming to 1.5°C (see *Chapter 2: Assessing the current 2050 target’s contribution to limiting global warming*) and comparing the 2050 target against other countries (see *Chapter 3: Checking for significant change*).

^{iv} **Gross emissions** are the total amount of greenhouse gases produced from the energy, agriculture, industry and waste sectors.

Net emissions take into account how much carbon dioxide has been emitted and removed from the atmosphere from forests, subtracting that amount from gross emissions calculations. In Aotearoa New Zealand, **removals** are currently achieved through planting trees, which take in and store carbon dioxide from the atmosphere as they grow.

^v 19–28 MtCO₂e

The 2050 target guides Aotearoa New Zealand's long-term approach to reducing emissions

Targets are important tools used to identify and achieve shared, quantifiable and time-bound goals. They help galvanise and focus collective action by converting a vision for the future into tangible and attainable outcomes. They can set the conditions to encourage structural and behavioural change, enable technological advancements, and influence investments. Targets also support public accountability by providing a means to track and measure progress.

As a central element of Aotearoa New Zealand's approach to reducing emissions, the 2050 target has wide-ranging impacts across society, technology, the economy and the environment. For Aotearoa New Zealand to reduce emissions in an ambitious and achievable manner, the 2050 target needs to drive an equitable and well-managed transition to a thriving, low emissions economy.

Many of Aotearoa New Zealand's shorter-term decisions about reducing emissions are directly tied to meeting the 2050 target. Under the Act, successive governments are required to set emissions budgets, which represent the total net volume of emissions the country can emit over a five-year period, with a view to meeting the 2050 target. In this way, emissions budgets act as stepping stones, setting short-term, measurable requirements for reducing domestic emissions on the way to achieving the longer-term 2050 target.

To meet emissions budgets, successive governments develop corresponding emissions reduction plans, which outline the policies, strategies, and actions they will put in place to reduce emissions. Each choice made in an emissions reduction plan has different implications for New Zealanders. This includes how change is experienced across different groups in society (for example, what employment opportunities are available in rural communities, or when and where solar and wind farms are built), and what benefits and opportunities related to emissions reductions are realised (for example, when and by how much energy costs are reduced).

The design of the New Zealand Emissions Trading Scheme (NZ ETS) has also been influenced by the 2050 target. The scheme – which puts a price on emissions, changing the relative price of goods and services across the economy – was created with the purpose of assisting Aotearoa New Zealand to meet its climate change goals, including the 2050 target. Each year, the Minister of Climate Change is required to update the NZ ETS settings in accordance with the 2050 target, emissions budgets, and Aotearoa New Zealand's Nationally Determined Contribution (NDC) under the Paris Agreement.

Aotearoa New Zealand has also committed to achieving its Nationally Determined Contribution

In addition to the 2050 target, Aotearoa New Zealand also has an international emissions reduction target – its Nationally Determined Contribution (NDC) under the Paris Agreement. The current NDC, which covers 2021–2030, is expected to be met through a combination of reducing domestic emissions, removing carbon dioxide from the atmosphere through forests, and paying for emissions reductions or removals occurring overseas (known as offshore mitigation).

Aotearoa New Zealand also contributes to combatting global temperature rise through financing, collaboration to measure and report emissions, collecting and sharing scientific data, and putting in place plans to adapt to the effects of climate change. Aotearoa New Zealand could also cooperate with other countries to reduce global emissions and fund offshore mitigation.

While these wider international efforts are not the main focus of our review, they inform aspects of our work, as domestic action to meet the 2050 target can support achievement of these other goals.

For the purposes of this review, we have assumed that in the long term, efforts to achieve or exceed the 2050 target will be Aotearoa New Zealand's primary contribution to the global effort to limit temperature rise to 1.5°C.

Emissions accounting rules and target setting

In *Ināia tonu nei* we laid out the following principles on how accounting for emissions budgets interacts with target setting. We have found no reason to change those principles, which were that emissions accounting should:

1. seek to cover all material human caused emissions sources and sinks
2. be grounded in robust science and evidence
3. send a clear signal for climate action
4. be accurate and reduce uncertainty as far as practicable
5. be transparent, practical, and acceptable
6. be consistent and maintain the integrity of the targets.

The principle 'be consistent and maintain the integrity of the targets' has particular relevance for the issues raised in this document. If a new source or sink is added to the New Zealand Greenhouse Gas Inventory (the inventory), this should trigger a review of the target to ensure its integrity.

This issue is most important when considering adding more sinks to the inventory. There is interest in the storage potential of wetlands, soils and the marine environment. If these are added to the inventory, then the target should be reviewed to ensure it still represents the desired level of ambition and only the additional removals caused by climate policy should be counted.

This issue is also relevant to the distinction between pre-1990 and post-1989 forests. As defined in our advice to the Government regarding its second emissions reduction plan, additionality is the concept that an activity only contributes to carbon dioxide removal if it is extra to the status quo or business as usual. This was the reason for the setting of baseline years for carbon storage in forests in Aotearoa New Zealand at the 1989/1990 boundary. The 1990 base year has been put into policy through the New Zealand Emissions Trading Scheme (NZ ETS). It contributes to a sense of unfairness among pre-1990 forest owners, including some iwi/Māori representatives.

Accounting is also important the context of how carbon stored in forests is counted. Aotearoa New Zealand has now moved to a modified version of Kyoto Protocol accounting called 'averaging'. Averaging applies an additionality test to every area of newly planted forest. Only the carbon dioxide stored from the initial growth of the first rotation is stored for the long term. Beyond that point carbon is sequestered and then re-emitted once it is harvested. Under averaging, the first 16–26 years (depending on species) of removals of a plantation forest count towards the target. After that it is considered part of the baseline and the land must be maintained in forest. Emissions and removals from growth and harvesting from that point onwards balance out over the long term and so no longer count towards targets.

Forest management aims to track the impact on emissions from the changed management practices of pre-1990 forests. It involves setting a reference level, based on a future projection of what emissions and removals in pre-1990 forests would be with no change in management. By tracking progress against this reference level, we can potentially measure and monitor the impacts of changes in management practices on a long-term basis.

This approach can, theoretically, be used to recognise the effect of human interventions, such as pest control, that increase carbon stocks in pre-1990 forests. In practice this is difficult to implement, given the measurement and monitoring systems that are used to estimate national scale land emissions.

For more information on emissions accounting, see *Chapter 7: Rules for measuring progress* from our *Draft advice on Aotearoa New Zealand's fourth emissions budget*, which is now available as part of this public consultation.

Our approach to reviewing the 2050 target

As an independent Crown entity, we base our advice on research, evidence, and modelling, and draw on the expertise of our Board of Commissioners, He Pou Herenga (a Māori advisory body to the Board), and staff. We are informed by evidence and insights gathered through engagements with people on the ground.

As we develop our advice, we consider a wide range of matters as required by the Act, including current available scientific knowledge, existing and anticipated technological developments, likely economic effects, the distribution of costs and risks between generations, and te ao Māori.

We are inviting your input to test and strengthen our analysis before we develop our final advice and recommendations to the Government.

We are consulting part way through our analytical process as part of our commitment to transparency. There is high public interest in this review, and decisions on whether, and if so, how, to amend the 2050 target will have wide-reaching implications for Aotearoa New Zealand.

What we hear and learn through this public consultation will inform our advice to the Government, which we will deliver by 31 December 2024. The Government will then consider our advice, including any recommendations we make in accordance with the conditions set by the Act, before responding to our review by the end of 2025.

We are also consulting on two separate but related documents at the same time: one on the fourth emissions budget, the other on the question of whether emissions from international shipping and aviation should be included in the 2050 target, and if so, how. For more information about this consultation, and how these pieces of advice relate to our review of the 2050 target, see the *Foreword*.

What we heard in the call for evidence

There were 26 respondents in total across the three projects we are currently consulting on.

10 respondents provided evidence or information directly relevant to our review of the 2050 target.

A mix of individuals and organisations provided a range of evidence and perspectives on the direction of the Commission's advice to the Government.

We met with some of the organisations who submitted evidence and perspectives on the call for evidence for this review between July and December 2023.

We have considered and reflected the evidence, perspectives, and discussions provided where appropriate in our analysis.

Several submitters provided evidence of the different warming impacts of different greenhouse gas emissions and emphasised this should be an important factor in our review. In response to these submissions, we looked carefully at how best to assess the warming effects of different gases. Where possible, we compare the effects of different gases by looking at how they directly affect warming. We also increased our focus on the split-gas target. This chapter discusses the 2050 target's specific requirements for emissions of biogenic methane, which reflect the different impact they have on warming, compared to emissions of long-lived gases. *Chapter 4: Looking at the impacts of change* highlights our initial finding that the 2050 target could be strengthened without making changes to its split gas structure.

What we must consider in our work

We are looking at a range of factors in our assessment. To give structure to our initial analysis, we are asking two main questions:

- Under the current 2050 target, what is Aotearoa New Zealand's contribution to global efforts to limit warming to 1.5°C?
- Has significant change occurred, or is it likely to occur, since the 2050 target was set by Parliament in 2019?

The Act does not specify the parameters for our advice on the outcomes of our review. We may only recommend a change to the 2050 target if we find that significant change has occurred, or is likely to occur, in one or more specified topics as they relate to climate change since the target was set.

The topics related to climate change which we are required to assess for significant change are:

- global action
- scientific understanding of climate change
- Aotearoa New Zealand's economic or fiscal circumstances
- Aotearoa New Zealand's obligations under relevant international agreements
- technological developments
- distributional impacts
- equity implications (including generational equity)
- the principal risks and uncertainties associated with emissions reductions and removals
- social, cultural, environmental, and ecological circumstances.

In our final advice to the Government, we will answer two more questions:

- If we have found significant change, does that change justify amending the 2050 target?
- If amendments to the 2050 target are justified, what should those changes be?

To answer these two questions we need to look at what the impact of change will be on people and the planet.

If we find there has been significant change that justifies amending the 2050 target, we may recommend a change to the target's: ¹

- **timeframe** – the timeframe for achieving the target (or components of the target)
- **level** – the amount of emissions reductions required by the target (or components of the target)
- **structure** – the greenhouse gases, emissions, and carbon dioxide removals to which the target (or components of the target) applies
- **rules** – how the target (or components of the target) may be met, including limits on removals and offshore mitigation.

Any recommendation we make must be justified by the significant change we have identified.

As we conduct this analysis, the Act requires us to consider, where relevant, a broad range of matters, including:

- current available scientific knowledge
- existing technology and anticipated technological developments, including the costs and benefits of early adoption of these in New Zealand
- the likely economic effects
- social, cultural, environmental, and ecological circumstances, including differences between sectors and regions
- the distribution of benefits, costs, and risks between generations
- the Crown–Māori relationship, te ao Māori, and specific effects on iwi/Māori
- responses to climate change taken or planned by parties to the Paris Agreement or to the United Nations Framework Convention on Climate Change.

Setting or amending a target requires judgement

Under the Act, we are required to review the 2050 target every five years beginning in 2024. Regular reviews of the 2050 target provide the opportunity to assess how fit the current target is for its purpose, and to make changes when appropriate to adapt to new circumstances.

Our first step in reviewing the 2050 target is assessing Aotearoa New Zealand's contribution to global efforts to limit warming to 1.5°C under the current target. The Act does not give specific guidance about how we should approach this question. There is no formula for determining or setting the 'right' target. Parliament applied its judgement in designing the current target, and we need to apply our judgement in reviewing it and advising any potential change.

We have not yet made a judgement about whether amending the 2050 target is justified. Before we do, we want to hear from you about the issues, impacts and evidence you want the Commission, and eventually the Government, to consider and prioritise.

How we have structured this document

This document has four chapters.

Chapter 1: Introduction introduces the task we have been set by the Act, provides provide important context about the current 2050 target and its wide-ranging impacts on life in Aotearoa New Zealand, and outlines our initial approach to our review.

Chapter 2: Assessing the current 2050 target's contribution to limiting global warming discusses our initial approach and findings in considering the contribution from Aotearoa New Zealand to global efforts to limit warming to 1.5°C.

In this chapter we want to know:

- *Do you agree with our approach to assessing how the current 2050 target contributes to global efforts to limit warming to 1.5°C? Are there any other approaches or pieces of evidence you think we should include in our final assessment?*
- *What role do you think Aotearoa New Zealand's national circumstances should play in how the country contributes to global efforts to limit warming, as defined by the 2050 target? Do you think Aotearoa New Zealand's national circumstances justify departing from the IPCC's international burden sharing perspectives? If so, why? If not, why not?*

Chapter 3: Checking for significant change discusses our initial findings of whether or not there has, or is likely to be, significant change in circumstances across each of the nine areas specified by the Act.

In this chapter we want to know:

- *Do you agree with our approach to looking for significant change? Are there any other approaches or pieces of evidence you think we should include in our final review?*
- *Do you agree with our initial findings related to significant change? Have we missed any important information or evidence?*

Chapter 4: Looking at the impacts of change describes the different ways the 2050 target could be amended based on our initial findings.

We have not reached an initial view on whether changes to the target are justified. Determining this requires weighing up different questions and considerations, including the potential opportunities and trade-offs of different possible amendments.

In order to form a view on whether a change to the 2050 target may be justified, we want to know:

- *Are there any issues or impacts related to people and/or the climate that you want the Commission, and eventually the Government, to consider and prioritise when reviewing the 2050 target?*

Assessing the current 2050 target's contribution to limiting global warming

The first step to assessing a climate target is understanding the contribution to limiting warming. Setting a climate target requires balancing other important matters and circumstances, which we discuss in later chapters.

This chapter sets out, for your feedback, our approach and initial findings related to how the target links to the purpose of the Act: **Under the current 2050 target, what is Aotearoa New Zealand's contribution to global efforts to limit warming to 1.5°C?**

There is strong evidence that the world is not on track to meet the goal of limiting warming to 1.5°C and will need sustained reductions and removals to bring temperatures back down below that mark. This underlines the importance of the 2050 target driving short-, medium- and long-term action to reduce emissions in Aotearoa New Zealand.

When Parliament set the current target, it weighed a range of factors and made a judgement on how to balance different considerations and priorities. We are similarly taking a system-wide view in our review and will also need to apply judgement when recommending whether a change is justified or not. This chapter takes the first step in that process by looking at:

- the progress of global efforts to limit warming to 1.5°C
- Aotearoa New Zealand's efforts to limit warming, and how those efforts compare with international efforts, using four perspectives from the Intergovernmental Panel on Climate Change (IPCC).

Our initial finding is that the current 2050 target as a whole is not compatible with any of the four perspectives from the IPCC.

This initial finding alone is not a reason for changing the target, as setting or amending a target requires weighing up the benefits of change with other factors. To get a full picture of Aotearoa New Zealand's contribution to global efforts to limit warming requires thinking about national circumstances and how they affect what the country can and should do to reduce emissions.

Chapter 4: Looking at the impacts of change outlines the considerations that will inform our eventual judgement about the 2050 target's contribution to these efforts, and whether the target should change. We are seeking your feedback about how we should think about Aotearoa New Zealand's national circumstances, including whether they justify departing from the IPCC's international burden sharing perspectives.

We are seeking your feedback

In this chapter, we are seeking your feedback on our initial review of the 2050 target's contribution to global efforts to limit climate change. In particular, we would like to know:

- Do you agree with our approach to assessing how the current 2050 target contributes to global efforts to limit warming to 1.5°C? Are there any other approaches or pieces of evidence you think we should include in our final assessment?
- What role do you think Aotearoa New Zealand's national circumstances should play in how the country contributes to global efforts to limit warming, as defined by the 2050 target? Do you think Aotearoa New Zealand's national circumstances justify departing from the IPCC's international burden sharing perspectives? If so, why? If not, why not?

Global efforts to limit climate change

Aotearoa New Zealand's 2050 target is a part of global action to limit global warming, which we define in this discussion document as meaning the amount by which Earth will be warmer with, compared to without, the greenhouse gases emitted by human activity.

Assessing the current target requires understanding how warming works, global efforts to limit warming and Aotearoa New Zealand's contribution to those efforts.

The Paris Agreement sets a goal of limiting the increase in the global average temperature to well below 2°C above pre-industrial levels, and to pursue efforts to limit warming to 1.5°C. One of the purposes of the Climate Change Response Act 2002 is to enable Aotearoa New Zealand to contribute to global efforts under the Paris Agreement to limit warming to 1.5°C.

The world is currently heading for warming above the goals of the Act and the Paris Agreement, even if all climate targets and domestic net zero pledges are met. To avoid this outcome, countries will need to deliver more than they have currently promised both before and after 2050, as highlighted by the United Nations *Emissions Gap Report 2023*.²

Future emissions, past emissions and current temperatures combine for future warming

The first step to estimating future warming is identifying the causes of global warming. Factors that influence how much and when global temperatures will rise and whether the world meets the temperature goals under the Paris Agreement include:

- the warming that has already occurred due to human activity
- the warming that will occur in the future due to past emissions (CO₂ emissions that have already been emitted into the atmosphere have the main impact here – the relationship between cumulative CO₂ emissions and global warming is close to linear³)
- the amount of non-CO₂ greenhouse gases emitted in the future, including both long-lived and short-lived greenhouse gases like nitrous oxide, and methane
- the amount and durability of future removals of greenhouse gases from the atmosphere (for example, carbon dioxide removal through planting trees).

Other factors that can be unpredictable and difficult to assess include events like volcanic eruptions and geo-engineering activities.

If the world warms beyond 1.5°C, known as an overshoot, then returning to the 1.5°C goal will require achieving net negative emissions of long-lived greenhouse gases and increased reductions of short-lived greenhouse gas emissions.

The global effort to limit warming needs to limit future emissions

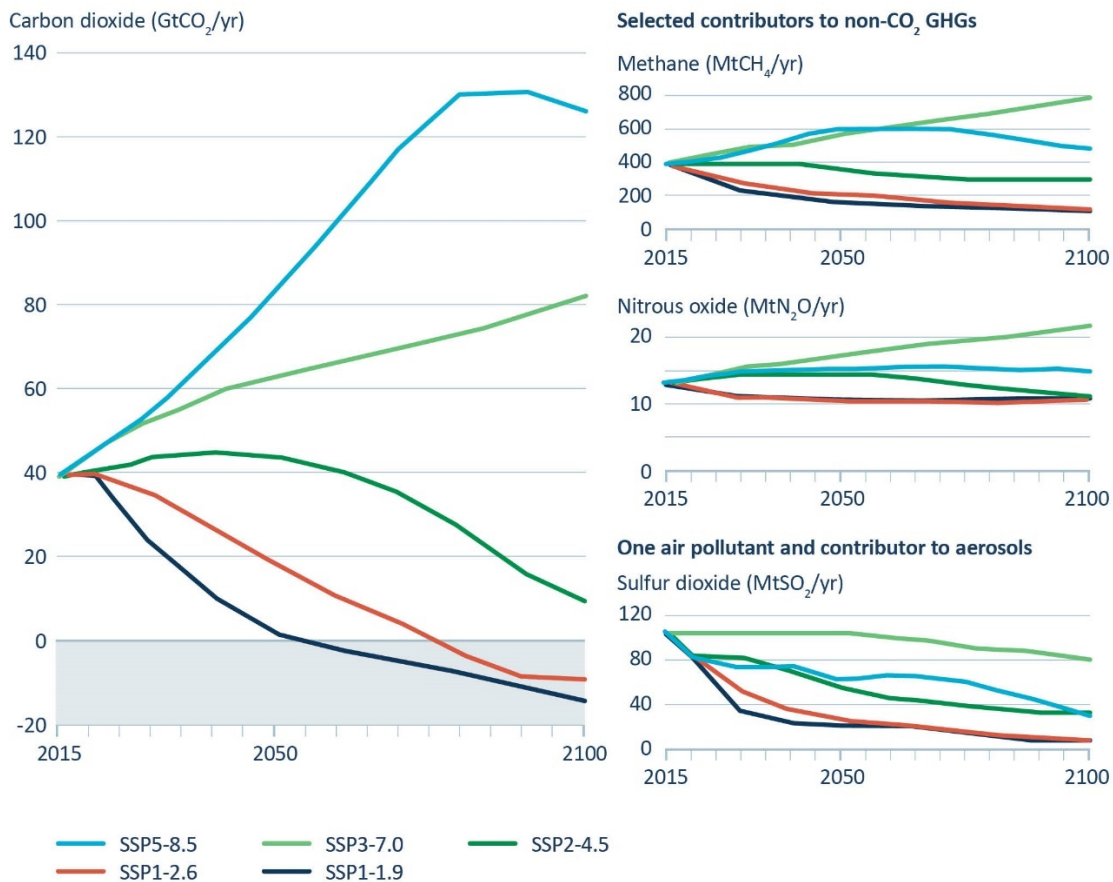
This section sets out what projections of future emissions can tell us about future temperatures.

The Intergovernmental Panel on Climate Change (IPCC) has used scenarios of future emissions based on broad socio-economic trends that could shape future society. They are useful because while future global emissions are unknown, they largely depend on what people around the world do now and in the future.

These scenarios are called ‘Shared Socio-economic Pathways’ (SSPs) based on five narratives describing broad socio-economic trends that could shape future society. These are intended to span the range of plausible futures. The main differences between SSPs come from their assumptions on global population growth, access to education, urbanisation, economic growth, resources availability, technology developments and drivers of demand, such as lifestyle changes.⁴

In its Sixth Assessment Report (AR6), the IPCC looked at five global emissions pathways, one from each narrative, to illustrate what temperatures would result from different levels and combinations of global emissions, including temperature increases already locked in by past emissions. The emissions reductions of different greenhouse gases in those pathways are shown in **Figure 2.1**.

Figure 2.1 Future annual emissions of greenhouse gases across five illustrative scenarios

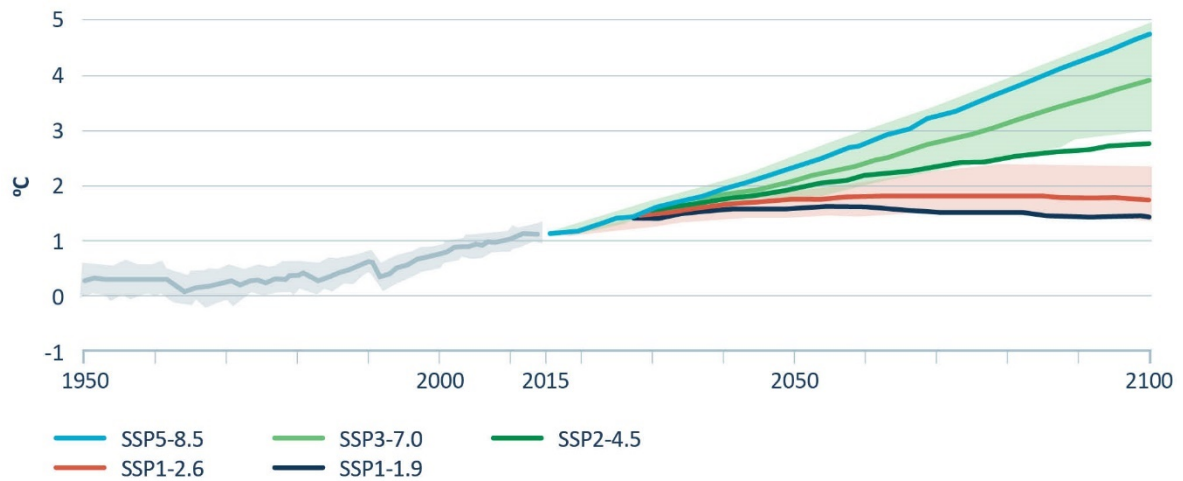


Source: IPCC, Climate Change 2021: The Physical Science Basis⁵

Only one scenario, the SSP1-1.9, shows an outcome close to limiting warming to 1.5°C. The SSP1-1.9 scenario would require the world to achieve net negative emissions of carbon dioxide shortly after 2050, meaning that more carbon dioxide would be being removed from the atmosphere than is emitted. This scenario also requires significant reductions in methane emissions, and reductions in nitrous oxide emissions.

The temperature outcomes of these scenario are shown in **Figure 2.2**.

Figure 2.2: Global surface temperature change relative to 1850–1900 across five illustrative scenarios



Source: IPCC, Climate Change 2021: The Physical Science Basis⁶

The SSP1-1.9 gives us a good baseline for a global emissions pathway that comes close to limiting warming to 1.5°C, although it requires sustained net negative emissions after 2050 to achieve this.

The world is not on track to limit emissions enough to limit warming to 1.5°C

It is increasingly clear that global temperature increases will exceed 1.5°C.

The latest United Nations *Emissions Gap Report 2023*⁷ shows that:

- as a result of commitments under the Paris Agreement, global greenhouse gas emissions are now expected to be lower in 2030 than previous projections
- in the most optimistic scenario – with all commitments and pledges implemented – the world has a 66% chance of limiting warming to 2.0°C (range: 1.8°C to 2.5°C)
- with only current policies continuing, the world has a 66% chance of limiting 21st century warming to 3.0°C (range: 1.9°C to 3.8°C)
- limiting warming to 2°C will require implementing current targets and increasing the ambition of targets.

Temperature goals under the Paris Agreement (limit warming to well below 2°C and pursue efforts to limit warming to 1.5°C) will likely be exceeded due to current and unavoidable future warming, and future emissions. Greater emissions reductions now and emissions reductions after 2050 will be needed to bring global temperature rise back down to 1.5°C. Negative long-lived greenhouse gas emissions and further reductions in the rate of short-lived greenhouse gas emissions are the key ways to return to 1.5°C after overshooting.

Aotearoa New Zealand's efforts to limit warming

To provide a range of perspectives on how the target drives Aotearoa New Zealand's contribution to limiting warming, we have modelled the warming from Aotearoa New Zealand's past and possible future emissions and how that makes a contribution to global efforts to limit warming to 1.5°C.

Warming from Aotearoa New Zealand's emissions

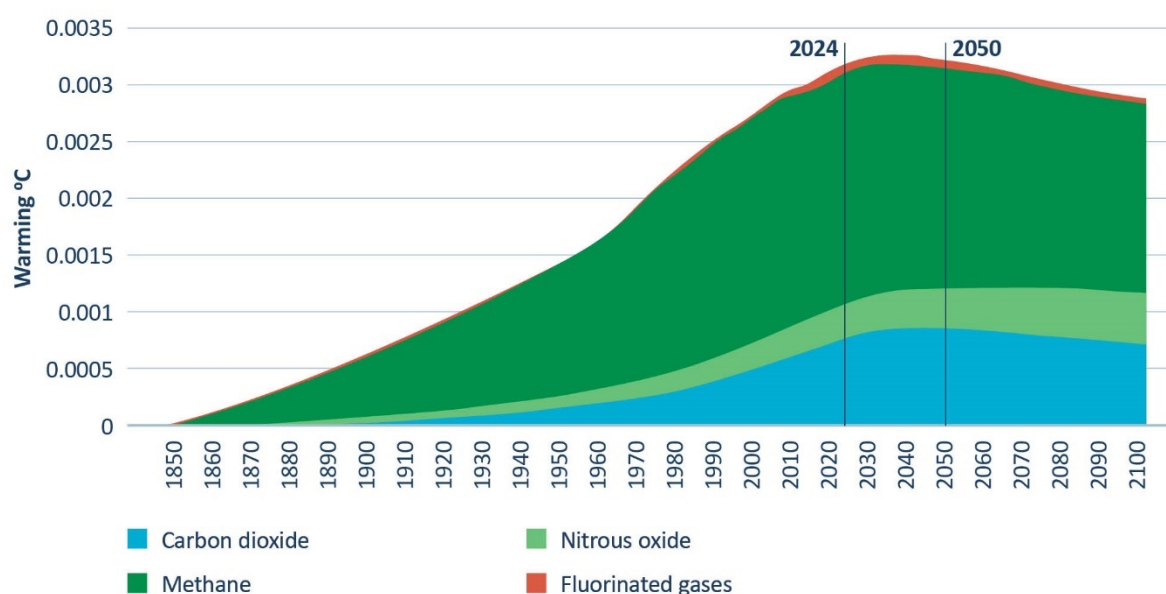
This section sets out how emissions from Aotearoa New Zealand have contributed to global warming in the past and may do in the future. The warming in a given year is the result of emissions from previous years. Note this excludes deforestation. The future projections are based on the low technology and low systems change (LTLs) emissions pathway developed for our draft advice on Aotearoa New Zealand's fourth emissions budget. This is one possible pathway that meets the current target and can be used to draw insight about how much warming Aotearoa New Zealand would contribute if we achieved the current target.

The results show that:

- warming is mainly from methane, carbon dioxide and nitrous oxide
- most warming comes from methane emissions
- warming peaks in 2036 at 0.0033°C
- Aotearoa New Zealand contributes 0.0032°C in 2050 and below that at 0.0029°C in 2100.

Looking at the temperature response or 'warming' in this way allows us to understand total warming from different greenhouse gases without the use of metrics that equate other greenhouse gases to carbon dioxide. If everyone in the world contributed the same level of warming per capita as Aotearoa New Zealand, total warming would peak at around 5°C and decline to around 4.3°C by 2100.

Figure 2.3: Warming from emissions in Aotearoa 1850–2100 under the LTLS scenario



Source: Commission analysis^{vi}

Target timeframe and level primarily determine the contribution to warming

How much (the level) and how fast (the timeframe) we reduce emissions will make the biggest difference to global warming.

Emissions of long-lived greenhouse gases like carbon dioxide stay in the atmosphere for hundreds to thousands of years after they were emitted. This means Aotearoa New Zealand's role in warming the atmosphere as a result of these emissions will depend on how quickly they are brought down to net zero or lower. Biogenic methane, on the other hand, is a short-lived greenhouse gas – the warming it causes will decrease if emissions decrease. This means Aotearoa New Zealand's role in warming the atmosphere as a result of biogenic methane emissions depends on how much these emissions are reduced.

The target does not require further emissions reductions after 2050. The world will need sustained net negative CO₂ emissions and further reductions of methane even in the best-case scenarios assessed by the IPCC.

While the current target requires Aotearoa New Zealand to achieve net zero emissions of most greenhouse gases by 2050, it does not require emissions of biogenic methane to reach net zero. There is no requirement for the remaining emissions of biogenic methane to be offset by deeper reductions of other greenhouse gases before or after 2050. This means that it is possible to achieve the 2050 target and still have net positive emissions of 700–1,000 KtCH₄^{vii} and associated contribution to global warming in 2051 and every year after.

^{vi} To produce the analysis we used the Finite Amplitude Impulse Response simple climate model (FaIR). FaIR is a reduced-complexity climate model useful for scenario assessment. Note this figure shows warming from net target accounting emissions only and does not include deforestation, which has contributed even more warming.

^{vii} 19–28 MtCO₂e

From multiple perspectives, the 2050 target may not represent an equitable contribution to global efforts to limit warming

We have also looked at the 2050 target's contribution to global efforts to limit warming from four perspectives used by the IPCC consider how the burden of reducing emissions is shared across different countries and economies:⁸

- **equal per capita emissions** – this perspective assumes everyone in the world has an equal right to use the atmosphere
- **capacity/ability to pay** – this perspective looks at the technical, financial and economic ability of each country or economy to contribute to reducing emissions
- **responsibility for warming** – this perspective holds countries responsible for the total amount of warming caused by both historical and future greenhouse gas emissions
- **the right to sustainable development** – this perspective assumes that meeting basic needs is a global priority before contributing to emissions reductions.

Our initial finding is that, as a whole, the current 2050 target is not compatible with any of these international burden sharing perspectives. We discuss the other factors we need to consider in our review of the 2050 target in *Chapter 3: Checking for significant change*, and *Chapter 4: Looking at the impacts of change*.

Methodology for the analysis on Aotearoa New Zealand's contribution to global efforts

For these perspectives, we calculated what Aotearoa New Zealand's share of world emissions would be if world emissions followed a 1.5°C pathway. We used the pathways assessed by the IPCC as limiting warming to 1.5°C in the Sixth Assessment Report. We compared emissions under the current 2050 target to the country's share of emissions in the median pathway using decadal timesteps from 2020 to 2070. This was assessed on a split-gas basis assessing the biogenic methane and net zero components of the target separately, and then aggregated together using GWP₁₀₀. Overall results for net emissions under each approach are presented in this chapter, and Appendix 1 shows the emission pathways split out by biogenic methane and all other gases.

Offshore mitigation can be used to meet the net zero component of the 2050 target. However, the Act severely restricts the use of offshore mitigation in meeting emissions budgets – the stepping stones to reaching the target. Accordingly, we have not assumed that there will be any offshore mitigation used in meeting the 2050 target. Where the contribution assessments presented here would require offshore mitigation, we have noted that.

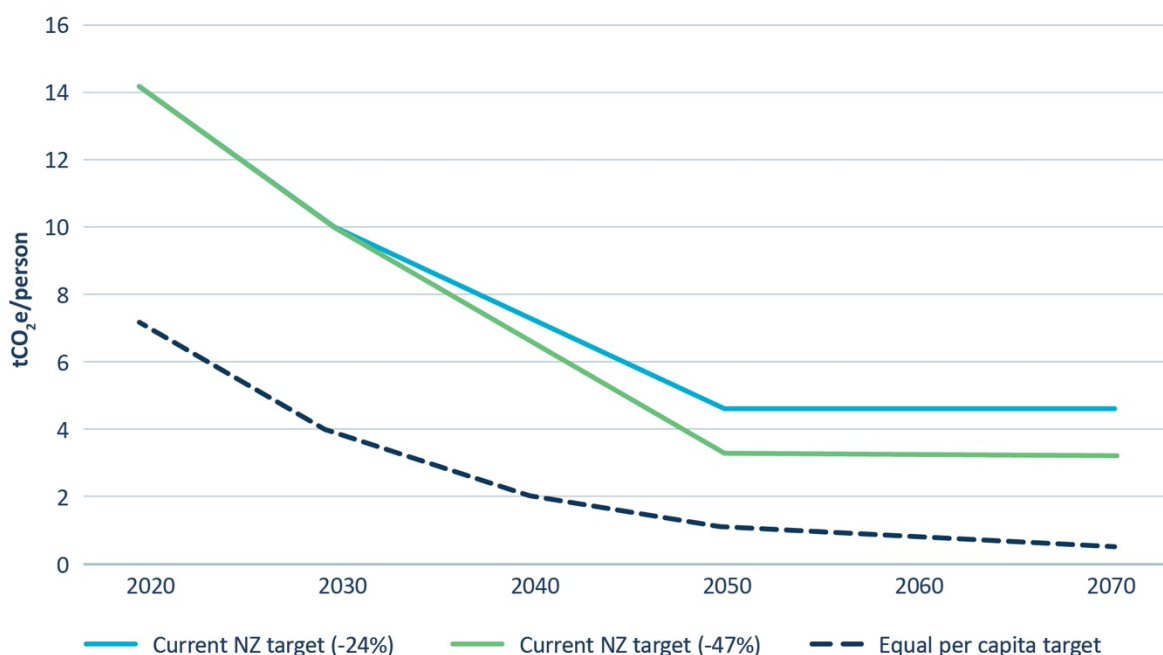
Where possible we have also presented the analysis using the warming caused by emissions of different gases. However, for this analysis it is also necessary to convert gases into carbon dioxide equivalents (CO₂e) using the GWP₁₀₀ metric. We have used this metric as it is the international standard by which emissions are compared, and often it is the only source of data. It is also helpful to see the overall contribution of other countries. Where we have used GWP₁₀₀ we have used the values from the IPCC's *Fifth Assessment Report*.

Equal per capita emissions

In this approach everyone in the world has an equal right to use the atmosphere. Here, global emissions that are compatible with limiting warming to 1.5°C are apportioned to countries equally by population.

A target based on equal per capita emissions would require Aotearoa New Zealand's emissions to be around 1 tonne CO₂e per person by 2050. The current target has remaining biogenic methane emissions from 2050 of between 3 and 4.5 tonnes CO₂e per person from 2050 (110–160 kg of methane per person), as illustrated in **Figure 2.4** below. Even though methane has a short lifetime, continuing these emissions into the future beyond 2050 would mean the associated contribution to global warming is sustained in perpetuity.

Figure 2.4: Per capita net emissions of all gases under the 2050 target and in global 1.5°C pathways using an equal per capita approach



Source: Commission analysis

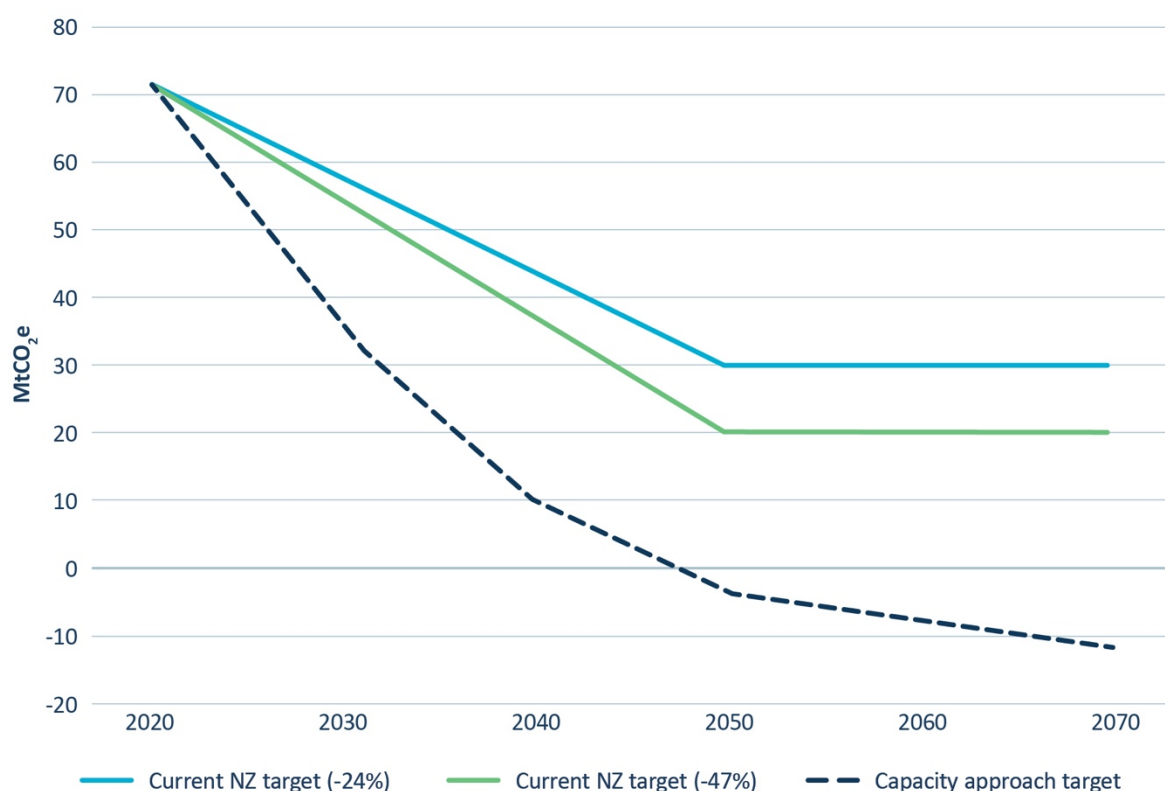
Capacity/ability to pay

Under a capacity approach, countries' shares of emissions reductions are split by their capacity to reduce them. Capacity requires economic and financial resources, but also technical skills, sound institutions and the human capacity to make changes. We've taken a simplified approach that uses share of global GDP as a proxy for capacity to reduce emissions.

Under this approach Aotearoa New Zealand takes on a share of world emissions to be reduced in proportion to the country's level of GDP. This is independent of Aotearoa New Zealand's actual level of emissions or abatement opportunities, and assumes international trading of emissions reductions or financial support is included. The assumption of international trading is a limitation of this approach since the Act restricts the use of international emissions trading in meeting emissions budgets on the way to the 2050 target.

Under this approach, Aotearoa New Zealand's total net emissions for all gases would need to reach net zero around 2050 and include ongoing net removals to a small degree in the decades after 2050 (**Figure 2.5**). If applied to the separate components of the 2050 target, a capacity approach would allow emissions of biogenic methane to be reduced by less than the current target range. However, emissions of all other gases would need to be reduced much more rapidly, reaching net zero by 2030, and continuing to increase net sequestration so that emissions are significantly net negative by 2050.

Figure 2.5: Net emissions of all greenhouse gases under a capacity approach compared to the current 2050 target



Source: Commission analysis

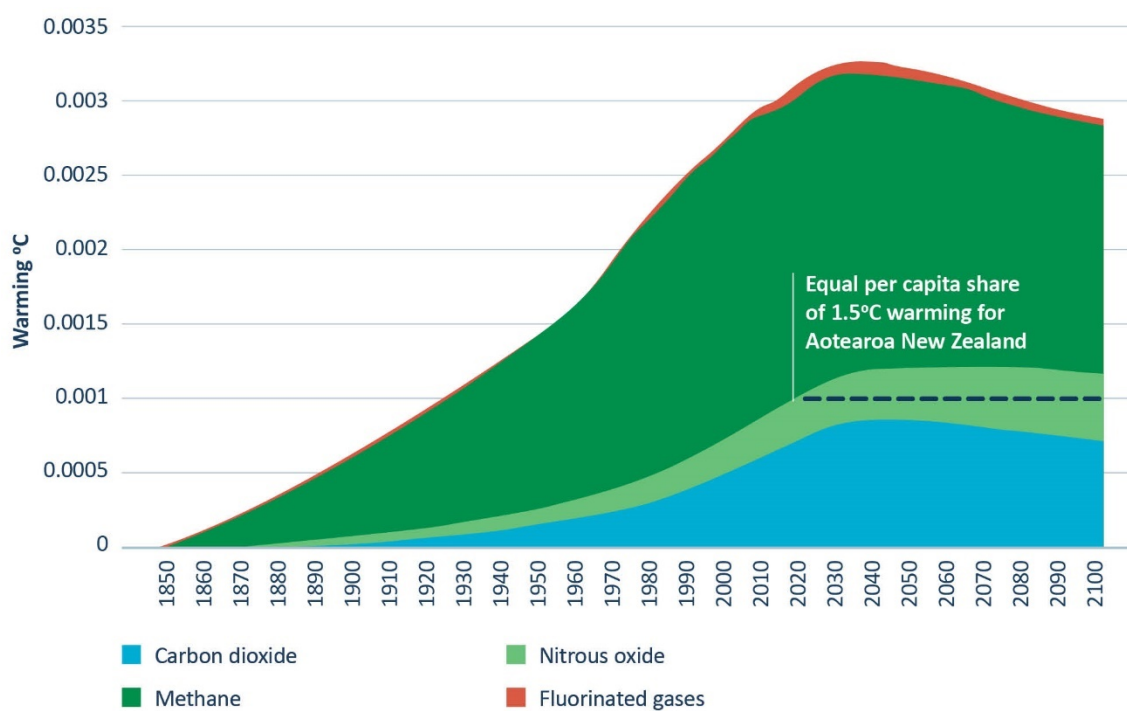
Responsibility for warming

Under a responsibility approach Aotearoa New Zealand takes responsibility for the warming its emissions contribute to the globe, including warming from emissions that have occurred in the past. This approach accounts for how countries have arrived at the current circumstances. Countries which have emitted more in the past – and benefited economically from doing so – are required to reduce emissions by more to bring the warming they have contributed back down to an equal per capita share.

While the year 1850 is frequently used to decide where responsibility for the warming caused by past emissions starts, and is used in our analysis, other choices are possible.

In **Figure 2.6** the 1.5°C of warming is apportioned globally by population (represented by the dashed line). Aotearoa New Zealand's share of the total warming that limits warming to 1.5°C would be a limit of 0.001°C.^{viii} **Figure 2.6** below illustrates that warming from Aotearoa New Zealand's emissions would peak at just above 0.003°C. Note this excludes deforestation.

Figure 2.6: Warming from emissions from Aotearoa New Zealand 1850–2100 under the current 2050 target and share of 1.5°C warming from 2024



Source: Commission analysis

^{viii} Based on Aotearoa New Zealand's share of world population between 2010 and 2070 in 1.5°C scenarios.

The right to sustainable development

A fourth principle of burden sharing identified by the IPCC is the right to development. The right to development recognises that many people in different parts of the world are still working towards having their basic needs met – food, housing, clean water, education. It recognises that not all current emitters are equally responsible for climate change, and not all income is equally usable to combat climate change. Under this approach it is inequitable for wealthy emitters who developed their standard of living on the basis of fossil fuels and other emitting activities to require people to reduce emissions before they have developed a minimum standard of living.

The right to development has been a long-standing feature of climate agreements.

The Commission's previous advice⁹ on the first Nationally Determined Contribution (NDC) relied upon this principle, in assessing that Aotearoa New Zealand's contribution should be more than the global average required to meet a temperature goal. Because some developing countries will need more time to reduce their emissions while they meet their development needs, other countries who have already realised their basic development needs must reduce emissions more quickly to keep to the same goal.

One application of this principle is the Greenhouse Development Rights framework.¹⁰ This framework sets a development threshold of personal income, below which individuals are not expected to contribute to emission reductions. Importantly, it is assessed based on not just the average income for a country but also its distribution. This means that as well as wealthier countries doing more, wealthy individuals in poorer countries are also expected to contribute.

There is no consensus about the exact development threshold over which people should contribute to emissions reductions. We have not sought to assess what this framework would show for Aotearoa New Zealand, since it requires detailed data on the income distributions across countries and value judgements on the appropriate development threshold. Given Aotearoa New Zealand's levels and distribution of income, it would require deeper reductions than an equal per capita approach and potentially higher than a capacity/ability to pay approach.

Much of the world's methane emissions in developing countries are for subsistence farming of rice or livestock, and fugitive emissions from fossil fuel production and distribution. Fugitive emissions will reduce as fossil fuels are phased out and monitoring technologies are widely deployed, but agricultural emissions may not. This principle would suggest that much of the allowable global methane budget for a 1.5°C pathway should be reserved for those who are using it to meet their basic survival needs – requiring greater reductions from richer countries like Aotearoa New Zealand.

Methane and warming

The coalition agreement between the National Party and the ACT Party commits the Government to “Maintain a split-gas approach to methane and carbon dioxide through to 2050 and review the methane science and targets in 2024 for consistency with no additional warming from agricultural methane emissions”.¹¹

The Parliamentary Commissioner for the Environment defines warming as the amount by which Earth will be warmer with, compared to without, a given stream of emissions.¹² The Commission uses the term warming in the same way.

Methane and carbon dioxide are both greenhouse gases, and emissions of each are contributing to global warming. However, the way they impact atmospheric temperatures is different, as is the timeline of their warming effect.¹³ The science of these differences was known and understood when the 2050 target was set in 2019.

Methane has a strong warming effect that lasts several decades, with a smaller amount of warming lingering up to hundreds of years. By contrast, carbon dioxide has a weaker warming effect on a tonne-for-tonne basis, but lasts much longer in the atmosphere – its impacts can remain over hundreds to thousands of years.

Because methane decays more quickly in the atmosphere, if methane emissions are stable from a given point in time, the amount of warming they cause will also eventually stabilise.

This effect is similar to how water behaves in a bathtub, with the water representing the emission and decay of methane in the atmosphere. When the tap is on, methane is being emitted, filling the bathtub. The more the tap is open (the more methane emitted) the faster the water level (warming) rises. When the plug is open, methane is decaying, flowing out of the bathtub.

If more water is coming out of the tap than going down the plug, the water level in the tub – or levels of methane in the atmosphere – will rise. When methane levels increase, so does warming. If the amount of water going down the plug is equal to the water coming from the tap, the water level will stabilise, as will the warming impact of methane. If the tap is turned down and the plug is left open, the water level in the bathtub will go down, decreasing methane’s impact on the climate.

This means sustained methane emissions make the world warmer than it would be without those emissions. The higher the rate at which methane emissions are sustained, the greater Aotearoa New Zealand’s contribution to global warming.

As part of our initial review of the 2050 target, we have looked at the implications of an approach to meeting the 2050 target through no additional warming from a specified date from methane emissions. Changing the biogenic methane target from the current range to ‘no additional warming’ and keeping the net zero component of the current target as is would mean higher emissions and an increased amount of warming than the current target.

We have not analysed in detail what biogenic methane emissions would result under a no additional warming approach, because such a technical analysis would hide the more fundamental question: should Aotearoa New Zealand cause more global warming than implied by the current 2050 target? Our review of the current target (this chapter) or assessment of significant changes (see *Chapter 3: Checking for significant change*) has found no grounds that would justify an increase in the overall amount of global warming caused by Aotearoa New Zealand’s emissions.

If the country does not wish to cause more warming than under the current target, then revising the biogenic methane components of the target in a way that is consistent with no additional warming would require a much faster reduction in net emissions of all other greenhouse gases and greater reliance on forests to remove carbon dioxide.¹⁴ Such a shift in Aotearoa New Zealand’s approach to reducing emissions would likely lead to significant and different impacts on households, businesses, communities, and the economy.

Checking for significant change

To understand whether the 2050 target is serving its intended purpose for Aotearoa New Zealand, it is important to find out if circumstances have changed which could impact its influence and impact.

This chapter sets out, for your feedback, our approach and initial findings related to the question:
Have there been significant changes since the 2050 target was set by Parliament in 2019?

In establishing the 2050 target as Aotearoa New Zealand's domestic contribution to global efforts under the Paris Agreement to limit warming to 1.5°C, Parliament set the country on a long-term course for reducing its emissions.

With any long-term target, circumstances can change that affect its ability to serve its intended purpose. As part of our review of the 2050 target, we are tasked with assessing whether significant change has occurred, or is likely to occur, since the target was set in one or more specific areas as they relate to climate change. The reality is that change is constant and to be expected. Almost no aspect of the climate, economic, or societal landscape has remained unchanged since 2019. The challenge with this analysis is to determine what changes are significant and may merit a change to the 2050 target.

We can only make a recommendation for the Government to amend the 2050 target if we are satisfied that significant change justifies that amendment. This sets a high bar for recommending change, keeping Aotearoa New Zealand on a steady course to low emissions while still allowing the country to adjust when necessary along the way.

For this analysis, we are looking specifically at what has changed since 2019, rather than assessing current circumstances. Regardless of whether the Government ultimately decides to amend the 2050 target, an equitable transition that is well-paced, well-planned, and well-signalled is needed to ensure durable outcomes. This includes addressing existing inequities, providing targeted support for people less able to transition to low emissions, and working in partnership with iwi/Māori under Te Tiriti o Waitangi/ The Treaty of Waitangi.

We have found initial evidence of significant change in four of the topics identified by Parliament. Our initial findings are there is has been a change in:

- global action relating to the action the world needs to take to limit warming to 1.5°C and Aotearoa New Zealand's contribution compared to its peers and competitors
- the scientific understanding of climate change relating to the understanding of the impacts of climate change
- technological developments relating to a methane inhibitor capable of reducing methane emissions from animals like cows and sheep by around 30%, which is now widely available overseas
- the principal risks associated with emissions removals relating to risks of forestry.

Together, these changes show there may be reason to strengthen the 2050 target. In *Chapter 4: Looking at the impacts of change*, we look at what this might mean for whether or not the target should be changed.

We are seeking your feedback

In this chapter, we are seeking your feedback on how we have checked for significant change, and what our initial findings show. In particular, we would like to know:

- Do you agree with our approach to looking for significant change? Are there any other approaches or pieces of evidence you think we should include in our final review?
- Do you agree with our initial findings related to significant change? Have we missed any important information or evidence?

Our approach to checking for significant change

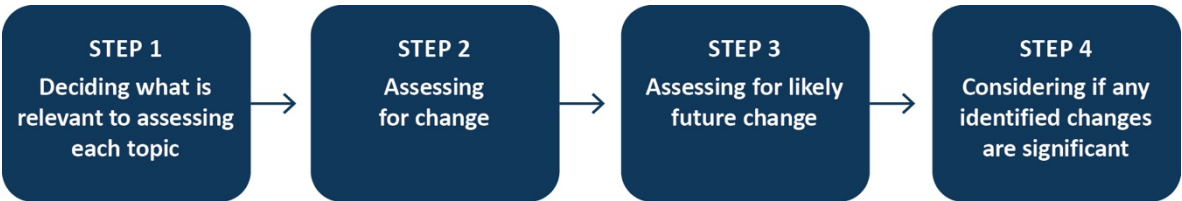
As the bar for changing the 2050 target is high, the Climate Change Response Act 2002 specifies the areas in which we are tasked with looking for significant change.¹⁵ These are:

- global action
- scientific understanding of climate change
- Aotearoa New Zealand’s economic or fiscal circumstances
- Aotearoa New Zealand’s obligations under relevant international agreements
- technological developments
- distributional impacts
- equity implications (including generational equity).
- the principle risks and uncertainties associated with emissions reductions and removals
- social, cultural, environmental, and ecological circumstances.

Our approach to checking for significant change involves four steps

While the Act directs us on where to look for significant change, it does not provide specific guidance on how to tell if it has occurred or is likely to occur. For this initial review, we have developed a four-step process (**Figure 3.1**) which enables us to consider each area methodically, looking at a wide range of factors.

Figure 3.1: Significant change assessment process



Step 1: Deciding what is relevant to assessing each topic

In each area, we looked for change, related to climate change, that could impact the 2050 target's ability to serve its intended purpose. To do this, we identified indicators that would help us understand how each connects to the purposes of the Act:

- develop and implement clear and stable climate change policies
- contribute to global efforts under the Paris Agreement to limit warming to 1.5°C.

Step 2: Assessing for change

In this step, we looked at what the circumstances were in 2019, when the 2050 target was first set, and compared them to the current day. We expected to find some level of change across all of the specified areas, as a natural course of events over time. As part of this step, we assessed which identified changes could impact the 2050 target's ability to serve its intended purpose.

Step 3: Assessing for likely future change

In this step, we used projections, and in some cases, modelling, to look at whether circumstances were likely to undergo significant change in the future. We then assessed whether likely future change could impact the 2050 target's intended purpose. This included considering when the likely change might occur. As we will review the 2050 target every five years, change that is likely to happen sooner is more relevant and more likely to be important, consequential and notable.

Step 4: Considering if any identified changes are significant

In this step, we analysed the changes identified in steps 2 and 3 for their importance, consequence, and notability.

To assess if a change was 'important', we looked the change's relevance to the 2050 target, and whether it could impact the ability of government and society to take action to achieve it.

To assess if a change was 'consequential', we looked at whether the change could impact the 2050 target's ability to achieve its intended purpose.

To assess if a change was 'notable', we looked at whether it was reasonably foreseeable in 2019, when the 2050 target was first set.

Under this process, we only considered a change to be 'significant' if we found evidence that it had, or was likely to have, important, consequential, and notable impacts on the 2050 target.

Next steps: Determining if changes to the target are justified

If we find evidence of significant change within one or more of the areas of focus specified by the Act, our next step is to determine if that significant change justifies a change to the 2050 target. If we determine that a change to the 2050 target is justified, we can make recommendations to the Government in line with our findings in our final advice, due at the end of this year.

For this initial review, we have not come to any conclusions about whether a change to the target could be justified. For more on where we are in this process, and how your feedback can inform the next stages of our analysis, see *Chapter 4: Looking at the impacts of change*.

We think four topics have changed significantly

Applying our approach to looking for significant change, we have found evidence of significant change in four of the nine areas of focus specified by the Act. These areas are:

- global action
- scientific understanding of climate change
- technological developments
- the principal risks and uncertainties associated with emissions reductions and removals

Global action

Step 1: Deciding what is relevant to assessing each topic

To assess global action as it relates to climate change, we considered several indicators:

- the long-term emissions reductions committed to by comparable countries and economies through self-determined targets
- the adequacy of those targets to contribute to global efforts under the Paris Agreement to limit warming to 1.5°C
- the progress being made by countries and economies to achieve their targets through actual emissions reductions.

For this analysis, we used information about countries and economies with some similarities to Aotearoa New Zealand, including:

- countries that are often compared to Aotearoa New Zealand, including by the Ministry for the Environment in its reporting, such as Australia, Japan, USA, Canada, the European Union and the UK¹⁶
- members of the Small Advanced Economies Initiative (SAEI), which are countries with a similar population size and economic framework as Aotearoa New Zealand, including Singapore, Switzerland, Denmark, Finland, Ireland and Israel¹⁷
- developed countries and those in transition according to the United Nations Framework Convention on Climate Change Annex 1 who emitted methane at a similar or higher rate in 2021 compared to Aotearoa New Zealand in 2021, including the United States, Russia, Canada, Ukraine, Turkey, France, Kazakhstan, the United Kingdom, Germany, Italy, Poland, Spain, Romania, Netherlands, Ireland and Japan¹⁸
- countries that emit relatively large amounts of biogenic methane emissions compared to their overall emissions, including Uruguay, Costa Rica, Bulgaria, Albania, Belarus, Brazil, Ireland, Argentina and Latvia. For this group, we have excluded countries with relatively low incomes (with per capita Gross Domestic Product below US\$6,000) or population sizes (below one million people).

Steps 2 and 3: Assessing for change or likely future change

Aotearoa New Zealand's relative position as a leader in setting its long-term emissions reduction target has changed compared to other countries

When the 2050 target was first set in 2019, Aotearoa New Zealand was a relative global leader along with the UK,¹⁹ Switzerland,²⁰ and Denmark²¹ in setting or announcing long-term emissions reduction targets.

Our initial analysis suggests that position has changed, and that the 2050 target is now less ambitious than many of the targets set by comparable countries and economies. Net zero all gas targets include biogenic methane in their net zero requirements, which is a lower level of emissions than Aotearoa New Zealand.

- Finland, which in 2019 had a target to achieve net zero emissions of all greenhouse gases by 2050, brought its target's timeline forward in 2022. It now requires net zero of all greenhouse gases by 2035, and net negative emissions in the years following.²²
- Australia,²³ Japan,²⁴ USA,²⁵ Canada,²⁶ EU,²⁷ Singapore²⁸ and Ireland²⁹ moved to targets requiring net zero emissions of all greenhouse gases in 2021.
- Norway³⁰ and Israel³¹ do not require net zero emissions of all greenhouse gases, but our initial analysis shows their targets still exceed the ambition level of Aotearoa New Zealand's 2050 target.
- Among the comparison group of countries identified as emitting relatively high levels of biogenic methane, the number of targets requiring net zero emissions of all greenhouse gases has increased since 2019. Argentina, Ireland and Brazil have now joined Latvia,³² Costa Rica³³ and Denmark, which already had targets requiring net zero emissions of all greenhouse gases in 2019.

The time available for global action to prevent an overshoot of 1.5°C has decreased

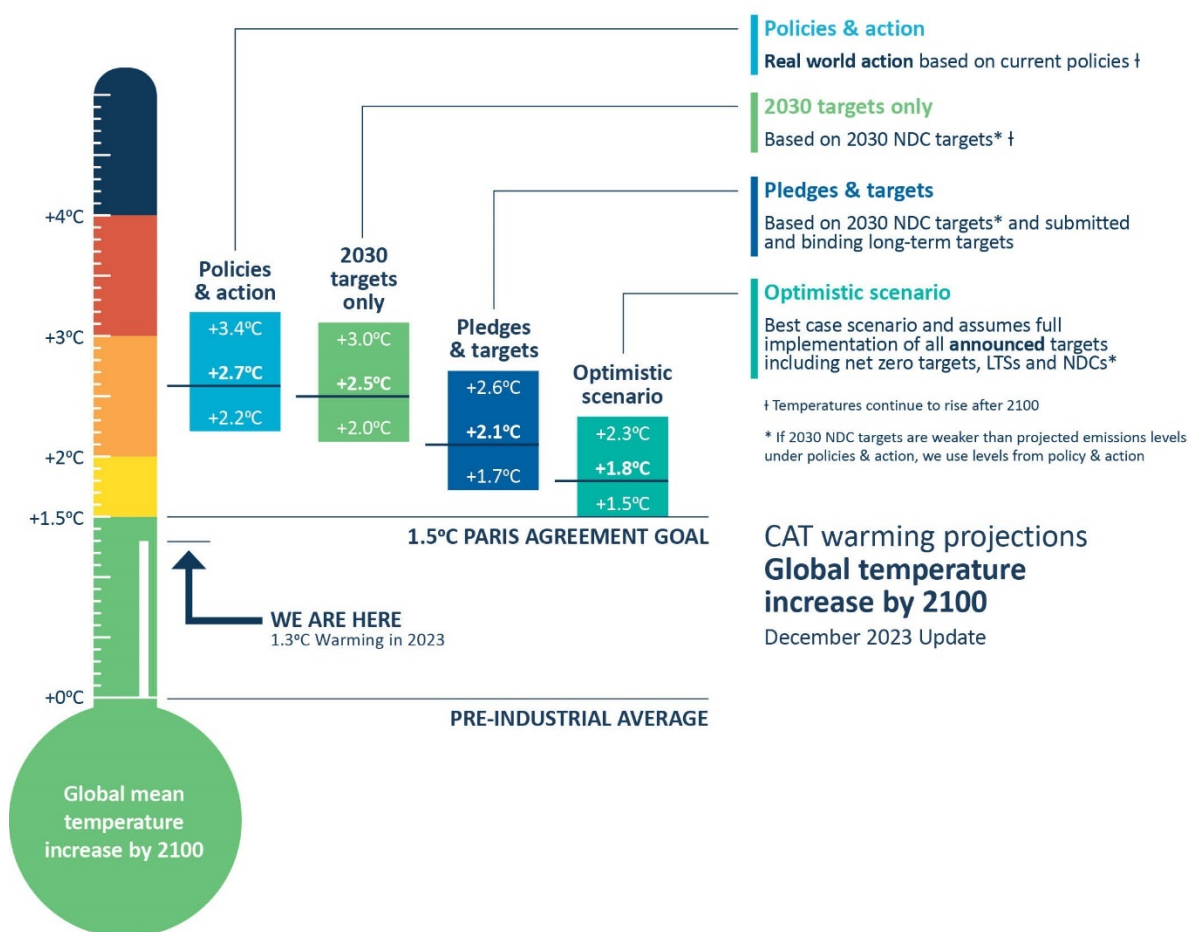
Since 2019, the likelihood that global warming will exceed 1.5°C, requiring action to reduce temperatures to bring warming back below that threshold, has increased, while the time available for the world to act has decreased.

The latest United Nations *Emissions Gap Report 2023*³⁴ shows:

- As a result of commitments under the Paris Agreement, global greenhouse gas emissions are now expected to be lower in 2030 than previous projections.
- In the most optimistic scenario – with all commitments and pledges implemented – the world has a 66% chance of limiting warming to 2.0°C (range: 1.8°C to 2.5°C).
- With only current policies continuing, the world has a 66% chance of limiting 21st century warming to 3.0°C (range: 1.9°C to 3.8°C).
- Limiting warming to 2°C will require implementing current targets and increasing the ambition of targets.

Figure 3.2 shows that, globally, current policies and actions are not enough to limit warming to 1.5°C, nor are the world's 2030 nationally determined contributions under the Paris Agreement or long-term targets (generally 2050 targets).

Figure 3.2: Warming Projections



Source: Climate Action Tracker, 2023³⁵

Step 4: Considering if any identified changes are significant

We are seeking your feedback on our initial findings that there have been two significant changes to global action as it relates to climate change.

Our analysis suggests the changes in relative ambition of Aotearoa New Zealand's international peers and competitors – which mean the 2050 target is now less ambitious than targets set by comparable countries and economies – have important, consequential, and notable impacts on the 2050 target, and are therefore significant.

Our analysis suggests the change in the likelihood that global temperatures will rise beyond 1.5°C above pre-industrial levels – with the chance of an overshoot increasing since 2019 and the time available to act to avoid an overshoot decreasing – has important, consequential, and notable impacts on the 2050 target's ability to achieve its purpose and is therefore significant.

Scientific understanding of climate change

Step 1: Deciding what is relevant to assessing each topic

Research and scientific understanding begin with questions, then information and observations are collected and tested, forming preliminary understandings. Models are developed based on preliminary understandings and then tested with additional data and observations. Results are systematically scrutinised by peers and then published if they meet scientific quality standards in scientific journals. These journal articles build the basis for improving understanding of components of the climate system and factors that influence it.

To provide the world with a clear consensus of the understanding, the Intergovernmental Panel on Climate Change (IPCC) provides governments at all levels with scientific information they can use to develop climate policies and responses. To achieve this objective, the IPCC provides regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.

The IPCC's reports are comprehensive and balanced assessments of the state of knowledge on topics related to climate change. Reports from other professional organisations, similarly based upon foundations of peer reviewed science, also feed into the collective understanding of climate change.

The Commission draws upon the consensus view of the scientific understanding of climate change that is based upon recognised peer-review processes.

For this review we looked across the spectrum of climate change science:

- **how the climate system functions** – advancements in modelling and observations
- **the detection and attribution of climate change** – assessing whether the climate is changing and if it is, identification of the cause
- **how greenhouse gases behave in the Earth system** – the accumulation of greenhouse gases in the atmosphere controlled by biogeochemical cycles
- **climate change mitigation** – emission sources, levels of gases, and mitigation options
- **the quantification of emissions** – considering changes in how the emissions from individual sources (or groups of sources) are reported on using internationally agreed upon methods
- **how to compare the warming impacts of greenhouse gases in the atmosphere** – models and metrics
- **the impacts of warming** – the negative and positive consequences of climate change and options for adapting to it
- **the risks and implications of warming impacts** – the vulnerability of socio-economic and natural systems to climate change.

Steps 2 and 3: Assessing for change or likely future change

The following IPCC special reports were the most up to date at the time the target was set: *Global Warming of 1.5°C*,³⁶ *Climate Change and Land*³⁷ and *The Ocean and Cryosphere in a Changing Climate*.³⁸ These reports were commissioned in response to a request of the Conference of Parties following the adoption of the Paris Agreement in 2015, to identify the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emissions pathways.

The most recent report from the IPCC is the *AR6 Synthesis Report: Climate Change 2023*³⁹, released in March 2023 and the three working group Assessment Reports upon which it is based. We also considered a number of other relevant reports including: the *Global Methane Assessment* (2021),⁴⁰ the UN's *Emissions Gap Report* (2023),⁴¹ *United in Science 2022 Report* (2022),⁴² the *State of Climate 2022 report* (2023),⁴³ the Food and Agriculture Organization (FAO) of the UN's *Methane emissions in livestock and rice systems* (2023),⁴⁴ and the *Global Stocktake Report* (2023).⁴⁵

From analysing these reports, our initial findings are:

- Since 2019, there have been advances in the scientific understanding of climate change across the first six topics listed above – including the understanding of the physical science of methane and how it warms the atmosphere. However, these have largely added nuance and precision to the existing state of knowledge and are not consequential or notable.
- Understanding of the physical science of greenhouse gases is improving all the time. However, there has not been an important or notable change in the understanding of the physical science of methane and how it warms the atmosphere.
- There has been a change in scientific understanding identified in the last two topics that could be significant, relating to the impacts of warming, and the risks and implications of warming impacts. Risks are increasing with every increment of warming and high risks are now assessed to occur at lower levels of global warming.

Understanding the impacts of warming

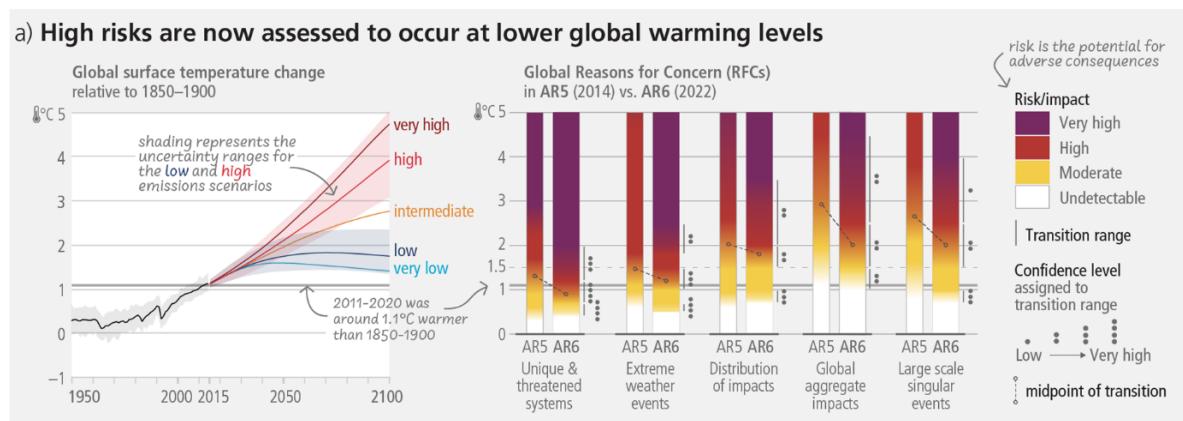
The impacts of warming will be widespread, affecting the way we live, work and play. The IPCC has been assessing the vulnerability of socio-economic and natural systems to climate change.⁴⁶ To understand these impacts the IPCC has used a set of five key “reasons for concerns” to summarise key risks from climate change at a global level. The methodology has become more formalised for the past two assessments to enable a systematic comparison of the level of risk identified over time. This methodology covers more than 120 key risks⁴⁷ aggregated into five reasons for concern:

- unique and threatened systems
- extreme weather events
- distribution of impacts
- global aggregate impacts
- large scale singular events.

As shown in **Figure 3.3** below, the very high and high risks (the darker colours on the bars) are assessed to occur at lower temperatures than was previously understood. This means climate risks are appearing sooner and with more severity than was previously understood.⁴⁸

Figure 3.3: Change in risks between Fifth Assessment Report (AR5) and Sixth Assessment Report (AR6)

Risks are increasing with every increment of warming



Source: AR6 Synthesis report summary for policymakers IPCC AR6 Figure SPM.4 panel A⁴⁹

The main change in scientific understanding is new knowledge of the **impacts** of events. There is a greater understanding of the vulnerability of human and natural systems, meaning for any given change in the climate, those systems are both more likely to be affected and more likely to be more badly affected. We have experienced early indications of this vulnerability in Aotearoa New Zealand with Cyclone Gabrielle and the Auckland anniversary weekend floods in 2023.

Step 4: Considering if any identified changes are significant

Most of the physical science underpinning Aotearoa New Zealand's emissions target has not significantly changed. The understanding of the impacts of climate change however is important, consequential, and notable given the potential scale of those impacts on Aotearoa New Zealand and around the globe.

Our initial finding that we are seeking feedback on is that a significant change has occurred in the scientific understanding of climate change, but only as it relates to the impacts, risks and implications of warming. Risks are increasing with every increment of warming and high risks are now assessed to occur at lower levels of global warming.

Technological developments

Step 1: Deciding what is relevant to assessing each topic

We researched how technologies that reduce emissions have changed since the 2050 target was set and whether a significant change is likely. We considered the availability and relative cost of low or zero emissions technologies across:

- renewable energy, process heat and buildings
- industrial processes
- engineered removals
- transport
- agriculture
- waste.

For more information about on the cost and availability of technologies, see the *Technical Annex – Modelling and analysis to support the draft advice on Aotearoa New Zealand's fourth emissions budget*.

Steps 2 and 3: Assessing for change or likely future change

Renewable energy, process heat and buildings

Since 2019 a number of renewable power technologies became cheaper than the lower range of the fossil generation price.⁵⁰ Anticipated technologies and fuels, and their price and availability across renewable energy and process heat were reasonably foreseeable in 2019.

Industrial processes

Mitigation technologies available for heavy industries (aluminium, cement and lime, iron and steel, ammonia, methanol) have not changed notably since 2019. While there has been increased adoption of technology – an electric arc furnace in steelmaking – this technology is not new. Aotearoa New Zealand has made steel using this particular technology in the past.⁵¹

Engineered removals

The costs of technologies for carbon dioxide removal (carbon capture and storage, bioenergy with carbon capture and storage, direct air carbon capture and storage) have remained persistently high since 2019.⁵²

There are emerging technologies that we have noted and are tracking, but there has been no uptake in Aotearoa New Zealand to date. We expect incremental changes that are in line with changes over previous years but do not anticipate anything notable.

Transport

Anticipated technologies and fuels for transport have not changed notably since 2019. Electric vehicle technologies have been more widely deployed through a wider range of makes and models available in the Aotearoa New Zealand market, but the underlying technology has not changed. The changes in availability were reasonably foreseeable in 2019.

Agriculture

Since 2019, a methane inhibitor^{ix} for sheep and cattle has changed from a promising possibility to a widely available method for reducing methane emissions in over 40 countries including Australia, Canada and across Europe. Current methane inhibitor technology can reduce methane emissions from animals like cows and sheep by around 30%.⁵³

While methane inhibitors are not yet commercially available in, or suitable for, Aotearoa New Zealand, the advances in this technology over the last five years provide more confidence a variation on this technology can eventually be used domestically. Its availability and use overseas could potentially erode Aotearoa New Zealand's comparative emissions intensity advantage.

We have not observed any other notable changes to technologies for reducing agricultural emissions. A large number of technologies are under development and there is significant research and development investment. However, it is too early to say whether any of these are likely to become commercially available at scale.

Waste

Mitigation technologies for emissions from waste have not significantly changed since 2019. In mid-2022 the Ecogas Reporoa Organics Processing Facility opened. This facility is the first major anaerobic digestion plant in New Zealand. However, the technology was well known prior to 2019.

Step 4: Considering if any identified changes are significant

We consider that the changes in technology for process heat and buildings, industrial processes, engineered removals, transport, and waste have not changed in a way that is notable or consequential.

For renewable energy the trend from 2010 to 2019 made further improvements reasonably foreseeable, making the change less notable. On this basis our initial finding is that this change does not meet the bar of being significant.

We consider that the development of a methane inhibitor for use in agriculture, albeit only available overseas, is an important, consequential, and notable development.

Our initial finding that we are seeking feedback on is that there has been a significant change in technological developments relating to the availability of a methane inhibitor for ruminant animals and no significant change or likely significant change in other technological developments.

^{ix} A compound that directly reduces the amount of methane produced, which can currently be applied via a feed additive, but similar technology is under development to apply it via a vaccine or slow-release capsule called a bolus.

The principal risks and uncertainties associated with emissions reductions and removals

Step 1: Deciding what is relevant to assessing each topic

We considered the principal risks and uncertainties associated with emissions reductions throughout our assessments of each criteria in this chapter. For the risks and uncertainties of removals, engineered removals are not currently occurring in Aotearoa New Zealand. Forests are currently the only carbon dioxide removal activity recognised in New Zealand's Greenhouse Gas Inventory. There are specific risks and uncertainties associated with forests that are not covered elsewhere, so we focused on possible changes in these risks and uncertainties associated with forests.

Forests, which remove and store carbon from the atmosphere, are critical to the pathway to achieving the net zero component of the 2050 target. They also provide us with an option for reaching and maintaining net negative emissions, which the analysis from *Chapter 2: Assessing the current 2050 target's contribution to limiting global warming* suggests the world will need.

We consider there are two key risks and uncertainties associated with forests as a climate change solution:

- **permanence** – the expected duration of the carbon storage
- **acceptability** – the balance of benefits and harms.

Steps 2 and 3: Assessing for change or likely future change

Permanence

Storing carbon in forests is less durable than not emitting fossil carbon in the first place. The durability of forests as carbon storage can be affected by several factors including fires, extreme weather events, pests, and human actions.

- In recent years wildfires have increased in number and area, along with lengthened fire seasons at some sites, surpassing expectations set in 2019.⁵⁴
- Since 2019 extreme weather events have become more frequent and intense, and although this was anticipated, vulnerability has been shown through events such as Cyclone Gabrielle.
- Climate change creates favourable conditions for the introduction and establishment of new pest species, and the northern districts of the North Island are projected to become more suitable for sub-tropical pest species, including those that pose a threat to forests.⁵⁵

Acceptability

Forests provide many useful services and benefits in Aotearoa New Zealand. There is a strong connection between forestry and iwi/Māori land ownership, and the relationship iwi/Māori have as tangata whenua to te taiao. Forestry waste can provide a sustainable energy resource to decarbonise other parts of the economy such as in process heat. Forests currently remove, and are projected to continue to remove, significant amounts of carbon dioxide. These removals provide more options in how climate targets are met, with other non-forestry forms of carbon removal such as direct air capture currently expensive and uncertain. Afforestation is likely to be an important part of global efforts to respond to temperature overshoots. Forests can allow Aotearoa New Zealand to realise significant long-term carbon removals, while providing co-benefits.

Since 2019 there has been increasing concern from communities regarding the land use change to forests, usually from sheep and beef pasture.⁵⁶ Many agricultural and rural communities worry about the consequences of the transition for their communities and livelihoods.⁵⁷

The operation of plantation forestry carries environmental risks if forestry slash (wastes at harvest) is not well managed. The acceptability of these risks of forests as carbon storage has reduced beyond what was expected in 2019. In particular extreme weather events such as Cyclone Gabrielle in 2023 resulted in devastating damage connected to some harvested forest land which flooded woody debris and sedimentation into land, waterways and infrastructure.^{58,59} The Ministerial inquiry into land use since Cyclone Gabrielle found that the forest industry has lost its social licence in Tairāwhiti, and recommended an immediate halt to large-scale clear-fell harvesting in the region.⁶⁰ For society these concerns are now 'real' and not simply theory.

Step 4: Considering if any identified changes are significant

While the impacts of climate change on the permanence of carbon dioxide stored in forests were recognised before 2019, the magnitude and frequency of the resulting events (especially wildfires and extreme weather events) have confirmed the vulnerability of forests and changed the perceived permanence of forests as carbon storage. We do not consider this change is notable, as such a reduction in the permanence of forests as carbon storage was likely known in 2019.

Since the target was set, the concerns over forests as carbon storage have increased, beyond what was expected in 2019. Our initial finding is that this change is important, consequential, and notable, and therefore significant.

Considerations on whether climate targets are an appropriate way to ensure the risks from forestry are well managed, or whether other policies and tools may be more appropriate, will be made later in the analysis process.

We think five topics have not changed significantly

Applying our approach to looking for significant change, we have not found evidence of significant change in five of the nine areas of focus specified by the Act. The areas where we do not find significant change are:

- Aotearoa New Zealand's economic or fiscal circumstances
- Aotearoa New Zealand's obligations under relevant international agreements
- distributional impacts
- equity implications (including generational equity)
- social, cultural, environmental, and ecological circumstances.

Economic and fiscal circumstances

Step 1: Deciding what is relevant to assessing each topic

For this analysis, we are looking specifically for changes that are likely to shift Aotearoa New Zealand's economic or fiscal circumstances over the long term, to 2050. If there are large, persistent changes in short-term indicators that add up to a more fundamental change in circumstances, these will be reflected in long-term indicators. This is an important aspect of our analysis, as many economic and fiscal indicators fluctuate over months or years.

For economic circumstances, we used the forecast Gross Domestic Product (GDP) per capita, which reflects the value of final goods and services produced in the country in a year, divided by its total population. For fiscal circumstances, we used the projected net core Crown debt-to-GDP ratio, which reflects the actual debt burden that needs to be repaid, considering the Government's financial assets.

These indicators combine information from multiple sources to show any change in the resources available to transition the economy to low emissions while maintaining wellbeing, and align with domestic and international reporting metrics. Significant changes in other economic indicators, for example inflation or interest rates, are likely to affect these indicators.

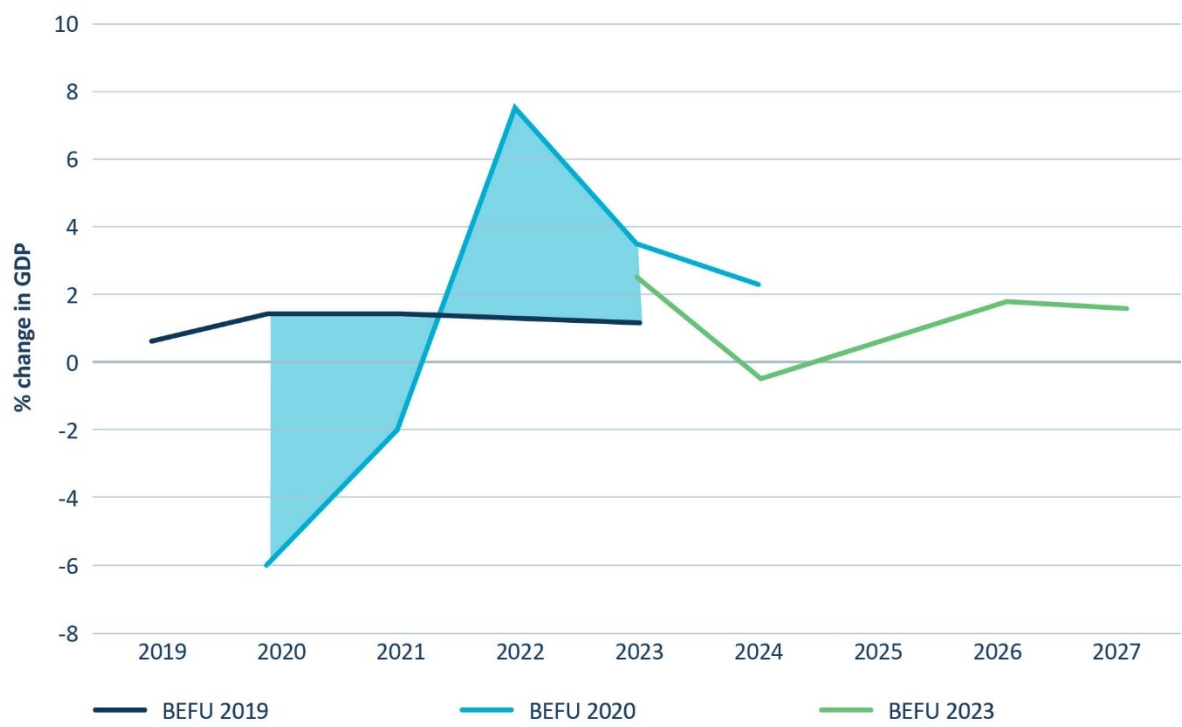
Steps 2 and 3: Assessing for change or likely future change

Forecast GDP per capita

Since 2019, Aotearoa New Zealand, along with the rest of the world, experienced the COVID-19 pandemic. The pandemic was incredibly difficult for many people in many ways, including impacts on health and livelihoods. From an economic lens, the pandemic caused significant economic disruption and a contraction of GDP per capita in 2020.⁶¹ However, as the economy has recovered, the economic forecast has moved back in line with long-term trends.⁶²

Recently, increases in inflation have raised the cost of living in Aotearoa New Zealand, impacting daily life for many people across the motu. While high inflation is impactful, it has historically not been persistent largely in part due to the actions taken by successive governments and the Reserve Bank. Current inflation rates are not anticipated to continue over the long term or to change the country's expected economic circumstances out to 2050.

Figure 3.4: Change in Budget Economic and Fiscal Update (BEFU) forecasts of GDP per capita 2019–2023

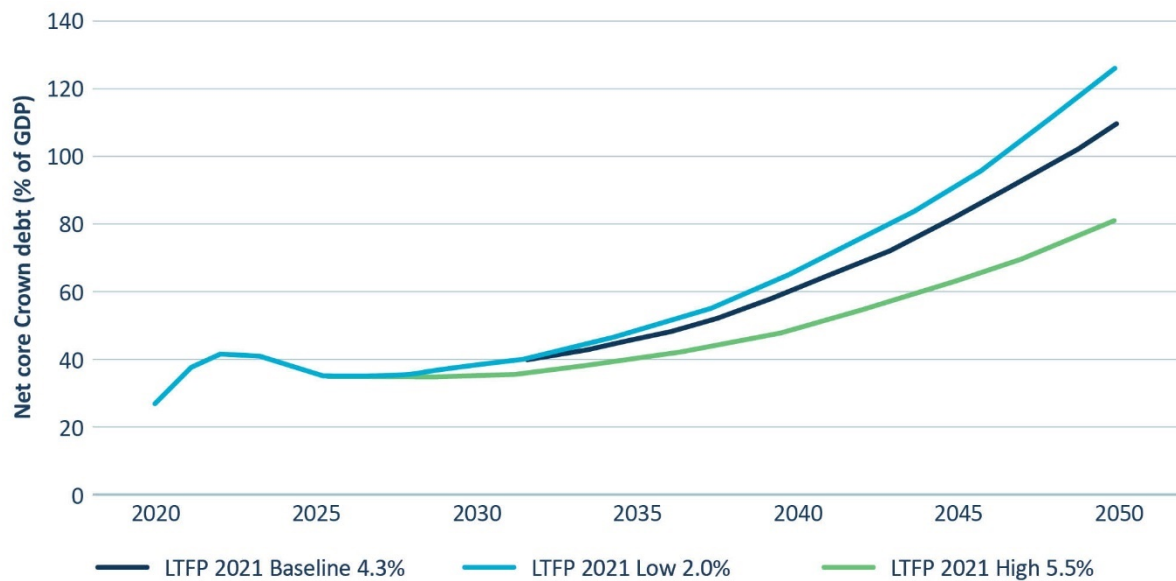


Source: Commission graph, adapted from BEFU’s 2019,⁶³ 2020⁶⁴ and 2023⁶⁵. Note BEFU forecasts show a five-year outlook only

Projected net core Crown debt-to-GDP ratio

The net core Crown debt-to-GDP ratio shows government debt relative to the size of the economy. Since 2019, the net core Crown debt-to-GDP ratio has increased (as shown in **Figure 3.5** below). If unaddressed, the higher debt-to-GDP ratio may limit government ability to allocate funds towards emissions reduction efforts and the transition to a thriving, low emissions economy. Our initial analysis, based on data from the Treasury, shows this increase is expected to decline in the short term, and then to remain somewhat consistent through to around 2030 before increasing again in the long term. The Treasury has stated that is possible to manage net core Crown debt within ‘prudent levels’.⁶⁶

Figure 3.5: Projected net core Crown debt as % of GDP using the Treasury’s Long-term Fiscal Position (LTFP), testing for different interest rates



Source: Commission analysis adapted from He Tirohanga Mokopuna 2021.⁶⁷ Note the different lines in the graph above represent the sensitivity testing of different interest rates (2.0%–5.5%).

Step 4: Considering if any identified changes are significant

We are seeking your feedback on our initial finding that there has not been significant change to Aotearoa New Zealand’s economic or fiscal circumstances as they relate to climate change.

Our analysis suggests the changes to GDP per capita since 2019, largely caused by the COVID-19 pandemic, were temporary and will not affect the long term, and are therefore not consequential for the 2050 target.

Our analysis suggests the projected changes to fiscal circumstance (**Figure 3.5**) are consequential, but were foreseen in 2019 and can be adapted to over time, and are therefore not notable for the purposes of this review.

Aotearoa New Zealand's obligations under relevant international agreements

Step 1: Deciding what is relevant to assessing each topic

To investigate this topic the Commission defined international agreements, and then looked at what would constitute an 'international obligation'. We engaged expert help on international law from Russell McVeagh.

Relevant international agreements

The United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, and the Paris Agreement (the climate treaties) are referenced in the purpose of the Act multiple times. Relevant international agreements extend beyond the climate treaties to all agreements that both create obligations and have a bearing on Aotearoa New Zealand's response to climate change.

International obligations

Obligations under relevant international agreements will include all actions Aotearoa New Zealand commits to making under those agreements. However, there is a distinction between formal international agreements and high-level political commitments. International agreements can impose obligations on Aotearoa New Zealand and go through a ratification process by Parliament. This includes multilateral treaties and bilateral agreements.

Political commitments can be agreed to by the government of the day but are not binding commitments and do not impose obligations. These are voluntary initiatives such as the Global Methane Pledge and the Beyond Oil and Gas Alliance. The Ministry of Foreign Affairs and Trade's (MFAT) guidance on International Treaty Making⁶⁸ notes that, since such arrangements are not intended to embody international legal obligations, they are not agreements in the legal sense at all.

Aotearoa New Zealand has entered into numerous non-binding political arrangements since the emissions target was set, whereby Aotearoa New Zealand has committed to taking certain steps (individually or collectively with other countries) in relation to climate change. We consider that these are likely outside the scope of Aotearoa New Zealand's obligations under relevant international agreements.

Steps 2 and 3: Assessing for change or likely future change

Agreements that potentially create obligations fall into three categories:

- multilateral agreements that impose obligations on Aotearoa New Zealand in relation to climate change or related topics
- COP^x decisions under the UNFCCC, Kyoto Protocol, and Paris Agreement
- free trade agreements, both multilateral and bilateral.

The following analysis looks at changes in these categories since 2019.

Changes to Nationally Determined Contributions

Aotearoa New Zealand submitted its original NDC when it signed up to the Paris Agreement in 2016. In October 2021, before the United Nations conference in Glasgow, Aotearoa New Zealand updated its NDC.⁶⁹ The Paris Agreement imposes a binding obligation on countries to **have** an NDC in force at all times

^x The UNFCCC Conference of the Parties (COP) is an annual international climate change meeting held by the United Nations.

but does not impose an obligation to meet that NDC. NDCs themselves are non-binding. This means changes in the level of Aotearoa New Zealand's NDC are not a change in international obligations.

New COP decisions

There have been three COP meetings since the Act was passed. These concluded the Glasgow climate pact (COP25), the Paris rulebook (COP26), and the Sharm el-Sheikh implementation plan. The Paris rulebook includes guidance on a transparency process and implementation of article 6. While some aspects of the Paris rulebook are binding, it does not impose any additional obligations on parties to reduce emissions, and the same is true for the Glasgow climate pact and the Sharm el-Sheikh implementation plan.

Free trade agreements

Aotearoa New Zealand concluded two new free trade agreements (FTAs) since 2019 – one with the United Kingdom and one with the European Union. The two new FTAs create legally binding obligations on Aotearoa New Zealand, including “in respect of climate change”.

New Zealand-United Kingdom FTA

The environment chapter includes environmental obligations, such as ending unabated coal-fired electricity generation in their territories as part of a clean energy transition aligned with the goals of the Paris Agreement. MFAT's National Interest Analysis⁷⁰ confirms that these commitments are consistent with Aotearoa New Zealand's environmental legislation and current policy settings.

New Zealand-European Union FTA

Article 19.6 is the most relevant and requires the parties to:

- effectively implement the Convention and the Paris Agreement, including commitments regarding NDCs
- refrain from any action or omission that materially defeats the object and purpose of the Paris Agreement.

The Paris Agreement imposes a binding obligation on countries to *have* an NDC in force at all times but does not impose an obligation to meet that NDC. NDCs themselves are non-binding. The FTA provides an enforcement mechanism for existing obligations but does not establish any new obligations.⁷¹

We consider that the obligations in the FTA are consistent with Aotearoa New Zealand's existing legal obligations under the climate treaties.

Step 4: Considering if any identified changes are significant

The three climate treaties (the UNFCCC, the Kyoto Protocol and the Paris Agreement) are the most important international agreements under section 5T(2)(a)(iv) of the Act. We consider that Aotearoa New Zealand's obligations under the three climate treaties have not changed since the 2050 target was set, including because of subsequent COP decisions. FTAs have not changed the nature of Aotearoa New Zealand's obligations under the Paris Agreement.

Our initial finding that we are seeking feedback on is that there has not been a significant change to Aotearoa New Zealand's obligations under international agreements, and we have seen no evidence that there is likely to be a significant change to them in the future.

Distributional impacts

Step 1: Deciding what is relevant to assessing each topic

Distributional impacts are about the effects on people and their lives, homes and employment. We recognise that any changes to people in these areas are often incredibly impactful. While we do not seek to dismiss or minimise these personal experiences, our task is to look at what has changed significantly at a national level enough to warrant considering a change in the climate target. We investigated distributional impacts as they relate to climate change. We found research on this topic was generally focused on either the impacts on production and employment, or the impacts on households.⁷² We investigated climate policy impacts on employment between regions and between industries, and household living costs, in addition to selecting three indicators which draw on data gathered by Stats NZ. The indicators reflect how income (Gini coefficient), material wellbeing (material wellbeing index (MWI)), and child poverty (the proportion of children who are materially disadvantaged) are currently distributed in Aotearoa New Zealand, and how this distribution has changed over time.

Steps 2 and 3: Assessing for change or likely future change

Net employment impact likely minimal

Climate policy will have distributional impacts on employment between industries and regions, however modelling by Riggs and Mitchell shows the net impact of climate policies on total employment is likely to be relatively small in Aotearoa New Zealand,⁷³ while international research has shown the impacts of climate policy on employment are mostly reallocation between industries rather than any net losses or gains in jobs.⁷⁴

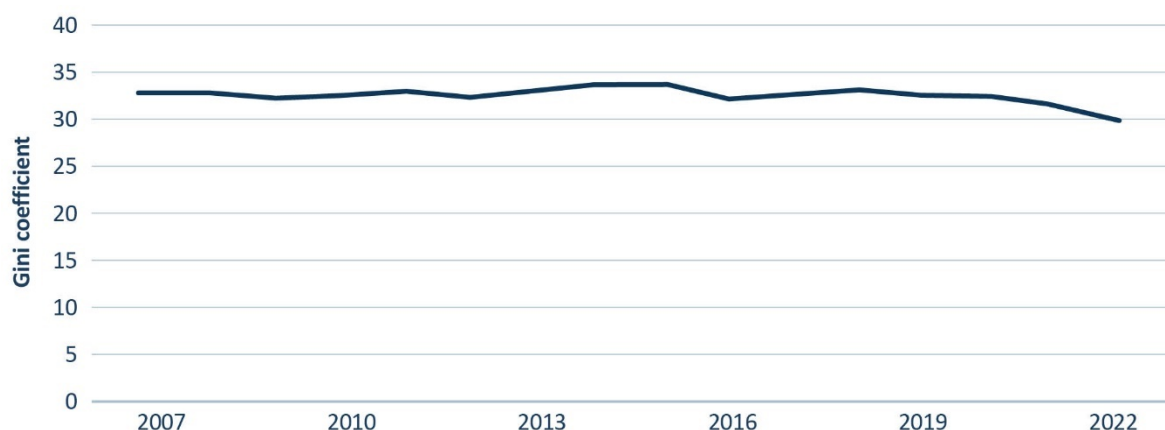
Short-term costs but long-term benefits for households

In the short term, emissions prices will be passed on to households via costs for emissions-intensive goods like transport, fuel and energy, which will likely have a disproportionate impact on lower-income households. As households transition away from fossil fuels however, they will experience longer-term benefits such as warmer, healthier homes. For the poorest in Aotearoa New Zealand, increases in the cost of living have been counterbalanced to a degree by boosts to benefits, working for families tax credits, and increases in the minimum wage.⁷⁵

The Gini coefficient shows reduced income inequality

The Gini coefficient is a common method of measuring income equality in a population, where a higher number represents increased inequality. The Gini coefficient in Aotearoa New Zealand fell from 32.7 in the year ended June 2019⁷⁶ to 30.0 in the year ended June 2022,⁷⁷ representing a reduction in inequality since the target was set.

Figure 3.6: Time series of Gini coefficient for Aotearoa New Zealand 2007–2022

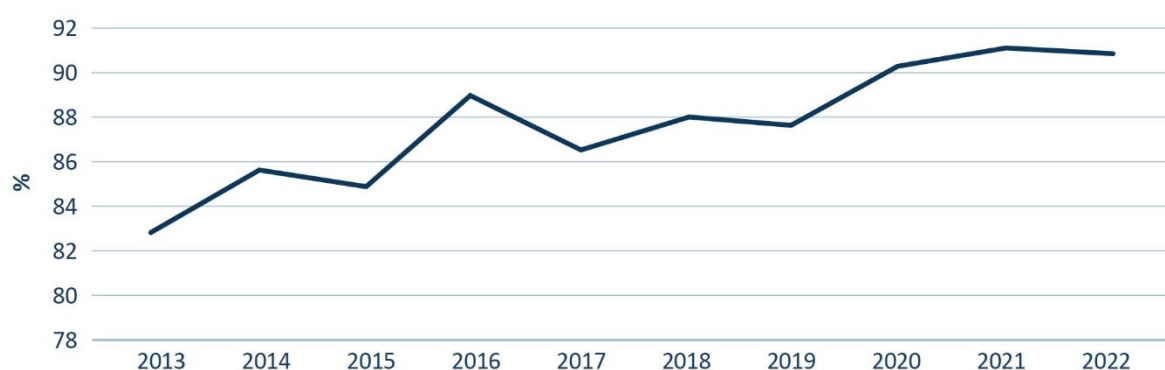


Source: Stats NZ Household income and housing cost statistics, 2022,⁷⁸ 2020⁷⁹ and 2019⁸⁰

Material wellbeing increases

Between 2019 and 2022, the percentage of households reporting good material wellbeing increased from 87.5% to 90.8%.⁸¹ This continues a longer-term trend of increasing material wellbeing since 2013 (illustrated in **Figure 3.7** below).

Figure 3.7: Proportion of survey respondents who report good material wellbeing (MWI>15) 2013–2022

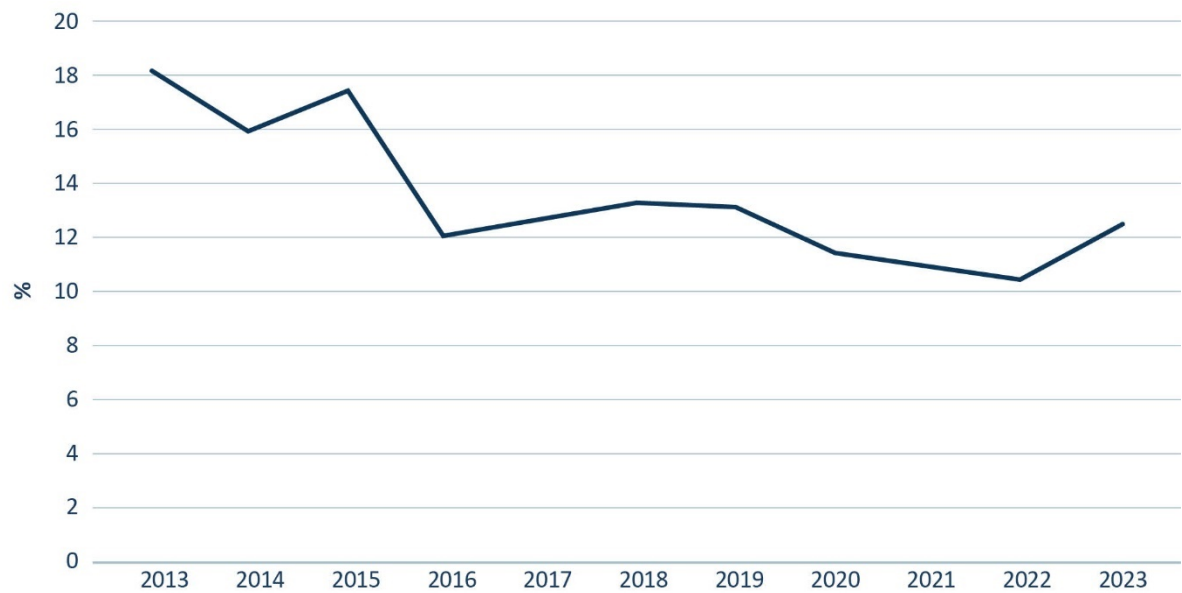


Source: Stats NZ Household income and housing cost statistics, 2022⁸², 2020⁸³, and 2019⁸⁴

Child poverty decreases

Between 2019 and 2023, the percentage of children living in households in material hardship decreased from 13.2% in 2019 to 12.5% in 2023, a trend of decreasing child poverty since 2013.⁸⁵

Figure 3.8: Proportion of children living in material hardship 2013–2023



Source: Stats NZ Child Poverty Statistics Year ended June 2023⁸⁶

Step 4: Considering if any identified changes are significant

We do not consider the changes since 2019 to distributional impacts as they relate to climate change targets are important, consequential, or notable.

Our initial finding that we are seeking feedback on is that there has not been a significant change to distributional impacts, and we have seen no evidence that there is likely to be a significant change to them in the future.

Equity implications (including generational equity)

Step 1: Deciding what is relevant to assessing each topic

Equity is about how society treats different people and groups. We recognise that this can be incredibly impactful and we do not seek to dismiss or minimise these personal experiences. Our task is to look at what has changed significantly at a national level enough to warrant considering a change in the climate target.

To determine the dimensions of equity most relevant to transitioning to a low emissions future we looked to the IPCC's *Fifth Assessment Report*,⁸⁷ from which we identified the following types of equity: equity between genders, equity between low- and high-income people, regional equity, international equity, intergenerational equity, and equity for iwi/Māori. The first three we considered under 'distributional impacts' above. Here we look at international equity, intergenerational equity, and equity for iwi/Māori.

International equity – we identified trends in international equity in addressing climate change.

In *Chapter 2: Assessing the current 2050 target's contribution to limiting global warming*, we analysed Aotearoa New Zealand's 2050 target against four metrics of international equity: equal per capita emissions, capacity/ ability to pay, historic responsibility for warming, and the right to sustainable development.

Intergenerational equity – we considered qualitatively how the impacts of climate change and of climate policies affect current and future generations.

Equity for iwi/Māori – we assessed where iwi/Māori have been affected differently by climate policy, and considered policies introduced since 2019.

Steps 2 and 3: Assessing for change or likely future change

International equity

In *Chapter 2: Assessing the current 2050 target's contribution to limiting global warming* we assess how Aotearoa New Zealand's 2050 target contributes to the global effort to limit warming to 1.5°C. While the results of these different approaches differ between them, their results have not changed significantly since the target was set in 2019. They may change in the future as we act to meet the target, but that is yet to be determined. We consider that there is no evidence that issues of international equity have changed notably or consequentially since the target was set.

Intergenerational equity

The balance of intergenerational equity shifts when Aotearoa New Zealand accelerates or delays taking action to reduce emissions. Delaying action puts more burden on future generations. Accelerating action puts more burden on current generations. Between 2019 and 2021, gross emissions reduced from 80.0 MtCO₂e to 76.8 Mt CO₂e.⁸⁸ Part of this change will be due to Covid restrictions and may be temporary. Future New Zealand Greenhouse Gas Inventory data will show whether these reductions were maintained. Accordingly, it is too early to determine whether the rate of emissions reductions has changed the balance of intergenerational equity to meet the 2050 target since the target was set. The Commission's monitoring reports will be able to better assess progress on this matter.

We have not seen evidence that issues of intergenerational equity have changed since 2019.

Equity for iwi/Māori

Although emissions targets do not disproportionately affect Māori directly, the implementation of policy occurs against a historical context of policies that have resulted in poor outcomes for iwi/Māori.^{89, 90, 91, 92, 93, 94}

Examples of climate change targets driving policy that affects iwi/Māori include:⁹⁵

- Some iwi/Māori have significant interests in the forestry and/or agriculture sectors, which may be more affected by climate change policy than other sectors.
- Land use characteristics of Māori freehold land mean that these landowners may have more limited options and face challenges in terms of land use change.
- A large proportion of forested Māori freehold land was planted before 1990, rendering this land ineligible for earning emissions trading units – but still liable to pay carbon credits if deforested.
- Māori are disproportionately in lower paid jobs, which are more exposed to shocks in the economy.

We have not seen evidence that these issues have changed since 2019.

Step 4: Considering if any identified changes are significant

We do not consider any of the changes to the indicators to be important, consequential, or notable.

Our initial finding that we are seeking feedback on is that there has not been a significant change in equity implications of climate change and we have seen no evidence that there is likely to be a significant change to them in the future.

Social, cultural, environmental, and ecological circumstances

Step 1: Deciding what is relevant to assessing each topic

To enable us to identify any changes that might have occurred in these areas since the emissions target was set in 2019, we compiled five indicators to provide insight into social, cultural, environmental, and ecological circumstances within Aotearoa New Zealand as they relate to climate change. We chose democratic participation, public concern about climate change, and education as areas relevant to social and cultural circumstances, and water quality and air quality as areas relevant to environmental and ecological circumstances.

General election turnout rates were chosen as a measure demonstrating the willingness of the public to participate in collective processes. If there was a significant social change, that could show up in reduced trust in institutional processes, particularly the democratic process.

Climate mitigation and adaptation will not succeed without the support of the public, so to understand the level of that support and whether that had changed since 2019, we investigated public attitudes towards climate change.

An educated workforce is required to transition Aotearoa New Zealand to a thriving, low emissions economy. For education we assessed the proportion of school leavers with NCEA Level 2.

To assess water quality, we used as an indicator the macroinvertebrate community index (MCI). The MCI is a measure of the abundance and diversity of macroinvertebrates and is an indicator of overall river health.

For air quality indicators we used commonly accepted measures of particulate matter in the air (concentrations of PM₁₀ and PM_{2.5}).

Steps 2 and 3: Assessing for change or likely future change

Social and cultural indicators

Democratic participation – Aotearoa New Zealand shows generally high levels of engagement in general elections and turnout has been steadily increasing between 2011 and 2020, reaching 82% in 2020.⁹⁶

There was a slight decline in estimated turnout at the 2023 election to 78%.⁹⁷

Public concern about climate change – In 2018 just 19% of the Aotearoa New Zealand public surveyed rated climate change as an important challenge.⁹⁸ By March 2023, 71% of respondents said that climate change was an important or very important issue for New Zealand.⁹⁹ While these surveys asked slightly different questions,^{xi} they nonetheless show an increase in public concern about climate change between 2018 and 2023.

Education level of school leavers – The proportion of school leavers with NCEA Level 2 or above dropped from 79.9% in 2019 to 75% in 2022.¹⁰⁰ This is likely due to the impacts of the COVID-19 pandemic on students' ability to learn through disruption.

Environmental and ecological indicators

Water quality – Freshwater quality requires measurement on very long timescales to account for the strong influence of natural variation from year to year.¹⁰¹ While water quality has been decreasing in Aotearoa New Zealand since 2001, it is too early to assess whether it has changed since 2019. In the future, increases in horticulture due to land use changes could increase freshwater demand and put pressure on freshwater ecosystems, but it is too early to tell what the actual effect might be.¹⁰²

Air quality – Vehicle exhaust is a significant source of air pollution, and as vehicles have become more emissions- and fuel-efficient over time in Aotearoa New Zealand, air pollutant concentrations have decreased.¹⁰³ Looking to the future, we can expect that as internal combustion engine use reduces in favor of increased use of electric vehicles and public and active transport, transport emissions will continue to contribute less to air pollution.

Step 4: Considering if any identified changes are significant

Of the indicators chosen, general election turnout rates, MCI, and air quality have not changed in an important, notable, or consequential way since 2019. The other two indicators have changed, but increased public concern about climate change was foreseen in 2019, and we consider the proportion of school leavers with NCEA Level 2 or greater is unlikely to continue to decline due to the temporary nature of COVID-19 lockdowns and other restrictions.

Our initial finding that we are seeking feedback on is that there has not been a significant change to social, cultural, environmental, and ecological circumstances and we have seen no evidence that there is likely to be a significant change to them in the future.

^{xi} The 2018 survey asked, "What would you say are the most important challenges facing New Zealand in the next 20 years?" And "Which of these would you say best describes your view of climate change?" with options ranging from "Entirely natural process" to "Entirely human driven". The 2023 survey was part of EECA's ongoing monitoring of public attitudes and asked, "How important do you consider each of the following issues to New Zealand?"

Looking at the impacts of change

Amending a target requires thinking about a range of factors, including the impacts of change. Before we come to any conclusions about whether changing the 2050 target is ultimately justified, we want to hear from you about the issues, impacts and evidence you want the Commission, and eventually the Government, to consider and prioritise.

There are many ways the 2050 target could be amended in response to findings of significant change, with different implications for Aotearoa New Zealand's approach to reducing emissions as well as its society, economy, environment and future generations. In Chapter 3: Checking for significant change we found no evidence to support weakening the current target, and enough to consider strengthening the target.

This chapter outlines how the 2050 target's design could be amended, identifies some of the impacts of changing the target, and explores a strengthened target through scenario pathways from the fourth emissions budget which demonstrate potential emissions reduction actions. This chapter then sets out our planned approach to the question: **What are the impacts of changing the target on people and the climate?**

In our work reviewing the 2050 target we are required under section 5M of the Climate Change Response Act 2002 to consider matters including: current scientific knowledge; existing and anticipated technology; likely economic effects; social, cultural, environmental, and ecological circumstances; intergenerational distribution of benefits, costs, and risks; te ao Māori; and global action. We want to hear your thoughts on how a strengthened target could impact any of these, or other, factors.

We have not yet considered these impacts or reached any judgements on whether a change to the target is justified. Your input will inform these next stages of our work, and the Government will receive our final advice and recommendations at the end of this year. They will then have 12 months to provide a response.

We are seeking your feedback

In this chapter, we are seeking your feedback on what to consider and prioritise in making judgements about whether the 2050 target should change. In particular, we would like to know:

- Are there any issues or impacts related to people and/or the climate that you want the Commission, and eventually the Government, to consider and prioritise when reviewing the 2050 target?

Strengthening the target would have impacts

How the 2050 target could be changed

Menu of possible changes

In section 5T(1) the Act specifies the types of changes the target review can recommend.

The Commission may recommend a change to the current 2050 target's:

- **timeframe** – the timeframe for achieving the target (or components of the target)
- **level** – the amount of emissions reductions required by the target (or components of the target)
- **structure** – the greenhouse gases, emissions, and carbon dioxide removals to which the target (or components of the target) applies
- **rules** – how the target (or components of the target) may be met, including limits on removals and offshore mitigation.

A finding of significant change in one or more the topics outlined in *Chapter 3: Checking for significant change* may justify making changes to one or more of these design features of the target. The scope of potential changes that could align with our initial findings of significant change is broad.

Table 4.1: A range of different target changes are available

Design feature	Examples
Timeframe – independent of the level, emissions reduction targets can be set with goals for multiple time periods	Currently the target timeframes are set at 2030, and at 2050 and every year thereafter. This could be changed to include additional waypoints, such as 2035, 2040, 2045, or any year between, and new waypoints for action after 2050.
Level – a level change can be made to the current timeframe, or new levels established for new timeframes	Currently the target has a level of net emissions (zero) for all gases except for biogenic methane and gross emissions in relation to 2017 for biogenic methane. This can be changed. • The emissions level of biogenic methane can be changed. • The emissions level of greenhouse gas except biogenic methane can be set on a continuum from negative to positive emissions.
Structure – the greenhouse gases and removals covered can change	The target currently groups all greenhouse gases except biogenic methane, with a net target, and sets a gross target for biogenic methane. This combination could be changed. • New combinations of greenhouse gas emissions and removals can have net targets. • Any gas could be moved from a net target to a gross target.
Rules – the target includes rules about how it should be met, which can be changed	A broad range of rules could be amended, including: • new targets for forestry removals • new targets for other removals • new rules on eligible offshore mitigation • new rules on inclusion of emission sinks and sources.

A strengthened target would mean making changes to reduce emissions further and faster

Any target changes we recommend must respond to our final findings of significant change. We have not yet undertaken the task of identifying complete targets that respond to changes, and then assessing whether they are justified.

Our initial finding is that there is a change in global action, the scientific understanding of climate change, technological developments and the principle risks associated with emissions removals. Together, these changes show that while new ways to reduce emissions are being developed and introduced, global temperature increase is currently expected to exceed 1.5°C, and the impacts of a warming climate are more severe than understood in 2019.

This is, we believe, a clear direction of change. We have found no evidence to support weakening the current 2050 target, and enough to consider strengthening it. Strengthening the target will primarily require greater emission reductions over a shorter timeframe, and further reductions after 2050. The next section in this chapter looks at what strengthening the current 2050 target could mean for people and the planet. We want to hear your feedback on the potential issues and impacts you want us to consider and prioritise as we finalise our advice to the Government.

The target could be strengthened without changing the structure

The structure of the target has specific requirements for biogenic methane emissions, reflecting the different impact on warming they have to emissions of long-lived gases, as well as uncertainties around the availability and affordability of options to reduce them.

Any desired level of warming contribution can be achieved through combinations of changes to the timeframe and level of one or both of the biogenic methane and the non-biogenic methane components of the target.

Our initial thinking is that there is no reason to consider changing the split-gas structure of the target.

Looking at what strengthening the current target could mean for people and the planet

Targets are not policies – many impacts are determined by policy, and policy can help manage impacts

Targets will set a level of emissions to reach over a timeframe, and therefore how much change is needed. Targets don't dictate the pathway and policies to meet them, but the policies must add up to meet climate goals. After setting targets, successive governments have choices in how to reduce emissions. These choices can help achieve an equitable transition for the benefit of all New Zealanders.

Scenario modelling can help us understand the types of positive and negative impacts on people that could result from strengthening the current target

The scenario pathways developed for the fourth emissions budget can give some useful insight into potential impacts and implications of target changes.

The Commission developed a set of scenarios to demonstrate the range of actions that could be taken to reduce emissions, using dimensions of technology and systems change across sectors of the economy. This analysis focuses on what's possible rather than defining an optimal mix of actions.

Of these scenarios the pathway that represents the greatest level of emissions reductions, in the fastest timeframe, is called the high technology and high systems change scenario (HTHS). We look at this scenario to illustrate possible implications of strengthened targets. We present this scenario as a well-grounded and evidenced potential emissions pathway, that offers insight into potential target changes. It is not intended as a preferred or recommended change.

This scenario draws heavily on new and emerging technologies while targeting systems shifts with significant co-benefits. For further detail on the assumptions in each scenario, see the *Technical Annex – Modelling and analysis to support the draft advice on Aotearoa New Zealand’s fourth emissions budget*.

Table 4.2 below lists example changes in society to align with the scenario.

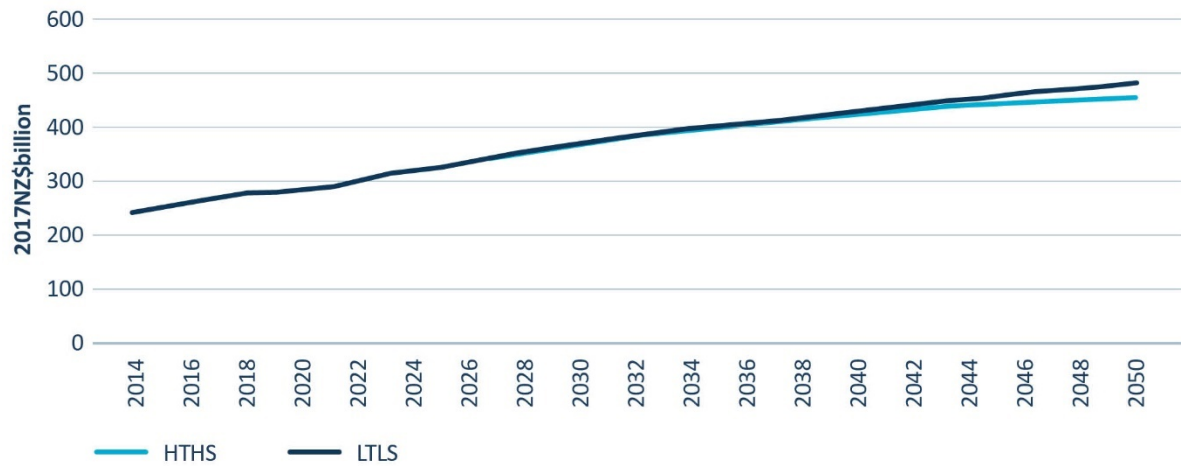
Table 4.2: Example changes that are required for emissions to be on the scenario pathway

Sector	High technology change examples	High systems change examples
Transport	Faster adoption of battery electric trucks, faster reduction in EV battery costs, rapid deployment of public charging infrastructure, earlier adoption of electric small aircraft, quicker electrification of public ferries.	Reduction in air travel demand, greater mode shift to active and public transport.
Energy	Faster cost reduction for building new renewable electricity generation, high efficiency recovery boiler for wood/pulp/paper.	Faster fossil gas phase out – by 2045 for process heat and by 2050 for buildings, reduced demand for heating from faster rates of retrofit.
IPPU (industrial processes and product use)	Deployment of green hydrogen steel production, deployment of green anodes for aluminium, faster electrification of compressors in urea production.	Further transition to electric arc furnace for steel production with improved scrap steel collection and recycling, faster phaseout and better recovery of F-gases.
Agriculture	Methane reduction technologies for dairy/sheep/beef, greater ambition for low-methane genetics for sheep, inclusion of genetics for dairy.	Greater reductions in stocking rates, further land-use change to horticulture and forests, further reductions in nitrous oxide use, all urea coated with urease inhibitor.
Waste	Greater organic waste to anaerobic digestion and boiler fuel, increased landfill gas capture efficiency.	Greater composting, greater waste avoidance, increased landfill gas infrastructure.
Forests	No change from LTLS scenario.	Afforestation of sheep and beef land on land use change (LUC) classes 7 and 8, all land classed as LUC 8 and erosion prone LUC 7 retired to natives.

Source: Commission analysis

The economy will continue to grow under this scenario. GDP growth in this scenario compared to the LTLS scenario (which aligns with the current target) of current polices is shown in **Figure 4.1** below. GDP is a measure of the size of a country’s economy. While this is often interpreted as a measure of wellbeing or economic welfare, there are limits to what is included in GDP. We also acknowledge that our ability to model GDP is limited by the ability of our models – for more information about our approach to modelling to support this work, see the *Technical Annex – Modelling and analysis to support the draft advice on Aotearoa New Zealand’s fourth emissions budget*.

Figure 4.1: Projected GDP impacts of the high technology and high systems change (HTHS) scenario



Source: Commission analysis

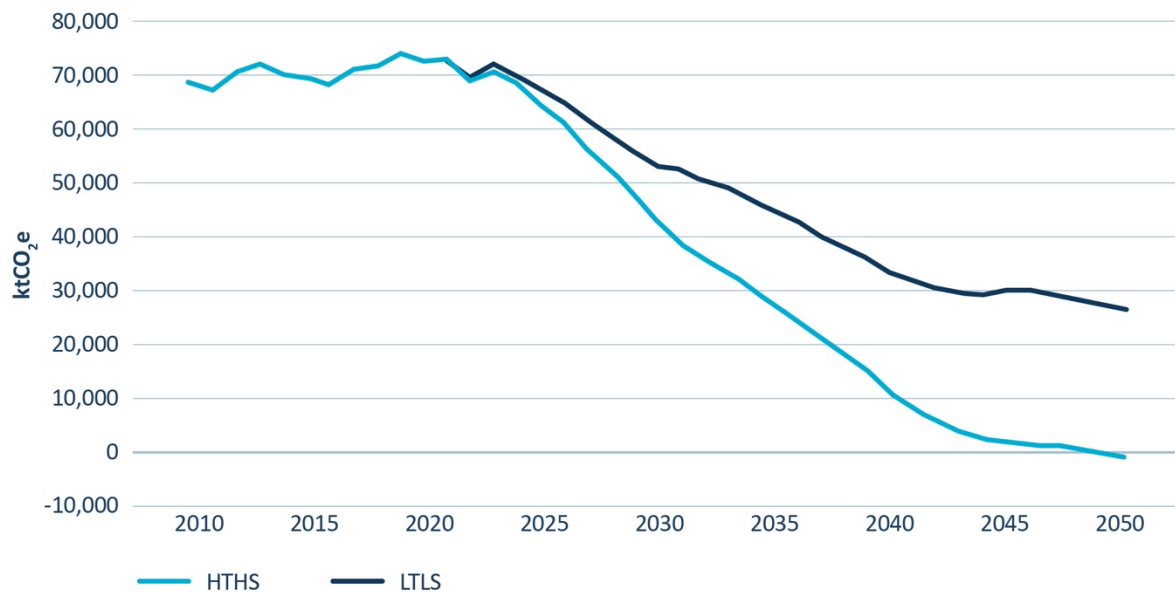
We understand the level of change required in the scenario will not be experienced evenly across society. Research on the emissions profile of the Māori economy found the following key areas of risk¹⁰⁴:

- Some iwi/Māori have significant interests in the forestry and/or agriculture sectors, and may be negatively impacted by any increasing costs or other changes in these sectors.
- Land-use characteristics of Māori freehold land mean that these landowners may have more limited options and face challenges in terms of land-use change.
- A large proportion of forested Māori freehold land was planted before 1990, rendering this land ineligible for earning emissions trading units – but still liable to pay carbon credits if deforested.
- Māori are disproportionately in lower paid jobs, which are more exposed to shocks in the economy.
- Māori small- and medium-sized enterprises (SMEs) make up almost all of the Māori asset base for transport, construction, and manufacturing, which are capital-intensive industries and often involve investing in vehicles, tools, machinery and technology. Transitioning to low emissions will likely require some of these investments to be updated or replaced, which could present a cost barrier for some of these Māori SMEs.

For more information about potential impacts on iwi/Māori, please see *Chapter 5: Impacts of the fourth emissions budget on New Zealanders* from our *Draft advice on Aotearoa New Zealand’s fourth emissions budget*.

Figure 4.2 below shows emissions under the example HTHS scenario are significantly lower than the LTLS scenario which achieves the current target.

Figure 4.2: Net emissions of different emissions pathways (ktCO₂e)



Source: Commission analysis

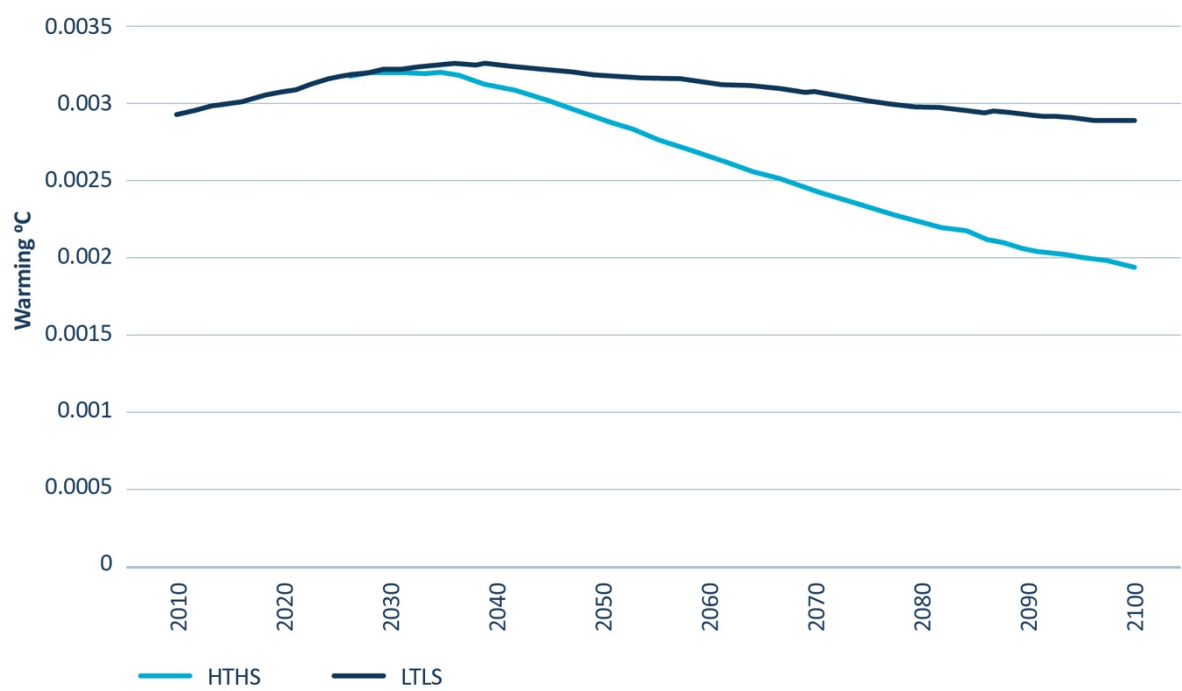
Scenario modelling can help us understand how global temperatures could be impacted by strengthening the current target

The key purpose of the 2050 target is to contribute to the global effort to limit warming to 1.5°C. Understanding the warming impact of the HTHS scenario is useful in considering whether a change to the target may be justified. **Figures 4.3–4.5** show the warming impact for different gases of this scenario compared to the LTLS scenario that we use to represent a pathway compliant with the current target. For further detail on the assumptions used to produce temperature response figures, see the *Technical Annex – Modelling and analysis to support the draft advice on Aotearoa New Zealand’s fourth emissions budget*.

Requiring a pathway with emission reductions similar to the HTHS pathway will reduce warming in the 2030s, have lower peak warming, and reduce warming to 0.002°C by 2100. This is about a third lower than under the current target.

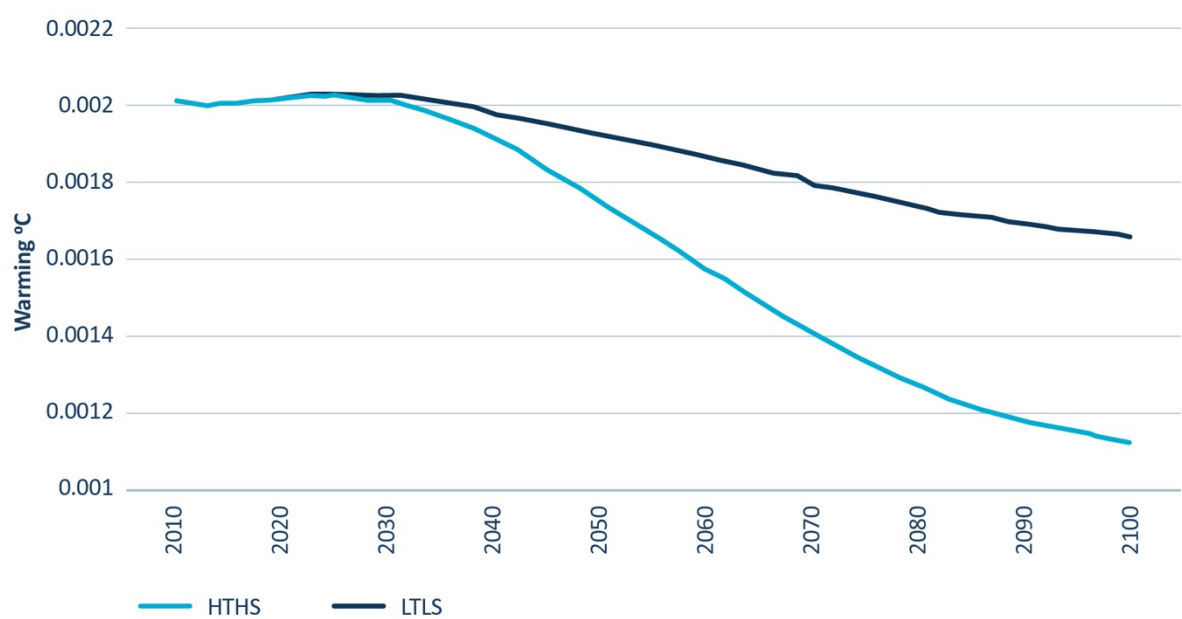
As context, if countries were required to reduce emissions to bring the warming they have contributed down to an equal per capita share, this would be around 0.001°C for Aotearoa New Zealand.

Figure 4.3: Comparison of the warming impact of different emissions pathways, all emissions



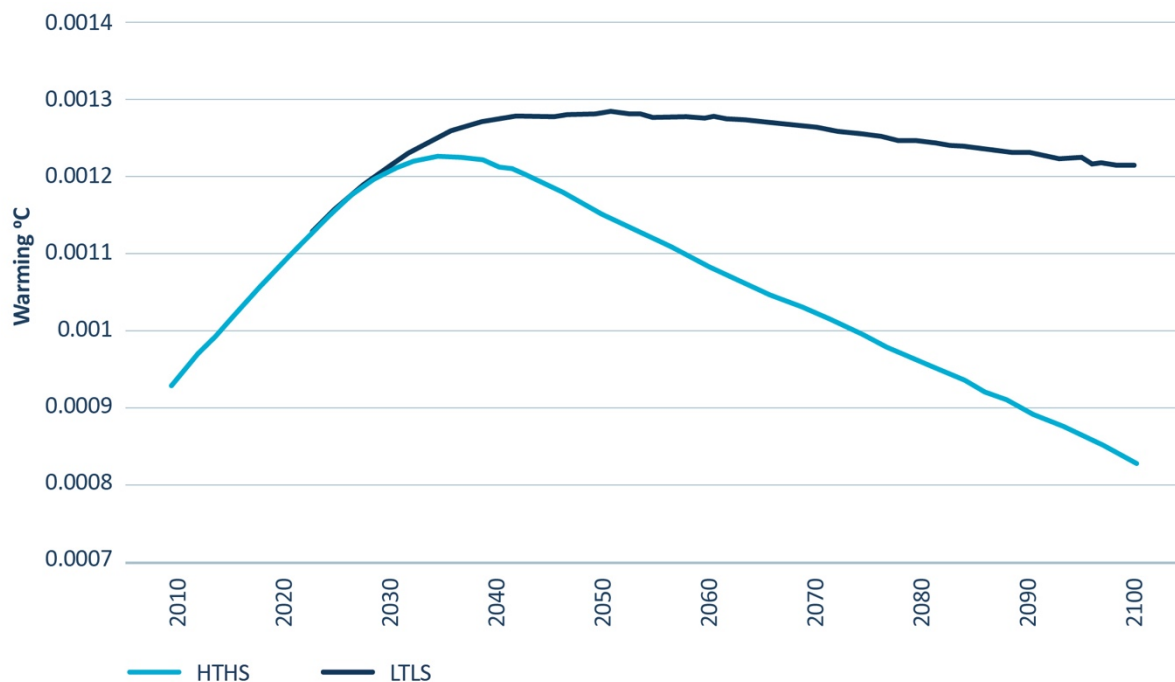
Source: Commission analysis

Figure 4.4: Comparison of the warming impact of different methane emissions pathways



Source: Commission analysis

Figure 4.5: Comparison of the warming impact of different emissions pathways, all gases excluding methane



Source: Commission analysis

The Commission will look at whether a changed target is justified as a next step

Our approach to the next steps

When considering whether a target change is justified or not, we will consider your evidence, perspectives, and insights on whether a change to the target is justified. This feedback will inform the next steps of the target review.

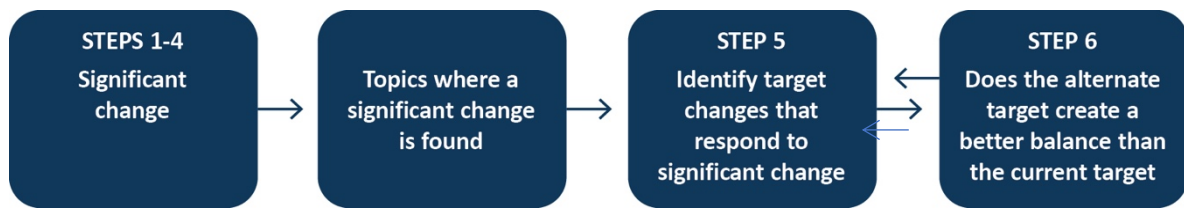
In our final advice, we can only recommend a change to the 2050 target if we are satisfied that there has been significant change, and that the change(s) justifies a change to the target.¹⁰⁵ This is where steps five and six of our process apply as they are about identifying the target changes and whether the changes are justified. We have not yet identified target changes or considered whether a change to the target is justified.

The next step is to look at alternative targets that respond to the significant changes. This includes looking at the direction and magnitude of a potential target change that is linked to the significant change in circumstance. We would then identify an alternative target that responds to the significant change.

The step after that is to look at whether the change to the target is justified. A key judgement for us will be whether the alternative target creates a better overall balance between contributing to limiting warming to 1.5°C and other important considerations. These considerations are outlined in the next section.

Designing alternative targets and the justification analysis will be an iterative process. As we consider the impacts of an alternative target, we are likely to amend it and look again. **Figure 4.6** shows this process and links it to our earlier analysis checking for significant change.

Figure 4.6: Process for judging whether a change to the target is justified



Source: Commission analysis

To determine whether a change to the current target is justified, we need to consider a range of factors and apply judgement

In all our work the Commission considers matters as set out in section 5M of the Act:

- current available scientific knowledge
- existing technology and anticipated technological developments, including the costs and benefits of early adoption of these in New Zealand
- the likely economic effects
- social, cultural, environmental, and ecological circumstances, including differences between sectors and regions
- the distribution of benefits, costs and risks between generations
- the Crown–Māori relationship, te ao Māori, and specific effects on iwi/Māori
- responses to climate change taken or planned by parties to the Paris Agreement or to the United Nations Framework Convention on Climate Change.

When considering whether a target change is justified we will address the section 5M matters as set out in **Table 4.3**.

Table 4.3: *Considering section 5M matters*

Section 5M matter	How we plan to consider it
Current available scientific knowledge	Through analysis of the scientific understanding of climate change (see <i>Chapter 3: Checking for significant change</i>)
Existing technology and anticipated technological developments, including the costs and benefits of early adoption of these in New Zealand	Through analysis of technological developments (see <i>Chapter 3: Checking for significant change</i>)
Likely economic effects	Through analysis of Aotearoa New Zealand's economic or fiscal circumstances (see <i>Chapter 3: Checking for significant change</i>) and Aotearoa New Zealand's specific mitigation costs and options, and role as a food exporter
Social, cultural, environmental, and ecological circumstances, including differences between sectors and regions	Through analysis of social, cultural, environmental, and ecological circumstances (see <i>Chapter 3: Checking for significant change</i>)
The distribution of benefits, costs, and risks between generations	Through analysis as part of equity implications, including generational equity (see <i>Chapter 3: Checking for significant change</i>)
The Crown–Māori relationship, te ao Māori, and specific effects on iwi/Māori	The relevant analysis in <i>Chapter 3: Checking for significant change</i> , initial insights relevant to target design outlined below, and additional insights based on consultation feedback from iwi/Māori
Responses to climate change taken or planned by parties to the Paris Agreement or to the Convention	Through analysis as part of global action (see <i>Chapter 3: Checking for significant change</i>), and considering the implications of potential emissions leakage

Source: Commission analysis

The Crown–Māori relationship, te ao Māori, and specific effects on iwi/Māori

Our initial considerations of the Crown–Māori relationship, te ao Māori, and specific effects on iwi/Māori show that there are several important insights relevant to target design:

- A target that can be met flexibly with respect to iwi/Māori is more likely to support iwi/Māori to exercise rangatiratanga and kaitiakitanga than one that is more prescriptive, which also enables Māori leadership in addressing specific effects for iwi/Māori and upholding the Crown–Māori relationship.
- A target that is effective at limiting the impacts of climate change is more likely to result in a healthy and thriving taiao, which is a foundational aspect of tikanga within most iwi/Māori communities and is closely connected with hauora and wellbeing. A thriving taiao also enhances many other things of value including intergenerational kaitiakitanga and ambitious action in the present for the benefit of mokopuna and future generations.
- Because hauora o te taiao and hauora o te tangata are linked within te ao Māori, having a target that enables an equitable transition is likely to be important for many iwi/Māori.

Our consideration of these impacts is closely connected to our consideration of the potential impacts for different sectors of the economy. Some iwi/Māori have significant interests in the forestry and agriculture sectors, which are key sectors likely to be affected by climate change policy.

Circumstances may have changed, but stability is also important

The Act includes a purpose of providing a framework by which New Zealand can develop and implement clear and stable climate change policies. The balance between stability and responsiveness to change is an important consideration. This is reflected in setting a five-yearly review, but also a significance test for making change recommendations.

As a central element of Aotearoa New Zealand’s approach to reducing emissions, the 2050 target has wide-ranging impacts across society, technology, the economy and the environment. Our initial analysis shows that the certainty a target provides is closely tied to its ability to guide and coordinate action, with implications for whether and when to make changes.

On the other hand, if a target is no longer serving its intended purpose, the benefits of making a change may outweigh the consequences. In addition, if a change to the target is needed, making that change sooner rather than later will increase the time that people and systems have to respond and adjust.

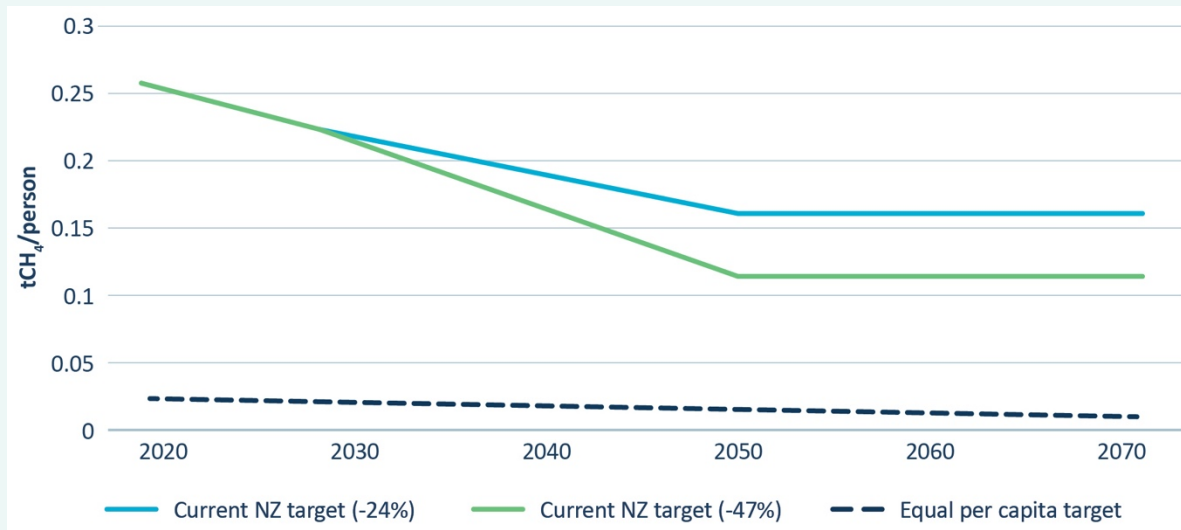
Balancing stability against recommending the target should change because circumstances have changed will be a key judgement the Commission needs to make.

Split-gas analysis of the 2050 target's contribution to limiting warming

In addition to the assessments of the current target described in *Chapter 2: Assessing the current 2050 target's contribution to limiting global warming*, which combines all emissions using GWP₁₀₀, we assessed each component of the 2050 target separately against the equal per capita, and capacity/ability to pay approaches.

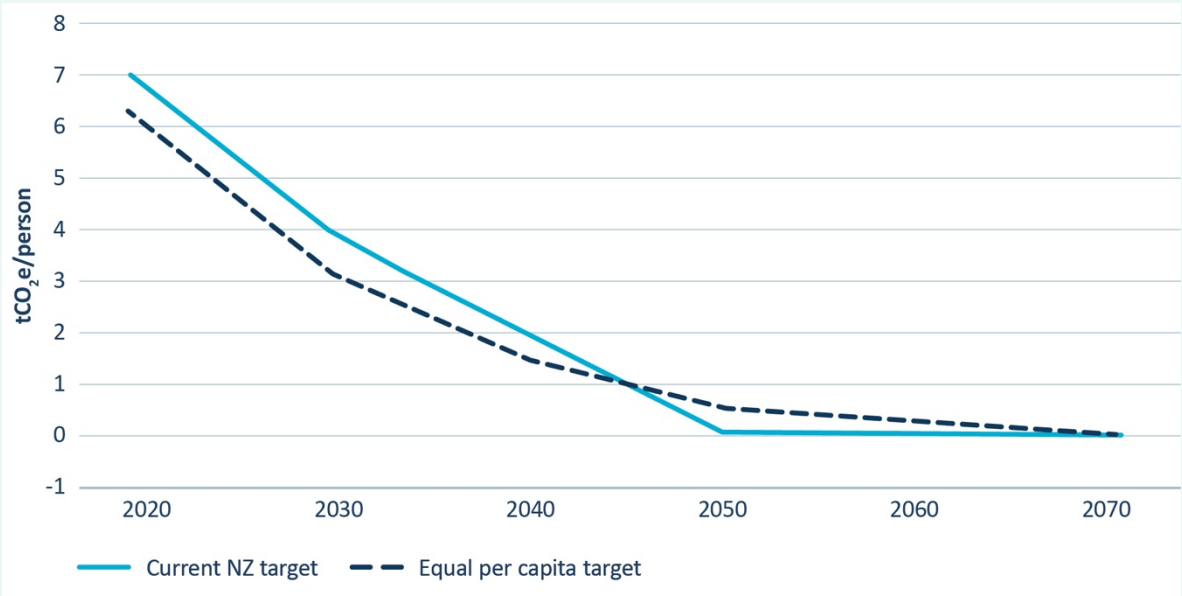
Equal per capita emissions

Figure A1.1: Per capita emissions of biogenic methane under the 2050 target and in global 1.5°C pathways using an equal per capita approach



Source: Commission analysis

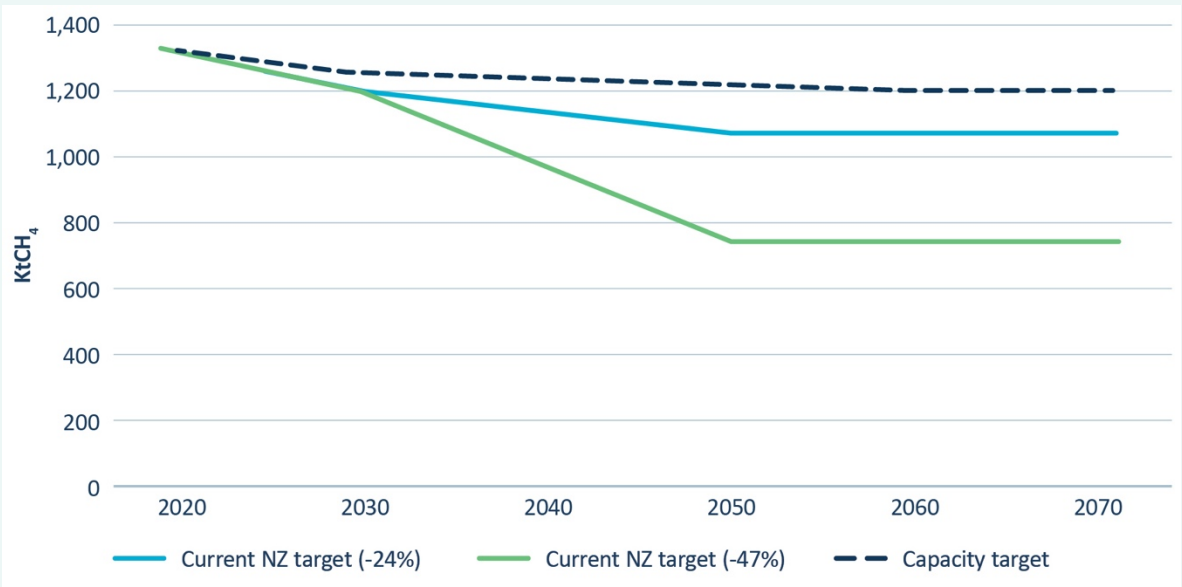
Figure A1.2: Per capita net emissions of all other gases (non-biogenic methane) under the 2050 target and in global 1.5°C pathways using an equal per capita approach



Source: Commission analysis

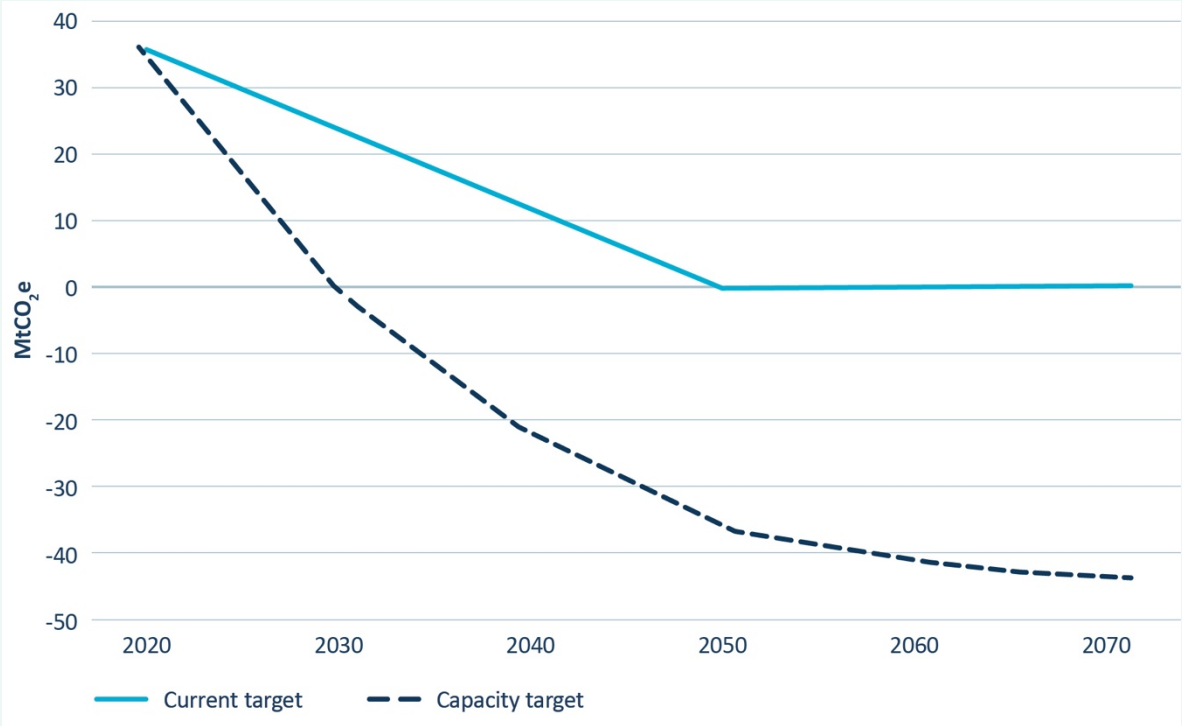
Capacity/ability to pay

Figure A1.3: Emissions of biogenic methane under a capacity/ability to pay approach compared to the current 2050 target



Source: Commission analysis

Figure A1.4: Net emissions of all other gases (non biogenic methane) under a capacity/ability to pay approach and the current 2050 target



Source: Commission analysis

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