

Inquiry into Australia's transition to a green energy superpower  
Submission 62 - Supplementary Submission  
**Standing Committee on Trade and Investment Growth**  
Answers to questions on notice  
**Climate Change, Energy, the Environment and Water Portfolio**

**Inquiry:** Inquiry into Australia's transition to a green energy superpower  
**Question No:** IQ23-000101  
**Hearing Date:** 10 February 2023  
**Topic:** Estimate of land required for wind or solar per megawatt of capacity  
**Hansard Page:** 4  
**Question Date:** 10 February 2023  
**Question Type:** Spoken

**Senator Canavan asked:**

Senator CANAVAN: In the submission you've made to us, you say:

Under Net Zero Australia's preliminary modelling, over 460 GW of wind and solar generation would be required by 2050 if Australia was to become a major producer and exporter of green iron, hydrogen and other products ...

I'm just interested to know this: do we have estimates of how much land is required for wind or solar per megawatt of capacity? Do you have an estimate of that?

Mr White: Sorry, Senator, no. I don't have an estimate of that with me.

Senator CANAVAN: Could you take that on notice?

Mr White: Yes.

**Answer:**

The Clean Energy Council and state planning authorities assess that a standard large scale solar farm (single-axis tracking) currently use around 2 hectares of land per 1 MW of installed solar capacity. The land area required per 1 MW of installed solar capacity has progressively fallen as solar panel efficiency has improved, and is expected to continue to do so.

The land area required for wind farms is more complex, as there is a need for spacing between wind turbines to optimise the wind energy capture by the turbines. This can vary according to wind resources, topography, landowner needs and local approval requirements.

The Macintyre Wind Farm under development in Queensland will have a capacity of 1,026 MW located on 36,000 ha of land predominantly used for sheep farming, for a ratio of 35 hectares per 1 MW of installed capacity. Current farming practices will continue during the construction and operations phases of the wind farm.

The Golden Plains Wind Farm under development in Victoria will have a capacity of 1,330 MW located on 16,739 ha of land predominantly used for broad acre cropping and livestock farming, for a ratio of 12.6 hectares per 1 MW of installed capacity.

While wind farms can notionally occupy large land areas, the actual area of land dedicated to the wind power station infrastructure is a small proportion of the total land area and pre-existing activities can usually continue. NSW Farmers advise that:

- the land required for wind farm developments is generally minimal. Land is required for the tower base (about 100m<sup>2</sup> each) and access roads (usually gravel, between 3-6m in width) running between each turbine. Depending on the development, a substation may also need to be established (potential footprint up to 1Ha).
- most landholders generally find that once a wind farm is operational, livestock quickly become accustomed to the moving turbines and are happy to graze in their vicinity and seek shelter in the shade.

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**Inquiry:** Inquiry into Australia's transition to a green energy superpower  
**Question No:** IQ23-000102  
**Hearing Date:** 10 February 2023  
**Topic:** Water allocation  
**Hansard Page:** 5  
**Question Date:** 10 February 2023  
**Question Type:** Spoken

**Senator Canavan asked:**

Senator CANAVAN: Do you have any oversight for use? Say someone's setting up a hydrogen-export facility in Australia to export, effectively, our water to another country. Does the federal government have any oversight of the approval for that process, or is it left to the states?

Mrs Evans: In terms of the water allocation, I think it would be left to the states, but I would like to take that on notice to check that I've got that right. I don't think we have any role in it.

**Answer:**

It is common for exports, for example in the agriculture sector, to have water embedded in the exported product.

Water allocations are the responsibility of the states and territories. Where water extraction or use may impact on matters of national environment significance the action would also be regulated by the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999*.

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**Inquiry:** Inquiry into Australia's transition to a green energy superpower  
**Question No:** IQ23-000103  
**Hearing Date:** 10 February 2023  
**Topic:** Electrolyser process  
**Hansard Page:** 5  
**Question Date:** 10 February 2023  
**Question Type:** Spoken

**Senator Canavan asked:**

Senator CANAVAN: What happens here, scientifically or physically, to the water? My bush understanding here of the water cycle is we might use it in farming, it goes into the ground, eventually there's evapotranspiration and it goes back up to the clouds—it has a cycle, right? There's a cycling effect to the water; we don't really get rid of it, as such. But when you put it through an electrolyser, you're actually splitting the H<sub>2</sub>O. You're splitting the hydrogen atom and the oxygen atom. Have you destroyed the water, so to speak? Does that water not come back? What happens to it when you use the hydrogen molecules as molecules for energy?

Mrs Evans: I feel like I might be on the edge of—

Senator CANAVAN: Okay.

Mrs Evans: We might take it on notice. I might give you my bush understanding of it, and that is, no. It might be true you split it at the point of creating hydrogen, but that other point of using the hydrogen is recombined and you get a release of water back into the atmosphere. I think the answer is it's still cycling exactly the way it does in every other context, but to be quite sure we will ask the scientists and come back to you.

**Answer:**

An electrolyser uses electricity to drive a chemical reaction to split the water molecule into oxygen and hydrogen molecules. The hydrogen and oxygen components of water are not destroyed, but are transformed into separate molecules.

If the hydrogen is subsequently combusted in the presence of oxygen, water is produced as the major product in addition to the release of energy. Hydrogen fuel cells also allow for the controlled release of energy from hydrogen in the presence of oxygen, and often a catalyst, without combustion. Water is also produced in these chemical reactions.

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**Inquiry:** Inquiry into Australia's transition to a green energy superpower  
**Question No:** IQ23-000104  
**Hearing Date:** 10 February 2023  
**Topic:** First Nations Clean Energy Strategy  
**Hansard Page:** 10  
**Question Date:** 10 February 2023  
**Question Type:** Spoken

**Mr Georganas asked:**

Mrs Evans: I am just describing to you—

CHAIR: I need a couple of questions answered about the particular status of the First Nations clean energy strategy currently being developed. Can you tell us where that is up to? Does the department intend to pursue other ways to promote First Nations engagement with Australia's transition towards renewable energy?

Mr White: I am not directly involved with that work. I can say that we have commenced work on the First Nations clean energy strategy. The government has provided some funding towards that work in the 2022-23 budget context. The First Nations clean energy strategy is also one of the work streams under the national energy transformation partnership, so it is involving the states and territories as well as the Commonwealth. The specific activities currently underway under the First Nations clean energy strategy, I cannot tell you right at the moment. I may have to take that on notice.

CHAIR: If you could, because I know it was part of the proposal for engaging with First Nations people with clean energy and seeing how we can pursue ways to promote the engagement in that area, so I would be really keen if you could get something back to us.

Mrs Evans: We will come back on notice with the detail on that particular element.

**Answer:**

- The Department of Climate Change, Energy, the Environment and Water has set up a partnership with the National Indigenous Australians Agency (NIAA) and the First Nations Clean Energy Network to deliver the First Nations Clean Energy Strategy.
- The First Nations Clean Strategy will be co-designed with First Nations communities.
- The department is developing a consultation and engagement plan, including roundtables with First Nations communities and organisations across each state and territory in 2023.
  - Details on these events will be shared publicly closer to the dates.
- The department is engaging with states and territory governments through a working group to inform the development and implementation of the strategy as well as linking work of the jurisdictions to the strategy.
- An Expert Reference Panel is being established to bring together experts on clean energy and First Nations affairs to provide overarching guidance on the strategy.

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**Inquiry:** Inquiry into Australia's transition to a green energy superpower  
**Question No:** IQ23-000105  
**Hearing Date:** 10 February 2023  
**Topic:** Hydrogen Energy Supply chain project  
**Hansard Page:** 17  
**Question Date:** 10 February 2023  
**Question Type:** Spoken

**Senator Canavan asked:**

Senator CANAVAN: Thank you. HESC—the Hydrogen Energy Supply chain project. Can we get an update on that? That used to be in your area.

Ms Long: That's actually with the department of climate change and energy now.

Senator CANAVAN: So you don't have that anymore?

Ms Long: Yes.

Senator CANAVAN: Would you be able to take that on notice for me? My question is: what's the status of moving from the pilot plant to the commercial investment?

Mr Lawrence: I think we'd have to take that on notice. The project has finished the pilot stage, with the shipping of the first liquified hydrogen to Japan. But since the machinery of government changes, that's moved to the department of climate change.

**Answer:**

1. Since the conclusion of the HESC Pilot Phase in June 2022, the Japanese consortium are proceeding with the pre-commercial phase which includes a range of feasibility studies and cost modelling for the project.
2. On Saturday 4 March 2023, the Japanese Government announced that they have committed \$2.35 billion out of Japan's \$24 billion Green Innovation Fund to help build a hydrogen facility in Victoria (the Hydrogen Energy Supply Chain project) and construct a 160,000-cubic-metre-capacity bulk carrier ship capable of floating the liquid hydrogen to Kawasaki in Japan.