The Liveris Academy: Global Leadership Podcast

Max Foreman and Alan Finkel

Andrew Liveris

There's never been a more important time to make a difference and create better lives. I'm Andrew Liveris, former chairman and chief executive officer of the Dow Chemical Company, and the former executive chairman of Dow Dupont. In this podcast series, you'll hear from one of our Liveris Academy scholars, interviewing a leader they identified as being important to them.

Max Foreman

At present, we grapple with a lot of volatility. Advice that Andrew Liveris has shared with the scholars of the Andrew N. Liveris Academy, is that we should consider this state of heightened volatility condition normal and create purpose out of the disruption. Undoubtedly, rapid anthropogenic climate change is a key source of disruption that leaders of today are working to reverse. In this case of disruption and many more, effective and inspiring leadership, science and technology will be cornerstones to eliciting change. And who better to continue this discussion than the inspiring leader and change maker, Dr. Alan Finkel.

Hi there. I'm Max Foreman, and in this installment of the Liveris Academy global leadership podcast, I have the absolute honor of hosting Dr. Alan Finkel to discuss effective leadership values, the electric planet, and how emerging scientists can help us get there. Dr. Finkel has an extensive background spanning entrepreneurship, engineering, neuroscience, philanthropy and being a champion of STEM Education. Dr. Finkel served as Australia's chief scientist from 2016 to 2020. And as part of this role, he led the 2017 national electricity market review, the development of the 2019 National hydrogen strategy and chaired the panel developing the 2020 low emissions technology roadmap. Dr. Finkel is currently Special Adviser to the Australian Government on low emissions technology. Thank you so much for sparing some of your valuable time to speak with us today.

Alan Finkel

Max, it is my pleasure.

Max Foreman

To begin with, could you describe your trajectory to becoming Australia's chief scientist, and what your job description and responsibilities were?

Alan Finkel

Max, it's one of those tough questions trajectory was a bit of a zigzag. So I didn't have being chief scientist in mind. You know, life is often choices that happen on the spur of the moment and a question of seizing the opportunities. I always thought I would be a doctor as I was growing up. And then at the last minute, when I was applying for university, I realized I didn't really have the personality to deal with sick people and old people, but I liked the technology of the body. So I decided not to do medicine, and I applied to engineering, and I liked physics and maths. So I chose to do electrical engineering. I did a PhD in electrical engineering, in which I had the opportunity to go back to my original interest in biology

in the human body, by combining my electrical engineering work with the study of the electrical activity in brain cells, you've got about 100 billion brain cells, I hope, Max, and they talk to each other, both chemically and electrically. And so it's a complex network. It's fascinating for electrical engineers to study the electrophysiology of the human brain. So I did that during my PhD, I did two years of postdoctoral research at the Australian National University. And then I, for many years in my PhD, and during the postdoctoral research, I was coming to grips with the fact that I wasn't a very good researcher, researchers have a hypothesis, do experiments, gather data, and then continuously refine their hypothesis. It's a sort of exploratory phase, the same time I was designing the equipment that I needed, and I loved doing it. So I was designing exotic electronic equipment to measure with great sensitivity, the electrical activity in individual brain cells. And so I decided that I would leave academia after a couple of years of postdoctoral research and I went to America, and I started my own company in Silicon Valley, before you were born. And before most people had even heard of Silicon Valley, that was back in 1983. And it was successful. I ran that company for 23 years, and we got bought out. And in 2006, the first of January, I retired. And that was my first big failure in life. I failed retirement 101. That miserable status, don't want to be in a retired state. But I did enter what I now call my third trimester in life. Life consists of sometimes three trimesters, the first is zero to 30, or roughly, it's all about me, growing up, learning, educating, falling in love. Then from 30 to 60 is the second trimester and it's investing in your family and in your career, and doing what you can to be successful. And then if you're lucky, you have the opportunity in your third trimester to give back to community. And so I started in that phase, but I never really had a plan and opportunities came up. I got a phone call from somebody who said, Gosh, I'm heading the committee that's looking for the next chancellor of Monash University, would you consider being on the list of potential candidates? And I said, What's the chancellor? But I did, and eventually I got chosen to be the Chancellor of Monash University. So I spent eight years as the chancellor, by the way, in case some of your listeners don't know who the chancellor is, one of my friends said, Oh, that's the Grand Poobah. The chancellor is the head of the Council that is responsible for the university, the day to day responsibility is the Chief Executive Officer, known as the vice chancellor. So I became chancellor Monash University, I became president of the National Academy of Engineering and Technology. I joined an electric car charging company very early on in 2010, before electric cars had appeared in Australia, as the part time Chief Technology Officer, I started some education programs just doing all sorts of things for general public good.

Then I got another one of those phone calls. Alan, would you consider putting your name in the ring to be the chief scientist of Australia? And I said, no, leave me alone. I've got other plans. But my wife said, Alan, you should do it. Your country needs you. My business partner said it's as if you've been trained all your life for this. I went through the process and I became chief scientist of Australia. So that's the trajectory. It's a zigzag. But your second part of your question was, what's the responsibility of the Chief Scientist? Sounds like you get to manage all the scientific endeavor in Australia. But it's not the case. It's a policy advisory position. Probably better titled in the UK where the same role is referred to as the Chief Scientific Adviser to the Prime Minister. In Australia, it's the Chief Scientific Adviser to the science Minister, the Prime Minister and other ministers were relevant. And also, part of the job description is to communicate to the public about the opportunities in science, research and innovation. It's a very loose job description. Each chief scientist kind of works out what they're gonna do with the intention of doing the best they can to inform the government and the public on matters to do with science, research and innovation.

Max Foreman

You've had such incredibly diverse experiences. So I would now like to discuss values that you've held in and amongst all of these incredible roles. In the Liveris Academy, we're taught the importance of recognizing and upholding our values to realize a purpose that we find significant. As an introduction,

what are your values? And how have they guided your work and leadership as chief scientist and in preceding roles?

Alan Finkel

So probably the most important value that's relevant to the activities, the roles that I've had, is just a complete commitment to integrity in everything that I do. People band you around terms like evidence based, etc. It's important, I do feel that I'm respected by both sides of politics and others in the research and industry communities. Because I've never taken an ideological position. I've never overstated the circumstances or misrepresented the circumstances. Evidence based means that when I've led reviews, and I've led a lot of reviews for the government, I've always consulted widely, so that the content of the review is informed not only by my fellow panel members in the task force that's supporting me, but by the information. The evidence comes from consulting widely with the political community, the academic community, the investment community and the industrial community. So I'm using the word integrity pretty broadly. I don't mean, gosh, I never tell a lie. I'm saying it's much deeper than that. Everything I do, is informed by the facts that are out there and told, straight down the line. So that's one, let me give you another one. Not so much a value, but a skill that I really do recommend that everybody develop. I have – unfortunately, this is not a video so you can't see but Max you can see your leaders can't see - I've got two little antennae coming out of my head. And those two, little antennae are my BS detectors, you can look up the definition of BS. So you really have to be aware that a lot of what you hear is exaggerated, either intentionally or unintentionally. Or just confused information that's being conveyed to you. So having those BS detectors to cut through is critically important. And when I feel them buzzing, I challenge people, I say, well explain to me how you came to that reason, you know, to that conclusion, what was the reasoning behind that. So having finely tuned, BS detectors, is an important skill set that all of you should try to develop. Just don't accept things as they're presented to you. It's obvious when you see a label on some alternative medicines that it's crap. But sometimes its much more subtle than that and that's why you need those BS detectors. And then going back to values, another value that is important, especially in the world of social media and outrage where people are just angry all the time about what they hear other people say, I've learned to listen to people and hear what they say for their good intentions rather than interpret what they say for the potential bad intentions. People are judged word by word for what they say. And it's not fair. Often, their intentions are just fine, but they didn't choose the language exactly correctly and so they're interpreted negatively. Swap it around, you know, interpret people for their good intentions, rather than looking for bad intentions. One more, one more. I always try to treat disrespect, or to respond to disrespect, with respect. It's never worth going down the spiral of a disrespectful response to something disrespectful that's been said. And it's amazing how you can prevent people from going down just an ugly path by staying positive in all your communications.

Max Foreman

Wow, what fantastic values you hold. That's, it's incredible to hear. And there's a lot to digest there. But I particularly like that idea of interpreting what people say for their good intentions, and of course, treating disrespect with respect. Now, given that you are an inspiring Science Leader, are there any attributes or values you would add to these which an effective leader in science possesses?

Alan Finkel

I don't know Max whether you've had the chance to read many published scientific papers. But the range of communication skills is from the sublime to the ridiculous. I mean, some are just so dense that

even an expert in the field would struggle to read them. Some of them are sloppy, and then you get these pristine ones, which follow the tradition of, you know, what's the problem we're trying to solve? What's the aim of the experiment? What were the methods we used? The results, discussion and the conclusion. In fine English. You don't have to hide behind jargon, in order to show people that you're intelligent. Jargon should be part of what you're communicating, not the essence of how you do it. So communications is critically important. Another thing is when you're communicating, scientists are often invited to communicate to a lay audience, many scientists get to the point where they are asked to give a public speech. Or you're giving a speech to a seminar to a mixed scientific audience where you are an expert in a certain area, you're invited to go to another university, and you're talking to maybe 50, or 100, academics from all sorts of disciplines. What's important if you speak to a public audience, or mixed audience like that, is to keep two things in mind. Recognize that the audience doesn't have the skills base. So in a sense, assume zero knowledge. But on the other hand, they came because they're interested, they're not dopes. So assume infinite intelligence. So zero knowledge, infinite Intelligence, keep that in mind and you'll communicate well,

Max Foreman

Zero knowledge, infinite intelligence. Okay, got it. I'll keep that one in my back pocket. It would be good now to transition to a topic where many science leaders are involved in at present. So could you please introduce our listeners to the idea of the electric planet, which you are a champion of?

Alan Finkel

Okay, so the Electric planet that's the way I like to capture the future energy system of planet Earth. We need to transition we have a problem. Everybody who's listening today recognizes that. We have a climate change problem. If you're analytical about it, you say why do we have climate change? The problem is because of global warming, why do we have global warming as a problem? It's because of anthropogenic greenhouse gas emissions. When you map out total greenhouse gas emissions across the whole of planet Earth, more than 70%, nearly three quarters, comes from burning fossil fuels for energy - so coal, oil and gas, for reducing energy. So clearly, the best bang for the buck, in terms of investing to try to reduce emissions is in the energy sector. It's a big sector, Nothing's easy. But the logic is clear. We need to replace oil, coal and gas. Now that's easy to say. But it will be the biggest transition that humanity has ever gone through. People don't appreciate how hard it is, there are a lot of people who say, who think to themselves, well, I put in solar panels at home or dad or mum put in solar panels at home, we put a battery in the basement. Problem solved, why can't the government get on with it and do the same? It's not nearly as easy. First of all, you've got to accept that without energy, we don't have society. You take away a controlled source of energy - we don't go back to the Middle Ages, we go back to the Stone Age. You know, deliverable managed energy in the forms of electricity, gas, coal, oil, whatever, is critically important to modern society, people are not prepared to give up their quality of life. In fact, they want to continue to advance their quality of life. That doesn't happen without energy. So we've got a serious conflict. If you look at the history of energy use, up until just a little over 200 years ago, all the energy used by society came from biomass from burning wood, or cattle dung and other things like that. Around about 1800, coal started, or a little bit before, coal started to be used across our society. And if you looked at a graph of uptake, you'll see the biomass has stayed pretty much constant for the last 250 years or maybe even longer. And coal has just come out of the baseline and grown and grown and grown and grown, it's still huge. So coal added to the energy mix. Then just before 1900, oil appeared in quantity, if you look at the graph, you'll see that oil has grown and grown and grown and grown for the last 120 years to be a very, very substantial fraction of our energy mix. So now we've got biomass, we've got coal, and we've got oil they've just added. And then just before the 1950s, you saw the same thing with natural gas where it came out of the baseline, and natural gas just

grew and grew and grew and is a huge contributor to our total energy mix. So we've got biomass, we've got coal, we've got a cocktail of energy, and everything's been added in, nothing's been taken out. Nothing's been taken out. And what we need to do now is take out coal, take out oil, take out gas, and what do you replace it with? You replace it with electricity. And it has to be clean electricity. So it's got to come from solar, or it's got to come from wind, or it's got to come from hydro electricity, or in many countries it will come from nuclear electricity. All four of those sources give you zero emissions electricity. And at the moment, it's likely that most of the growth will come from solar and wind. And globally, at the moment, they only constitute about three or 4% of our total energy use. So the task ahead of us to replace oil, coal and gas is just massive. I mean, you're talking about the last 20 years of construction of solar and wind being multiplied by 25, and we need to do that in the next 20 to 30 years, it is a huge task. But once we get there, we'll be getting all of our energy from clean electricity. And that's what I call the electric planet. Complications are that sometimes electricity is not the most suitable form. Electricity is like magic. It's just fantastic at nearly everything but sometimes it's not quite the most suitable form. So for example, long distance transport where you want, you know, you've got 55,000 giant cargo carriers plowing the oceans of the Earth, they're not going to run on batteries in the foreseeable future. So you need something else other than electrons. And one way to get a transportable fuel is to convert electricity into hydrogen by cracking water, it's another story, but it's still electricity doing the work. So it's still the electric planet. It's the vision of where we need to be, we have no choice. That still leaves 25% of our emissions from other things such as the agricultural sector and certain industrial processes, like making cement that emit carbon dioxide. They're hard, and the solutions are not all that obvious. We have to keep working on them. But if we can get rid of three quarters of our emissions by converting to the electric planet, gosh, we're doing pretty well.

Max Foreman

As a follow up, what advice would you give to emerging science leaders looking to make progress toward the electric planet?

Alan Finkel

Be realistic and be ambitious. Realistic - there are no simple solutions here, the scale of what we need to do is so immense, there are no simple solutions. On the other hand, we're at the beginning of a decade already, where the solutions are starting to be delivered, we're starting to see ever increasing scale of solar and wind in Australia and everywhere. Australia, by the way, leads the world when it comes to solar. I'm not sure that many people know this. But if you look at solar installed per person, Australia is the world leader, we have more solar per person than any other country by really quite a significant margin. So what you're seeing in Australia and many other countries is a massively increasing rate of installation of solar and wind, and then batteries, because without batteries to cover the times, night times and when the winds not blowing, you don't have a solar and wind based solution. So we need solar and wind, we need batteries, transmission lines, all sorts of longer term storage, and it's starting to happen people have vision. So it's a question of scientists and engineers working together to optimize. Optimize everything. Optimize the efficiency of the solar panels and the efficiency of the wind turbines, optimize the methods for deploying millions of solar panels to create a giant solar farm, optimizing the chemistry in batteries to take out costs to get rid of metals, such as cobalt that are not easily available, optimized recycling, because all those batteries are going to come to end of life, and will become a huge problem that will upset people. We need social scientists and ethicists to work with communities to come up with the most equitable means of sharing the benefits of transmission lines across people's land holdings, whether it's indigenous or farmers. We need to make sure that when wind turbines and farms go up, that neighbors who don't have the turbines and don't have the revenue from those turbines on their lands, but see the wind turbines in their visual horizon, as to some

extent compensated. So we need social scientists, and we need, you know, the economics are really difficult. Solar and wind are not as easy to deploy as natural gas and oil and coal generators. So the economics are complex, but becoming more and more favorable. We need research across the board, not just chemistry, not just physics, but social sciences as well, and economics. And scientists working together with engineers and being positive. You know, I don't think it really helps to go out there and complain about things as much as it helps to go out and do things. We need clear thinking. So there are some things that people want to see done that actually, when they're achieved, make the planet worse off. Let me give you an example: divestment. So divestment is something you hear about from time to time where shareholder activists have put pressure on companies like Exxon, and BP, and shell to sell off their oil and gas wells. It's called divestment. And in the last year or two, Shell, BP and Exxon have sold off more than $100 billion dollars worth of oil and gas wells. But the essence of divestment is somebody buys those oil and gas wells. And the purchasing entity is not a public company like BP, Shell and Exxon Mobil. They're a private equity company who have lower standards, and don't operate those assets as well as the originators. So the planet is worse off. Much better, much more logical, in my opinion, is to put shareholder pressure on those companies, Shell and others to continue operating those oil and gas assets but to commit half the profits or 10% of the revenue, some number, I don't want to say what the number should be, but to commit to investing their revenue in the technologies of the future, the batteries, the electric car recharging stations, and hydrogen production, etc. So clear thinking, and positive action is much better than just negative actions and confused thinking. And the obvious is not necessarily correct. It sounds good to get those companies to divest themselves. But in the long run, it's a bad thing.

Max Foreman

So you did mention solar electricity generation in your response just now. The most recent addition to the low emissions technology statement is ultra-low cost solar electricity. The goal is $15 per megawatt hour or approximately a third of today's costs. So given that Australia is a leader in this space, in terms of adoption per capita, what needs to change to enable this ultra-low cost goal?

Alan Finkel

So several things. Arena has a plan here. Arena is the Australian Renewable Energy Agency and their job is to invest - they're funded by the government, the Australian government - and their job is to invest in late stage research and demonstration projects. And they've put out a funding round called 30 30 30 where the goal is to get the cost of installed solar panels at large scale down to 30 cents per watt. And the efficiency up to 30%, all done by 2030. So that's why it's called 30 30 30, you need a bit of everything. The efficiency is important. Not because there's insufficient sunlight and if we don't capture it all we're in trouble, but because the higher the efficiency, the smaller the land area that is required, the lesser the amount of aluminium and steel that is required for brackets and the lesser the amount of copper that is required for the length of wiring, etc, etc. So efficiency is not make or break. But it absolutely helps. But a lot of the cost reduction will come from the solar panel fabrication processes, but also from the deployment. A large solar farm could have three, four or 5 million panels in it. And if each panel is taken off a truck, somebody makes a bracket, and then each panel is taken off a truck and screwed onto the bracket and wired up to a cable, the labor overheads and the time taken will just destroy the economics of the project. So investing in clever deployment approaches is part of the future success in reducing the cost. Coming up with deployment, which not only allows you to take hundreds of prefabricated solar panels off a truck at a time, but also project management. So instead of trying to do a one gigawatt solar farm in a year, if you can split it over three years and keep a smaller number of people employed on the same site for a longer time, you might save a lot in your project economics as well. There's just so many things that have to be done, Max. But Australian investors and project

managers are pretty good at these large scale resource projects and I'm confident that we'll get there. By the way, if we can get the cost of solar electricity down to $15 per megawatt hour, and the cost of battery storage to back it up down further, we will end up with consistently cheaper electricity than we've had in recent years. And that's good for homeowners. It's good for businesses, it's good for the competitiveness of Australian industry, not just good for reducing emissions.

Max Foreman

In the context of technology and science, is Australia an innovative country? What makes us innovative? Or where can we be doing better?

Alan Finkel

Look, I think we are innovative. For example, there are no international metrics that would recognize the contribution of Australia's iron ore industry to an innovation metric. What's the product of iron ore? It's dirt! Iron ore hasn't evolved in millions and millions and millions of years. But the iron ore industry is incredibly innovative. We have over 50% of the global export trade, in iron ore, and yet, I'm not 100% sure of this, but it's probably correct. We have probably the highest salary structure, especially for those workers who fly in and fly out in the Pilbara. So we have very high salary structure, which works against us. And yet we've captured more than 50% of the market based on price and quality of the product. And that's because the iron ore companies have been continuously innovative in how they operate their mines in the introduction of automation in the introduction of artificial intelligence in the introduction of advanced process control. So we've had innovation there. We're innovative in other invisible ways. When I was young and I would go out for breakfast, I was lucky to get fried eggs on toast from an expensive cafe. Now you go out for breakfast and you to get your camera out to take a photo because the breakfast looks beautiful and tastes beautiful. That's innovation in retailing in marketing. I think there's a lot more innovation across the Australian economy than people give credit. Is there enough? No, there's never enough because we are operating in a very intensely competitive world. And we don't want to lose export market share, tourism market share or anything to other countries. Innovation is not just the number of pharmaceutical products introduced to the market and digital technology products. You have got to look pretty broadly and give credit for where you find it.

Max Foreman

You have certainly broadened my interpretation of innovation. So thank you for that. Now, if you could see what today's emerging scientists are up to, say a decade into the future, what sorts of focuses and actions in the research landscape would make you proud or happy to see?

Alan Finkel

I would like to see end to end pipelines in major disciplines. And let me give you an example of where Australia gets it right. And we really haven't got this across the other disciplines. So one that I happen to be interested in, of course, is clean energy technologies. And there we've got a structure which is end to end and works very, very well. So I'm going to talk about four pillars. The first pillar is fundamental research. Some people might call it blue sky research, but fundamental research, which takes place across the university sector, and a little bit in the CSIRO and some other institutions in the clean energy space, whether it's solar or inverter electronics, or whatever. The second pillar is translational research, we've got really good structures for that, too. We've got the CSIRO and we've got the CRC’s there are a lot of cooperative research centers, which are collaborations between

industry and universities to do translational research, and there are a lot of CRC's, but a good half dozen or so are funded in the clean technology space. So first pillar is fundamental research in universities. Second pillar is translational research and the CRC's and CSIRO. The third pillar that we need is demonstration level projects where you got to take the outputs of those translational research projects and say, could they potentially be scaled up and show promise for commercial application. And there we've got ARENA, the Australian Renewable Energy Agency, and their job is to fund demonstration projects, they co-fund with industry, the projects that will show that there's potential to scale up and truly make a commercial product. And then the fourth pillar is funding the early stage commercialization of those products. And there we have the Clean Energy Finance Corporation, it's called the CEFC, which is a government funded green bank that is willing to go into earlier stage commercialization say than the traditional banks, but it often does it collaboratively with other funding institutions as well. We don't have that in many other areas, we've got something a little bit like that in medical devices and pharmaceuticals. But most other areas we don't, we've got funding in fundamental research funding, and some translational but not the third and fourth pillars. And by the way, the amount of funding that we've got in fundamental research, I would be very happy to see that substantially increased.

Max Foreman

Wow, it's interesting to hear that we don't have that four-pillar architecture in more research areas. So as a final question, I've heard you say, we can have our cake and eat it too, as a recurrent part of your optimism toward moving closer to the electric planet. Could you please explain to our listeners what you mean by this?

Alan Finkel

Well, I think the origin of the phrase goes back to the French Revolution. But what I'm really saying is that our future should be a win-win future. A lot of people have historically looked at the challenges of doing something about global warming and climate change, as a win, lose, or lose win. They really have seen it either we do things to reduce our emissions and sacrifice our economy. Or we concentrate on our economic growth, and sacrifice our attention to reduce the emissions, it's been part of the so called climate wars narrative for a long, long time. And it's becoming pretty clear that it doesn't have to be that way. We can have economic growth while we're driving emissions down. By seeing the investment opportunities in all of these green technologies, I mean, look at how much money is pouring in to solar and wind farms and battery development, from investment institutions from project developers because they see that they'll be able to win a greater and greater share of the electricity market and make money out of it. And then, ultimately, they'll be delivering lower cost electricity, so it's good for the economy. So by investing in solar and wind and batteries, which historically has not been technologically easy, because of the cost of the products and the complexities of integrating them into the electricity system, its now getting to the point where it's clear that we can do it, we can do it well, and we can have economic growth and opportunity while we are simultaneously reducing emissions, and that's what I call having our cake and eating it too. Or what Boris Johnson famously said in the Biden Leaders Summit last year. I guess he was quoting Yoda. He said, cake. Have. Eat.

Max Foreman

Fantastic. That concludes the questions I have for the podcast today. Thank you so much for giving myself and our listeners a world class insight into your values, the attributes of science leaders, and expertise on the electric planet. You covered many things we can each adopt from installing our own

BS detectors to hearing what people say for their good intentions, and assuming zero knowledge but infinite intelligence when communicating to a lay audience. You also emphasized how we will need the whole suite of disciplines from scientists and engineers to social scientists, ethicists and economists to draw closer to the electric planet. And not to mention, that we can have our cake and eat it too. It has been an absolute pleasure chatting with you.

Alan Finkel

Max, I enjoyed talking to you. And I really do look forward over coming years seeing you and the other graduates from the Livers Academy in leadership positions in academia and the broader community.

Max Foreman

You've been listening to the Livers Academy global leadership podcast series with my guest, Dr. Alan Finkel, former chief scientist of Australia and current Special Adviser to the federal government on low emissions technology. You can find more of these conversations on the Liveris Academy, global leadership Podcast Series website, or wherever you get your podcasts. I'm Max Foreman. Thank you for listening.

Voiceover

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