



Productivity Commission

NZGBC submission on the draft report on transitioning to a low-emissions economy



8 June 2018

About NZGBC

The New Zealand Green Building Council (NZGBC) is a not-for-profit, industry organisation. Our vision is that New Zealanders live, work and play in healthy, efficient and productive buildings in a sustainable built environment.

We do this through:

- Promoting the benefits of sustainable buildings by creating a common language and demonstrating the value.
- Assisting the property and construction sector to acquire the skills and knowledge to be able to deliver a sustainable built environment.
- Motivating and rewarding the sustainable development and operation of buildings across New Zealand.

SUMMARY

Thank you for providing NZGBC the opportunity to respond to the draft report on transitioning to a low-emissions economy. Overall we welcome the inclusion, since the publication of the issues paper, of a section on embodied carbon in construction products and materials.

We also welcome the recommendation for Government to consider peak electricity demand reduction in its review of the building code. The following sets out areas where we think the coverage of buildings in the draft report should be improved.

The draft report is excessively dismissive of the role of energy efficiency in meeting the 2050 targets. Most recent modelling carried out on decarbonising the grid – and often referenced in the report – emphasises the role of energy efficiency in keeping a lid on grid demand and the Commission should do likewise. All things being equal, NZGBC argues that carbon savings from energy efficiency should be preferred over the construction of more grid renewable energy given health and fuel poverty benefits.

This trade-off is not sufficiently quantified in the report and not enough detail is provided on the additional measures that Government could take to promote, incentivise or mandate greater energy efficiency. It is appalling that the Productivity Commission puts more emphasis on building grid infrastructure rather than keeping New Zealanders warm and healthy. The Commission should cease referring to the relative magnitude of emissions from the building sector and instead talk about the costs and benefits of specific measures such as the roll out of insulation programmes, the retrofit of heat pumps and energy efficient lighting. Many of these will have lower lifecycle costs of abating carbon than in other sectors such as agriculture and should be prioritised.

The draft report is also excessively reliant on the use of price mechanisms in promoting change within the building sector. As with transport, the price elasticity of demand for energy in buildings is low meaning that large price increases are required for relatively small gains in energy efficiency. There is ample evidence from around the world that additional measures are required to overcome this low-price elasticity that are not being implemented in New Zealand such as mandatory energy labelling of buildings¹, tougher new-build standards and Government promotion of higher performance in buildings that it owns, builds or leases.

The report also does not sufficiently recognise the holistic nature of the building sector. The construction industry is large and complex. There are many actors including product manufacturers, product suppliers, building developers, designers, main and sub-contractors. It is well known that supply chains are limited in size meaning that vested interests will resist change. The report itself proposes, for example, that existing steel production be protected from any higher ETS costs offering no incentive to change. Embodied carbon in products and materials is a “wicked” problem that will require more complex solutions than a higher carbon price.

The following sets out the above points in more detail.

SUBMISSION IN MORE DETAIL

Focus on the largest carbon producing sectors not standard practice

The draft report states that “Because New Zealand already has a low-emissions electricity system and abundant untapped sources of renewable electricity, improving the energy efficiency of buildings does not hold the same importance in an emissions mitigation strategy as it does in other countries.”

The Commission does not state what is meant by “importance” in this context but the implication seems to be that energy efficiency in the built environment should take a lower priority than other carbon reduction measures. There is no calculation to support this view and this approach does not make sense from an economic point of view.

Measures that reduce carbon emissions for the least lifecycle cost are ones that should be pursued first, not necessarily ones that produce the largest overall magnitude of savings. As the Commission itself finds:

“No mitigation option currently exists for achieving dramatic reductions in New Zealand’s agricultural emissions without substantially reducing production”.

Another way of putting this is that reducing agricultural emissions will be expensive and difficult.

The building sector has a plethora of mitigation options available now at low cost and yet the productivity commission emphasises almost none of them. In addition, emissions savings from the built environment are generally long lived (CO₂) and not subject to diminishing returns as with afforestation. They also bring a myriad of co-benefits. Indeed, “efficiency first” is a core part of the approach to most of the OECDs approach to lower carbon.

Notably absent from the report are carbon abatement cost curves (from the built environment at least) that are commonplace in other countries' assessments of areas to target in decarbonising the economy. These are critical since it is not the size of a particular sector that matters but the relative costs and benefits of each measure within a particular sector. The carbon abatement costs of measures in the built environment are not quantified anywhere in the report and this is a major shortcoming particularly given the acknowledged co-benefits.

Recommendation 1 – Quantify the Costs and Benefits of Carbon Reductions in the Built Environment

The report should provide evidence on the costs and benefits of various interventions in the built environment and make recommendations on how the most effective can be incentivised and/or where necessary mandated. It is notable that the Motu/Vivid modelling *assumes* a 0.25% annual improvement in the energy efficiency of residential space heating but makes no policy prescriptions as to how this might be achieved. The Commission should specifically review the lifecycle costs of energy efficiency (including health benefits) versus the lifecycle costs of building additional grid renewable energy.

Too much emphasis on a carbon price to bring down emissions

The lack of "importance" placed on the built environment in the report means that it is very short on recommendations on ways to reduce carbon emissions from this sector. Chapter 15 only includes 2 findings and 3 recommendations. The main finding is that:

"Increasing the price of emissions in the New Zealand Emissions Trading Scheme is the most effective way to incentivise a transition toward the construction of buildings with lower embodied emissions."

This finding is specifically made in relation to embodied carbon in building products and materials, but the report makes repeated assertions that pricing carbon is the best way to reduce emissions from the built environment despite little evidence in support of this view (and contrary evidence supplied for other sectors such as transport).

There is evidenceⁱⁱ that the price elasticity of demand for energy in buildings is low. This is similar to emissions from transport (which the Productivity Commission acknowledges). There are many reasons behind this inelasticity including:

Split incentives

The presence of split incentives in the built environment is well documented. In most buildings without energy labelling it is very hard for purchasers or renters to determine the quality of the building.

The research undertaken in Australia to consider the benefits of an energy labelling system for offices was strong in its endorsement for energy labelling. It found disclosure was an exceptionally low-cost mechanism to reduce carbon AND drive up productivity. The report found that energy labelling delivered:

- \$44m worth of benefit to Australian businesses

- \$168m worth of productivity gains.

The Australian Carbon Disclosure Programme moved to cover three times as many offices. This programme has the support of the Australian Property Council and property owners.

This research was shared with the Productivity Commission. Neither its findings nor the report are listed anywhere. The Property Council of New Zealand is also supportive of mandating an energy labelling system in New Zealand.

It is the same issue with housing. Energy labelling was mandated in all of the EU in 2005. It has been effective in helping to inform purchases of the quality of a home. It is also now used to inform regulatory decisions. For instance the current shortage of housing for rent also means that renters are willing to take homes in any state.

Lack of expertise/knowledge (including productivity gains from better buildings)

Home owners lack the expertise to appraise the payback of energy efficiency measures and put a high discount rate on future energy savings.

High turnover of housing stock

Homes are on average owned for 7 years in New Zealand. This is less than the payback period for many energy efficiency measures.

Many benefits are societal

While the costs of carbon can be factored into energy prices the health impacts of poorly performing homes are not. As with energy savings homeowners heavily discount the risk of future ill health.

Little recognition of sunk costs in the built environment

The installation of energy efficiency measures in buildings is much cheaper and less disruptive during construction than when retrofitted. Once new homes are completed their orientation, glazing area and under-slab insulation are hard to change retrospectively.

Electricity price rises will be hard for politicians to enact

Finally, stimulating energy efficiency in buildings through a higher carbon price implies raising electricity prices. Given the highly political nature of electricity prices this is likely to be resisted by politicians.

Recommendation 2 – Mandatory Energy Labelling of Buildings

Even if government does succeed in increasing electricity prices the likelihood of action in response to price rises depends on consumers having good knowledge of the energy performance of the buildings that they buy or rent. In the absence of clear energy performance labelling of buildings this is not assured.

There is little evidence of house builders or landlords currently proving higher (energy performance) specification housing and NZGBC would argue that this because there is little knowledge or

understanding among consumers of what to ask for when they buy a house. Government should introduce mandatory energy labelling of all buildings at point of sale or rent to give consumers sufficient knowledge on which to base their decisions. This is one of the recommendations from the OECD report on New Zealand's environmental performance:

"New Zealand operates three voluntary rating tools for sustainable buildings. To improve the environmental performance of buildings, energy performance ratings could be made mandatory for large public buildings, and be further rolled out across the commercial and industrial sectors over time. This approach, adopted in many other OECD member countries, would encourage the housing market to factor energy efficiency into property prices (IEA, forthcoming). Ratings could be extended (or complemented) to include other sustainability dimensions such as water efficiency, waste or indoor environmental quality, building on existing voluntary rating initiatives.

Mandatory energy performance assessments have been adopted widely across other OECD countries in order to correct a perceived market failure such as lack of information on energy performance when purchasing or renting a property, and there is growing evidence that, as a result, energy performance is being priced into the market.

Not enough emphasis on the role of demand-side measures in reducing emissions

While it is understood that international standards for the reporting of GHG emissions focus on the *source* of emissions the report still puts too much emphasis on *supply* rather than *demand*. This is in contrast to many of the recent reports on decarbonising the grid that recognise that demand causes supply:

MBIE Energy insights – based on 2013 EDGS:

*"In the short to medium term, **demand growth will be a very important driver of electricity emissions**. This is because the utilisation of existing fossil fuel generation will depend heavily on the future level of demand."*

MBIE – based on 2016 EDGS:

"There is less need for flexible gas fired peaking generation if the daily residential demand profile has lower peaks."

Transitioning to zero net emissions by 2050: moving to a very low-emissions electricity system in New Zealand - Sapare:

*"Notably, **the higher demand growth is the harder it will be for the system to wean itself off thermal generation** providing the flexibility the system needs."*

BEC 2050: A deep dive into the New Zealand energy and transport sector emissions

*"... note that recent history suggests that, since 2007, efficiency has largely offset the increase in the inherent demand (i.e. the change in the number of households, size of households, and any proliferation of appliances within the household) resulting in no absolute growth in residential demand. **The impacts of efficiency over the last ten years***

may have reduced demand by up to 1,400GWh, relative to a counterfactual where the long-term trend in household consumption had continued. The question of whether this trend continues is open, but the degree of efficiency impact to date is potentially significant, when compared to the factors driving future growth.”

“We believe there is much more work to do to understand the impact of efficiency on future electricity demand projections in the residential sector the commercial sector and the industrial sector. The scenarios did not provide sufficient detail, in our view, about the potential role of efficiency to take pressure off future need for electricity generation.”

From the draft report, chapter 15:

“Improving energy efficiency, particularly in the design and operation of buildings and in the use of energy in industry will play a role in tempering demand”

To put some numbers behind this; the population of New Zealand is forecast to expand considerably between now and 2050. StatsNZⁱⁱⁱ has a median scenario predicting an additional 1.4M people. At current occupancy rates that is likely to translate into an additional 500,000 households or 27% more than the current 1.85M households.

These extra people will also need workplaces. Assuming that 80% are of working age (as currently) that could translate into an additional 16,000,000m² of “workplace”. We estimate that at current average energy efficiency the additional homes and workplaces would add up to 7.5 TWh of grid demand. Much of this demand will happen in the early evening in winter contributing to peak capacity constraints.

The MBIE Electricity Demand and Generation Scenarios (EDGS) project large demand increases. Their “high grid” scenario suggests electricity demand might increase from 45 TWh to 63 TWh per year or an increase of 40%. To meet this additional demand EDGS suggests a 60% increase in electricity generating capacity from 10GW to 16GW between now and 2050. The High Grid scenario predicts the construction of 950 MW of gas thermal baseload, 1060 MW of gas peaking plant, 400 MW of coal (!!!), 2770 MW of wind and 790MW of new geothermal. Much of this capacity demand will come from buildings.

The environmental impact of all this additional generating capacity will be significant. Two key questions for the Productivity Commission are:

- 1) Who will pay for this additional capacity? Often these additional costs are passed on to the tax payer or to energy users in the form of higher energy costs.
- 2) Is additional capacity more cost effective than improving homes and buildings. This results in less energy being used and less embodied carbon, a key area the productivity commission stated needs focusing on.

It is a sad indictment of the Productivity Commission approach that it prioritises the construction of new electricity plant rather than improving the energy efficiency of new and existing homes and workplaces and consequently improving the health and well-being of New Zealanders.

New Zealand has one of the highest rates of Asthma in the OECD as a result of notoriously damp, mouldy and cold homes. This is not just the view of the New Zealand Green Building Council. Both

the OECD and the International Energy Agency have been sharply critical of the energy efficiency of New Zealand's built environment:

*"Despite progress, an estimated 30% of the housing stock remains uninsulated. The 2016 residential Tenancies Amendment Act introduced stricter floor and roof insulation requirements for rented homes and social housing. **Additional measures** may be needed to encourage insulation in the untreated homes not covered by the legislation; **the Building Code is below the standards required in many other OECD member countries** (IEA, forthcoming) and local regulation cannot go beyond the code requirements (NZPC, 2015). **The authorities should consider strengthening the standards for newly built homes under the Building Code...."***

It is appalling that the Productivity Commission is proposing to leave New Zealanders in poorly performing homes, with high energy bills and instead loading them with even more costs to pay for this added infrastructure.

Recommendation 3 – Quantify the benefits provided by energy efficiency in the built environment in obviating the need for additional grid capacity

MBIE should urgently review the potential costs and benefits of programmes to make substantial energy savings in existing housing – retrofit insulation (including wall insulation), retrofit double glazing, heat pumps, etc. These savings should be put in the context of reducing the need for grid capacity particularly in scenarios reported in the draft report that see the need for an additional 75% of grid supply. The report conclusions that downplay the role of energy efficiency in this way should be removed or substantially toned down.

Recommendation 4 – Commission work on projected marginal emission factors for the grid

International best practice is to use *marginal* grid emission factors when looking at future energy efficiency policies rather than the grid average in a given year. This is because “average” plant is not dispatched, built or decommissioned in response to changes in energy demand. The UNFCCC methodology is the most widely used and is adopted by the UK Treasury in its guidance on valuation of energy use and greenhouse gas emissions for appraisal.

New Zealand Government should do the same. The current marginal grid emission factor is likely to be higher than the current average factor better reflecting the way energy efficiency reduces demand for peak (often thermal) plant. The Motu cost/benefit modelling should use these marginal factors.

Finally, if has not already been completed, Government needs to publish (as the UK has done) implied electricity price projections based on decarbonising the grid between now and 2050. This will allow cost/benefit analysis for policy to be realistically determined.

Recommendation 5 – Use Government Procurement to lead the way

Commercial Buildings

The 2017 IEA report on New Zealand's energy policies states:

*"The government is a large stakeholder as it rents commercial buildings and is a major tenant in the market with the ability to set the standards. **The government should consider taking the lead in the public sector by making NABERSNZ mandatory for all large public buildings**, with a view to a further roll-out of NABERSNZ or alternative assessments across the commercial, industrial and residential sectors over time. This would encourage the market to factor in energy efficiency into property and rental prices."*

As a first step Government should mandate that all properties should have a valid Nabers rating in which it is the major tenant. Overtime this mandate should include all office tenancies. Ultimately Nabers should be mandated for all office buildings over a certain size threshold as has been the case in Australia since 2010.

Our estimates show that where Government measures the performance of their buildings they will save \$50m per year.

Government built housing

The draft report suggests using the income from carbon pricing to support vulnerable households (exposed to higher prices). It would make economic sense for this support to be in the form of investment in higher quality (state) housing than in subsidised fuel payments. In particular the Government's KiwiBuild programme should be built to much higher standards than the current NZ Building Code. The Homestar programme run by the New Zealand Green Building Council is an industry-created higher standard that could be mandated.

Recommendation 6 - Set a trajectory for a near zero energy building code by 2030 and make all buildings near zero energy by 2050.

The "high grid" EDGS scenario (which features the least energy efficiency) forecasts annual emissions from the electricity sector at nearly 5 Mt CO₂e by 2050, i.e. unchanged from now. It's not clear how this might be consistent with a Net Zero Carbon ambition once the country is fully planted with trees and this avenue is unavailable for offsetting. In addition, presumably there is every likelihood that the population will continue to rise post 2050. At the same rate of growth an additional 2.2M people could be added to the population by the end of the century. The draft report states that New Zealand has "abundant untapped sources of renewable electricity". Renewable energy may currently be abundant, but it is not infinite and assuming such is irresponsible.

In this context it is crucial that buildings reduce energy consumption to very low levels. New Zealand should set a trajectory for all new buildings to be near zero carbon by 2030. The energy provisions (H1) of the building code should be tightened every 3 to 4 years towards the goal. Having a firm trajectory will help the sector (designers, product suppliers, developers) "tool" up for the change and will considerably reduce the costs of building better. This has been the case in the UK where the energy provisions of the UK Building Regulations have been periodically tightened since 2002^{iv} in response to EU policy for near zero energy buildings.

Holistic Nature of the Building Industry

NZGBC welcomes the broader treatment of buildings in the draft report, particularly the inclusion of embodied emissions from the manufacture of building materials and products. The

recommendations on embodied carbon are, however, limited to the imposition of a carbon price. In taking this approach the Productivity Commission neglects to take enough of a holistic view of the construction industry *as a whole*. This is reinforced by policy prescriptions that do not target the building industry *as a whole*.

The construction industry is a large and complex. There are many actors including product manufacturers, product suppliers, building developers, designers, main and sub-contractors.

The Productivity Commission should not assume that all the players in the industry will collectively have sufficient foresight/knowledge of the implications of higher carbon pricing on their design, procurement and investment decisions. The construction industry is very dominated by business-as-usual approaches and is very slow to change. Large parts of the materials and products supply chain are also known to have very little competition meaning that there are powerful vested interests in the status quo.

Large scale investment decisions will be made in coming years in building procurement and building product and materials manufacturing facilities. These are yet another example of sunk costs unless very clear signals are given by Government. Once large-scale investments have been made (and some may have been made already) it is hard for government to resist lobbying from these sectors. The draft report itself suggests that steel should be given exemption from the ETS for their existing production quotas offering little incentive for the construction sector to change its ways.

The section of the report that deals with embodied emissions from construction quantifies the reduction in emissions possible from a switch from masonry to timber residential buildings. It then belittles the potential reduction by stating that most new homes in New Zealand are already constructed in timber.

This is a straw man. The majority of embodied emissions come from the construction of commercial buildings which are predominantly built from steel and concrete. In addition, the commission neglects that nearly 1/3 of new homes consented in 2017 were apartments which are also commonly built in concrete. This trend is likely to continue.

Recommendation 7 – Use Government Procurement to Guide Construction Industry

New Zealand Government needs to provide clear signals as to the ***types of construction practices*** implied by the 2050 zero carbon ambition. Policy should not focus solely on decarbonising the ***supply*** of steel and concrete (through price signals). It should look at the way in which buildings are designed, i.e. in a manner to reduce the need for steel and concrete.

In particular, New Zealand Government should, in the procurement of its own buildings, require ***sustainability standards*** that force the sector to take a complete supply chain approach to reducing emissions. This will have the effect of gearing up the industry in the direction it needs to go. Green Star Design & As-Built includes life cycle analysis of the environmental impacts of the construction phase. This type of approach is not typical in New Zealand and needs to become more commonplace. It will only do so with guidance from Government. It is a shame that the Commission does not apply finding F5.5 from the draft report to the building sector:

"Evidence indicates that policies to incentivise the development and uptake of clean technologies may be highly effective. Impacts can be both large and rapid and, as such, can help economies break from their existing high-carbon trajectories to low-carbon trajectories. Evidence also indicates that low-carbon innovations induce greater economic benefits through larger knowledge spillovers compared to innovations in mature high-carbon industries."

The ambition should start at a level that the industry is comfortable with and signal a ramping up of ambition over time. A starting point would be to require Green Star Design & As-built on all new government commercial projects. This should include a requirement for project teams to quantify embodied emissions and seek to reduce them by a set amount. This should be accompanied by investment in research and development and trial public sector projects, particularly in low carbon building products and materials.

ii [The impact of Energy Performance Certificates on building deep energy renovation targets December 2017](#)
[Alexandro G Charalambides](#)

ii https://www.eia.gov/analysis/studies/buildings/energyuse/pdf/price_elasticities.pdf

iii

http://archive.stats.govt.nz/browse_for_stats/population/estimates_and_projections/NationalPopulationProjections_HOTP2016.aspx

iv http://www.zerocarbonhub.org/sites/default/files/resources/reports/Cost_Analysis-Meeting_the_Zero_Carbon_Standard.pdf