

Planning for 100% renewable energy

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The Vision

Australia can be a renewable energy powerhouse, harnessing our tremendous resources of sun, wind, wave, earth and human ingenuity to replace our reliance on coal with 100% renewable energy within decades.

To make that transformation rapidly and efficiently, Australia needs a plan: we need to know where our biggest and best renewable energy resources are; we need streamlined consultation and approvals processes that bring communities together instead of dividing them; and we need jobs and infrastructure in the right place at the right time.

Right now, Australia's development of renewable energy electricity is uncoordinated and directionless. The main mechanism used to drive renewable electricity generation - the Renewable Energy Target - creates an incentive for investment in renewable electricity but does not facilitate the planning of the country's renewable electricity development. As a result there is a high risk that ad hoc decisions will lead to inefficient outcomes. For example, if an electricity transmission line to a new wind farm is installed before consultation identifies future likely development in the area, either the transmission line will have to be replicated (at great expense) or future development potential will be curtailed.

With the right planning now, supported by the Greens policies to drive investment in renewable energy, including a more ambitious renewable energy target and a 'gross' national feed-in tariff, we can avoid these mistakes and drive an inspiring transformation.

The Solution

The Greens' *Safe Climate (Renewable Energy Infrastructure) Bill* is a vital step in planning the transition to 100% renewable energy in Australia, giving Infrastructure Australia several new planning tasks that will be essential in making that transition as rapidly and efficiently as possible.

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Under this plan, Infrastructure Australia would be tasked with:

1. mapping the renewable energy resource areas of Australia;
2. bringing all levels of government, local communities and renewable energy developers together in consultation; and
3. creating renewable energy development zones based on the mapped areas, with streamlined approval processes and funding connection of the zones to the electricity grid.

Recognising that Infrastructure Australia is not receiving high quality infrastructure proposals from either state governments or the private sector, the bill establishes an independent expert advisory committee to advise Infrastructure Australia. This committee will provide advice on:

- (a) the competitiveness and reliability of existing and emerging renewable energy technologies;
- (b) the synergies between different technology types with respect to the reliability of renewable energy generation;
- (c) the potential of electricity demand management, 'smart-grid' technology and emerging energy storage options to enhance the reliability of renewable energy electricity generation; and
- (d) the need and potential to expand and upgrade transmission and distribution grid infrastructure.

The Bill also requires the expert committee to complete a scoping study on the infrastructure investment required to achieve a 100% renewable energy target by 2030, 2040 and 2050. After the committee has prepared this initial assessment, the Minister must select two of those target dates to be the subject of a detailed plan, to be completed by the expert committee. This plan must set out how the selected targets could be achieved, including mapping of:

- (i) potential locations and concentrations of renewable energy generators, including wind, solar thermal, biomass, geothermal and wave power;
- (ii) where and how the existing electricity grid (including high voltage DC lines) should be extended; and

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(iii) any other matters the committee considers relevant.

Infrastructure Australia would then be required to take account of the detailed plan in the performance of its normal infrastructure funding function.

The key steps under *Safe Climate (Renewable Energy Infrastructure) Bill* are:

1. Mapping the renewable energy resource areas of Australia

Australia's four best renewable electricity sources, all with significant untapped potential, are solar, wind, hot rock geothermal and biomass. Ocean energy is also a potential renewable fuel with great potential but is at an earlier stage of development and is not yet ready for large scaled use. Large hydro has been fully exploited in Australia.

The existing, albeit rudimentary, renewable energy resource maps suggest:

- a) There is significant overlap of the country's prime solar and wind areas in southern Western Australia, northern South Australia and throughout many parts of the Northern Territory and Queensland.
- b) The best hot rock geothermal areas - which exploit regions with superheated subterranean granite deposits - are mostly located in the north-east of South Australia, south-west of Queensland and in the north of the Northern Territory.

Not only are there large areas where the nation's prime solar and wind resources overlap, but there are also regions where both also overlap with areas of excellent geothermal potential. These regions may have such great promise for large scale renewable energy development that they may warrant significant public investment in grid infrastructure. Just as railways opened many parts of the world to agriculture in the 19th and 20th centuries, grid infrastructure will open many parts of the world to new forms of electricity production.

Australia has a large number of potentially significant ocean energy sites around its coastline. These may coincide well with coastal wind resources, but they need to be located in areas where siting and connection to coastal grids is cost-effective.

Wind, solar, geothermal and ocean energy can be supported by biomass energy, which can provide a reliable backup to the intermittent renewable energy technologies. Importantly,

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if used for electricity generation, biomass energy could provide a major financial boost to farming communities across the country (see box), however, that biomass must be generated from sustainable sources, and native forests must be excluded. There is, however, uncertainty about the economic feasibility of Australia's biomass resource because much of it may have to be transported long distances to be usable in electricity generation. Some of it is also needed to replenish soil quality and to be used as feed for stock. Further, there must be limits on the extent to which biomass production competes with food production. Despite these constraints, it is likely a significant amount of Australia's biomass resource (particularly crop waste) can be economically used for electricity generation. To ascertain how much can be feasibly utilised, under this renewable energy mapping exercise the Greens will ensure the federal government funds comprehensive assessments of biomass generation. The assessment will cover different types of biomass resource throughout the country at a significant number of sites covering all major climatic zones and major types of agricultural enterprise. To date there has only been limited field trialling of Australia's biomass generation potential covering biofuels and biochar.

Renewable energy zones can benefit rural Australia

Farming is in crisis in Australia. Between 1996 and 2021 the National Land and Water Resources Audit predicts a decline in the number of farmers in Australia from about 200,000 to no more than 140,000. Sixty three per cent of all rural councils in Australia lost population between 1991 and 2001. Climate change will make this decline even worse.

The Greens' Safe Climate (Renewable Energy Infrastructure) Bill will help turn that around by creating jobs in rural Australia. If the zones led to the creation of about 12,500MW of new solar thermal and 6,000MW of wind generation capacity, they will generate roughly the same amount of renewable electricity that Germany currently generates.

In Germany renewable energy currently employs 250,000 people so there is no reason why the renewable energy development zones proposed in the Safe Climate (Renewable Energy Infrastructure) Bill couldn't employ a similar number, many of them in rural Australia.

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2. Bringing together all levels of government, local communities and renewable energy developers in consultation and streamlining of the approval process

The second task the Greens' *Safe Climate (Renewable Energy Infrastructure) Bill* assigns to Infrastructure Australia is expediting the planning permission for areas identified as prime renewable energy zones.

State/territory government approval for renewable electricity development is expensive, very time consuming and is a major barrier to renewables investment. Unlike several European countries, Australia does not proactively plan the utilisation of its renewable energy resource. This is despite the fact that, unlike Europe, Australia has enough renewable energy to be able to generate its current national electricity demand hundreds of times over.

Under the Greens' *Safe Climate (Renewable Energy Infrastructure) Bill* Infrastructure Australia will be tasked with providing communication and consultation links between all levels of government, local communities and developers in order to establish the renewable energy development zones. The intent is that Infrastructure Australia must invite and respond to local views on proposed development in the renewable energy zones. This type of planning approach is already used in Denmark and Germany and is being increasingly adopted in other European countries.

Case study: the Silverton wind farm

In 2007 an announcement was made by the Silverton wind farm development company that it planned to construct 598 wind generators near Broken Hill which would have a combined capacity of 1,000MW.

It will be the largest wind development in Australia and will be an exciting step forward for renewable energy development in our country. Imagine, though, how much more exciting it would be if it could be combined with a large solar thermal generator that took advantage of Broken Hill's abundant sunshine.

*This type of integrated renewable energy development is the type of development envisaged by the Greens' *Safe Climate (Renewable Energy Infrastructure) Bill*.*

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3. Planning and funding of the connection of the renewable energy zones to the electricity grid

The third major task the Greens' *Safe Climate (Renewable Energy Infrastructure) Bill* assigns to Infrastructure Australia is the planning and funding of the connection of the zones to the electricity grid.

Australia's electricity transmission network is elongated and sparse – it is the least dense transmission network of any developed country in the world, and it fails to reach into many areas with significant renewable energy generation potential. It also has weak links between most state grids, does not include the Northern Territory and Western Australia in its national grid, and is owned and operated by monopoly public and private owners who will only extend the transmission grid if users pay for the extensions.

The country's locally based distribution grids are also of varying quality. All these factors create often insurmountable barriers for renewable electricity generation. The new grid connection and planning function of Infrastructure Australia will be similar to the transmission planning initiatives in California and across the US (see box). Infrastructure Australia will designate key transmission corridors needed to connect the renewable energy electricity zones to the grid and will expedite the planning and financing of the transmission extensions. It will also examine the benefits of connecting Australia's existing eastern and southern national grid with the Western Australian grid as well as reinforcing the links between state and territory grids. In addition it will audit the country's distribution network identifying weaknesses that need to be fixed to be able to properly distribute renewable energy electricity and to establish a 'smart grid' across Australia (see box).

Transmission planning initiatives in the United States

The United States is miles ahead of Australia in the planning of its electricity transmission network. At a federal level, in 2005 the US government created the National Interest Electric Transmission Corridor initiative which gave the national Department of Energy the authority to override local and state planning authorities if they failed to give planning approval to transmission developments within a reasonable period of time.

The Department's authority includes the power to acquire land. California's Renewable Energy Transmission Initiative identifies prime renewable energy development sites in the state then develops detailed transmission access plans for those zones that include the facilitation of siting and planning approvals.

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Smart grids

Most electricity grids are out of step with modern-day energy demands. They were set up to serve centralised, generally fossil-fuel based, electricity generators that send energy in one direction. But increasingly electricity generation is becoming decentralised, peak electricity demand is becoming more costly to service and households are becoming electricity generators as well as consumers. The answer to these new demands is 'smart grids'.

Smart grids work in two directions: from generator to consumer and back again. They signal to consumers when electricity is least (and most) expensive to generate via time-of-use 'smart meters' and they allow for much more complex delivery of generated electricity.

They use new digital technology that transmits demand and supply information and can use new direct-current transmission technology that allows electricity transmission over long distances which aids the generation of renewable electricity.

They replace traditional one-direction hub-and-spoke transmission and distribution electricity systems with multidirectional systems that resemble spiders' webs. Smart grids can also reduce bushfire danger by allowing vulnerable areas to be shutdown during times of extreme fire risk.