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2nd November, 2023

Dear Committee,

Thank you for the opportunity to give evidence last Friday regarding the *Climate Change (Net Zero Future) Bill 2023*. Please find below my responses to questions on notice that were directed at me, as highlighted in the transcripts provided. I believe Professor Pitman has already given a very brief response to you in an email reply. I apologise for the brevity of my responses below, but the request came with a 1-2 day turn around at a very busy time.

The CHAIR: In the current situation, are those scope 3 emissions accounted for somewhere?

GABRIEL ABRAMOWITZ: That's up to wherever those goods go. My interest is really in limiting emissions, and the point with considering scope 3 is that we have another avenue for control over emissions. Whether or not that comes in budget soon in an international context—I doubt it would be backdated, but if it were backdated we might be in trouble. It may come in an international context soon that that becomes part of a national budget rather than wherever it ends up going.

The CHAIR: With your work with the ARC, are our scope 3 emissions that we don't account for accounted for in a non-official sense? Are we aware of what our scope 3 are from New South Wales?

GABRIEL ABRAMOWITZ: I don't think it's in any formal budgeting. I could take it on notice to find out in more detail, but my understanding is it's roughly four times the New South Wales budget as it stands—our scope 3 emissions from New South Wales.

Exact numbers for this will vary depending on the sources and the years of statistics one might choose, but my suggestion in the transcript that scope 3 emissions are roughly four times total NSW inventoried emissions is not too far out – with the numbers I've found it's more like three times the entire NSW budget. Please understand that my area of research does not cover the NSW carbon budget explicitly, my focus in raising this is to emphasise that scope 3 emissions have the same effect as any other emissions, they do not count for less in terms of the risks we face. The calculations below are from easily accessible publicly available data for your guidance.

The NSW Minerals Council states that 164 million tonnes of coal was exported from NSW in 2021¹, slightly less than the 2019 figures quoted in an Australia Institute report on NSW Scope 3 emissions². Accurately converting this to CO₂ from combustion depends on a range of factors that depend on the nature of the coal and how it's burnt, but the conversion factor is roughly 2.2-3.5x (the upper limit assumes the coal is pure carbon), so 164 million tonnes of coal approximately equates to 410 Mt of CO₂ if we assume a conservative 2.5x conversion. The NSW EPA suggests that in 2019 NSW emissions were around 136Mt CO₂ equivalent³ – about 1/3 of coal exports in CO₂ terms. The Australia Institute report on NSW Scope 3 emissions mentioned above² suggested, using 2019 exports, that scope 3 emissions were around four times the NSW greenhouse gas budget.

¹ <https://www.nswmining.com.au/news/2022/2/nsw-coal-exports-and-jobs-remain-strong-during-challenges-of-2021>

² <https://australiainstitute.org.au/wp-content/uploads/2020/12/Coal-mines-and-scope-3-emissions-Web.pdf>

³ <https://www.soe.epa.nsw.gov.au/all-themes/climate-and-air/greenhouse-gas-emissions>

The Hon. PETER PRIMROSE: I was wondering if either of you have any other comments in relation to the guiding principles—whether you believe there are things we should add, whether you're basically happy or whether there are things that should be deleted?

GABRIEL ABRAMOWITZ: I did read through them, but I confess that I can't remember all of them. I didn't see anything that alarmed me, but I'm very happy to take it on notice if feedback would be welcomed.

The CHAIR: Very welcome.

The Hon. PETER PRIMROSE: Thank you. I would appreciate that, in terms of the legislation. The other thing, if you would do the same, is in relation to the proposed functions, in clause 14, of the Net Zero Commission. I was wondering if you could have a look at that and also provide some feedback in relation to whether you're basically satisfied or if there are things that you would like to see amended, added or deleted.

GABRIEL ABRAMOWITZ: Okay. I am very happy to do that as well on notice.

I appreciate the opportunity to comment directly on the legislation. A few thoughts are below, as I now reread the proposed legislation:

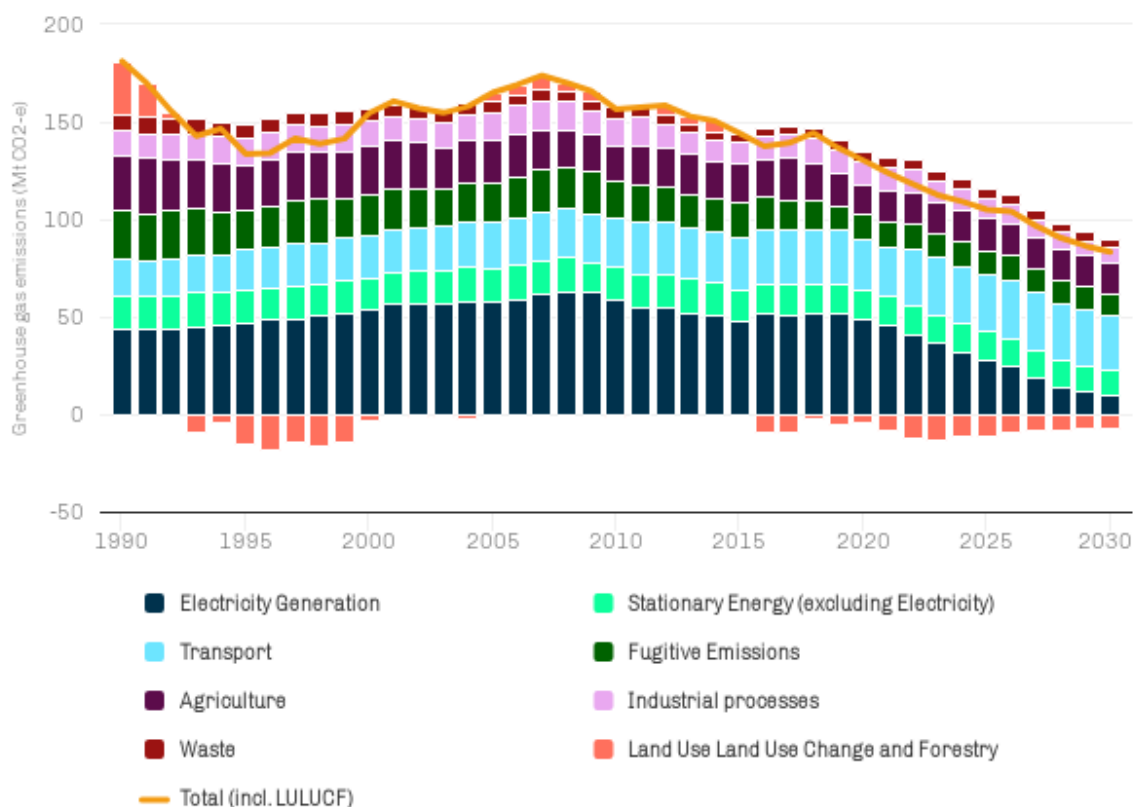
- Part 1, Clause 3, section 1 (b): while I appreciate this reflects the goals of the Paris Agreement, my professional opinion is that we are already committed to more than 1.5°C of warming. This is just not achievable.
- Part 1, Clause 3, section 2 (b) and Part 2, Clause 8, section 9 (a): I genuinely appreciate that the urgency is actually stated.
- Part 1, Clause 3, section 3: I'd suggest that this will also position NSW well to benefit economically by being ahead of the curve on transitioning to a net zero economy. Much is made of the costs associated with transition, and they are real, but I'd suggest the economic growth resulting from this will ultimately far outweigh costs, especially in terms of an abundance of cheap energy.
- Part 1, Clause 5, section (a) (ii): while I do appreciate that sequestration has a role to play in atmospheric carbon reduction, it's role can only be very small relative to emissions reductions if these targets are to be met. As noted in my evidence, sequestration, at best, could absorb roughly the amount of carbon that has already been released from land clearing. It does not come close to the quantities of carbon that have been and are being emitted through fossil fuel burning and other sources. At best, this would not cover one tenth of the task at hand. It is also very risky, as noted in my evidence, we are not confident that above ground sequestration in vegetation can be guaranteed to be stable in a changing future climate.
- Part 2, Clause 8 – Guiding Principle (3): I think highlighting that earlier cuts are more beneficial than later cuts is very important. Meeting the targets by cutting early as opposed to right before a target deadline can reduce risks significantly. This is as simple as noting that cutting emissions early means less greenhouse gases are emitted in total.
- Part 2, Clause 9, section 1: As noted in my opening statement, I'd encourage seriously considering including the Government's current emissions reduction target of 70% by 2035 in addition to those stated here. This would also obviously require amendments elsewhere, but from a risk management perspective, and arguably an economic perspective, cutting early is key. I'll address this in the supplementary questions you sent in more detail.
- Part 2, Clause 9, section 3: I'd suggest that intent of this section be made much clearer. My understanding is that this is intended to avoid the aims of this legislation being overruled by another mechanism. It might also be viewed as blocking more ambitious cuts. Needs to be clearer.
- Part 3, Clause 12: As noted in my evidence, I think the independence of the Commission is extremely important. Its role is to provide definitive advice on progress towards the proposed targets and the best mechanisms to achieve them. My question to the committee, noting I am not familiar with how the

proposed appointment is likely to work in practice, is whether you believe that the power of the Minister to appoint commissioners and the Commission's chair might undermine that independence. I encourage the committee to do everything it can to ensure the Commission's independence from the government of the day.

The Hon. SCOTT FARLOW: With respect to the 50 per cent by 2030 target, what's our trajectory in terms of being able to reach that at the moment?

GABRIEL ABRAMOWITZ: I don't know the answer to that. I could take it on notice and look it up.

This is not my active research area, but there are many sources of detailed information that are publicly available that can give good insight into this. For example, the NSW EPA, using NSW Department of Planning, Industry and Environment modelling and analysis, has charted how this transition will likely be realised in different sectors of the carbon economy (see figure below, from <https://www.soe.epa.nsw.gov.au/all-themes/climate-and-air/greenhouse-gas-emissions-2021#peaked07>, which has more detail). You'll see that the vast majority of these cuts are achievable via continuing the transition of electricity generation towards renewable generation. I'd suggest that with appropriate regulation, incentives and infrastructure, the transport sector will be the next to see significant reductions beyond 2030 via electrification.



The Hon. JOHN RUDDICK: So I take it that you're saying that Bondi Beach has not risen since 2000. So where in the world has it risen half a foot, or something?

GABRIEL ABRAMOWITZ: If you'd like me to take it on notice—

The Hon. JOHN RUDDICK: I would.

GABRIEL ABRAMOWITZ: —and give you some information. **The Hon. JOHN RUDDICK:** Yes.

GABRIEL ABRAMOWITZ: It's been rising consistently for a long time.

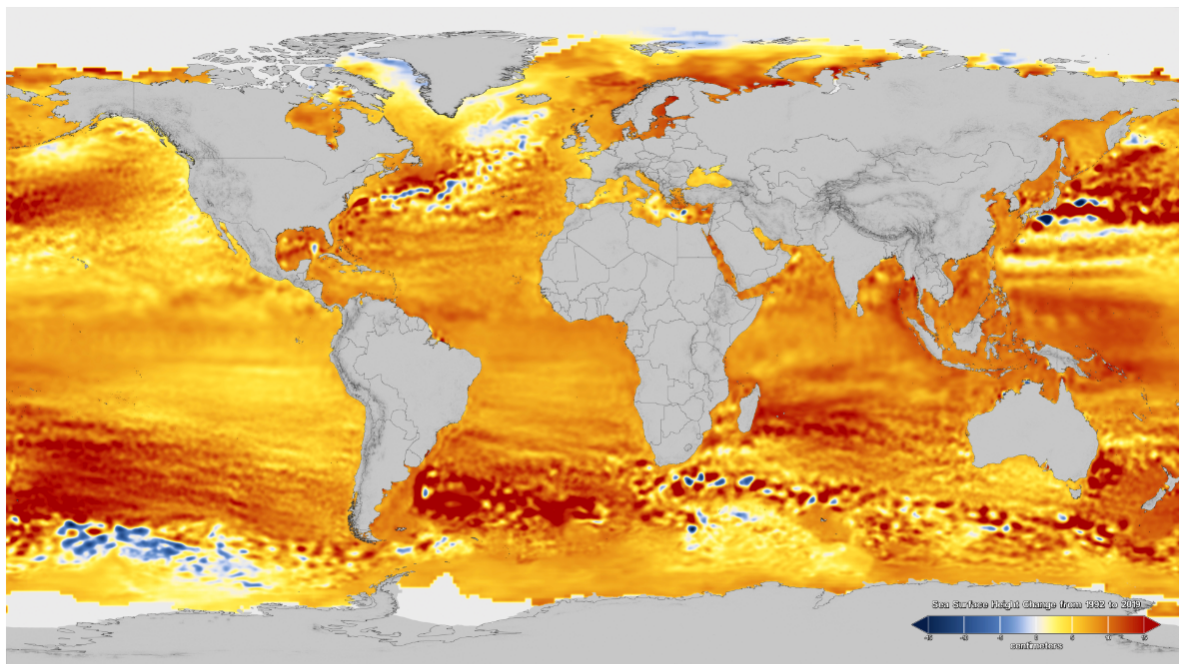
The Hon. JOHN RUDDICK: I would like to take you up on that, Professor Abramowitz.

GABRIEL ABRAMOWITZ: Excellent. It has mostly been thermal expansion. There has been some contribution from melting land ice, but it's mostly been thermal expansion.

The Hon. JOHN RUDDICK: I look forward to your response.

I did not comment on Bondi Beach sea level rise specifically on Friday, but I can at this stage give a confident answer that sea levels at Bondi beach have risen by at least 75mm since tide gauges started measurements in the Sydney area in 1886, and that this rise is well below global average rises.

As I noted in the transcript before this section, sea level rise is not uniform. It is affected in different regions by changes to ocean circulation, atmospheric pressure and more. Below are two graphics taken from the NASA *Understanding Sea Level* website (<https://sealevel.nasa.gov/understanding-sea-level/key-indicators/global-mean-sea-level>). It is not hard to find. The first shows the spatial variability in sea level rise over the last ~30 years – including that some (albeit small) regions are experiencing a drop in sea levels (shown in blue). Note that these represent a very small percentage of the ocean.

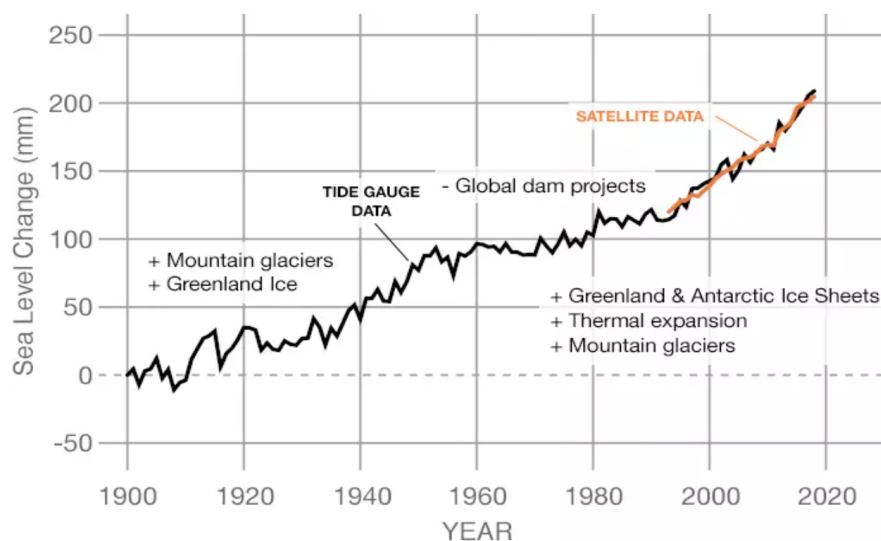


For over 27 years, satellite altimeters have measured the sea surface height of our ever-changing oceans. This image shows the change in sea surface height across the globe from 1993 to 2019. Credit: NASA

Next, in the figure below shows a multi-source estimate of global sea levels over the last 100 years or so. As may be apparent from this second figure, the rate of sea level rise globally is increasing with time, although there is nothing explicitly quantifying this in the figure beyond the visible increase in the gradient of the curve.

SOURCE DATA: 1900-2018

Data source: Frederikse et al. (2020)
 Credit: NASA's Goddard Space Flight Center/PO.DAAC



Similar information can be found on the websites of many reputable scientific organisations, including the CSIRO, the Bureau of Meteorology, the Australian Academy of Science, the UK Met Office, the Royal Society, and many, many more. Again, very easy to find, if you want to find it.

As far as I am aware, sea level rise in Australia was most recently comprehensively analysed by White et al (2014)¹. They note that in the periods 1966 to 2009 and 1993 to 2009, Australian sea levels on average rose 110mm and 50mm (that is, 2.1 ± 0.2 mm per year and 3.1 ± 0.6 mm per year), respectively, again illustrating the increasing rate over time. This is quite similar to the global average over the same period of 2.0 ± 0.3 mm per year and 3.4 ± 0.4 mm per year. A graph of this over time would look very similar to what's above, and there are many variants within White et al (2014) if you wish to explore further detail.

As noted in this paper, the Sydney area has experienced rates that are well below the Australia-wide average, seeing just 76mm (at Fort Denison, measuring since 1886) of sea level rise in the period 1886–2007. For comparison, the rate of rise in Sydney over the 1966 to 2009 period was only 0.8mm per year (while the Australian average rise was 2.1mm per year). I'd suggest the sea level rises at Bondi Beach would be essentially the same as at Fort Denison.

¹ <https://doi.org/10.1016/j.earscirev.2014.05.011>

Hopefully these answers go some way to addressing the questions posed by the committee. Please let me know if more information is needed.

Sincerely,

Gab Abramowitz

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2nd November, 2023

Dear Committee,

Thank you for the opportunity to give evidence last Friday regarding the *Climate Change (Net Zero Future) Bill 2023*. Please find below my responses to the supplementary questions you have sent. I apologise for the brevity of my responses below, but the request came with a 1-2 day turn around at a very busy time.

- 1. In your view, is it possible to achieve a reduction of 70% by 2035 if we achieve a 50% reduction by 2030?*

Yes, absolutely.

- 2. In other words, is a 20% reduction in 5 years feasible?*

This is a slightly different question, and while physically/technically it's absolutely feasible, there are of course economic and I gather political considerations, that will likely hinge on exactly how the 50% by 2030 target is reached. I should make it clear that my active research does not cover the NSW economy or the specific changes required to meet these kinds of targets. It nevertheless a topic of interest and frequent professional conversation.

I would argue it is feasible, yes, but it obviously requires genuine commitment, planning, coordination and cooperation to achieve. I'd direct the committee to the existing resources that are widely available from NSW Government itself, the EPA and other bodies that have more thoroughly assessed how these types of cuts are likely to be reflected within different sectors of the NSW economy. I gave an example in my response to a question on notice from Mr Farlow. It is not a wildly ambitious target at all in my view.

- 3. Is that reduction desirable? What is the value of entrenching a 2035 target of 70% in legislation?*

Yes, it absolutely is desirable. As stated in my evidence on Friday, and reiterated in my response to questions on notice, it is much more beneficial to cut emissions early and meet a given target than to cut them later, even if the same target is met. Addressing climate change is about minimising risk in the face of considerable uncertainty, and cutting emissions earlier in the 2030-2050 window by legislating a 2035 target reduces that risk.

- 4. Can you explain why you don't think 80% emissions reductions from 2005 levels by 2035 is an achievable target?*

I cannot speak for Professor Pitman, who I believe this question is directed to (and was unable to respond in the short timeframe), but I believe his point is that the Government has already assessed that a 70% target by 2035 is feasible. It is currently Government policy. There obviously comes a point, if increasing

the possible 2035 target beyond 70%, where it becomes unreasonably difficult to achieve, in terms of the costs of transition, effects on some communities, and sectors of the NSW economy. Once again, this is not something I have explored professionally.

5. *Can you explain why you couldn't really say whether a 70% reduction in emissions by 2035 is achievable?*

Once again, I believe this question is directed to Professor Pitman, who I can't speak for, only to point out that this is existing Government policy and that I am not familiar with the detail of the information and modelling that underpinned this decision.

6. *Do you consider your Professional qualifications to be suitable when asserting what can and cannot be achieved in terms of emissions reductions?*

As noted above this is not something I actively research, only that I do have some basic understanding of the makeup of the NSW carbon budget and which sectors of the economy are easier to transition to net zero.

7. *Do you think that more ambitious targets in NSW would encourage the flow of global capital to invest in renewables here?*

I confess I do not know what the controls and limitation on the flow of global capital are in the NSW context. It seems plausible to me, but in reality I do not know enough about it to comment in any detail.

Sincerely,

Gab Abramowitz