

Calling on engineers to detour the social license barriers to the clean energy transition

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The enthusiasm among Australians to achieve net zero emissions is widespread, as is the belief that if we set a target the outcome will materialise. Unfortunately, it is not that easy. The reality is that the transition to net zero emissions is the most difficult economic transition undertaken by humanity. Not the most difficult transition since the Industrial Revolution. Not the most difficult since the Second World War. This economic transition is the most difficult, ever. It is driven by externalities, not convenience or economic benefits.

The low-hanging fruit is the electricity supply. Harvest season is right now, and to capture the moment, federal and state governments are setting targets and providing funding for renewable electricity. Financial institutions are keen to back the developers, who are bursting at the seams with enthusiasm to proceed. The core technology is in hand. Yet, in the last two years, the rate of deployment of new solar and wind has been slower than it was in the prior three years. Something is not right.

One contributing factor is that the transition of this essential service is left to markets to deliver, rather than government ownership and delivery. Other contributing factors are supply-chain constraints and the high costs of labour for infrastructure projects in Australia. Help is on the way with the emerging pattern of state governments leading the design of their transmission systems, and federal and state government collaborations on capacity investment schemes to encourage developers to bid on projects to meet the design requirements. The supply-chain costs will eventually sort themselves out in response to the maxim that the 'cure to high prices is high prices'. Similarly, supply delays will diminish as manufacturers compete to fill the backlog of orders. The high cost of labour for infrastructure projects in Australia is a bigger challenge that will eventually be managed by developers bringing more of the project management in-house. However, these solutions will not be sufficient to accelerate the deployment of renewables, because there are barriers in the way.

The biggest barriers to the rapid deployment of solar and wind electricity are not financial, they are not technological. They are societal, the so-called social license issues that lead to a plethora of objections that delay or kill projects.

These barriers include a slow and ponderously complicated permitting system across local, state and federal governments, distributed across multiple departments at each government level.

Another barrier consists of the various heritage requirements and the time to ink partnerships with Traditional Owners.

A formidable barrier comes from the collective biodiversity requirements, all of which are focused on local biodiversity. To the best of my awareness, these regulatory requirements do not include any balancing credits for delivering national or planetary biodiversity benefits.

In principle, there are solutions that can be delivered by government. However, in practice, it is difficult to see a future in which governments will consolidate the regulatory minefield into a single, well-marked highway for developers to follow. Not on current trends.

Are we likely to see biodiversity regulations that currently lead to the rejection of a wind farm project because of the possibility that a local bird might be killed, instead be approved, acknowledging that unmitigated global warming leads to the death of billions of native birds and small animals, as occurred in the 2019-20 bushfire season? Not on current trends.

Are we likely to see heritage mapping accelerated simply because the need is urgent? Not on current trends.

It is time for lateral thinking, for engineers to step up to the plate and ask how they can help solve these social license issues. I am talking about looking for ways to obviate the barriers through clever engineering. I don't have proven solutions in hand. Identifying the solution is our job – the engineers and the engineering leaders of Australia. To get started, here are some possibilities.

- First, mining. The problems include a lack of confidence by local communities that mine sites will be rehabilitated, concern about damage to heritage sites, and frustration over excessive tailings and water contamination. How can engineers help? One solution would be to invest in the development of precision mining, which would have a smaller footprint because the extraction of refined ores and metals will be more efficient. Fully automated precision mining systems will be able to mine small sites as cost-effectively as giant sites while committing to continuous rehabilitation as the ore in each small site is exhausted.
- Second, transmission lines. The problem is that the connection of new utility-scale solar and wind generation sites to the grid is stalled because of a lack of transmission capacity while new transmission lines are blocked by landowners and environmentalists. One solution would be to better utilise the existing transmission lines, by investing in on-site batteries and various grid-enhancing technologies that in combination will enable existing transmission lines to work harder.
- Third, distributed energy generation. The problem is that despite the millions of solar rooftops delivering fantastic value to our decarbonisation effort, they are at the same time destabilising the electricity system's security and reliability. Solutions include developing cheaper behind-the-meter battery storage systems, coupled to software that optimises energy use without requiring the homeowner to think about electricity for even a microsecond. At the same time, the software must communicate to the distribution service provider and the local aggregator about the premises' energy supply and demand, while preserving privacy. The bidirectional communications, the automation, the privacy provisions, if all of these are done well, aggregated rooftop solar has the potential to be a huge contributor not just to our annual, national renewables generation but to enhancing the security and reliability of our electricity system. Importantly, this distributed but aggregated source of energy can be deployed at a faster pace than utility-scale solar and wind generation because there are no barriers.
- Fourth, heritage mapping. It can take years for Indigenous Elders to walk Country looking for artifacts that must be preserved. Depending on it being acceptable to the Elders, it might be possible to use drones, machine learning and artificial intelligence to build databases to support Traditional Owners in their tasks.

It may be that none of these specific suggestions provide the answer to the problem of lack of social license, but the principle that engineering can find alternative ways forward is important. I have confidence that engineering solutions to the regulatory and approvals quagmire are more likely to be achieved than political solutions.

About the author

Alan Finkel was formerly Australia's Chief Scientist and is now a corporate adviser on climate-change technologies and author of *Powering Up: Unleashing the Clean Energy Supply Chain*.