

Australia New Zealand Society of Ecological Economics (ANZEE)

Overall, ANZSEE supports the Climate Change Commission's first three budgets, and its advice to the Minister on New Zealand's Nationally Determined Contribution (NDC) and biogenic methane emissions.

We recognise that the Commission's advice on biogenic methane emissions in the first three budget periods has been constrained by statutory targets and shaped by other requirements in section 5M of the Climate Change Response Act 2002 such as taking "anticipated technological developments" into account, rather than relying on proven available technologies.

Within that statutory context, we recognise that the Commission has gone to a great deal of effort, in a relatively short space of time, and produced advice that ANZEE commends and supports.

The comments that follow are submitted as thoughts and reflections on the policy development process and economic modelling that has been done to date, and how it has been communicated in the Advice Report and Evidence Report.

We present this feedback as suggestions for future consideration when the Commission comes to producing its next set of budget recommendations.

Future Generations and Carbon Markets

It is uncontroversial to say that a pure market approach to determining the price and quantity of greenhouse gas (GHG) emissions will fail to produce inter-generational equity for two reasons:

- First, future generations are unable to bid for natural resources or emissions in contemporary markets, so we (current generations) cannot know what value they would place on them.
- Second, if we could imagine (or construct a policy simulacrum of) a world in which future generations were able to bid for emissions in today's markets, the price they could pay would still depend on decisions we make: their future wealth, and therefore willingness and ability to pay, will be constrained by decisions we have already made.

Inevitably, then, the wellbeing of future generations is dependent on decisions that we make about the price and quantity of GHG emissions today.

The question that we face is fundamentally a stark moral choice: should we value the wellbeing of future generations as much as we value our own? The economic analysis and policy recommendations must necessarily follow from how we answer that question.

It seems to us that the Commission has not taken a clear position on answering that question. Nor has the Commission clearly expressed the moral choice as one that the Minister and Parliament must make, when deciding to set GHG emissions budgets,

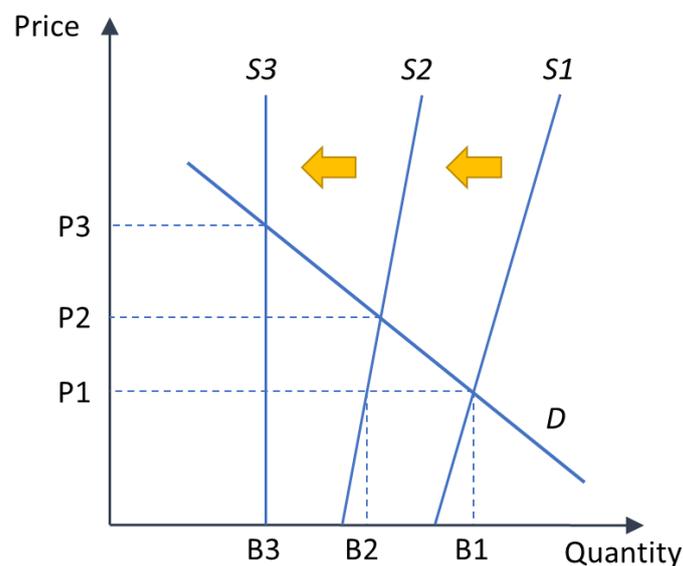
then developing the Emissions Reduction Plan in accordance with section 5ZG of the Act, and then implementing it.

Carbon Budgets, Supply Elasticities, Substitution, and Political Naivety

The essence of setting GHG budgets is that they create an (eventually) inelastic supply curve for emissions, and intentionally move that supply curve to the left. Diagrammatically, we suggest it will look something like Figure 1.

As the quantity of emissions is reduced over time (B1, B2, B3 on the horizontal axis), the supply curve moves to the left and, we suggest, will become increasingly inelastic (S1, S2, S3). Prices will rise (P1, P2, P3) more or less sharply, depending on the elasticities of both the supply and demand curves.

Figure 1: Supply quantity and elasticity - sequential budgets



The elasticity of the demand curve is determined largely by the cross-elasticity of demand for substitutes. In other words: if there are sources of energy other than oil, gas and coal become readily and cheaply available, and/or if the agricultural sector can easily move to producing commodities other than beef, milk, wool and lamb, then reductions in GHGs will be relatively painless. Prices for GHGs will tend to be stable or increase modestly, and there will be little flow-on impact to the economy.

If there are no readily available alternatives, then GHG prices will tend to rise. Those price rises will tend to disseminate across the whole economy, creating both inflationary pressure and resistance to change.

ANZSEE suggests that the latter scenario is more plausible as matters currently stand. The New Zealand economy is heavily dependent on hydrocarbon energy sources, particularly in the transport sector, and the agricultural sector is heavily invested in the methane-producing dairy industry and production of red meat from cattle and sheep.

This leads to a “political economy” issue, that we suggest the Commission ought to directly address, and which should be described and included more explicitly among the scenarios fed into the economic modelling.

The issue is that a rational, self-interested, economic actor might make the moral choice of ignoring the interests of future generations and focusing instead on their own short-term interests. They might then decide it is cheaper and more profitable to “change the rules of the game”, rather than responding to market signals and embracing innovation and change.

They would then be inclined to invest in drumming up public and political support for the *status quo*, and for abandoning the statutory targets, budgets and plans instead of investing in a zero carbon future. There is ample evidence that this is exactly how the coal, oil, gas, and agriculture industries have in fact responded in the past.¹

In this context, the Commission has touched upon the need for the Climate Change Minister to build public and cross-party support for the first three budgets – an approach that ANZEE fully supports.

However, we suggest that the Commission needs to go further. The political economy issue is a material reality that should be fully incorporated into the scenarios which feed into the Commission’s economic modelling.

It would be wilfully naive not to address this issue in a deliberate and considered way. We suggest the Commission should not shy away from addressing the matter and incorporating it into formal advice.

Economic Modelling

The Commission has contracted-out its economic modelling to two respectable firms, who have between them produced a complex and plausible economic model.

We welcome the modellers’ expressed intention to fully document the C-PLAN model and create an open source version of it. Our comments on the modelling are somewhat constrained because the documentation has not yet been produced.

There are technical aspects of the economic modelling that rely on and express that moral choice, which are not evident from the publicly available descriptions of the C-PLAN model. We note that the C-PLAN model is based on the MIT Emissions Prediction and Policy Analysis (EPPA) Model, and so have relied on the most recent published description of it in making the following comments.²

The question of who should benefit from the consumption of non-renewable resources (hydrocarbon fuels), and the diminishment of renewable resources (the biosphere’s

¹ For example, Oreskes, Naomi and Conway, Erik M. **Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming**. New York: Bloomsbury Press, 2011, and Barry, Alistair. **Hot Air**, 2014 film, retrieved from NZOnScreen <https://www.nzonscreen.com/title/hot-air-2014>

² Paltsev, S., J.M. Reilly, H.D. Jacoby, R.S. Eckaus, J. McFarland, M. Sarofim, M. Asadoorian and M. Babiker (2005): **The MIT Emissions Prediction and Policy Analysis (EPPA) Model: Version 4. Joint Program Report Series Report 125**, 72 pages: <http://globalchange.mit.edu/publication/14578>

capacity to reabsorb carbon), lies at the very heart of the moral issue which must frame the modelling approach.

- What amount of consumption are current generations willing to forgo, to support the wellbeing of future generations?

The answer to that question leads to two subsidiary questions:

- What proportion of economic output should we collectively “save” as a nation and redirect toward producing essential public goods (i.e. a stable and life-supporting climate system)?
- How should that redirection be implemented, when striking a balance between public and private investment decisions?

It is our view that the Climate Change Commission’s economic modelling has not adequately addressed those questions, for the reasons set out below.

Intergenerational discounting

Nowhere in the documentation of C-PLAN or the EPPA can we see any statement about the application of a discount rate, which is a common feature in economic modelling.

We think it essential that the Commission should state whether their modellers placed a lower value on the well-being of future generations than we place on our own (by applying a positive discount rate), and if they did, to state what the rate was, and why they chose it.

The financial sector

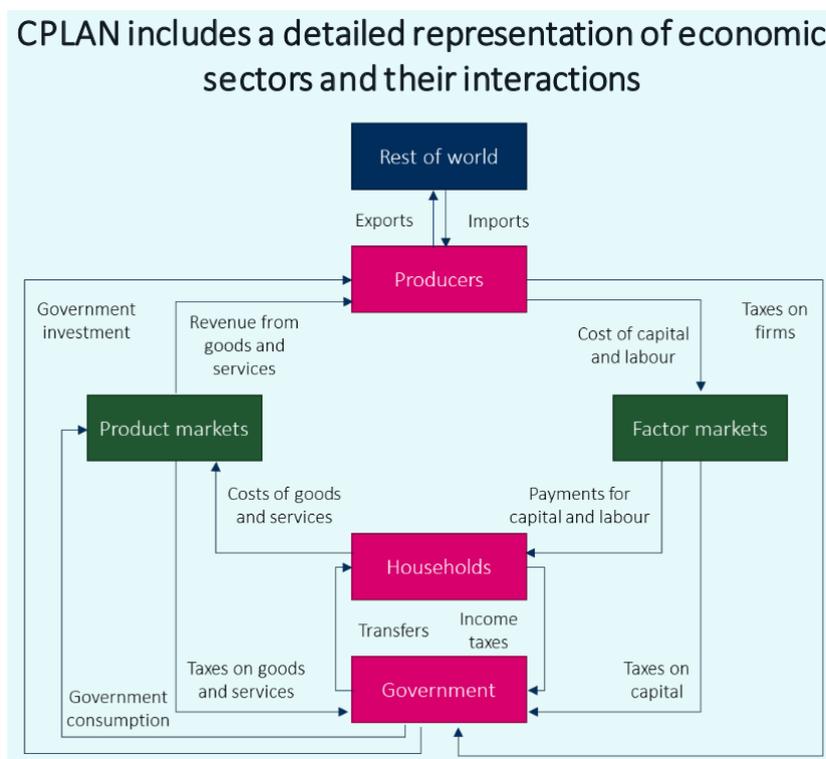
There is a comment on page 7 of that model description that concerns us:

“Another important aspect of CGE models is the degree to which they capture the dynamics of the economy through time, particularly their representation of savings-investment decisions. In this regard, EPPA falls into a class of models known as recursive dynamic. Savings and investment are based only on current period variables, as opposed to a forward-looking inter-temporal optimization model. In this latter approach savings and investment decisions are modeled to take account of all future economic conditions, which are assumed to be known with certainty. Saving in each period is equal to investment, which both compensates for current-period depreciation and contributes to the next period’s stock of capital.”

We interpret this as meaning that savings and investment (sometimes represented as ‘leakages’ and ‘injections’ in the ‘circular flow’ of economic activity) have been essentially eliminated from the model and are assumed to have no influence on its outcomes.

It is our impression that this omission has been carried through into the C-PLAN model is supported by the diagram shown below.³

Figure 2: Diagram of C-PLAN sectors



There are no household savings in that diagram, and no link from savings to investment via the financial and banking sectors.

Whether the transition to a zero carbon economy encounters “Headwinds” or “Tailwinds” scenarios through the decades to come will depend very heavily on the rate of saving and investment in the economy, and the proportion of economic output directed to research and development, and capital investment in zero carbon technologies, instead of current day consumption.

Those matters cannot be addressed adequately without considering how the finance, banking and investment sector of the economy will respond to economic policy and incentives. But by factoring out the banking and finance sector, the EPPA and C-PLAN models essentially eliminate monetary policy and interest rates from consideration. And their absence is a striking omission from the Commission’s policy recommendations.

This is hardly a new problem in economic theory. Keynes considered the effects on savings and investment of adopting a wartime economy. He discussed the matter of deliberately reducing household consumption spending and redirected economic

³ Climate Change Commission 2021, **CPLAN-model-results-summary.pdf** (pg 6). Retrieved from: <https://www.climatecommission.govt.nz/get-involved/our-advice-and-evidence/>

output toward public goods (i.e. peace, security, democracy) in “How to Pay for the War”.⁴ The dimensions of the economic “problem” of how to pay for a stable climate system are equally broad – and it is unhelpful to simply leave the banking and finance sector out the analysis.

Ownership of Natural Resources and the rents accruing to their owners

Another aspect of the EPPA model that concerns ANZSEE is the statement on page 6 of the documentation:

“EPPA also separately identifies natural resource capital as fixed factors in agriculture (arable land) and in the oil, coal, and natural gas industries (fossil fuel resources). These assets are owned by households, and their returns (associated with their rental values to producers) accrue to households as income. The value of these assets thus reflects the annual flow of returns to the economy.”

The assumption that “natural resources belong to households” is a hangover from 18th and 19th century economic theory, when the rents accruing to the ownership of land benefitted the landed gentry, and when one of the main interests of classical economics was how economic output was to be shared among the landed gentry, the capitalist bourgeoisie, and working classes.

Assuming that “natural resources belong to households” is not a useful description of contemporary reality, and the concerns of classical economists did not include inter-generational distribution of wealth.

When modelling climate change considering the question *who owns the Earth*, and the resources that it provides to the human economy, the assumption that “households” do is at best useless and at worst positively harmful. It implies that current generations can, and should, maximise income from the exploitation of resources in current periods.

Assumptions about Economic Growth

Finally, the EPPA model appears to assume ongoing economic growth at a rate of around 2% to 2.5% per annum with no real justification other than historical trends and some assertions about capital accumulation and technological change.

The discussion about growth trends in the documentation posits high, moderate and low levels of ongoing positive economic growth each of which in turn implies an accelerating use of energy and physical resources (only ameliorated by resource use efficiency and substitution, both of which are limited).

However, the long-term effects of climate change (and other forms of depletion or destruction of natural resources) on growth are more likely to be a choice between various levels of “degrowth”, weighed against the possibility of “collapse”. There is

⁴ Keynes, John M. **How to Pay for the War**. London: MacMillan, 1940.

ample evidence from history, and plentiful warnings from the science community, that such is the case.

Summary

ANZSEE respects the work that has been done by the Commission and its economic modelling team to date. We understand that the policy questions are complex and that the the statutory requirements reflect that, while adding certain constraints.

We also appreciate there was considerable merit in taking a robust and well-developed model, such as the EPPA, and adapting it to local conditions and the task at hand. The scenarios fed into the models and the results they produced represent are creditable within the limitations of the time and resources available.

The challenge, now, is to take a further step. The economic modelling that has driven the Commission's recommendations must be more clearly described and explained for expert audiences, so that they can help improve it. The key questions and recommended answers need to be more clearly communicated to non-expert audiences, so they can understand the stark moral choice that current generations face, and the part they might play in making that choice.

And further than that, there is a problem of how orthodox economic theory has failed, and continues to fail, in dealing with the core issues of concern to the Climate Change Commission – especially the issues of intergenerational equity, and of trying to solve a global economic and environmental problem with models built for analysing and managing national economies.

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