

David Glanz: Australia is a vast island continent, yet population growth is overwhelmingly concentrated in just a few places; our capital cities and their nearby coastal strips. How do we balance livability and sustainability? Do we build up or do we move out? Do we squeeze more people into established areas with infrastructure and public transport, or do we gobble up more farmland by letting the outer suburbs rip? That was the topic of a recent federal government report entitled "Building Up and Moving Out." The Australian Academy of Technology and Engineering was among those who submitted suggestions to the Parliamentary Committee that produced the report. Academy fellow [inaudible 00:00:50] Professor Deo Prasad was one of those who contributed to the Academy's proposals. I'm David Glanz, and I'm in Sydney talking to Deo, who is Chief Executive Officer of the Cooperative Research Center for Low Carbon Living at the University of New South Wales. Deo, there's been a lot of talk recently about urban sprawl and congestion. In reality, how big is the challenge?

Deo Prasad: It is quite a big challenge. Cities are very complex, in terms of design, planning, and policy processes on the one hand, and the economic imperatives that make cities grow in a certain way based on development and infrastructure needs, and so forth. Ultimately, it's about people because you're designing or planning cities for people and their livability, health, wellbeing are very, very important. To get the mix right is very, very difficult sometimes. On the one hand, there is a lot of talk about increasing density, which means going up. There are a lot of advantages in that and some of the sustainability outcomes that relate to that. However, when you look at the infrastructure and so forth required, one may find that we are continually in a deficit situation, in terms of infrastructure that supports such development. On the other hand, we have clearly much higher density examples around the world. We want cities like Sydney and Melbourne to have their own characteristics, and community and all of that, and hence we don't want to become a Hong Kong, for example, by following some of their examples in high density living.

Deo Prasad: To get the balance right is very, very important. That's where the role of all three levels of government comes in, and hence that report that just came out is so important. We hope that a lot of the findings and recommendations get taken up from the level of a national settlement plan, getting the balance between cities and regions right down to the city itself. I guess in the case of Sydney, the Great Sydney Commission is taking on some of those challenges across individual councils. Sydney has about 33 or so council districts. To get the communication between them right, to get the balance of city planning right is very, very important. There is no one answer whether density is important. It is more getting the balance right and using within that other finding of the report, such as value uplift and so forth. How do you capture that? The middle city is very, very old in most cases where they have locked in inefficiencies, in terms of how energy efficient or low carbon they are. How do you get them to refurbish or get together, in terms of community co-design, to actually get the benefits of value uplift and develop those, in terms of new, modern, high performance, low

carbon developments, which are more livable and better for health and wellbeing?

Deo Prasad: But to do that, you need to have councils on board because they need to stipulate the requirements that make them so. It is quite complex and this communication between different levels of government is very important.

David Glanz: I understand. Let's break down some of those challenges into individual parts. For instance, one of the Academy's suggestions was to legislate building standards that require energy efficiency and demand side management of energy. What do we actually need to do?

Deo Prasad: This is a very relevant question. The CRC, which I lead, has recently completed an industry lead report for the government that looks at a trajectory of changes in building code. Building codes have changes in the past based on one off suggestions within government for a change, but what the industry decided to do was to look at a trajectory, a 10 year trajectory at a time, which shows a pathway to zero carbon for buildings. In doing so, it looks at the technical and economic case for the change. The changes have been found to be very, very good, both on technically feasible, as well as economically sound basis for change. The other benefit of a change in standards and codes like this is that industry finds certainty, in terms of what the building code expectations would be for a change towards lower carbon, say, and they can invest in innovations. We want Australian industry in this area to be innovative, so that they can come up with new products, new systems, new technologies that help deliver a lower carbon and more sustainable buildings in the future.

Deo Prasad: The case for standards and codes is very strong. The industry is the one taking charge. The federal government is beginning to look at its own pathway trajectory for change. I'm pretty confident that, in the near future, we will have the standards and the building code process align themselves with a view of having a zero carbon pathway in mind.

David Glanz: That's fantastic. I think most people now recognize that solar is a very important part of that element, but there is some debate about whether the current very fast uptake of household rooftop solar is a good thing or a bad thing, in the sense that is it the best use of resources. Would it be better to invest in solar factories outside of our cities, feeding into the grid? Or do households that invest in rooftop solar, are they actually contributing meaningfully to a low carbon or ultimately a zero carbon economy?

Deo Prasad: I think both are important. The solar photovoltaic costs are coming down very rapidly, and a lot of the new technology has come out of UNSW in this building where the high efficiency solar cell research center has been for many, many years. The business case for using solar at a household level is very, very strong now. If you link it to things like energy affordability in particular, which is a major issue at the moment for governments, if you size your systems correctly,

you can easily have house with no bills into the future. It is a one-off upfront expenditure, and perhaps that's where a lot of the government support can come in, particularly for the affordable housing sector and so forth. But on balance, I think one needs to look at household solar, certainly from a number of perspectives, but in terms of solar factories, as you say, UNSW is a classic example. UNSW has gone to 100 percent renewables based on solar. The farm is near Mildura, far away from here. Origin is our intermediary. We try and meet all our energy offsets using that. This way we avoid going through a green power scheme and all of the uncertainties that may be linked to that.

Deo Prasad: But we have been the first university in the world to go that pathway of 100 percent renewables. It is not just because we are among the world leaders in research in this area, but because it makes economic sense. Over a 10 year power purchase agreement, we are going to be well ahead. The case for both are there.

David Glanz: Fantastic. Another Academy recommendation to the Parliamentary Committee was around starting to plan a shift to a transport system based on shared vehicles, traffic optimization and battery powered vehicles. How quickly is that kind of vision realizable and what are our cities going to look like 10, 20, 30 years from now?

Deo Prasad: There's been a lot of talk about driverless cars, and electric cars and so forth. We see a lot of that coming into play now in different parts of the world and in some parts of Australia, as well. Our CRC is doing some research in terms of electric vehicle and plugging into a home energy system at night, and both ways, either charging the battery or drawing from the battery if the house is running short of energy and so forth, to try and take a particular house all the way to zero carbon and not reliance on the grid and so forth. When you look at those technologies and disruptors into the future, most studies point towards a very significant number of those vehicles on the road by 2030 even, which is not that far away. That's going to be a significant change in the way we move people around.

Deo Prasad: In the shorter term, shared mobility, obviously, has come in. We have projects. In Adelaide, we are looking at the CBD of Adelaide, which is actually aspiring for a carbon neutral city. We are looking at how the bulk of the vehicles can be left outside the CBD and when they come into the city using public transport, they can move around. With things like Go Get we have here, plus bicycles and so forth, there has been a few bad experiences with the bicycle side of things. I think now, clearly with improvements, with designated docking stations and all that, some of the problems to do with bikes lying everywhere can be dealt with. It has been dealt with in some countries already. We're going down that pathway of sorting those things out, but it allows for other benefits. For example, large development in Sydney where you would have had to allocate one to two car parking spaces per unit in a 100 unit building and so forth, we are now ... If you have Go Get provisions, you can cut down the number of cars. The

key thing is behavior change. Behavior change is kicking in quite readily, especially in city type developments where people are beginning to rely on those shared mobility options, which then link with public transport options to go down towards a more sustainable and less congested cities into the future.

Deo Prasad: We are at the early stages of the change. I see, with some of these technological innovations like driverless cars coupled with shared mobility, to be able to tackle a lot of the problems that we have in cities at the moment.

David Glanz: I understand that the CRC that you lead by 2020 will have helped cut residential and commercial carbon emissions by 10 megatons. That's a tremendous outcome. What have you done to reach that result?

Deo Prasad: That was a sort of calculated projection we made at the time when we got the CRC. We had a review done after six years, end of last year, independently by PricewaterhouseCoopers. We are actually on track to deliver that. In terms of how it has been, through a combination of technologies for energy, rooftop solar, which captures solar electricity plus heat and cool for building, so taking just the solar PV to the next levels of integrated systems in buildings. Some of those technologies, and based on certain uptakes into the future, what would be the reduction potential, we have looked at key areas of carbon, like normal cement, and looking at how geopolymers might come in with one third the amount of carbon. We're trialing new products for different end use at the moment through accelerated tests and so forth. We have gone into schools and looking at how we can engage the communities around schools through the students doing projects in trying to not only reduce the energy use in carbon impact of schools, but then doing projects at home, and auditing and so forth, so that whole communities at a time can go down that way.

Deo Prasad: We have started 15 living laboratories, which are large developments from western Australia, White Gum Valley type developments to [Lockhill 00:14:07] Park and Tonsley developments in Adelaide to areas within the area, district in Melbourne to BlueMount that's in Sydney and so forth, looking at better understanding social change and behavior uptakes. At the people and community level, what sort of incentives allows people to be part of that low carbon journey? Outcomes from that feed into better design, planning and policy innovations. We have input into a number of policy areas where our work has acted as evidence for policy. Yesterday there was a policy launch in Victoria by the minister there, Lily, and it was about zero carbon housing. They built on a project we did in Perth through our project led by Dr. Josh Burn, and that was about mainstreaming low carbon housing. Having demonstrated that it can be done in a number of houses, that becomes evidence for uptake into policy, for example. When policy kicks in, it starts to drive things faster.

Deo Prasad: Our research has looked at from evidence for design, planning, policy to new technologies, and system and design ideas, which is already delivering outcome for the built environment sector.

David Glanz: Well, we're beginning to run out of time, so my last question is really what's next? What's the next big challenge for you and for people doing the kind of work that you do?

Deo Prasad: Okay, so the current CRC we have is coming to an end middle of next year. We have a future city CRC. The industry has looked at the needs for research, innovation, collaboration and so forth and have put up a bid for a future city CRC looking at smart, resilient, sustainable and healthy cities of the future. This includes the regions, not just the big cities. Within that is a very significant 10 year proposal to provide the underpinnings, the innovation that will drive better cities of the future. One of the elements of that is smart cities. Australia, at the moment, is a net and, by a big proportion, recipient of technologies, smart sensors and so forth. Council districts are getting locked into long term arrangements for putting in smart systems. Our goal is to kickstart a smart city technology industry in Australia within the next 10 years. At the end of 10 years, we want to have successfully kicked in a series of products, and systems and so forth that can sell to the world. We can become a net provider of technologies and innovation. This is where the advanced knowledge based technology skills of Australians can fit into the future.

Deo Prasad: That's one of the outcomes. Looking at resilience, there's a lot of opportunity in a changing climate to look at how our cities will perform, in terms of urban heat island effect, comfort wellbeing of people within cities. We are looking at a range of technologies and design ideas that will mitigate the effects of changing climates, from canopies and vegetation all the way down to selective surfaces and the types of materials we use, in terms of roofing, walls, and streets and so forth. We're looking at new materials that will be mitigating the effects of changing climate. This new CRC will be not only enabling Australian industry to be at the front end of development, but building with our cities and regions in terms of both the design, planning, policy elements and what evidence is needed for that, but also dealing with the changing parameters more broadly of larger numbers of people, population growth and so forth, and how to keep people within regional centers and not have such a disparity that they have a natural tendency to move to bigger cities. We are trying to do research that underpins those things into the future.

David Glanz: All right. Well, good luck and thank you very much for your time today.

Deo Prasad: Thank you.