

Anthea Batsakis: It's intangible, invisible and interchangeable, but energy in Australia is the source of heavy debate in and out of parliament house. The dilemma, or rather trilemma, underpinning these debates is whether we can have reliable, secure electricity at an affordable cost while reducing greenhouse gas emissions. So can we have it all and what are the different pathways Australia can take?

Anthea Batsakis: My name is Anthea Batsakis and you're listening to a podcast by the Australian Academy of Technology and Engineering. Here to break down the debate is doctor Alex Wonhas, the managing director of energy resources and manufacturing at Aurecon.

Anthea Batsakis: Alex, there are a number of different roads Australia can go down for energy. What future do you believe is most likely?

Alex Wonhas: Well, first of all, it's really, really difficult to predict how the future's going to look like. What I think is quite important is first of all, to actually look at the past, because in the last 10 years the world of energy has changed absolutely fundamentally in Australia. Who would have guessed 10 years ago that we have nowadays the highest per capita penetration of rooftop PV systems. Who would have guessed that we have one state in Australia that now has 40 to 50 percent renewable energy generation, and who would have guessed that Australia is actually home to one of the world's largest batteries?

Alex Wonhas: So fundamental changes have occurred and I suspect we are going to see many, many more changes. There's the obvious one. You mentioned the trilemma, one of the elements of the trilemma is what is going to be Australia's emissions trajectory?

Alex Wonhas: That is a real choice that we can and have to make as a nation, but there are many other choices that will shape the future of energy. For example, are we going to go to an energy system that is much more decentralized or are we going to stay with a relatively centralized system? Is that system going to become much more interconnected to achieve greater balance between the different states, or are we actually going to be every man or woman becoming their own island and basically solve their own energy needs? Another question is are we going to go nuclear or not? There is a huge debate about that and if you'll watch the most recent policy debate, are we actually staying with a system that is largely driven by the private sector, or are we going to see increasing levels of government interaction?

Anthea Batsakis: Let's break down the debate to its core. What are the main opposing arguments pervading Australian politics?

Alex Wonhas: As you have already highlighted, really the core question of energy is how are we going to solve the so called energy trilemma? So that means how are we going to achieve an emissions reduction from the energy sector, which is a very significant contributor to emissions. So energy, in total, actually makes up 80%

of Australia's emissions. So that includes electricity, stationary energy, transport and fugitive emissions. If you just look at electricity on its own, it is still about a third of our emissions profile. So what we do in energy really, really matters.

Alex Wonhas: Secondly, there is the question around affordability. Now, over the last decade we have seen a doubling of electricity prices in Australia for a variety of different reasons. That is difficult for households in particular, low income households sometimes pay up to 10% of their income on electricity. So that's a really difficult thing. And we also have a number of industries in Australia that are highly dependent on low cost electricity. And finally, reliability, as we have seen maybe most visibly during the blackout in South Australia. A major mine Olympic Dam owned by BHP was actually, for 12 days, without full power supply and according to their chief executive officer that lost the organization 130 million dollars.

Alex Wonhas: So emissions, affordability and reliability really, really matters. And they are very different views on what is the right pathway going forward to achieve that trilemma. I think that using the [full out suite 00:04:33] of technological solutions will actually help us to make that trilemma much less of a trade off than we believe it currently is.

Anthea Batsakis: Now you mentioned a nuclear energy before. Is that a road that you can see Australia going down in a bigger way?

Alex Wonhas: Personally, I think it would be a very, very difficult road to go down to. It is true that you know, nuclear technology is a well proven technology. There are some issues around, obviously, what happens in case of a malfunction of the reactor. There is the issue around waste disposal and there's the issue around proliferation. I think all of these challenges can no doubt be solved nowadays. I think the biggest issue with nuclear technology is really its lack of social license to operate. So if we believe that it is challenging, for instance, to develop onshore gas, then I believe that getting societal acceptance of building, say a nuclear reactor in Australia, would be much, much more difficult. And most importantly it would require a lot of political leadership, which at least if you look at the past, would be unlikely to occur in Australia. At the current time.

Anthea Batsakis: Energy in Australia has been referred to in the media as the energy crisis, are things really all that bad?

Alex Wonhas: I don't think Australia is really facing an energy crisis to be honest. I do, for example, a lot of work in Africa. And when you compare the stability, costs, and reliability of the energy system over there to what we have in Australia, I think that is probably a crisis. And I think what we are facing in Australia is basically a huge public debate and a very politicized issue, but an issue that we no doubt can solve.

Anthea Batsakis: Can you see a future in coal?

Alex Wonhas: I find it difficult at the current point in time to see how a private investor would invest into a new coal fired power station. It is a very capital intensive technology. It at least broadly speaking, doesn't have a lot of public support in Australia, and it is also contrary to I think a wide held belief by at least some people, it is actually not anymore a very cost effective solution. So that makes it very, very difficult for private [inaudible 00:07:23] to achieve that. Now if a government decides to invest in that technology, that might change that equation. But in the current environment, I think the future is really going to be a future that is based on a much broader mix of different technologies that leverages the full costs and other advantages of renewable technologies. And that works very hard to integrate some of the existing technologies with the new extra technologies into a fully functional system.

Anthea Batsakis: So what's stopping Australia from being a hundred percent powered by renewable energy? I don't know if you saw recently one of the Eureka Prize winners found 22,000 sites for pumped hydro storage. Is that something that you can see becoming a reality in Australia?

Alex Wonhas: So I think technically we know that a future with a hundred percent renewable power is feasible. The challenge will be to find a transition pathway that is acceptable and cost effective. What I'm much more interested in is how do we shape the next 10 years to set us up on the right trajectory for this country.

Anthea Batsakis: So in your opinion, what country is leading the future of energy and what can we learn from them?

Alex Wonhas: Yeah. I think when you look globally, I don't think there is a standout leader in the global scene that leads deployment of new technologies. I think there are many countries who make great strides. I mean even countries like China for example, which is the single biggest investor in renewable technologies at this stage is a great example of what can be done. The U S is actually the second largest investor into renewable energies. Europe has very, very ambitious targets and aspirations for how they want to change their energy system. My personal passion, frankly, would be for Australia to be a country that other countries look at in terms of what energy solutions we are implementing and that might not be as far fetched as it might sound. We are already a leader. I mentioned at the beginning that we for example, have now the largest battery on the planet operating in Australia, so we are a leader in deploying of these technologies.

Alex Wonhas: We also have a very unique need. We have one of the highest percentage of remote communities that require power and a lot of the new technologies are uniquely positioned to provide power to those communities. So I would love to see Australia become a leader in how the energy future should look like.

Anthea Batsakis: So in those remote communities, coal doesn't suffice.

Alex Wonhas: Well in remote communities it's often actually quite difficult to get a coal fired power station working because often the remote communities are much smaller and coal fired power stations typically scale, so they require a relatively large footprint. Secondly, coal fired power stations are often much less adaptable to the variable output of renewable generators. So what we often find when we designed systems for remote and regional communities is that they have a relatively high share of variable renewables depending on what is obviously the most optimal energy source in that region.

Alex Wonhas: And then it is firmed up by both a battery system for short term system stability and switching over to gas. A really great example is actually the energy system in Ella Springs, which we recently done a redesign for territory generation. So in a winter it is actually 50% powered by the existing solar energy, which is both from a large centralized plant and a large number of distributed renewable energy sources. Then we have added a relatively small battery to it that helps to stabilize the system and then manages to switch over to a number of gas generators that are also deployed there. So I think that is what I think, in the near term, a very, very cost effective solution. And when you look at the economics of that because renewables are very cost effective, the cost of that energy is actually typically lower than a system solely relying on conventional generation sources.

Anthea Batsakis: That's really interesting actually. So what do you wish more people knew about energy in Australia?

Alex Wonhas: I think there are probably three key misconceptions when it comes to energy. I think the first one is that renewables are very expensive, and really at the root cause of what has driven up our electricity prices. The reality is that the increase in electricity prices over the last decade has been driven by two factors, primarily. One is increasing that investment into networks because of growing peak demand and also because of the investment incentives that have been created in the 2000s when we were concerned about not having actually enough network to serve growing demand. And secondly, more recently since about 2015 where existing generators are exiting the system, and so the market now responded in exactly the way the market was designed to respond by raising prices to induce new capacity.

Alex Wonhas: So that's what we're seeing. So that's I think myth number one, that they're expensive. When you actually look at renewables compared to fossil generators, renewables are actually cheaper nowadays to build than conventional generators. Which brings me to the second myth, which is coal is cheap. It is true that coal is cheap when you look at only effectively the fuel cost of an existing plant that is being completely written off, then maybe you pay 20 or 30 dollars a megawatt hour. But as those plants age, they come to the point where they need to be replaced. And when you take into account the capital required for a new build plant coal becomes, on an energy basis, more expensive than

renewables. Now that still leaves probably an issue around what about the reliability of renewables versus say coal or other conventional generators.

Alex Wonhas: Now conventional wisdom is that fossil generators are reliable. Renewables aren't. Again, that's not true. Renewables are actually very reliable in the sense that we know when they are going to produce and how much they're going to produce. The thing that we cannot control is if the wind isn't blowing or the sun isn't shining, then they might not be producing. Similarly, conventional generators aren't always able to produce, and we have actually seen many, many cases, especially during the last summer, where conventional generators weren't available because they were old. They required maintenance. And that put the system into some very dangerous stages.

Alex Wonhas: So I think for me the the three key myths are number one, I think renewables aren't expensive anymore. Coal isn't the cheapest form of generation, and I think if we are clever about how we are designing the system we can build a system that is just as reliable with new forms of generation as our old system has been.

Anthea Batsakis: Thank you so much for talking to me. Was there anything else that you wanted to add?

Alex Wonhas: Thanks, Anthea. It's been an absolute pleasure to talk to you. I've really enjoyed those questions and I'll look forward to hearing the podcast.

Anthea Batsakis: All right.