

# Call for evidence



We are calling for evidence on options available to reduce greenhouse gas emissions over the period 2022 to 2035.

## Why are we doing this?

The Interim Climate Change Committee is the precursor to the proposed Climate Change Commission, expected to be established in late 2019 under the Zero Carbon Bill<sup>1</sup>. The Bill provides a framework to help New Zealand deliver on the objectives of the Paris Agreement.

A key part of the proposed Commission's work will be to advise the Government on emissions budgets.

Emissions budgets set the total emissions of all greenhouse gases permitted in the relevant budget period. The Government will set emissions budgets based on the proposed Commission's advice.

## Why are we doing this now?

We are running this call for evidence now as foundation work for the proposed Climate Change Commission to enable it to start work immediately as soon as it is set up.

It will help identify relevant information for developing these emissions budgets, and to maintain a broad, robust and transparent approach in developing the proposed Commission's evidence base.

We have been asked to do this through our [Terms of Reference](#). This work is also outlined in our letter to the Minister for Climate Change on 7 May 2019 [here](#).

## What are we looking for?

We are looking for high-quality, credible, evidence that will support the proposed Commission's work on emissions budgets. This is likely to include knowledge and evidence of technologies and options to reduce emissions, and the economic, environmental, cultural and social impacts of them. We are not looking for personal views or opinions.

## What if I have already made submissions on similar topics?

If you have already submitted evidence as part of consultation run by Government agencies, such as the Zero Carbon Bill or the Ministry of Transport's Clean Car Standard and Discount, then we are happy for you to point us to those submissions, noting the key information or material that relates to our call for evidence.

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<sup>1</sup> Climate Change Response (Zero Carbon) Amendment Bill:  
<http://www.legislation.govt.nz/bill/government/2019/0136/latest/LMS183736.html>.

## **What will we do with the evidence we gather?**

We will use this information to inform our initial work on emissions budgets and add to the evidence base the proposed Commission will draw upon.

## **Confidentiality and data protection**

All or part of any written response (including the names of respondents) may be published on our website [www.iccc.mfe.govt.nz](http://www.iccc.mfe.govt.nz). Unless you clearly specify otherwise, we will consider that you have consented to both your name and response being published.

Please be aware that any responses may be captured by the Official Information Act 1982. Please advise us if you have any objection to the release of any information contained in your response, including commercially sensitive information, and in particular which part(s) you consider should be withheld, together with the reason(s) for withholding the information. We will take into account all such objections when responding to requests for copies of, and information on, responses to this document under the Official Information Act.

The Privacy Act 1993 applies certain principles about the collection, use and disclosure of information about individuals by various agencies, including the Interim Climate Change Committee. It governs access by individuals to information about themselves held by agencies. Any personal information you supply to the Committee in the course of making a response will be used by the Committee only in relation to the matters covered by this document. Please clearly indicate in your response if you do not wish your name to be included in any summary of responses that the Committee may publish.



## Call for evidence: response form

We are looking for responses that are evidence-based, with data and references included where possible. Please limit your response to each question to a maximum of 400 words, plus links to supporting evidence, using the template provided. Please answer only those questions where you have particular expertise or experience.

We recommend that you refer to the Climate Change Response (Zero Carbon) Amendment Bill when considering your answers, which can be found [here](#).

If you have any questions about completing the call for evidence, please contact us via [feedback@ICCC.mfe.govt.nz](mailto:feedback@ICCC.mfe.govt.nz). Please include a contact number in case we need to talk to you about your query.

Please email your completed form by **12 noon, Friday 15 November 2019** to [feedback@ICCC.mfe.govt.nz](mailto:feedback@ICCC.mfe.govt.nz). We may follow up for more detail where appropriate.

### Contact details

<b>Name and/or organisation</b>	<b>Apricus NZ Eco Energy</b>
<b>Postal Address</b>	
<b>Telephone number</b>	
<b>Email address</b>	

### Submissions on similar topics

<b>Please indicate any other submissions you have made on relevant topics, noting the particular material or information you think we should be aware of.</b>
<b>Answer: N/A</b>

## Commercially sensitive information

***Do you have any objection to the release of any information contained in your response, including commercially sensitive information?***

***If yes, which part(s) do you consider should be withheld, together with the reason(s) for withholding this information.***

***Answer: No***

## Questions for consideration:

### Section A The first three emissions budgets

Under the proposed Zero Carbon Bill, the proposed Commission will have to provide advice to government on the levels of emissions budgets over the coming decades.

Currently, the Zero Carbon Bill requires budgets to be set from 2022-2035 (three separate budgets covering 2022-2025, 2026-2030, and 2031-2035). When preparing this advice the proposed Commission will have to consider the implications of those budgets for meeting the 2050 target. The Commission will also need to consider the likely economic effects (positive and negative) of its advice.

#### ***Question 1:***

***In your area of expertise or experience, what are the specific proven and emerging options to reduce emissions to 2035? What are the likely costs, benefits and wider impacts of these options? Please provide evidence and/or data to support your assessment.***

***Answer:*** *Prioritisation, incentives, promotion and other support should be provided by government in focussing on the replacement of fossil fuelled and/or standard efficiency electric resistive thermal, water heating appliances for domestic hot water, room heating and central heating. The following technologies are already in operation in New Zealand and their impact on reducing GHG emissions be extended with appropriate promotion, support, incentives, capital funding and legislative requirements:*

- 1. Wood pellet appliances*** – *domestically they are available as individual fires for room heating & as boilers for central heating systems & domestic hot water. Also provide heat for domestic “leisure” applications such as swimming & spa pools. Commercially & industrially used for central heating, domestic hot water and low to medium temperature process heat. These loads combined are an enormous proportion of NZ’s total energy consumption. They can be a direct replacement for coal, diesel, LPG and gas appliances up around 0.6MW. Wood pellets themselves can be used in larger boilers as a direct replacement for coal.*

**Wood pellet appliances:**

- 80-90%+ efficient
- ultra low emission
- have full temperature output regardless of ambient temperature (compared to heat pumps with poorer low temperature output performance & efficiency)
- have very high energy density wood pellets (5kWh / 1kg pellets)
- use a NZ manufactured fuel supply
- fuel manufactured out of a waste product with challenging alternative disposal options (managed decomposition at accelerated rate difficult with very high carbon content = very little agricultural value, very high requirement for added nitrogen & carefully managed process)
- Good range of both pellet fires and boilers are already available in NZ now and are certified to ECAN ULEBs.

<https://www.ecan.govt.nz/data/authorised-burners/>

**Domestic wood pellet appliances:**

*Pellet appliances (boilers & fires) are adequate & appropriate for the heating of whole homes, especially including bedrooms at night maintained above 16°C – 18°C. This has numerous, very well evidenced benefits for health, well-being, productivity, educational & economic outcomes – see research from University of Otago, EECA, Ministry of Health, etc*

*Pellet boilers connected to underfloor or radiator central heating system provides whole home heating with minimal carbon emissions.*

*Pellet boilers can be highly automated with refuelling and de-ashing ranging from once every 10 days to once per heating season. This reduces barriers to adoption due to apathy, poor health, physical limitations, etc.*

*Specifications and information for currently available pellet boilers is included as an addendum to this submission.*

*Pellet fire appliances will heat the air within a living room to high temperatures (unlike heat pumps) allowing excess heat to be transferred to bedrooms using very simple, low cost technology with heat transfer kits, providing close to whole home heating from one appliance, relatively low cost and very low emissions profile.*

*Pellet fires require more regular refuelling and deashing, assumed to be every 1-2 days.*

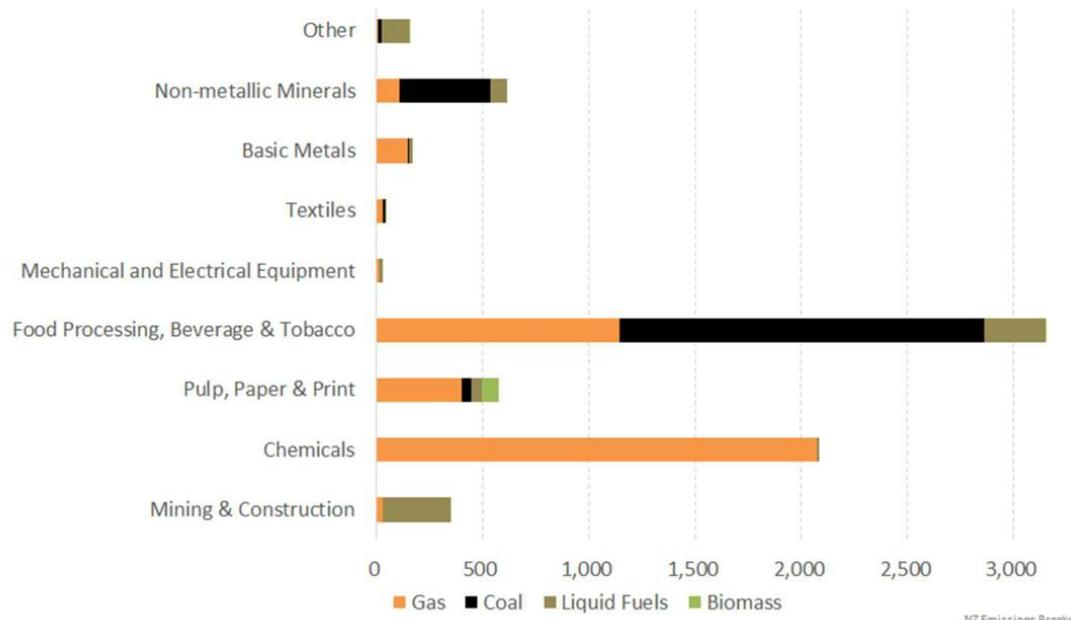
**Commercial wood pellet appliances:**

Pellet boilers currently available in NZ can fulfil any thermal duties at temperatures up to 85°C at peak loads of up to 550kW. Greater loads can be managed with more buffered storage. This represents the vast majority of DHW, central heating and process hot water demands that are currently using almost exclusively fossil fuels. See tables below for process heat loads – Concept Consulting report for NZ Parliamentary Commissioner for the Environment 2017 using MBIE data.

The pellet boiler technology is very well developed and supported internationally. For example, one Austrian product available in NZ – OkoFEN – have been designing & manufacturing pellet boilers for 30 years and have installed 85,000+ boilers across the globe. In NZ there are currently 10 companies distributing pellet fires and pellet boilers. So there is both international and domestic expertise and capacity to implement these systems.

An active pellet boiler market could use all the current capacity of NZ pellet manufacturers and bolster demand for them to increase production, up to maximum current capacity of around 270,000 tonnes/year. This fuel would therefore remain on-shore and the balance of payments deficit for importing fossil fuels would be reduced. There would be increased economic activity associated with the installation and maintenance of pellet burners, alongside the increase in pellet manufacturing, sales and distribution network. Currently 2 manufacturers produce around 60,000 tonnes per year (Nature’s Flame & Azwood), to be 100,000 tonnes per year by end 2019 with Nature’s Flame expansion to 85,000 tonnes/year. Nature’s Flame have potential capacity for 185,000 tonnes per year with currently available feedstock from waste wood fibre. They both have long term (10 year+) contracts for feedstock, underpinning supply and cost of pellets a long way in to the future.

Figure 4: 2015 process heat emissions by industrial sector



Source: Concept analysis of MBIE data

Industry Sector	Total Energy Demand	Sub 100°C Demand Approximate	Energy Demand Below 100°C
Food manufacturing	8.4 Pj 2.3 GWh	5 – 6 Pj 1.4 – 1.7 GWh	60% - 71%
Dairy processing	33 Pj 9.2 GWh	10 – 12 Pj 2.8 – 3.3 GWh	30% - 36%
Meat processing	6 Pj 1.7 GWh	4 Pj 1.1 GWh	67%

2. High efficiency, low emission **wood fires** for domestic use and some small commercial applications. Very similar benefits to pellet fires and boilers above but with more involvement in day to day operation.
3. **Solar thermal water heating** (solar hot water) remains a very viable technology when designed and implemented correctly. Solar thermal systems can be used in domestic, commercial and industrial applications for provision of hot water up to 85°C.

Some higher temperature solar thermal technology is available internationally but these are not available in NZ and may not prove to be economic for temperatures above 85°C in our temperate climate. See Arena research from Australia.

<http://arena.gov.au/assets/2017/05/ITP-RE-options-for-industrial-gas-users-Summary.pdf>

#### **Domestic:**

The greatest environmental benefit from solar thermal systems in NZ is when they replace gas and oil water heating. The best form of back up energy for the systems is electricity, preferably on a night rate control to use run of river hydro generation. The solar thermal system will provide 65%-75% reduction in annual energy consumption for household domestic hot water. This does not include the additional 20% of fuel wastage by instantaneous gas water heaters that operate at a declared efficiency of 80%. <https://rinnai.co.nz/Product/137/300/water-heating-gas-hot-water-systems-rinnai-infinity-a-series-rinnai-infinity-a-series-external#technical>, <https://rheem.co.nz/products/home/gas-water-heating/gas-continuous-flow-water-heaters>

#### **Commercial:**

Solar thermal in commercial applications makes an even clearer case for carbon reduction. The vast majority of domestic hot water supply in commercial buildings is by gas water heaters. As above, these generally operate at 80% efficiency and

are banked in cascades of multiple water heaters. A commercial solar thermal installation will have project specific design and modelling, generally targeting 40% to 70% reduction in annual fuel use for hot water generation. The systems can provide peak output of 90% during summer.

All solar thermal systems can and should be designed and benchmarked against industry best practice software, such as Polysun, TSol and TRNSYS.

Live monitoring of domestic and commercial solar thermal systems to evidence performance is available on our website. <https://www.apricus.co.nz/live-monitoring/> Monthly reports are provided to commercial customers on their system performance for comparison against modelled output.

Example case studies for NZ solar thermal commercial installations are attached. Monitoring data is freely available. Robert Tromop at Energy Efficiency International is currently undertaking a research and report on a number of commercial solar thermal installations in NZ. The draft findings are that: "The Lakeview Holiday Park system provides 45MWh or 39% of the total annual heating (domestic hot water and hydronic floor heating systems) demand of the holiday park. The balance of heat input; 70MWh or 61%, is from local network supplied LPG. This gives a solar fraction of 0.39."

Solar thermal can be combined with pellet boilers to provide optimised carbon and fuel use reduction. This combination will make the supply of wood pellets and other biofuels go further every year, making it more feasible to meet the milestones to net zero by 2050.

Good quality, internationally certified, well designed and locally supported solar thermal systems are a long-lasting technology with minimal impact in manufacturing, operation and end of life disposal. There are no refrigerants or hazardous chemicals. There are few moving parts (generally 1 pump) and these are in an accessible location and represent a small fraction of the total system in case of maintenance or replacement. The collectors are essentially a passive design and only require the circulation of water or another liquid media. The industry in NZ is well established and has benefited from a number of years of on- and off-shore development & experience. This means there is ready capacity for immediate implementation of carbon saving measures, given appropriate framework and support.

4. **Hot water heat-pumps (HWHP)**, particularly using the latest, high efficiency, low environmental impact refrigerants such as carbon dioxide (0 ODP, 1 GWP) & ammonia (0 ODP, 0 GWP). HWHPs have an important role to play in delivering domestic hot water and space heating in domestic and commercial buildings. Coefficient of performance (COP) of up to 5 are achievable in correct applications and standard temperature range. See Reclaim CO2 heat pump brochure appended with this submission for COP at range of ambient air temperatures.

The Global Warming Potential of the refrigerant should be considered to get optimum environmental improvement. See European example: "As of 2020,

*the EU F-Gas Regulation bans the placing on the market across the bloc of moveable room air conditioners that use HFCs with GWP above 150 and hermetically sealed commercial refrigeration equipment that uses refrigerants whose GWP is over 2,500”*

*As with solar thermal the biggest carbon reduction gains from utilising this technology in NZ is the avoidance / replacement of gas and other fossil fuel water heaters, particularly instantaneous gas water heaters. These water heaters have become increasingly prevalent in NZ both domestically and commercially. With an operating efficiency of only 80% (see references above) and burning a fossil fuel there is a huge opportunity to easily reduce GHG emissions associated with water heating. The comparison is pretty clear and stark - gas water heater has COP of 0.8 using 0% renewable energy, CO2 hot water heat pump has COP of 4.7 using 80% renewable energy (at 19°C ambient air temperature & using grid supplied electricity).*

*The highest performing current heat pumps with adequate storage (1 heat pump & 300L cylinder for family of 5) can have timed operation to optimise their performance and GHG reductions by: utilising electricity with minimised fossil fuel peaking generation; daytime operation for higher ambient air temperatures and therefore better COP; better utilisation of local generation from PV and multiplier of it's impact from COP of 4.7; low energy requirements (CO2 heat pump requires 800W, maximum 1,900 at -10°C air temperatures) reducing peak loading on grid and requirement for fossil fuelled peaking generation.*

*From a practicality point of view, the replacement of externally mounted, instantaneous domestic water heaters with high performing, low GWP refrigerant heat pumps plus cylinder would be easy to achieve as hot & cold water connections and a power supply are all already present at the side of the house. This replacement process will also contribute to job creation / diversion, growth in GDP and economic transformation to a renewable economy.*

**Question 2:**

***In your areas of expertise or experience, what actions or interventions may be required by 2035 to prepare for meeting the 2050 target set out in the Bill? Please provide evidence and/or data to support your assessment.***

**Answer:**

*Policies and activities as above up to 2035 to be continued and accelerated if required.*

*Keep integrating latest technological improvements to optimise performance.*

*Maintain focus on developments in psychology and sociology to motivate as many people as possible to make good individual choices*

**Question 3:**

***In your areas of expertise or experience, what potential is there for changes in consumer, individual or household behaviour to deliver emissions reductions to 2035? Please provide evidence and/or data to support your assessment.***

**Answer:**

*See sections below for impact of rolling capital availability programme for assisting households.*

*More information and realistic guidance is always a good tool, especially if it primarily aimed at best GHG reductions instead of rather muddled current presentation around economy and efficiency as delivered by lots of EECA product advice.*

*Technologies needs to be seen as desirable, standardised and easy to access so marketing support, high level communication about benefits and demonstration through government's own procurement are all important.*

*Incentive schemes need to be very carefully examined for all angles, including having business stakeholders providing a view before implementation, so that it does not have market or product distorting effects that do not deliver the GHG reductions that are being sought.*

**Question 4:**

***When advising on the first three emissions budgets and how to achieve the 2050 target, what do you think the proposed Commission should take into account when considering the balance between reducing greenhouse gas emissions and removing carbon dioxide from the atmosphere (including via forestry)?***

**Answer:**

*The two aspects need to be considered in parallel. CO2 levels are at the point where regeneration and carbon drawdown is as important as reduction in emissions. If we allow the inherent inertia of the existing climate system to continue while just reducing future emissions we will have a much too challenging environment to live within going forward.*

**Question 5:**

**What circumstances and/or reasons do you think would justify permitting the use of offshore mitigation for meeting each of the first three emissions budgets? And if so, how could the proposed Commission determine an appropriate limit on their use?**

**Answer:**

*This approach should be minimised as the first priority. It should only be used to fund carbon reduction measures in lower income countries, preferably those with close relationship to NZ and facing impacts of climate change directly, especially in the Pacific Islands.*

*The tipping point for it's use is a difficult calculation. It should only be used when the cost and net lowering of GHG will be greater in an overseas location than onshore in NZ. If it is cheaper to do it onshore then no matter the barriers it should always be done onshore first.*

## **Section B Emissions reduction policies and interventions**

The proposed Commission will also need to consider the types of policies required to achieve the budgets it proposes. This consideration should include:

- sector-specific policies (for example in transport or industrial heat) to reduce emissions and increase removals, and
- the interactions between sectors and the capability of those sectors to adapt to the effects of climate change.

**Question 6:**

**What sector-specific policies do you think the proposed Commission should consider to help meet the first emissions budgets from 2022-35? What evidence is there to suggest they would be effective?**

**Answer:**

1. *Implementation in full and to deadlines outlined of Net Zero Carbon Roadmap for NZ Buildings from NZGBC*  
[https://www.nzgbc.org.nz/Attachment?Action=Download&Attachment\\_id=2528](https://www.nzgbc.org.nz/Attachment?Action=Download&Attachment_id=2528)

*This report is well evidenced on effectiveness of the recommendations and timeline.*

2. *Capital assistance for people to transition to alternatives via interest free / ultra low interest loan scheme. A capital pool can be established for people to apply for*

approved, high performance, minimising GHG and GWP technologies that have a direct impact on the reduction of fossil fuel consumption & GWP. The total amount funded can be calculated based on the proven performance of that technology and its ranking in reducing GHG. 100% capital cost available as loan for highest performance tech and a sliding scale at a couple of set rates, for example 60% & 30% of cost to incentivise the best performing technology whilst not distorting the market too much by being exclusive. If interest is charged then this could also be a sliding scale with 0% levied for highest performing tech and slightly higher rates for lesser performance.

Further incentives in form of grant, lower interest rates (if applied) or lengthened repayment terms can provide a discount off the price could be offered for technologies that have a degree of natural resistance due to behaviour change, such as pellet fires, but have best environmental & healthy home outcomes. Applicants would need to meet minimum energy standards for insulation for existing homes and insulation, air tightness and thermal mass in new homes.

The loan scheme can have a constantly rolling pool of capital that will need to be funded for the first few years of operation and then will be self-funding through repayment of the capital.

The benchmarking and performance of this technology would have to be carefully considered so there are not unforeseen consequences, such as high GWP refrigerants leading to annulment of the GHG savings over the product's lifespan. Focus would need to be placed on total net GHG emission savings not just reduction in kWh consumption and/or cost.

3. Higher carbon price – this is self-evident, although according to our modelling and feedback from customers that there wouldn't be a significant difference to likelihood of projects going forward until carbon prices gets above \$250/tonne

A better way of looking at it and delivering the same outcomes at least a smaller project scale is the shame and humiliation associated with doing things in an old fashioned, outmoded way such as burning coal. This is a longer term process but more powerful than purely economic driver.

4. Take economics out of the argument as much as possible. There is a moral imperative to reducing GHG emissions that transcends economics. If everything has to be calculated on a payback or ROI or NPV basis then very little will be done. The governments role in this is to normalise what is currently uncommon by leading with their procurement and legislating so there is a reducing window of choice for environmentally unsustainable practices.
5. Legislate against new fossil fuel installations in buildings as part of the Building Act and progressively tighten the Building Code for improved building performance and home health. Implement the pathway or a very similar model to that set out by the NZGBC in their Net Zero Carbon Roadmap for NZ Buildings.

[https://www.nzgbc.org.nz/Attachment?Action=Download&Attachment\\_id=2528](https://www.nzgbc.org.nz/Attachment?Action=Download&Attachment_id=2528)

6. *Set minimum efficiencies for thermal appliances, particularly those burning fossil fuels so it is no longer cheapest economic option to have instantaneous water heaters.*

7. *Set minimum standards and guidelines for appliances that claim GHG emission reductions and are potentially eligible for state aid or access to low cost capital.*

*Ignore the international and often domestic pressure to fit PV systems unless there is a clear GHG benefit in that specific instance due to the high renewable proportion of the existing NZ national grid. Energy efficiency of existing buildings is a much bigger opportunity for reducing energy consumption.*

*Use government procurement to stimulate and highlight the technologies and appliances with the greatest GHG reduction potential, not window dressing.*

*Do as much work, incentivisation, leading by example and encouragement for the transition of the NZ vehicle fleet to EVs and hydrogen*

8. *Implement legislation similar to EU F-Gas Regulation to reduce impact of fugitive loss of refrigerant gasses*

9. *Copy best practice subsidies and support for biomass from European countries, for example in Austria there is currently:*

a. *for companies, clubs and associations are basic funding of 30% to 44% for biomass total installation costs, not just appliance cost.*

b. *Single family house: approximately 5,000 euros max, 30-50% total investment costs for biomass*

c. *Promotion according to efficiency, emissions, standards of boilers to ensure a certain standard of performance and installation but without becoming too complex. This must not just be on kW output basis*

d. *CO2 reduction compensation: get paid according to saving per year, or per ton of previous consumption for certain periods of 5-10 years*

e. *Co2 pricing or energy saving only in one payment.*

**Question 7:**

**What cross-sector policies do you think the proposed Commission should consider to help meet the first emissions budgets from 2022-35? What evidence is there to suggest they would be effective?**

**Answer:**

Unsure

**Question 8:**

**What policies (sector-specific or cross-sector) do you think are needed now to prepare for meeting budgets beyond 2035? What evidence supports your answer?**

**Answer:**

*Implementation in full and to deadlines outlined of Net Zero Carbon Roadmap for NZ Buildings from NZGBC*

[https://www.nzgbc.org.nz/Attachment?Action=Download&Attachment\\_id=2528](https://www.nzgbc.org.nz/Attachment?Action=Download&Attachment_id=2528)

**Section C Impacts of emissions budgets**

The proposed Commission will need to consider the potential social, cultural, economic and environmental impacts of emission budgets on New Zealanders, including how any impacts may fall across regions and communities, and from generation to generation. Potential impacts may be either positive or negative.

**Question 9:**

**What evidence do you think the proposed Commission should draw upon to assess the impacts of emissions budgets?**

**Answer:**

*Employment figures, suicide rates at different age levels, air & water quality measurements, satisfaction within iwi leaders with consultation and process outcomes, health outcomes particularly in relation to exercise*

**Question 10:**

**What policies do you think the proposed Commission should consider to manage any impacts of meeting emissions budgets? Please provide evidence and/or data to support your assessment.**

**Answer:**

Unsure

**Section D Other considerations, evidence or experience**

**Question 11:**

***Do you have any further evidence which you believe would support the future Commission's work on emissions budgets and emissions reduction policies and interventions?***

**Answer:**

*See attachments for supporting evidence*

Please email your completed form to [feedback@ICCC.mfe.govt.nz](mailto:feedback@ICCC.mfe.govt.nz) by **12 noon, Friday 15 November 2019**.

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