Webinar Transcript: Electrify Everything: Powering Economies on Clean Energy
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Treaty on the Prohibition of Nuclear Weapons

Sharan Burrow, Dr Marianne Hanson, Dr Helen Durham AO

Ebony Bennett 0:03

Good day everyone. I'm Ebony Bennett, Deputy Director at the Australia Institute and welcome to our webinar series. I'd like to begin by acknowledging that I live in work on nanowall. Country sovereignty was never stated here. It always was, and always will be Aboriginal land and I really pay my respects to elder's past and present who have cared for country for more than 65,000 years here. The Australia Institute does these webinars at least weekly, but days and times do vary, so make sure you register at Australia institute.org.au next Wednesday, we'll be talking to renowned Australian author and Booker Prize winner Richard Flanagan about his new book toxic on the running underbelly that is Tasmania's summon industry. Just a few tips before we begin today to help things run smoothly. If you hover over the bottom of the zoom screen, you should be able to see a queue and a function where you can type in questions for our panelists today. You should also be able to upvote questions from other people and make comments. Please keep things civil in the chat or will boot you out. And finally a reminder that this discussion is being recorded and you can find it up on Australia Institute TV afterwards. So this week, the leaders of some of the wealthiest countries in the world will be meeting in the UK for the g7 summit and high on the summit agenda this year is climate change. In fact, it's likely that the summit is going to see some of the strongest language on climate yet by world leaders. So more than other years. 2021 is really shaping up to be a year of climate action. President Joe Biden really changed the dynamic of global climate change politics at the beginning of this year when he took office, and has emboldened many other nations to follow suit in both word and deed. This week, the Australian UK High Commissioner Vicky Treadwell told media in the UK that the UK has made it very clear that climate change is their number one foreign policy priority. So where does Australia fit into this scenario? or more importantly, where could we fit in a year of global climate action? If you like some of us here, you might feel like discussions around climate change in Australia, leavers going around a bit in circles. So hopefully, this morning's webinar is going to be a bit different, and presenting you with a bit of a vision for Australia that, in my opinion, is both truly inspirational and completely achievable. A vision of a prosperous Australia and Australian economy, one that's powered by clean energy. So today, we're lucky enough to be joined by two extraordinary guests. So Griffith and Danny Kennedy, both acclaimed tech entrepreneurs, who are revolutionising the American energy system, one building at a time, they both declined to have a long winded bio. So you can find those details up on our website today, but we're gonna get straight into the discussion. Also joining them today is Richie Murthy and head of our climate and energy program at the Australia Institute, gray soul, Danny and Richie. Thanks so much for joining us. And, Danny, I'm gonna start with you electrify everything the subject of today's webinar. It's a movement gaining a lot of traction. But can you tell us a little bit about what it actually means and what it might mean for Australia?

Unknown Speaker 3:12

Sure. So you know, the good news that you started with and really setting up the g7 this week is that the world's realize what the hippies have been saying for decades. You know, we've got to stop fossil fuels. The International Energy Agency last month said, No more gas pipelines projects, no more coal mines, power plants, no more oil fields, none of it, if we're going to make 1.5. And then the g7 followed a week later to say no more coal finance. And that'll be part of the message coming out of the communique that Scott Morrison has to go on and listen to at least in UK. So the world's worked out, we've got to get off fossil fuels. And we know how to do 100% renewable power system. to really do it in the time required the sort of 2030 timeline, not the 2050 timeline, we have to rapidly electrify everything, we have to make sure all the cars and boats and planes and things including the appliances in our household, the heaters in our basements and the hot water heaters for our bathrooms and the stoves in our kitchens, they all get switched out to electric. And the good news in that is it's a massive spur moment of innovation and opportunity and wealth creation and jobs. Because all that work gets done in people's houses and their basements in their kitchens and bathrooms. And that's contractors doing things and I'm sure we'll get into numbers of those things when we talk to solve but the point is really that the flows of capital in the world, now that the AIA and the g7 have told them yeah, basta, enough. We can't do any more fossil fuel financing. The fiduciaries in the investment committees of the super funds and the big end of town can no longer do that. And so they're now looking for work to do renewables 100% and electrify everything, which is the strategy, the grid flexibility that we made the electrification of vehicles that we need to make all that balance and work in the system as a whole. And you know, from where I live backing startups in the space, it's a really vibrant time. You know, we've got companies getting $5 million injections this week to do a little box on a utility pole that makes it slightly smarter and part of the Internet of Things that we call the energy internet. There's a lot of Evie, hype, perhaps, but also a lot of really exciting stuff. And one of the problems for Australia is, you know, the consumer is being left out of the electrification of vehicles by the bad policy and the confused thinking from on a high in Australia, while the rest of the world's going there and doing it as part of this grid, the flexibility and renewables power build out, we can dive into that took too long to start, but really excited to be here. And thanks for having us.

Ebony Bennett 5:57

Ya know, we might get back into some of that grid discussion a little bit later. But so coming to you, that's a little bit of an explainer about electrify everything as a movement, but you've got your own, not for profit rewiring America. Can you tell us a little bit about that? And why electrification is now kind of this big energy solution that we're looking at to do as soon as possible.

Unknown Speaker 6:24

So I finished writing a book last year that will be out shortly called electrify, which is goes through all the numbers and the mechanics of electrification of everything. I think we need simple messaging to defeat some of the remaining conversations and arguments that are slowing down the climate action we need. So continuing conversations of how much hydrogen there will be, the answer is a little not a huge amount, how much carbon sequestration, there will be, it'll be a little not a huge amount. And once you've just grapple with those things, then you realize that the only real option is very, very heavy electrification. Because of that I started a nonprofit in the US last year called rewiring America. And that's working sort of on four fronts. One is to create a political movement

that politicians follow. as ambitious as some nations, including the US are, their climate commitments are still below par, if you think power is 1.5 degrees Celsius, or even too. So I don't think I think, you know, the good news is hopefully every year for the next decade, you'll see increasing ambitions from groups like the g7. And hopefully, we end up at around, you know, the majority of his job done by 2035, not by 2050, that probably won't give us one and a half, but that will be two degrees. To get there. Here's the fundamental reality. There's already a huge number of machines in the world that use fossil fuels, their furnaces in basements, their cars, their power stations. If we replace every single one of them at the end of their life with a clean, electricity powered electrified solution, that the the inertia of those machines because cars last 20 years furnaces last 25 power plants last 3040 means even with perfect replacement starting in 2021. Like we never made a mistake anywhere in the world, we're going to get about a 1.8 degree world. So the only way that people calculate that we have a chance at one and a half is to bake in negative emissions. But that was sort of a loophole that some disingenuous nations, including Australia lobbied for the IPCC in the early 2000s. And technologically we now Not a lot of people have optimism that we can do that much sequesteration on the time required. So fundamentally, you now need to make all of these good decisions. It's going to be electrification. And then what does that really mean is how do you deploy Finance? How do you put ever increasing levels of political ambition on it? How do you do the training and certification programs required to change the workforce from fossil fuels and installing gas networks, to installing electric vehicle charges in home batteries and rooftop solar and industrial wind, etc, etc. So we did a model out the jobs that would be created by this transformation in the US it's 28 million short term and 10 million permanent long term new jobs in the US. At least 2 million electricians and HVAC technicians need to be bought online. Like this is the Danny alluded to it the biggest creator of jobs ever probably even larger than the huge creator of jobs which was the American effort to manufacture the machines that won World War Two against the axis and you So rewiring Americans is helping right policy in the US helping build a political movement helping get the financing organizations in the US. It's the private equity, the venture and the public. private partnerships are critically, how does government leverage their investments, with private partnerships to go the longest way. The other work we're doing a lot heavily now is, it's easy to squint and say, the top 10% of households can now do this, they can buy their Tesla, they can buy these luxury items. But the reality in Australia and in the US is roughly the lower half of homes don't really make enough money to pay significant amounts of tax. So how do you how are you going to give those households the liquidity? How are we going to invent the financing mechanisms that allow everyone to benefit? and not have this become partisan politics? Because you're not working for all family?

Ebony Bennett 10:57

Yeah. And so we might come back to drill into a couple of those things. But I just cuz we mentioned the g7. A couple of times. Richie, I know you do a lot of our international work just as we had there, how much pressure is there going to be on Australia to kind of get on with the kind of job that Saul and Danny are talking about here?

Unknown Speaker 11:18

There'll be a good amount of pressure, whether it's public or not, is the real question. But if you look at all g7 members, they've all locked in net zero by 2050, they all have increased their 2030

ambition. In the last six months or so they all have some form of carbon price or plans for carbon price or a number of their states and provinces have carbon prices. And there is consideration now of a carbon border adjustment, certainly from the EU that's looking to bring one forward on the 14th of July, for consideration by its parliament. So there's more on the table than we've ever seen. We could be seeing language that stronger than we've ever had. And Australia will be asked to associate with it as it guests to the g7. whether they'll do that or not, it doesn't look like it. I mean, the Prime Minister is in Perth right now basically saying we do it our way. I love Frank Sinatra, whether that will actually stack up against our key allies, who we often take our cues from is another matter. And what those conversations are looking like behind the scenes, they're probably a lot less diplomatic.

Ebony Bennett 12:19

Danny, I want to come back to you, you wrote a book rooftop revolution, where you said that democratizing energy with rooftop PV PV really tilts the power away from the coal industry in particular, in Australia, obviously, were dealing with an ageing coal fired power station. situation. And obviously, there's a bunch of activists who want to accelerate that transition to clean energy yet, we're still seeing things around the transformation of the electricity grid here, where you know, some states and the energy security board throwing their weight behind a rule change to charge rooftop solar for exports. That's been rejected by some states. But I guess I wanted to ask you, what is the potential there for rooftop solar? In Australia, if we keep going down this path of kind of decentralizing and electrifying everything?

Unknown Speaker 13:15

Well, to make an obvious choice, the sky's the limit. And, and you know, when I did that book about a decade ago, you know, I got the numbers wrong vastly on the underside, if you look at how Australia has had rooftop penetration happened in the suburb, some of them, you know, 50 plus percent powered from their roofs, that rooftop revolution has actually occurred. And it is allowing all these really innovative businesses in Australia from you know, VB, selling your slab of beer, when you send them 30 bucks worth of excess solar power off your roof to power ledger and a no C and allume. And various great companies, Amber electric, I can't remember all of them probably shouldn't be doing plugs anyway. But the innovation that has had in the decade that that solar uptakes occurred. And it's only really just begun, you know, in an S curve of adoption. If you think about our experience with cell phones, we're still at the Nokia and the flip phone star tech stage. You know, we're not an Apple iPhone yet with where solar and integrated batteries and grid flexibility will come. As I was saying earlier, you know, one of the limiting factors for Australia about how far that can go to answer your question, Ebony is how much we use the batteries on wheels that the rest of the world is taking advantage of, you know, the place where solar has really taken off is actually an Asia you know, Vietnam did six gigawatts of rooftop last year. China did 20 gigawatts of solar in a month last year, including 10% or 20% of it on rooftop in the east. And they're pairing that with a massive deployment of electric vehicles. From buses down to two wheel you know 25 million of the 75 million motorbikes sold in the world last year were electrified, those are assets in the grid to balance in a absorb the solar power coming off the rooftops, you know that, that just the cars sold last month in China were the equivalent of 21 big batteries like rebuilt a cooling style 100 megawatt battery, that that's the kind of thinking that they have in China, they call it the energy internet where everything is an asset. And the fact is, that's the cleanest, cheapest way to build out a renewably

powered system, a decarbonized electricity system, which is what the world's going to, you know, I've seen in the chat some questions about is that possible, it's not only possible, it's happening, the home state for my fund, California has good days of 93 94%, solar and wind powered fifth largest economy in the world, you know, we're on path, our 2045 law, which was, you know, written in 2018, is now looking to make and we're more like what Saul was saying, and what Biden is saying, which is 2035, will get to 100%. Renewable. And we'll balance it. And we'll make it all work. And we'll drive the cost of it down. And we'll put it in the hands of the people, figuratively and literally, by innovation and the rollout of these new technologies, which are also the rollout of new jobs and opportunities for wealth creation, and so on, which is the exciting moment here.

Unknown Speaker 16:17

I'd like to touch on three or four points there that I think are interesting. So you ask how far can it go? There's some technical answers to that, that I think are really interesting will will illuminate a lot for people. If you we did this study for the US economy, I just finished this study for the Australian economy. If you electrify the great majority of transportation, you electrify the great majority of heating and cooling systems in homes, you will roughly triple the total amount of electricity that needs to be delivered over the wires in the US. In the Australia case, it's slightly more because we use proportionally more petrol, we drive we we use more of our energy for driving and when they get electrified, it will increase the load. So you're going to increase the amount of electricity that needs to be delivered to each household by somewhere between two and a half and 3x depending upon what portion of your vehicle charging you do at the house or not. And the there's good news there. Half of that load can be delivered by rooftop strangers have, you know whether we should boast or not, we have the largest rooftops in the world. And we have some of the best solar in the world so we can produce the great majority on the rooftop. In the US it's about half of that load can be done on the rooftop here. It might be two thirds, but it critically it's not all so this is not a game of it'll be all rooftop, it'll be all grid. The answer is yes. And all of the above. If you're telling a romance novel story of how all this plays out, and you can invent the perfect country with the perfect set of policies, that country would have Australian rooftop solar policies. It would have California non Norwegian electric vehicle policies and would have German or Japanese or South Korean heat pump and building technologies. Unfortunately, we don't have any of those sitting in the one place yet. If you run the thought experiment, okay, what if we had California AV policies in Australia? And we had, you know, really progressive building? How do we decarbonize the built environment sector as well. And then you think about the prices that batteries are going to be in 2024. They're precipitously dropping, solar is going to drop further.

Unknown Speaker 18:44

ie V's are going to be at parity with petrol counterparts 2024 2025, you can now start to model out, well, what's it going to look like for household economics? In the US, they spend about four and a half 1000 US dollars a year on energy and a household in Australia, it's six to 7000 Australian dollars in the US that bill once we electrify and we're a little bit astray or a little bit, Korean, a little bit Norwegian American households will save two to two and a half $1,000 a year. Australia does even better because our chart solar is so cheap, and there's so much but we have the potential here to get to two and a half to $4,000 per year savings per household in Australia, which is you know, 10s of billions of dollars of savings for the whole economy. And quite honestly we're going to live in a

future that is abundant and cheaper. But we're still having a climate conversation politically in most countries of the world that is about trying to just barely get to 90% instead of the conversation if we're going to get the 120% is going to be so goddamn sheep that we're all going to be you know swimming in savings and really enjoy the the better health because we won't be burning toxic things in Inside our houses and ruining our children's lives, but that's because the environmentalist movement and a Danny introduced the show. It's like it's not just hippies anymore doing this. But unfortunately, the hippies started a narrative that we have to have like efficiency and smaller cars and smaller homes and smaller all the things and we might just get there if we sacrifice enough. But we need to have a different conversation now about what happens with this complete transformation. And how do you make that as good as possible and which constituents should win. And let's just be very, very clear, depending upon the policy choices that we make right now. And we means that whatever country you're in those savings that could go to the household, we could make mistakes and allow those to go to the utilities or to other larger players. And, or we could allow it to go to third party companies that want to lease you these goods. And so I think we're at this unbelievable critical point where a government that wants to just come in and solve this and wants to do it, on behalf of its people could be telling an incredible story about how we're going to make policy choices that makes sure that in this transformation, the people who are going to be who are going to win and the punters in Penrith, and the former auto union people in Geelong. And here's how we're going to create jobs in your community and save your household money. Yeah, unfortunately, we're miles from that conversation. And we're still in abstract climate conversations about commitments. Net Zero, what does zero mean? I don't think anyone here knows what netzero means. Because it was consciously confused by the fossil fuel industry that very what net zero even means. So like, let's talk about things that matter to real people. Yeah. And again, to move the politics because we're gonna be dragging the politicians the hallway, the hot for the next two decades. Yeah.

Ebony Bennett 21:54

Yeah, that's right. So I was gonna ask you just as a follow up, I know a lot of the researchers here at the Australia Institute, were pretty motivated by the super Sankey map, that you did have the energy flow in the US. Just to get a little bit technical for a bit. I guess I wondered if you could explain what you did with that map and why you put it together? Your army to flash it up on screen? Yeah, hang on. Let me see if that's possible. Here we go. Yep, you should be able to do that if you like.

Unknown Speaker 22:36

All right, here we go. This is a, what's called a Sankey diagram. You read this from left to right. Typically, and it's a flow diagram. So right over here on the left, oh, takes a second. But this is where the natural gas enters in the economy, the call biomass, nuclear, wind, solar oil down here. And then this is how they're transformed and moved into sectors, things like the commercial sector, residential sector, industrial, etc. But you can see we've gone into incredible detail here. So we look at how much energy is used in mobile homes, how much energy is used in things like transporting one quarter of 1% of us energy is is diesel fuel being used to in freight rail to move coal from where it's mined to where it's burned in a power plant? Three quarters of 1% of us energy flow is the using natural gas to pump natural gas through 1.4 million miles of pipeline. There's, you know, we go break it down by type of building how much energy is used in churches in schools and warehouses

in, in food stores, etc. By trucks, how much energy by cars, light trucks, by motorcycles, etc, etc, etc. And with this level of detail, you can actually now run the thought experiment of what happens if we electrify the entire economy? And once Yeah, there's a couple of crazy things that happen here. One thing is the American uses 100 quads. That's a large amount of energy. If you electrify everything, the efficiency of the electric machines is so high that the American economy same sized cars, same sized homes would be doing everything with only about 42% of the energy it uses today. That's also true in Australia. In fact, he's the same thing for Australia. Not quite as much detail because we're limited by data sets. But that's the Australian one. Why is the Australian climate conversation it's quite apparent when you look at this this giant gray box at the top which dwarfs all of the domestic energy economy. Is our export economy. So this is call predominantly here, natural gas in purple here, tiny bit of other fuels, all goes to export. And so it is our fear of loss of those exports that has our climate conversation focused on the industrial sector, as opposed to the positive versus what is going to happen and what's good for the household, which is in the domestic economy over here. And we tell ourselves Little Lies, yes, we export 60, or $70 billion worth of coal every year. But we only make a small margin on that we probably only depending on if it's a good year, we make 20 or 30 billion on a bad year, we make five or 10 billion in profit, we spend more 32 billion importing oil to run our cars, then we make on all of our exports of fossil fuels. So this entire giant thing up here that we're allowing the driver, the Australian climate bus conversation isn't really even a net economic when it does create some jobs, but it's not going to create anywhere near the number of jobs of living in Danny's future where you know, every trading knows how to install solar, how to upgrade the heating and cooling systems in your home to make them electric, and how to install a couple of vehicle charges. And in 10 million houses in Australia, that's that's going to be much better economically much better in terms of jobs. So I think getting us to focus our climate conversation here on the domestic economy, change the politics, change the conversation, one that's positive one about saving money, not about fear of what we're going to lose. And that's very important to me. Yeah.

Unknown Speaker 26:42

Can I just go back to something really important that Saul said, I mean, I think there's a lot of important there, like, let's focus on the domestic economy for the gains we can make as a nation, but really treat the export business as we should, the reality of it. But even before he said that there was this point that may have been lost from the US example, that you know, 100 coordination, which is an enormous energy hog, as we all know, when it electrifies. To go back to the topic of the day, it goes to a 40 coordination, because we get rid of all the thermal inefficiency of burning shit to boil water, which is basically the electricity system we inherited from 200 years ago and really haven't innovated. And then along in 1954, came the solar panel. And the last 50 years have been about getting that to market and then the last 20 years has been about that booming and you know, all the while all the official conventional wisdom was our doesn't, it's too small to be interesting per Bill Gates, etc. And then last year, they basically buckled and the I sure one of his miracles will save us. Yes, one of his Hail Marys will get us there. Instead, we've got the things we need the solar, the wind, the storage, we know the technology solutions, the finance world even knows that and wants to fund it. They want certainty. They want targets. They want support and the right market settings and off to the races. And we get that huge efficiency gain. And I know a lot of the audiences I

Unknown Speaker 28:05

actually have the numbers. Australia's domestic economy today is 6500 petajoules. If we electrify everything, it'll be under 3000 petajoules it again, it's about a 40% discount. But in reality, we're going to put in much much much more solid, much, much, much more wind because Australia has the best of both of those resources in the world. We will use that to to electrify the steel making and the aluminum making industry. And instead of sending coal to Japan and iron ore and bauxite oft in the Asia, we will up process them with the cheapest electricity in the world because there's no way those high density high population density countries are going to compete with us on the cost. We are newable so we will if we wanted to do this right, the exports conversation the industry conversation is we're gonna have the cheapest electricity in the world, let's electrify the industries that consumed gobsmacking amounts of money which energy which is iron and steel and aluminum. And let's make an enormous profit on selling high value exports instead of selling or even

Unknown Speaker 29:09

or even lithium ion batteries. You know, Robin Denham was in the press the chair of Tesla and Telstra boss and she was pointing out you know, we sell $100 million worth of dirt with lithium in it literally rocks ground up to be baked in China at 1000 degrees C to be turned into lithium carbonate some powders so that they can make batteries out of them that we buy back for billions of dollars. So for $100 million worth of dirt, we get to buy a billion dollars worth of stuff. Why don't we do that here with this incredible surplus of clean energy which we can produce on this continent?

Unknown Speaker 29:42

Yeah idea that you're gonna make electricity Australia at one or two cents per kilowatt hour converted into roughly 70% efficiency if you're lacking into hydrogen compress it losing another 15% of that energy having to store it costing huge amounts of money ship that off that will be fixed. cent per kilowatt hour as the basis remember that half of the cost of steel is the energy cost into it. Right? This idea that you were going to ship hydrogen to other countries to make steel. It's just stupid. But we're still have we're still having these Neanderthal conversations that an undergraduate is who's a C student in physics would tell you a bad idea.

Unknown Speaker 30:23

We could take the hydrogen in the steel, the iron ore here and do it here is the point.

Ebony Bennett 30:26

Sorry, no, I can't say the Australia Institute has actually done a little bit of research on a couple of things you've just mentioned there. So the enormous emissions involved in our exports and how much energy is actually consumed, just digging stuff up and exporting it, particularly our LNG industry, as well as couple of the other things mentioned there. So we went ahead to our website to check out some of those reports. But I think we might go now to questions from the audience. We've got a bunch of really great ones here. So we'll try and get through as many as we can. So the first one I want to ask is from David Mikkel john, who says, it would be good to hear a little bit from the panel about what needs to change in Australia's grid in terms of rules and infrastructure, to

allow the electrification of everything. So Danny, I might come to you first, an idea of the barriers or what needs to be done?

Unknown Speaker 31:20

Well, you know, as you said, I'm not deep in the weeds on the market rules that are being established right now by the various energy agencies, but you know, penalizing solar producers rather than promoting, they're doubling so that you can get to the production levels that Saul mentioned. And, and whatever the limit is, which you know, new technology and new business models will continue to push the boundaries of is, is obvious. So like, let's not cramp our style. Now, just as with getting going, you know, we installed two, two and a half gigawatts of rooftop solar last year in Australia, how much more can we do and lead the world plenty of that. But then there's also a whole lot of rule setting that needs to be done to take advantage of the headroom in our distribution and transmission systems, you know, weird little details around regulations of those green boxes that you see outside your house, which limit how much bidirectional flow of electricity is even possible into the distribution layer, or how much transmission is able to carry per the default settings in the software, which really governs it. All these sorts of things are open to innovation. This is where we live, we do a lot of software businesses changing topographic rules and the ways that these systems are run, and then widgets that sit interstitially in the system and improve the dynamic and the flexibility so that the grid can achieve the greatest decarbonisation at the lowest cost. And the key piece there for that grid flexibility is enhancing AV service equipment, charging infrastructure, I mean by that, and Evie adoption. And you know, that's everything from bus depots being seen as major assets in grids, like Sydney, with the transit agency here to your car in the garage, getting allowed to be veida Ah, at least vehicle to home asset, a demand response asset, charging flexibility asset for the grid operators, all those rules are yet to be crafted and there's different islands.

Ebony Bennett 33:18

Yeah, just to check in there. So when you say be equal to home, that means like your home could be drawing on the car to power it.

Unknown Speaker 33:26

And, you know, I mean, famously, the Ford folk have just rolled out the F 150. But an electric one, you know, a big truck that trainees love, it's the most sold car as sold taught me 42 million or something other so far in history. And it's the most popular vehicle still to this size, as many as Volkswagen beetles is its bragging rights. It's now electric. And it's an uninterruptible power supply for your home. So you can imagine Texans who just went through this horrible winter with a week or more of blackout, going to be buying this thing in droves because they can plug it in and run their home circuits. For three days or so. On the back of this truck. They can also power their tools with induction charges in the truck, you know, the tradies are gonna love it. And it goes like the clappers, and it performs like a Tesla. So you know, they're better, cheaper, faster cars, that's a $40,000 unit sunrun one of those big solar innovators in the states is wrapping it with a financing product. So you can go solar, get your Evie charger and battery sort of power wall type device, along with the Ford when you buy it. That's the future bundle that we've got to create business models to allow

consumer adoption of make it easy. And a really critical point soulmate that I just want to underscore is for everyone, you know, this 100% doesn't happen if it's not for 100% of the population. And it could become the political turf war of our time, all the cultural content if we don't fix for the financing. But the good news is when we have massive rollouts of new infrastructure in a period of very low cost debt like today We can do this and be creative with financial innovation as well, the mortgage products actually, that we're so used to, by an age were designed to allow homes to be bought in America with a 30 year product, what's the version of that, that we need public and private finance partnerships to collaborate on to get this electrification of everything, all these appliances, all these cars, bought by everyone as they replace their current stock, and continue into a better cleaner future? Thank you,

Unknown Speaker 35:30

I might just jump in just on reforming the electricity sector in Australia. I now we spend a lot of our time of your strategy, just basically putting out fires in terms of some of the silly things that do come forward like taxing rooftop solar, because it you know, the claim is it's an impediment congest the grid, or alternatively, like the electric vehicle tax in Victoria, just tried charging a road user charge because they won't be paying the fuel excise, according to many politicians there. But worse, right now we're putting a submission in today to the energy security board is that an option to build a coal capacity market pay Australian coal fired power stations to stay on the grid longer to provide some sort of security and reliability. So a lot of the money that we spend is really is putting out fires, I think about this

Unknown Speaker 36:17

issue in enormous detail. I literally drawer in my head, the wires from the plug in your wall that your TV is plugged into, all the way back out to your meter on the side of your house, up to the electricity poles is eight and a half million of those utility poles in Australia, they connected 10 odd 1000 substations, and from those substations, they go out to the transmission grid. And when you think about that infrastructure, we will need new transmission infrastructure to bring the wind and the solar industrial resources to our population centers, not a huge amount, not as much as the scare mongers would have you think, but we definitely need new transmission infrastructure. But that looks like fantastic rural jobs. The eight and a half million utility poles, that distribution network is where all the action is because that's now going to deliver three times as much electricity, some of that's going to come from that transmission on the input side. But a lot of it if we're designing for the cheapest energy system of the future, a lot of it has to come from rooftop solar. Let me say it again, Australian rooftop solar, I can probably get three quotes this morning and woolen Gong at 90 to 95 cents a watt is about four to five cents per kilowatt hour of electricity. The green in Australia struggles to get it to you for 20 cents a kilowatt hour. The transmission costs alone in the US transmission and distribution costs alone are higher than the role rooftop of cost of solar in Australia and in Australia. I mean, in Australia, the transmission costs are even higher, because we have a low population density. So to get the lowest cost total system, you put as much solar as you can, on the roofs, you limit the amount of transactions and you put as much batteries in driveways on the sides of homes and in that distribution network as possible. We're at a crossover point where it'll probably happen 2022 2023, where we will be able to deploy lithium batteries onto the grid at 100 ish dollars a kilowatt hour with 2000 ish cycles, which is five cents per kilowatt hour storage cycle. So five cents

solar five cent storage cycle, that's 10 cents a kilowatt hour for 24 hour hard and renewables. And that's half the cost of what the Australian grid can deliver. Right. So the lowest cost system is going to be the maximum maximum maximization of that, but we will still use these industrial ones to top it up. And to provide more redundancy, more geographic distribution so that a cloudy day in Melbourne doesn't scare you as much because you're pulling from rural South Australia. So we've got to build that out. And that's how you get to the lowest cost system. There is already sufficient bandwidth in the local distribution network to support this because it was designed with basically 19th century engineering rules, which means you have to design the copper on your distribution network, assuming that every single house has every single light bulb on and everything else. But that never actually happens in the real world. And there's this thing called software. And there's these things called like the internet. And we're going to make it look like the internet, we're going to have the software make sure that when Danny wants to charge all three of his f1 50s in his driveway. it'll, it'll dial down a few other activities elsewhere in the grid. And that's that software layer is where Australia, Australia has arrived first in this future because of the deployment of rooftop solar. We could if we chose if we got rid of these regulatory rules that are trying to support legacy call and legacy natural gas and we embrace the future and we just said okay, It's going to be same rules of the road for everyone, whether it's a car, whether it's your rooftop solar, or whether you're aging coal or natural gas plant. So just sort of make it same sort of rules as the internet, no information packet has special priority. When Scott Morrison sends an email to Joe Biden, the Tech has the same priority as when I send an email to Joe Biden, we need those rules for the electricity grid, you might think of that as grid neutrality to mimic internet neutrality. And if we had those policies in place, now Australian entrepreneurs, the people who are doing this, we'll create the technology layer that balances there's all of these future loads. And that's where we have an opportunity to make export technologies and do really well. This is why Australia should be leading the world we have, because of our success on solar, because we are now facing these problems. First, we could be showing the whole world how this is done, we should be consequently setting the highest and most ambitious climate targets and we should be pulling the rest of the world along behind us in our wake, instead of right now roughly acting on the global stage as a Petro state. our peers are now Russia, Saudi Arabia, Venezuela and Brazil.

Ebony Bennett 41:19

pretty depressing. And I think the barrier here certainly in Australia, really is politics and politicians to a certain degree. So the next question links to that soul. So I'll come back to you. There's a question from Jason dromana, who says the political movement is a critical component of the strategy you outlined earlier. And how important is it to get the politics right as compared to the other strategies?

Unknown Speaker 41:47

I personally think this is the most important thing, we need to make this the politics of parameter and the politics of jilong. We need single mothers to be advocating for saying electric vehicle policies so they can save the most money in the future. It's not until we have a plurality of Australians seeing that this is good for them good for their jobs, good for their children. All studies now show, particularly if you are low income, that burning fossil fuels in your house through natural gas and your cookstove. And for heating your home is killing your children and causing respiratory illnesses,

diesel fumes, and particulate matter from burning, gasoline is still one of the worst things with it health wise, even in developed countries like Australia. So we need to make the politics around, we now have viable options that improve those health outcomes. And we have viable options that if the government plays nice, and we make public private partnerships, around fixing the regulations, it's going to be an economic win for everyone. get that message out. And have you know, I honestly, my fantasy and I still don't think it's impossible is the next election in Australia will be a bidding war between the two parties trying to be the most ambitious and figure out the details of this so that the meet the populace is demand. You know, we say the fires are still in our fresh in our memory. And I think people you know, Australia likes winning, we should be we should be appealing to the Australia still likes to bet, you know, to win more gold at the Olympics than any other nation per capita. Right, let's appeal to that with Australia can get more Gold's on climate change per capita than any other country in the world, it's gonna save your household money is going to improve the health of your kids, and turn that into the election issue for the next election.

Unknown Speaker 43:40

And I was gonna say that links back to Rich's point earlier about, you know, the Australia Institute has to just fight fires and have these skirmishes of the ESB and wherever you're currently submitting to about arcane rules, and you know, there is no net neutrality, obligation and understanding, we need a movement to get that so you know, as well as ti and the assignments here, which does wonderful work, obviously hosting this panel, we need the solid citizens and the beyond zero emissions and the ACS and the others that have been raising up the army for that argument as well. And to Saul's point, it should be, you know, the unconventional voices in that conversation, probably the take it forward, the folks that get the jobs out of it, who are the contractors in Sydney that to get around a boom right now out of the COVID stimulus, but where that's where's that going to go? Guess what, there's years of good work fitting out and electrifying everything in the homes of Australia for them, the mothers and others all that we need to organize them to. So it's collective action by the movement as well as these market forces.

Ebony Bennett 44:42

And we've got about 670 people on with us today. Thanks so much for joining us. The next question that I've got here is around how it's from Linda Tilburg. How close to scale is the tech to switch industries such as steelmaking? Lu l iminium. Those types of things to renewables. I'm not sure Saul or Danny who wants to take

Unknown Speaker 45:07

it, I'm happy to answer that. My first job was in the blast furnace in Newcastle second job was on the rolling mill third job was in an aluminum smelter in Western Sydney for comarca. So in my first degree was in metallurgy. So this one is near and dear to me. These technologies, the technologies to decarbonize that sector are not ready to go at scale. However, there isn't a crop on steel in Europe, Alcoa, in partnership with Apple on aluminum in El iminium. Now I can say it properly that I'm back down under they, there's, there's processes that look good and have us on track for both of them. I don't, I think we are driven by fear of not having an answer for steel, and aluminum. In Australia, that's a little bit odd, because mostly we export bauxite, not steel, and aluminum. So this

should be seen as an opportunity where we get to participate in those innovations. And make that happen. Really, the things that are ready to go, right now I think we can get there I see on aluminum within the decade, pretty confident most people who are working on that problem feel the same way. It's a huge, it's a small number of machines with high capital items problem, the things that are ready to go with a very large number of small machines, which is the V's the heat pumps, the batteries, that's the one we should be, you know, if you were prioritized, we're getting the cart before the horse which prioritize the things that you can deploy now to change the demand side. And you know, we will be doing clean up, quite honestly through the 2030s on the remaining difficult industries. And that will be deploying internationally steel and aluminium Australia, as I said before, absolutely can win that or win a very large chunk of that. And you know, the other things that are going to be hard in the 2030s are answers for long haul aviation, obviously, that's built in Australia, but there's more, you know, it's only a small portion of global energy about one to 2%. in aviation fuels, there's more than enough biofuel in Australia could do domestically produced biofuels from Sargassum or seaweed. And easily do that we could be a major player in that as well. You know, right now we burn sugar cane to to make sugar. Hence, instead of really thinking about it as making an end of the biofuels, like Australia could creatively play that I think we should D prioritize those in terms of the immediate conversation there. Because we know what to do on the domestic economy. And then the where our r&d dollars should be spent, are in those hard to decarbonize sort of the cleanup on the last 10 or 15% of emissions.

Unknown Speaker 48:03

I'm going to add a little dissonance with Seoul just to be controversial. I think the steel milling solution is going to come faster than the 2030s. You know, one thing that Australia should be very cautious about is in the 14 five year plan in China, which was just promulgated earlier this year, where they're going to peak by 2030 to get emissions down to 2060. The steel plan within that, like they do sectoral plans, says that by 2025, they're going to peak steel emissions. So you know, they're going very hard right now into recycling and working out a lot of these new technologies. And you know, when China says that a five year plan, they're going to do something they kind of tend to do it, you know, they're doing a terawatt of solar and wind and this one, the last one, the solar wind targets were exceeded by 40%. So you know, as the largest consumer of our iron ore and the largest steelmaker on Earth, I think somewhere close to 50% of all of it. They're planning on peaking missions come 2025 they're working hard. We run an incubator in Chengdu in Sichuan Province with a single high University out of Beijing. And that incubator has heavy industry, lab rats and all sorts of experiments and systems and software to optimize the lawmaking in that country and things could pop pretty quickly. And our iron ore exports unless we value adding them with things like hydrogen and what you know, we can create, we might lose out on that one too. So lots to play for but really a

Unknown Speaker 49:34

lot of Danny's argument is it's a small number of large machines. So getting it right once means, you know, you buy five big steel mills and you're done globally, so it is more binary the outcome and winning or losing. Also really a lot of these stories steel as the large, you know, steel making for recycled steel is an all electric process already. Steel is one of the most recycled materials in the world that's only improving and increasing. So the conversation we're really having and China

because they import the world's steel and recycle it, that's partly how they get those emissions reductions. The real conversation here is around virgin stiff.

Unknown Speaker 50:16

Ebony, I was just going to add just on on elementium, just a plug as well, the Australian suit has a paper coming out on Friday around carbon border adjustments. And it does find that of all the things that Australia's exposed on the submissions intensive, it's in particular our aluminium, given that we export almost all of it. And also the way that we do make element in here won't really compete with others, given that we do use mainly coal. And so there are interests for Australia to actually start shifting this and

Unknown Speaker 50:44

I can't jump on this one, please. Yeah, yeah, because I just want to emphasize the opportunity here. Aluminum is an all electric process already. emissions from aluminum A, B, from using a carbon electrode in the reduction process, and so you get carbon dioxide burning off that those carbon glampers the process that processes that are being developed to eliminate those emissions are using aluminum or native metal or alloying. electrodes, all of the other emissions from how your producer electricity, unfortunately, we'll go TriCity yeah is when natural gas or coal. If we upcycled all of the bauxite we export from Australia into aluminium, the amount of electricity required is larger than the entire domestic energy load in Australia, if we went all in on the renewables to do this, and remember, when you make aluminum make a giant bucket that's really hot that has something called thermal inertia that lasts a really long time. It is as the Australian aluminium industry could be the world's biggest battery. If we thought strategically as a nation, how do we make this the best for Australia, we could deploy far fewer electrode chemical batteries, which are expensive, because we could balance the entire renewables grid in Australia just by throttling up and down on our electrified aluminium industry and our electrified steel industry. Right. That's how you win at scale. That's how you subsidize Australian electricity prices while also producing the cheapest aluminium in the world. Right? We were turning everything into arguments that like fees instead of trying to find the double victories.

Ebony Bennett 52:30

Sounds like a good summary. Um, I want to go back down to the household level from scale. I've got a couple of questions here from Chris and Nicole, to ask him about the household savings that saw mentioned, do they consider the increased networks cost to allow two to three times the amount of electricity to flow? Won't network costs just go up? And just separate but linked? Nicole asks how to renters participate who don't own property and can't access? rooftop solar? And I guess questions around Yeah, the households there.

Unknown Speaker 53:09

These are two great questions. In the optimistic version of this where we write distribution policy correctly, and we're putting two or three times as many electron electrons over that same

distribution network, the distribution costs will go down. Because you're you're amortizing many more electrons over the same number of miles of copper of wire and the same number of people in fluro collared collars that have to climb the pole occasionally to fix a fried possum. So there's every reason to believe that distribution costs go down massive deployment of batteries on the distribution network and in the household as with electric vehicles, as with house home batteries, and even thermal batteries for our hot water and space heating systems will also lower the total cost of transmission and distribution because your your any any anytime you can get the battery closer to the end use and you can get the electrification close to the end, yes, you have a network saving compared to having to transmit it, you know, 1000s of miles. So I'm optimistic that with the right policies, we will lower the net cost of distribution. And then because of the much much lower cost of the solar rooftop solar and the batteries, the total cost of electricity will fall. That is that is what we can when the last 5% might need to be very expensive and might have to come from far far away, then that will be 5% of your bill, not 60% of your bill. The second question is harder to answer and is really going to come down to finance policy buildings policy and how do you do it? I don't think The world has a satisfying answer to the second question of how do you pass the savings on to renters. It's quite obvious how you pass the savings on even how you would attach the infrastructure investments of the electrification of your furnace and your hot water, etc. Like that will ultimately be reflected in property values. You know, it's a little bit of a joke for me, but it's kind of true. The Australian real estate Ponzi scheme is the greatest creator of wealth here, this is another way to pile on that. But how you get that passed through from landlords is going to be about how you regulate landlords and incentives that the government I think a lot more deep thinking needs to go.

Unknown Speaker 55:45

There are some good little startups testing some models and its business model innovation for renters and multi tenant dwellings, you know, there are without dropping too many names, the power shops and the alarms here in Australia and others trying to crack that nut. But it is a more complicated one, because the split incentives and stuff. But we get to solve prior and bigger point, their win wins here. We can work this stuff out community garden, solar gardens, all that stuff is part of the plan. And renters can benefit from low costs, too. Yeah,

Unknown Speaker 56:15

there's a lot of questions, if I could just jump on it just to I think a lot of people still struggle with we're talking in kilowatt hours. And we're talking and total amount of energy. And a lot of people hear the fear, which is voltage control on the distribution network under and over voltages, because it's 2pm, and every sunny everywhere. So we've got over voltages and midnight and under voltages, we will only solve that problem by shifting as many of these loads as possible and putting a huge number of them in the batteries. In the worst case, we've got to move about 50% of all loads. But, you know, we're going to in electrifying the heat, which we can we know there are technologies off the shelf for shifting the heating loads, these huge loads, electrical loads that are going to go into electric vehicles shiftable. It's in the incentives, the business models, the software layer that connects all of those things. And does those transactions were a huge amount of wealth creation will be made. And that's how we're going to we will solve this those problems. There's no I don't have any fear about it. If we deployed batteries in the distribution network instead of way out there in the

transmission network, we could do a huge amount of that voltage control at the distribution network level where it's currently a challenge.

Ebony Bennett 57:31

Thank you, we've only got a couple of minutes to go. So I just might ask you in under a minute. What would your final message be? I don't know whether I should say to the prime minister or to the public. What are your final thoughts I guess that you want to leave us with I'll start with you, Danny.

Unknown Speaker 57:51

Just back Aussie ingenuity. I think they're amazing startups that have been working on this for decades here in Australia, the solar analytics crew out of the US w solar space all those people, we've got to get them and to share their know how and smarts with the world and start exploiting that even bigger countries with bigger problems. So we can solve them because the atmosphere is a common heritage of all of us. And we need all of this shared globally this decade.

Ebony Bennett 58:18

And to use all

Unknown Speaker 58:22

make this an election this year doesn't matter which party wins on this platform. We just need them both fighting to do the best job at it. I think that's hugely important here. Broadly, were making Australia writing Australian energy policy today as though the technology of yesterday is the only thing that's ever going to exist. The only way any country in the world is going to get from here to there, where there is you know, happy lifestyles happy populace not a lot of climate change is by writing policy. Now as though it's already 2030 these things are fait accompli if we spend another decade nibbling at the edges of the regulations and the policies instead of going all in, we're gonna waste the decade.

Ebony Bennett 59:14

Thank you so much, Danny Kennedy, so Griffith Ricci missoulian. And thanks to everyone, for all your great questions. I'm sorry, as usual, we only got to a couple of them. I want to make one big pitch before everyone goes. It is the Australia Institute's end of financial year appeal on right now and between now and June 30. every donation will be matched dollar for dollar until we reach our target so please consider making a donation at Australia institute.org.au. These webinars as I think as you know, have been so important, I think for opening up the national political debate and giving the public access completely for free to some of the world's best thinkers like daddy and soul. We've hosted Nobel Prize winners. At least three prime minister former Prime mini investors, medical experts, academics, politicians from across the political spectrum, authors, activists, academics, you know, people from all over the world and every donation big and small really helps not only the

webinars, but obviously the Australia's independent Australia Institute's independent research. So please, if you can head on over to Australia institute.org.au to check that out. And make a donation today and double your impact. Thanks so much for joining us. Thanks so much to our guests. I know I often find discussions about climate change can be incredibly depressing, but I feel very uplifted and hopeful after this today's discussion, and I hope that you all do too. Please join us next week for Richard Flanagan. That should be another good one. And thanks so much for joining us today. See you next week. Thank you

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