



THE **FIFTH** STATE **V** OUR PLANET
OUR BUSINESS

FLICK THE SWITCH

TO ALL-ELECTRIC BUILDINGS AND CITIES

SUPPORTED BY THE DEPARTMENT
OF INDUSTRY SCIENCE, ENERGY AND
RESOURCES

AECOM

STIEBEL ELTRON

STIEBEL ELTRON

SUSTAINABLE SOLUTIONS FOR YOUR HOME

The future of home comfort is all-electric.



Enjoy energy efficient hot water and heating with a clear conscience.



Hot Water | Heating | Cooling | Ventilation

Electricity is the energy source of the future. Futureproof your home with STIEBEL ELTRON.

www.stiebel-eltron.com.au

Foreword

In the weeks since our Flick the Switch symposium the whole world has changed.

China has announced a net zero target by 2060 and an emissions peak by 2030 and in doing so pretty much wiped coal from the political lexicon. Now there's just gas.

And whatever you think of gas as a short-term transition fuel for industry, one thing is certain – the leaders in the built environment don't want it. They're doing their best to eliminate it from their buildings, whether commercial or residential, new or old.

Our event and now this ebook involves a deep dive into how they are doing it – from property owners to financiers, designers to consultants, in commercial and residential property, all jumping in with alternative solutions to power our new clean future.

And so many are banking the rewards!

I love how one investor said his team searches for buildings with "stigma" because they offer the best reward for effort. And how a residential developer in the ACT will pay buyers \$10,000 to NOT connect to the gas grid.

Massive thanks to our key supporter for this book and the event – the Department of Industry, Science, Energy and Resources – to our co-lead sponsors AECOM and STIEBEL ELTRON and to our supporting sponsors Mirvac and A.G. Coombs.

Also a huge thanks to the expert and incisive panellists who generously shared their insights and their time to help us all make this world a better place.

Enjoy!

Tina Perinotto
Publisher and Managing Editor

SUPPORTED BY THE
DEPARTMENT OF INDUSTRY
SCIENCE, ENERGY AND
RESOURCES

CO-LEAD SPONSORS

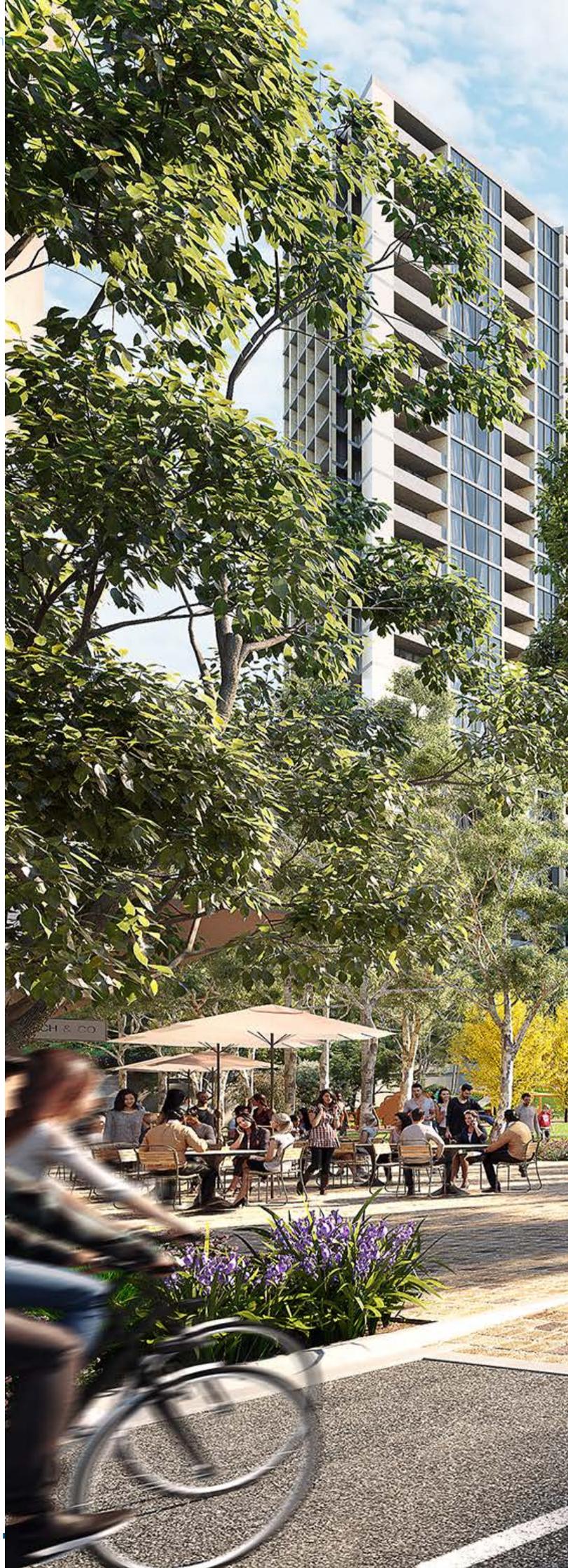
AECOM

STIEBEL ELTRON

SUPPORTING SPONSORS

 **A.G.Coombs**

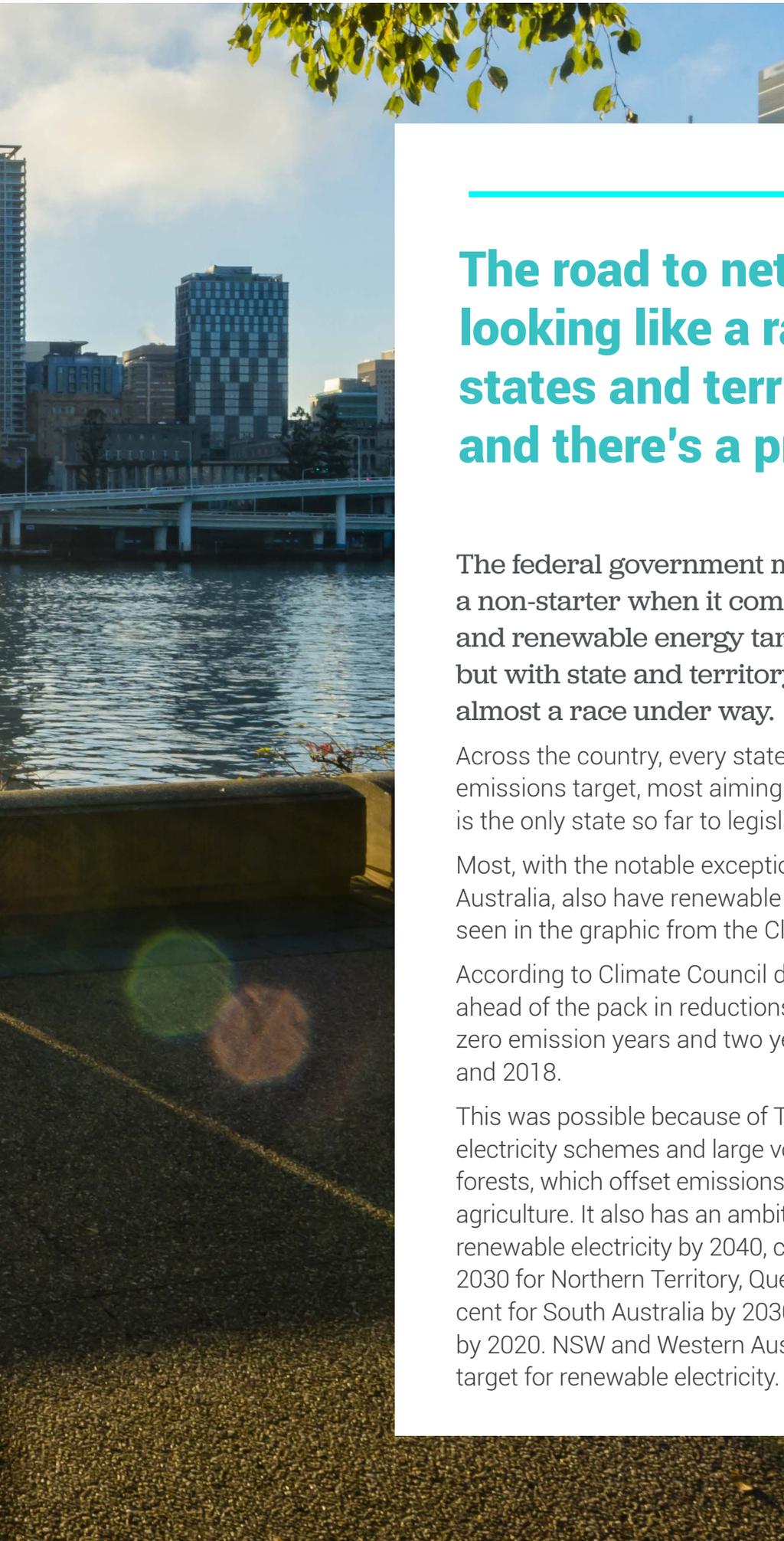

mirvac



CONTENTS

The road to net zero is looking like a race between states and territories – and there's a prize	7
Don't wait for government, don't wait for gas: all electric is here (event summary)	18
Financing a net zero world	38
BZE's Heidi Lee on knocking down the barriers to net zero	50
Why you should future proof apartments with electric instantaneous hot water units (partnered with STIEBEL ELTRON)	53
Decarbonisation of the grid has left the station are we all aboard?	57
Demand response goes back to the future	64
Net zero is no walk in the park but that's not stopping Mirvac	67
Case study: Sirius building, Canberra	70
Case study: 80 Ann Street, Brisbane	72
GPT ticks off carbon neutral buildings along the eastern seaboard	74
Sian Willmott: An ESD consultant's guide to net zero in office buildings (partnered with AECOM)	77
Case study: Gillies Hall – The star of Monash University's electrifying net zero plans	80
Case study: EG on how a B grade office building is not a problem, it's an opportunity	88
Case study: Quintessential Equity on how to find the sustainability jewels amid the unloved	92
Case study: Forza Capital's 6 star NABERS Brisbane rating shows how to make sustainability a value add	100
Frasers Property is going all electric apartments, in a big way	103
Case study: All-electric sustainable luxury in Brisbane	114
A guide to rating tools and how they help or hinder the all-electric, net zero transition	120
Resources guide	122





The road to net zero is looking like a race between states and territories – and there's a prize

The federal government might be a non-starter when it comes to net zero emissions and renewable energy targets but with state and territory governments there's almost a race under way.

Across the country, every state and territory has a net zero emissions target, most aiming for net zero by 2050. Victoria is the only state so far to legislate its target.

Most, with the notable exception of NSW and Western Australia, also have renewable electricity targets, as can be seen in the graphic from the Climate Council below.

According to Climate Council data, Tasmania has been ahead of the pack in reductions so far, achieving some net zero emission years and two years below net zero in 2014 and 2018.

This was possible because of Tasmania's massive hydro-electricity schemes and large volume of carbon-dense forests, which offset emissions from industry, transport and agriculture. It also has an ambitious target of 200 per cent renewable electricity by 2040, compared to 50 per cent by 2030 for Northern Territory, Queensland and Victoria, 100 per cent for South Australia by 2030 and 100 per cent in the ACT by 2020. NSW and Western Australia so far do not have a target for renewable electricity.



States are driving the net zero race

The inertia of the federal government on climate change and emissions reduction is striking, says Martijn Wilder, founding partner of climate change advisory and investment firm Pollination and until recently chair of the Australian Renewable Energy Agency (ARENA).

Luckily, change is being driven by the states, particularly in the energy, agriculture and transport sectors.

"We've got a phenomenal opportunity," says Wilder, who was part of a panel at The Fifth Estate's Flick the Switch symposium on low carbon and all electric buildings.

"The world's moving at a very fast pace and I think that Australia is heading in the right direction. There's a lot more movement than there was 12 months ago. But it is the states that are going to drive a huge amount of change.

"They've reached the point where they see it as an economic issue, regardless

of which party is in power.

"Unfortunately, the federal government is still treating climate change as a political or ideological issue."

Wilder says state governments realise there is a significant opportunity in net zero for them and don't want to be held back.

"...there is a bit of a race between [states and territories] as to who can go fastest. A key aspect for the states in the race to decarbonise is the desire to attract foreign investment."

Covid19 has also put more focus on how to rebuild the economy and there is real understanding of the need for economies to transition.

"This is a really positive thing," Wilder says. "Basically, the state governments are already there. In fact, there is a bit of a race between them as to who can go the fastest. A key aspect for the states in the race to decarbonise is the desire to attract foreign investment."

“

...there is a bit of a race between [states and territories] as to who can go fastest. A key aspect for the states in the race to decarbonise is the desire to attract foreign investment.

State & Territories Renewable Energy & Net Zero Emmissions Targets

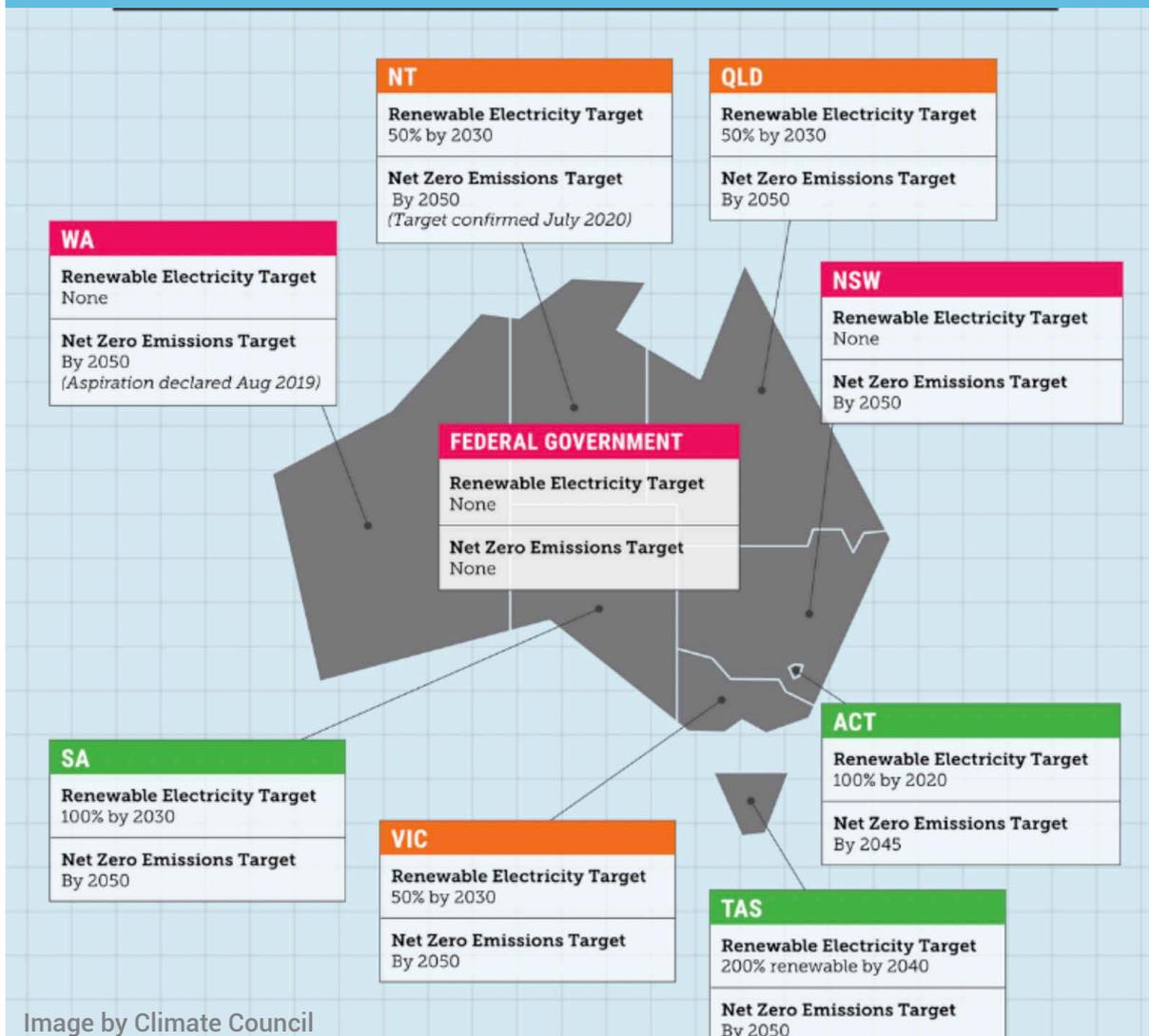


Image by Climate Council

Victoria is going hard

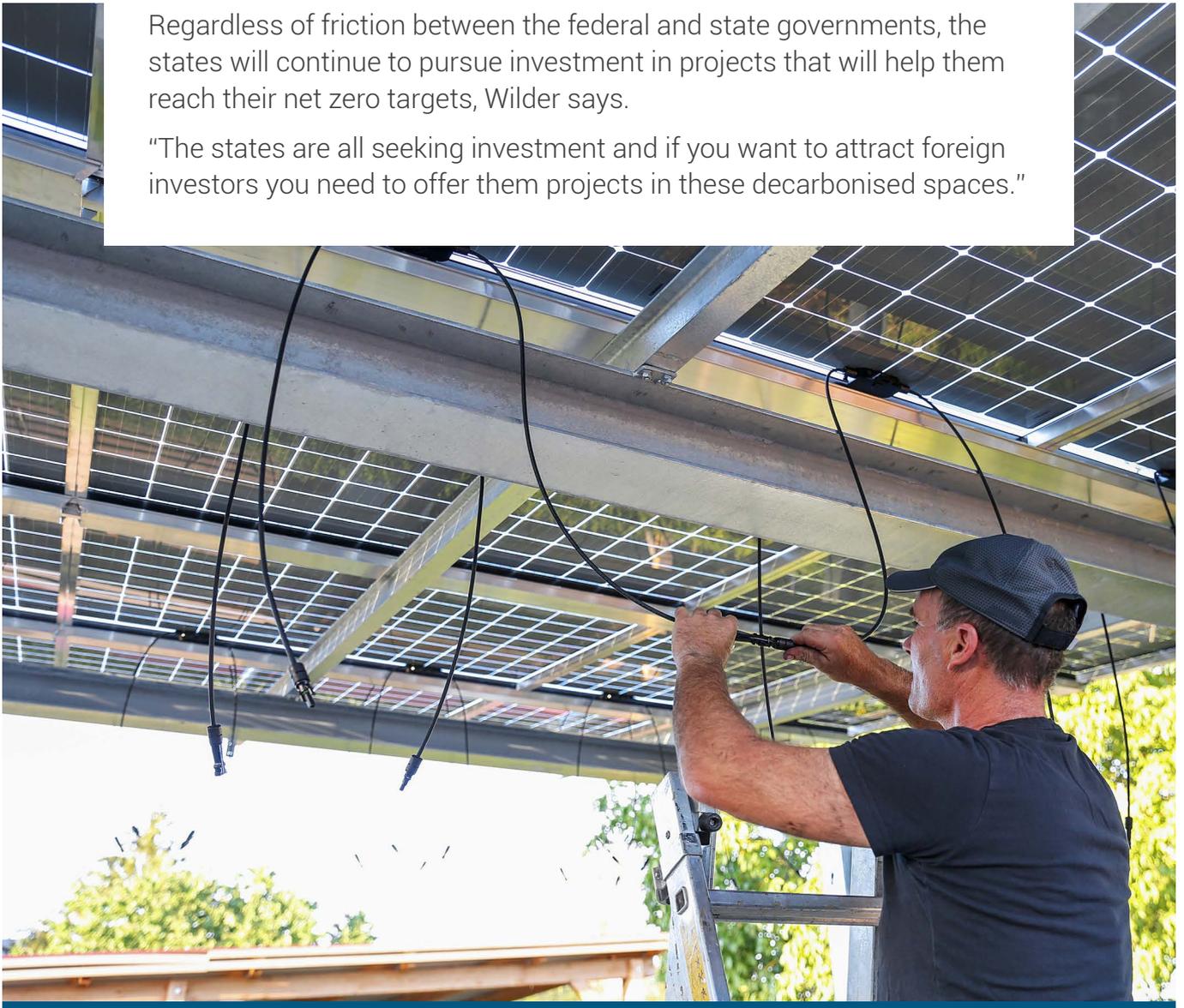
Victoria is pushing very hard in the race and has legislation that requires decarbonisation plans. The state is keen to attract investment to help it achieve this and is targeting industry sectors such as energy storage, renewables and transport lines.

However, its controversial Belt and Road Initiative agreement with Beijing would most likely be scrapped if proposed new powers for the federal government are passed by parliament. These changes would allow the federal government to veto agreements that state and territory governments, local councils and public universities make with foreign nations if these are deemed contrary to the national interest.

The BRI is Chinese president Xi Jinping's signature foreign policy agenda to bankroll infrastructure around the world. The deal with Victoria would allow for Chinese investment in the state and for Victorian companies to participate in Chinese government projects overseas.

Regardless of friction between the federal and state governments, the states will continue to pursue investment in projects that will help them reach their net zero targets, Wilder says.

"The states are all seeking investment and if you want to attract foreign investors you need to offer them projects in these decarbonised spaces."



Stronger mechanisms needed at national level

Wilder points to the four mechanisms that are in place to address climate change at a federal level:

- The Safeguard Mechanism, which provides a framework for Australia's largest emitters to keep their emissions at or below emissions baselines set by the Clean Energy Regulator
- The Climate Solutions Fund, which allows landholders, communities and businesses that run carbon reduction programs to earn carbon credits that can be sold to the government or private business
- Australian Renewable Energy Agency, ARENA, that funds developments in renewable energy technology
- Clean Energy Finance Corporation, CEFC, that invests in clean energy technology across industry sectors

Each of these plays an important role but none are strong enough or funded adequately to achieve decisive action on climate change and emissions reduction, Wilder says.

"We don't have any other policy at the federal level. The government has a Covid commission that is pushing extremely hard on gas, which is not the answer.

"We also have a technology roadmap, which is really just a list of all the available technology to help towards decarbonisation but with no specific agenda of how to implement them or how they are funded."

There are few signs the federal government is changing tack. In the past month, it altered the remit of both ARENA and the CEFC to include "low emissions" technologies, allowing the

“

Victoria is pushing very hard in the race and has legislation that requires decarbonisation plans.

renewable energy agencies to invest in gas and carbon capture and storage. It also announced its plans for a "gas-fired recovery", which will see \$52.9 million flow into gas projects.

Business and investors play key role

Wilder would like to see the business sector push harder for change, particularly for a more aggressive safeguard mechanism, a price on carbon and a clear vision on clean energy policy.

"A carbon price and emissions trading scheme would create a fundamental shift overnight, Wilder says. "Long term planning for the energy sector, particularly how to decarbonise it, is also vital, as is a plan to create new industries.

"The Business Council has come out in favour of net zero but the target is 30 years away. It needs to do a lot more than that."

In property, the top end of the sector has led the way in reducing carbon emissions but the mid tier is still struggling to reduce carbon footprints and energy efficiency.

Institutions are strong drivers

A strong driver is large institutional investors such as super funds that are showing increasing appetite for sustainable investments across all sectors, including the built environment.

This is a financial as well as an ethical consideration, with fund members becoming increasingly vocal on where they want their money invested ■

The chase is on.

The race to 'net zero' demands integrated and evidence-based design to maximise return on investment, both social and financial. We help our partners and clients meet this challenge head-on by seeking to reduce carbon emissions and whole-of-life costs in every project. From providing integrated consultancy services on Monash University's Gillies Hall – the largest passive house-certified building in Australia – to developing New Zealand's first National Climate Change Risk Assessment, we are driven by a common purpose to deliver a better world.

See how at [aecom.com](https://www.aecom.com)



AECOM Imagine it.
Delivered.



Flick the Switch speakers



Mitra Anderson-Oliver

Head of Urban Design and Strategy at Impact Investment Group and Associate – Better Cities and Regions, HIP v. HYPE

Mitra has over a decade of experience in strategic advice, policy development and implementation in urban planning and development, urban design, climate change and housing policy. She started her career in the Climate Change Branch at Victoria's Department of Premier and Cabinet. More recently, Mitra spent four years leading planning reform projects for the Minister for Planning in Victoria.



Stephen Bygrave

Director, Climate Resilience and Net Zero Emissions, NSW Department of Planning, Industry and Environment

Stephen has spent more than 10 years with the Senior Executive Service in various state and federal level government agencies including the departments of: Prime Minister and Cabinet; Climate Change; Environment and Heritage, Agriculture; as well as Executive Director Climate Change and Sustainability in the ACT Government and Director Climate Resilience and Net Zero Emissions in the NSW Government.



Kelly Davies

Partner, Norton Rose Fulbright Australia

Senior energy lawyer with skills across the energy mix - Oil & Gas, Power, Renewable Power, Project Finance and M&A across multiple jurisdictions in Europe, MENA, Asia and the Americas. Particular expertise includes power purchase agreements (PPAs) across different generation types and jurisdictions and corporate PPAs.



Glenn Day

National Sales Manager, STIEBEL ELTRON

Glenn has 25 years' experience with STIEBEL ELTRON in operational, sales, product and market development roles. He has been involved in local and offshore project designs as well as product and market training in Germany and Asia. Glenn is a previous member of the Australian Standards committee for solar water heaters and heat pumps as well as the Clean Energy Council.



Carlos Flores

Director, NABERS

NABERS is the largest and one of the most successful government building sustainability initiatives in Australia, and has been key in helping the Australian commercial property sector lead the world in reducing energy and emissions in the past decade. Carlos is responsible for all aspects of its delivery nationally. He is a mechanical engineer by trade, and a regular speaker at conferences in Australia and overseas.



Steve Ford

Head of Sustainability and Energy, GPT Group

Steve is currently tasked with delivering GPT's carbon neutral plan, starting with the carbon neutral certification of the GPT Wholesale Office Funds in 2020. GPT's carbon neutral plan includes elimination of emissions through efficiencies, on-site solar and off-site renewable electricity contracts and electrification.



James Grant

Practice Leader, Design + Planning Sydney, AECOM

James is guiding the team across a range of city shaping projects. With a background in landscape architecture, urban design and sustainability, James is passionate about creating liveable, people focused cities. He is a past State President of AILA and Vanguard Alumni. Former roles include with HASSELL, Lendlease, in transport, commercial and government.



Heidi Lee

Interim Chief Operations Officer, Beyond Zero Emissions

Heidi has worked in the building industry for 20 years, including on some of Australia's greenest buildings. She was also the project manager for BZE's 2013 plan to upgrade, electrify and repower every building in Australia with renewable energy.



Rory Martin

Sustainability Manager, Frasers Property Australia

With 10+ years industry experience in Europe, Asia, North America and Australia, Rory leads the sustainability agenda for Frasers Property Australia's development activities, as well as the Climate Risk and Resilience operations for Frasers Property globally.



Emma McMahon

Director – Sustainability, Pacific, CBRE

Emma is responsible for the overall management, analysis and reporting on all aspects of CBRE's energy and environmental related services for the Pacific region. She works closely with the client, sustainability team and the portfolio team to maintain high professional standards of service and meet all client deadlines, assist with the development of sustainability strategies, portfolio KPIs and develop cost effective solutions to reduce and optimise the consumption of energy, water and waste.



Elham Monavari

Senior Manager – Strategic Projects, GBCA

Elham is responsible for the delivery of the GBCA's strategic projects. These projects include the development of the Future Homes program including the Green Star Homes Standard, and the management of the Future Focus program. Elham is an accredited professional with over 15 years' of experience working in the built environment to drive sustainability on building and infrastructure projects at a national and international level.



David Palin,

Sustainability Manager, Technical Services division, Mirvac

David leads a team of seven sustainability professionals in the delivery of Mirvac's This Changes Everything sustainability strategy across the investment portfolios.



Clare Parry

Better Buildings Lead, HIP V. HYPE

Clare recently joined integrated sustainability company HIP V. HYPE. Clare is the founder and a former director of Grün Consulting, an Inhabit company and a Passivhaus and sustainability consultancy.



Bruce Precious

Principal Consultant, Six Capitals Consulting

Bruce has been at the forefront of sustainability in the built environment sector for over 20 years, working with a range of government and property related businesses to transform how the property industry responds to the most significant environmental and social challenges. Bruce is a Mechanical Engineer and member of AIRAH.



Craig Roussac

Co-founder and CEO, Buildings Alive

Buildings Alive is a leading provider of energy and environmental performance analytics for buildings. Craig has a PhD in architectural science and extensive experience in commercial building operations with a focus on environmental performance optimisation and reducing greenhouse gas emissions.



Professor Alistair Sproul

Head of School of the School of Photovoltaic and Renewable Energy Engineering, UNSW

Professor Alistair Sproul is Head of School of the School of Photovoltaic and Renewable Energy Engineering. His research interests include: Low energy buildings, Photovoltaic systems and Energy efficient fluid handling systems.



Siân Willmott

Sustainability Lead – Victoria, AECOM

Siân has over ten years of experience in delivering high performance sustainable communities and buildings across a diversified portfolio of commercial, residential, education and healthcare projects. Her recent work in advocating for the transition away from fossil fuels includes supporting the Trajectory for Low Energy Buildings and the revision of the Victorian Health and Human Services Sustainability Guidelines in Capital Works. She is a member of both the PCA sustainability committee and the CIBSE committee in Victoria.



Martijn Wilder

Founding Partner, Pollination

With a background in economics and law, Martijn is focused on developing innovative policies, ideas and investments that enable our economies to rapidly transition to net zero, while at the same time preserving our natural ecosystems. Martijn was head of Baker & McKenzie's global climate law and finance practice for 20 years. He was Chair of the Australian Renewable Energy Agency and a former founding Director of the Clean Energy Finance Corporation. He helped establish and later Chaired the Federal Government's Low Carbon Australia finance body. He is currently President of WWF-Australia and Chair of NSW Climate Change Council and the Law for Development Initiative.



Don't wait for government, don't wait for gas: all electric is here

WENDY FREW

Government policy and regulation is vital for the creation of all electric buildings and a net zero future but there is plenty of room for the private sector to innovate and lead change, say the experts.

Following is an edited report of what was shared live at the event and in pre-event interviews.

One of the key messages to emerge from The Fifth Estate's Flick the Switch event held in August is that government is a powerful driver of action in the private sector. It can help shape demand for carbon cutting activities and create investor confidence in carbon markets, while spurring investment in new technology.

However, experts warned we shouldn't wait for government action. We need to embrace a net zero approach now. That means not waiting for a green gas solution, and continuing to deploy one of the best tools in our carbon kit bag: energy efficiency.

Founding partner of specialist climate change advisory and investment firm Pollination, and climate policy specialist Martijn Wilder, said he is often asked if carbon reduction and other climate change laws make a difference.

"The answer is, yes they do," said Wilder.

"Policy is quite important because it can accelerate change," he said, adding that special zones for renewable energy generation, targets for emission cuts, and policies promoting technologies that decarbonise the economy help put a value on carbon and build investor confidence in a low emissions future.

"There is tremendous support for investment in carbon but the one thing everyone needs to realise is that we must create demand. Without demand, we won't have a market."

Electric vehicles (EV) are a good example.

"In Australia, we have a lot of work being done on EVs ... legislative reform is very important to accelerate the changes we want because policy drives uptake."





Wilder acknowledges the “enormous” progress the NSW government has made towards achieving a net zero future.

As NSW minister for energy and environment Matt Kean said, doing nothing is no longer an option, which is why the state government has committed to achieving net zero emissions by 2050.

“Net zero emissions is not only good for the environment; it makes economic sense. It will help us protect our future, creating new jobs and attracting investment,” the minister said in a recorded address to the symposium.



NSW Minister for Energy and Environment Matt Kean

“That is why we are building a range of ambitious initiatives to strengthen the prosperity of NSW while helping the state cut its emissions by 35 per cent by 2030.”

Keynote speaker, Stephen Bygrave, director of climate resilience and net zero emissions for the NSW department

of planning, industry and environment, outlined the government’s net zero plans and its electricity strategy to the Flick the Switch audience.

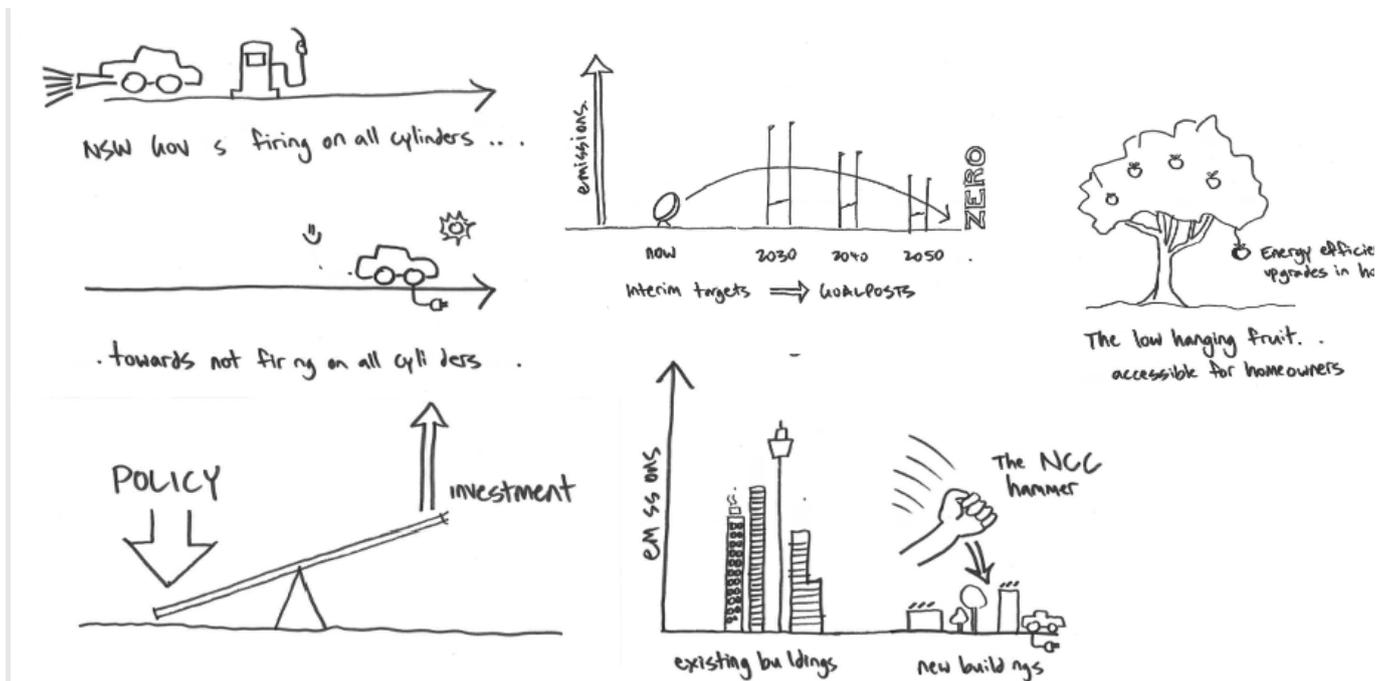
The four key priorities of the net zero plan include:

- driving the uptake of proven emission reduction technologies
- empowering consumers and businesses to make sustainable choices by providing them with more information
- investing in the next wave of emission reduction innovation
- leading by example

“We don’t want to say to others ‘Go and do this on your own’,” Bygrave said.

“We really want to make sure the NSW government is front and centre of this initiative and there are huge benefits for the NSW government doing this, from having electric vehicles in our fleets, through to building energy efficiency.”

A combined \$2 billion of NSW and federal government money is backing an emission intensity reduction program that



Visual notes taken by artist Michael Jones from Allen Jack+Cottier Architects



Stephen Bygrave, NSW DPIE

will support businesses transitioning their plant, equipment and processes to lower-emission alternatives, and a climate solution fund that will help businesses, farms and land managers take practical low-emission actions.

Among other things, the government plans to:

- expand energy efficiency to help bring down the cost of living for NSW residents
- divert material from land fill to achieve net zero emissions from organic waste by 2030
- introduce a primary industry productivity and abatement program that supports primary producers and landowners to take advantage of lower emission technologies and offsets
- develop a carbon services hub

It's Electric and Hybrid Vehicle Plan includes a charging master plan, proposed changes to apartment codes to make buildings "EV ready", and a range of incentives for industry to build charging infrastructure.

"There are a range of challenges around lack of standards and education on how to make our commercial and residential buildings EV ready," Bygrave said.

“

That is why we are building a range of ambitious initiatives to strengthen the prosperity of NSW while helping the state cut its emissions by 35 per cent by 2030.

"We need to have charging infrastructure that is 'smart'; we want to adapt the NSW apartments design and SEPP 65 to complement the national construction code changes in 2022; we want to provide an advisory service, trials of advance charging management and vehicles-to-grid facilities.

"We will have a large infrastructure program to roll out charging spaces across regional, metro [areas] and on our major highways and this is extremely important to support the transition to EV in NSW.

"NSW is not alone here ... Most states and territories have strong renewable targets as well as net zero emission goals. And, so do councils."

In Victoria, leading Australian impact investment funds manager, Impact Investment Group (IIG), is working with the state government on new planning standards for urban renewal.

The Victorian government wants to be a leader of sustainability in Australia, IIG head of urban design strategy Mitra Anderson-Oliver said, "and we are working with them to detail what that actually means".

"It is exciting to see they have committed to a net zero carbon target and all

electric buildings. What that creates is an environment for investment; you are looking at a precinct that will create an investment pipeline and new buildings.

"The challenge for us in Australia is that even though we have more regulations coming online we have this vast building stock which sits there underperforming year after year that needs stronger regulation," she told session moderator Heidi Lee, interim chief operations officer at Beyond Zero Emissions.

There are a lot of tools government can use to encourage the private sector to reduce emissions in the built environment, such as offering developers fast-tracked approval in return for building lower carbon intensity buildings and energy efficient homes.

In the wake of the pandemic, governments could also offer COVID-19

to be energy efficient.

"\$25,000 could fully upgrade a private residence with energy efficiency. Imagine that at scale!"



Mitra Anderson-Oliver, IIG

Precincts and their power to shape low energy outcomes

On the topic of scale, Maria Atkinson, of Maria Atkinson Consultancy, a cofounder of the Green Building Council of Australia and former commissioner with the Greater Sydney Commission, said meeting our low carbon targets with a single building is a big challenge. It's much easier when you expand to a city block, suburb, catchment or district.

Precincts are essential in order to fund the infrastructure that's needed for low carbon. Think of precinct scale energy, water, biodiversity, waste and recycling, perhaps with an onsite and potentially underground system for sorting and processing that would lower the need for truck movements and their attendant pollution, just to start.

Atkinson said large investors, particularly institutional investors, need environmental and social outcomes to

“NSW is not alone here ... Most states and territories have strong renewable targets as well as net zero emission goals. And, so do councils.

recovery bonds that focus on sustainability.

But in Australia, some opportunities have already been missed, Anderson-Oliver said, like the federal government's \$25,000 home renovation grant. It had no requirements for renovations

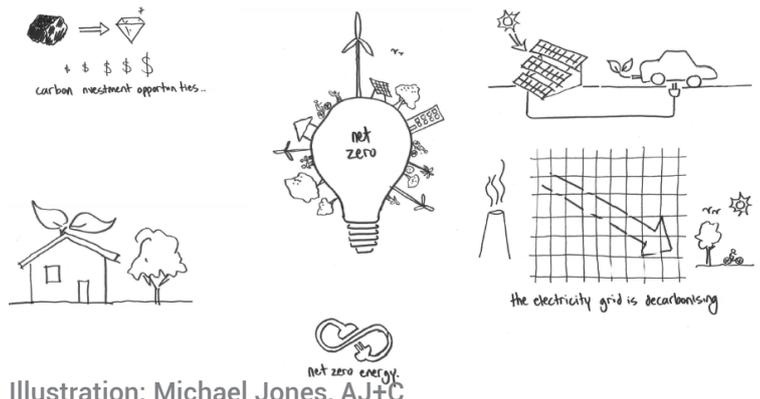


Illustration: Michael Jones, AJ+C

Hot Water, Heating, Cooling & Heat Recovery Ventilation

Energy efficient solutions for residential and commercial building services.

Air source and geothermal heat pumps can provide hot water, heating and cooling, while heat recovery ventilation provides fresh filtered air to Passive-certified and high performance homes.

Centralised Ventilation

Made in Germany with up to 94% heat recovery. Passive House certified. Air flow rate up to 350 m³/h. Summer bypass function for cooling effect.

Decentralised Ventilation

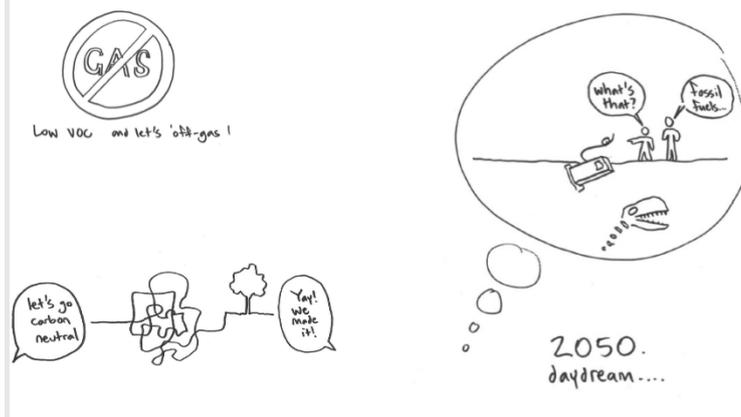
Low cost and easy installation. Ideal for existing dwellings. Provides fresh filtered air, while maintaining room comfort.



Geothermal Heat Pump

Inverter-driven heat pump which can supply heating, cooling and hot water. Cascadable with 16 appliances for up to 1.6 MW output.

Illustration: Michael Jones, AJ+C



attract their interest and they also need the outcomes to be measurable and demonstrable to their stakeholders, so low carbon plus social dividends.

It is hard to achieve this with a single building, she said, but at the precinct scale it can work.

According to work by the Greater Sydney Commission, the ideal precinct size is around four postcodes, Atkinson said.

According to a new federal government report developed by engineering services firm Arup, in the pursuit of net zero buildings and cities, the precinct scale has some key advantages for decarbonisation measures: They are large enough to achieve economies of scale, but small enough to be manageable.

Precinct level carbon abatement strategies include electrical energy systems (such as microgrids), energy efficiency coordination, waste management schemes and microclimate design.

“Precincts are essential in order to fund the infrastructure that’s needed for low carbon.”

The report found that the big challenge of the precinct scale is not the physical infrastructure or the engineering but coordinating ownership and responsibility.

In so many ways, urban planning is the problem (and the solution)

James Grant, practice leader, design + planning Sydney, AECOM, certainly thinks precincts are the way forward.

He said we need the power of the precinct scale to drive low carbon outcomes.

Think orientation of buildings, walkable liveable neighbourhoods that minimise the need for cars, and green spaces that encourage people to be outdoors in cooling green infrastructure instead of locked inside with airconditioning. There's also the power to mandate a particular building fabric or energy outcomes – the installation of gas infrastructure or not – at the precinct or estate scale

Parts of Australia are in danger of becoming Dubai style developments in a climate heading towards Dubai style temperatures [Western Sydney comes to mind].

“If you get it wrong you push everyone inside to airconditioning, which is a high carbon outcome and puts pressure on the grid.”

The problem is that planning is typically car- and indoors-centric. But governments can put policies in place that stimulate lower carbon planning outcomes.

Local governments should be setting policy levers to encourage neighbourhoods that limit energy use from the outset, Grant said.

Grant said the ACT government is quite advanced on this front thanks to favourable policy settings. In Canberra,



the planning agency is “very proactive” and willing to rewrite the rule book as part of its low carbon transition, such as removing the requirement for a gas connection in the Territory Plan (which dictates development in the ACT).

NABERS gearing up for net zero

The federal government’s environment benchmarking tool NABERS is also playing a role. Director at national ratings system NABERS, Carlos Flores, said that the organisation is working on its seventh star that will mean buildings are zero emissions.

The national program is also being updated to account for the growing penetration of renewable in the grid to give a fairer weighting to grid electricity versus gas.

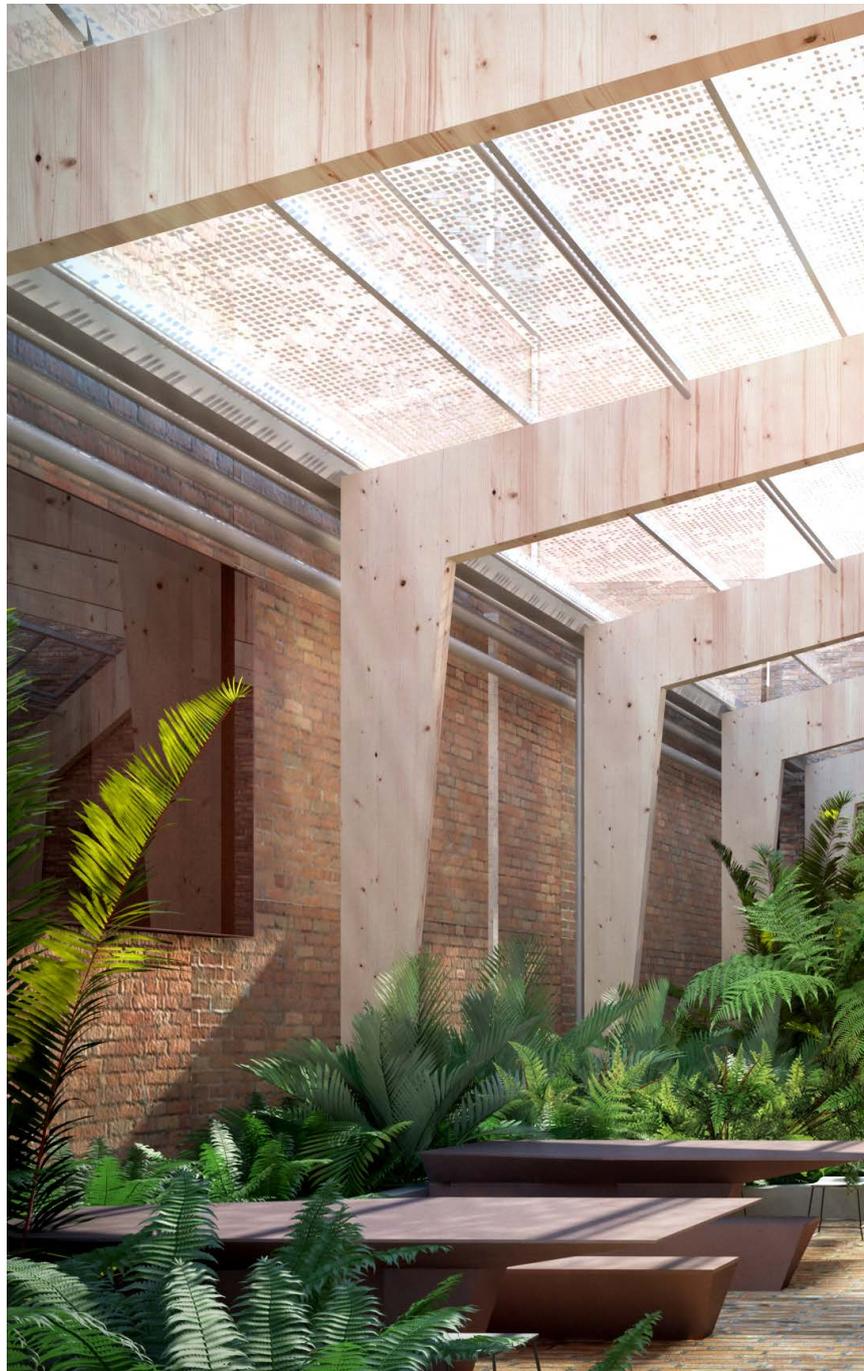
Consumer power

Governments aren’t the only drivers of change. Just ask energy expert Tim Forcey. His My Efficient Electric Home Facebook page – a searchable database and source of advice about making homes healthier, energy efficient and less dependent on gas – is a useful weathervane of consumer sentiment.

With about 18,000 members, including plumbers, electricians, builders and homeowners, it provides an insight into why consumers are embracing energy efficiency.

“It is interesting to watch the membership go up after cold weather, after hot weather, after bushfires,” Forcey said.

“It is mostly about comfort ... It is also about bills, and about getting the most out of your PV. It’s about draught proofing, and the cheap things you can do [to make your house more energy efficient], like getting airconditioning



“

Developers were already thinking along these lines but the bushfires made them realise it was real and would impact on our health rather than being someone else’s problem.



AECOM worked on Ballarat GovHub. Image: John Wardle Architects

instead of gas heating.”

Growing concern about climate change is also increasing the demand for energy efficiency and all electric residential construction, he said.

The people taking to the streets over climate change are often tenants or employees of tenants in large office blocks and their views are affecting the commercial leasing market.

With many Australians either losing their homes or retreating to them in the face of

last summer's heat, bushfires and smoke, combined with the extended amount of time we are spending in our homes because of COVID-19 restrictions, the public is demanding safer, healthier and more comfortable homes.

“Developers were already thinking along these lines but the bushfires made them realise it was real and would impact on our health rather than being someone else's problem,” according to Elham Monavari, senior manager for strategic projects at the Green Building Council of

“

Often, their Plan A is [a building] with gas, and then the sustainability people come along and impose an all-electric design over the top of a building designed with gas.

Australia.

“We all felt what it was like not being able to breathe; we all saw the [smoke-filled] sky. That was the moment when we all thought we've got to get onboard.”

Obstacles to change remain, however, such as a lack of knowledge about what can be done; a lack of robust performance standards in some areas; cost; inelastic demand for energy because of the way power contracts are written, and; difficulties for small business keeping pace with regulations.

How to get change

For sustainability manager at Mirvac, David Palin, the biggest challenge is mindset.

“You get in the consulting room and



Elham Monavari, GBCA

people say, 'It can't be done'; 'It doesn't suit the characteristics of the building'. Or they say co-generation is still the best way to get to a five-star rating,” Palin said.

“You have to dig through all of that rubbish to get to a point where you can say 'This is what we want to achieve. Can you help us?’

“Unfortunately, you have to be almost brutal to get to that point, to say 'We aren't joking about this.’”

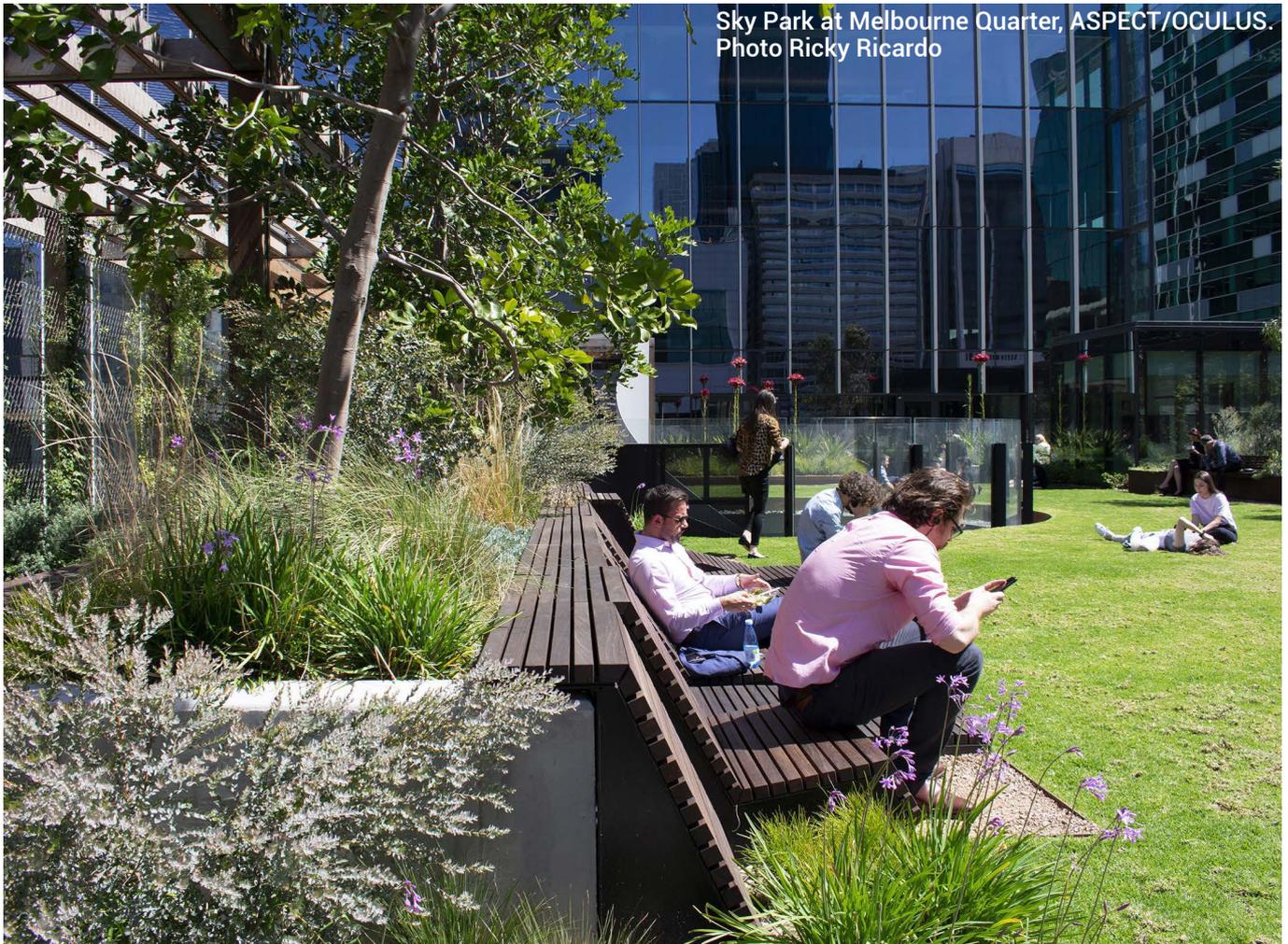
Old ways of doing things die hard, agreed Steve Ford, head of sustainability and energy at diversified property group GPT. He told session moderator Bruce Precious, principal consultant at Six Capitals, that most developers don't think about building an all-electric building until it's too late.

“Often, their Plan A is [a building] with gas, and then the sustainability people come along and impose an all-electric design over the top of a building designed with gas.”

“That affects the pricing. If you get to a mindset where Plan A is all electric, you get a fully competitive process with a proper procurement process ... you will find there are a lot more options in the market for all electric [when chosen] from the start than for retrofitting.”

Government can help with policy that drives industry players to try new things, and to ask 'Why not?' rather than 'Why?'. It can make sure also that building regulations and performance standards for materials keep pace with innovation.

Landlords and clients also need to be on the same page. Smart metering, demand management and usage profiles can make it clear to tenants where the value lies in all electric and energy efficient



buildings.

As Siân Willmott, principal sustainability consultant at infrastructure group AECOM in Victoria, pointed out, it is one thing to demand a fantastically efficient building, and quite another for tenants to plug in very inefficient appliances. “You have to work closely with tenants,” she said.

One kind of tenant has been using its muscle in the market to good effect. Big companies with sophisticated sustainability teams and brand profiles that include concern about climate change are leveraging their power in procurement, design and leasing contracts.

Energy performance consultancy Buildings Alive works with Google – which has been carbon neutral since 2007 – on the 1000 or so buildings it owns, partially

“**Recently started looking at its carbon footprint as a tenant and decided to expand that footprint to include the base building.**”

owns or rents around the world.

The tech behemoth recently started looking at its carbon footprint as a tenant and decided to expand that footprint to include the base building. It also wanted to know what the other tenants were doing, and how to influence them, Buildings Alive chief executive Craig Roussac said.

“Then they look at what they are doing in their business, and the carbon intensity

of the electricity grids they connect to all over the world ... to see if they can shift load. It's a very sophisticated model."

Kelly Davies, partner at the Australian arm of global law firm Norton Rose Fulbright, said big corporations can influence markets by pushing Australian norms.

"They influence markets by pushing the power supply market to innovate, to change contract terms, to provide greater certainty of the renewable energy provided under contracts and so on," Davies said.

"If the Australian market wants Google here, we have to give them a 100 per cent guarantee about renewable energy supply. This is influencing retail providers of energy and we aren't far away from getting much better certainty of volumes, especially as renewables are making up a bigger percentage of the NEM.

"Google and Amazon are volume on their own and they can change things so that what they want becomes the norm."

Which is just as well because although a lot of work has been done to get landlords to jump on the net zero carbon bus, smaller tenants are sometimes left standing at the bus stop.

Tenants have been adopting more efficient lighting and turning the lights off when the staff have gone home. But many companies can't afford to hire someone to manage their energy efficiency and so don't realise the significance of their carbon exposure.

Norton Rose Fulbright is a tenant at 60 Market Place in Sydney, which is a six star Green Star building developed by Investa Commercial Property Fund and co-owner Gwynvill Group.

Many of the law firm's clients won't use



Darling Quarter, Property NSW





8 Exhibition Street in Melbourne

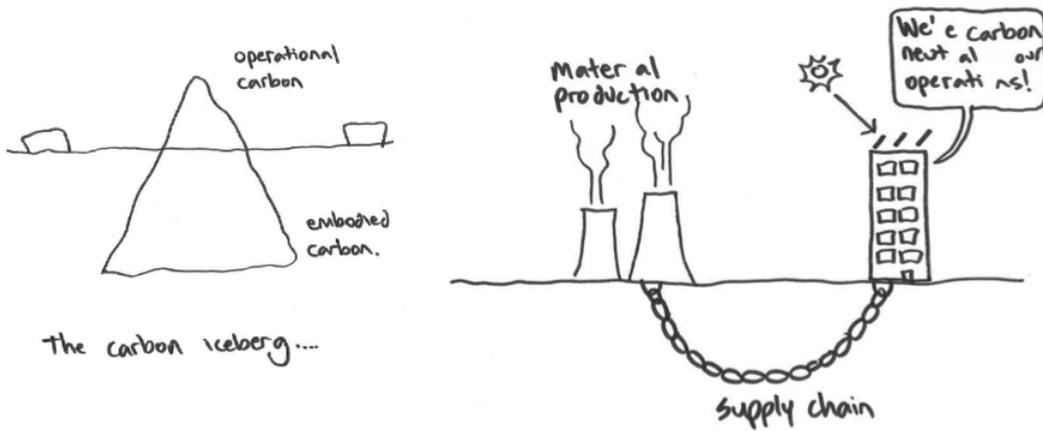


Illustration: Michael Jones, AJ+C

its services if it doesn't satisfy certain sustainability criteria, Davies said.

"Soon we won't win that business if we don't adhere to their sustainability criteria. There's also been a change in landlord behaviour. They are opening up to smaller tenants. This has become such core business for landlords it has made it easier for smaller tenants who can't deal with these issues on their own."

According to Emma McMahon, national director for sustainability at Australia's largest commercial real estate services company, CBRE, engagement around environmental, social and governance issues is affected by a tenant's priorities.

"Tenants no longer want to just be in a building; they want to be part of the building's community," she said, adding that many tenants are talking about how to manage their waste, changing behaviour to meet targets, even helping staff move to green energy suppliers at home.

"Tenants are actively looking at participating in sustainability programs so you need new and meaningful ways to

“

Tenants are actively looking at participating in sustainability programs so you need new and meaningful ways to engage with them.”

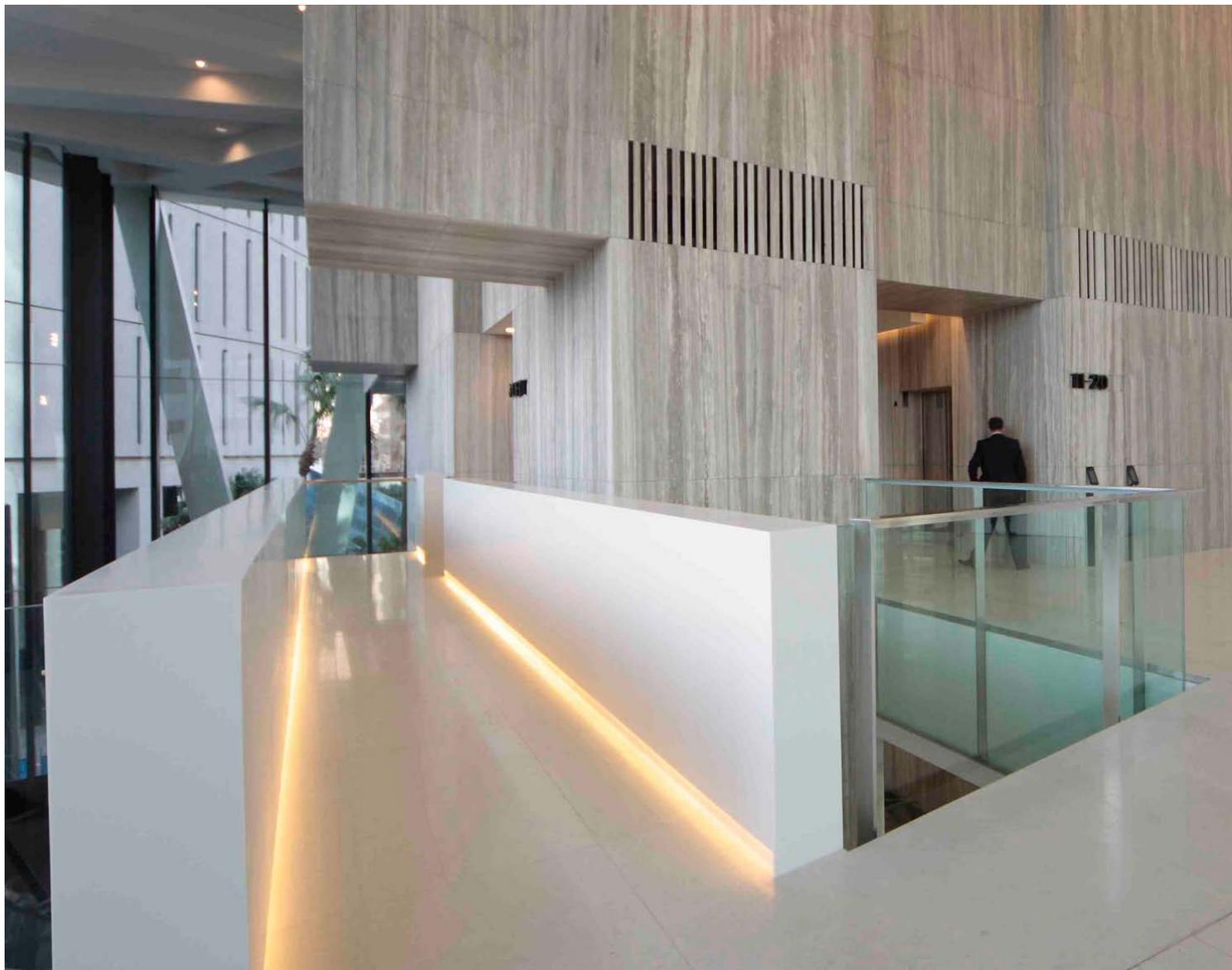
engage with them.”

Sometimes, decisions just come down to one simple thing: market return. If you can explain why energy efficiency and net zero make good business sense, you have won more than half the battle.

Mitra Anderson-Oliver said IIG's investors are aware of what the fund manager is doing.

"But we have been clear about getting market returns, not asking people to make concessionary investments," she said.

"You can get some financial returns from doing green buildings because you attract a higher quality of tenant ... and we have proved that by getting market returns



for our \$1 billion investment in green buildings. But it is relatively niche ... To make it grow we need regulation."

IIG is working with Beyond Zero Emissions to find ways to channel private investment into energy efficiency upgrades for homes and get a payback. It has to stack up, says Anderson Oliver.

Energy efficiency is one of the great low hanging fruits in the carbon sphere. Building homes powered solely by renewable electricity is great but it is even better if you begin by pushing a home's power demands down at the design stage.

The old mantra that the cheapest kilowatt hour is the one you don't use still rings true, Mirvac's Dave Palin said.

"Cost on its own is a good driver.

"Realistically, we need to get energy efficient buildings running on renewable energy; it is as straight forward as that."

We also need to design buildings, precincts, even whole cities in the right places and with the right parameters. Just ask anyone living in Sydney's west about why planning for tens of thousands of new homes in suburbs that regularly experience 40-degree summer temperatures isn't a good idea.

We need a balance between energy efficiency and a building's fabric, AECOM's Sian Willmott said, to create thermal comfort and resilience.

"If there is a black-out, we still want to



111 Eagle Street, Brisbane

“

You can get some financial returns from doing green buildings because you attract a higher quality of tenant ... and we have proved that by getting market returns for our \$1 billion investment in green buildings.

options should be on the table as long as they are supported with robust standards.

But Professor Alistair Sproul, head of the school of photovoltaic and renewable energy engineering at the University of New South Wales, said solar and wind are now cost-effective, and heat pumps – which have lower operating costs than gas – are also stepping into the spotlight.

“The grid will go green much more quickly... if people don't wait for green gas,” Sproul said.

“The opportunities are here and now; what you do in the near term has to be all electric. The grid in Australia can be 90 per cent renewable by 2035 so green electricity on the grid will happen much more quickly than anything else.”

GPT's approach includes eliminating emissions from gas rather than offsetting them. Mirvac is also steaming ahead with 100 per cent electric buildings, and has several major projects on the go.

The major challenge for these developers will be retrofitting existing buildings in their portfolios because heat pumps need much more space in the plant room than a gas boiler.

be comfortable in our homes. You can't do that if you compromise on your building fabric.”

GPT takes a risk based-approach, eliminating emissions by cutting energy use in the first place.

“There are a few circumstances where renewable energy might give you a bigger bang for your buck than pushing for more efficiencies, but in most circumstances efficiency is number one for us”, GPT's Steve Ford said.

So, can we go all electric?

Director at national ratings system NABERS, Carlos Flores, said we should remain open minded about green gas because it is hard to go all electric and all



Illustration: Michael Jones, AJ+C

66

“It is one thing to demand a fantastically efficient building, another for tenants to plug in very inefficient appliances, so you have to work closely with tenants.”

Glenn Day, director national sales & public affairs, STIEBEL ELTRON, said that in a retrofit, you need a roomy and well ventilated plant room to fit a heat pump of the same heating capacity as a gas boiler.

Improving the energy efficiency of existing buildings is a good first step and if done right, a lucrative one too.

Adam Murchie from Forza Capital has done some interesting work to bring poorly performing buildings up to top NABERS ratings at very low cost. He said it comes down to managing demand and understanding where the usage comes from.

“It is one thing to demand a fantastically

efficient building, another for tenants to plug in very inefficient appliances, so you have to work closely with tenants.”

Dr Caroline Noller from The Footprint Company reminded the audience not to forget embodied carbon, which she says accounts for half the emissions problem in the built environment over the next 10 years.

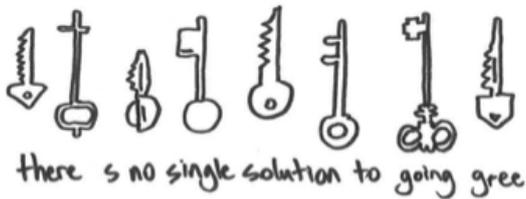
Residential is moving into all electric, fast

There is a massive back catalogue of all electric apartments coming into the NSW market.

According to sustainability manager for Frasers Property Australia Rory Martin his company is developing about 3000 all electric apartments at Ivanhoe in NSW, including social housing, with embedded networks, a 1.5-megawatt photovoltaic system, green roofs, and a focus on recycled materials and waste minimisation.

People aren't waiting for 2030 to go net zero, said Jeremy McLeod of Breathe Architecture and Nightingale Housing.

“Nightingale, Frasers Property, GPT and Mirvac are all doing it. Architects were finding it hard to bring their clients on the



journey because they themselves weren't net zero. But they can do the following easily: 1. buy green electricity; 2. audit energy use; 3. buy offsets.

"If you take gas off, it leaves you with electricity, and you can buy it at half the price and get a net zero building. What's not to like?"

And Breathe Architects, true to their commitment, has announced it is funding net zero offsets for The Fifth Estate. Thank you Breathe Architecture!

For Clare Parry, director, Grun Consulting, low carbon homes have other major benefits that will attract customers that aren't that interested in sustainability.

She's been living though lockdown in her very own ultra low energy Passive House home and said the comfort factor of living in an airtight, well ventilated home is hard to go past once you've experienced it.

Elham Monavari from the Green Building Council of Australia spoke about her organisation's standards for healthy, resilient, net zero energy homes, which are in pilot form.

She said the response to the testing phase has been positive, and that there's been a real shift in thinking in the

residential market – including the volume builders – since the bush fires brought climate change front of mind.

PC Thomas from Team Catalyst, who has worked with the GBCA on the new standard, pointed out that existing environmental performance tools for homes aren't fit for purpose.

He said that NatHERS (the Nationwide House Energy Rating Scheme) is a blunt instrument in its current form for a few reasons, including that it doesn't account for airtightness. It also doesn't consider other energy uses outside thermal comfort, such as appliances.



Financing a net zero world

LYNNE BLUNDELL

Around the world the impetus is growing for post Covid economic recovery strategies to focus on projects that reduce carbon emissions.

The collective power of investors has the potential to fast track the process.

Institutional investors, globally, have been actively divesting fossil fuels for some time and there are signs this is accelerating. Norway's \$1 trillion sovereign wealth fund last year divested more than \$13 billion worth of fossil fuel related investments, and BlackRock, the world's largest asset manager,

announced in January it would remove thermal coal companies as part of a broader climate change strategy.

In Australia institutional investors such as super funds are following suit. This is driven partly by demand from their members but mostly by their fiduciary



duty to protect members' money and avoid stranded assets.

According to Martijn Wilder, founding partner of climate change advisory and investment firm Pollination and chair of the Australian Renewable Energy Agency, ARENA, super funds' appetite for low carbon investments is intensifying.

It's where future growth, and hence stronger returns, will be.

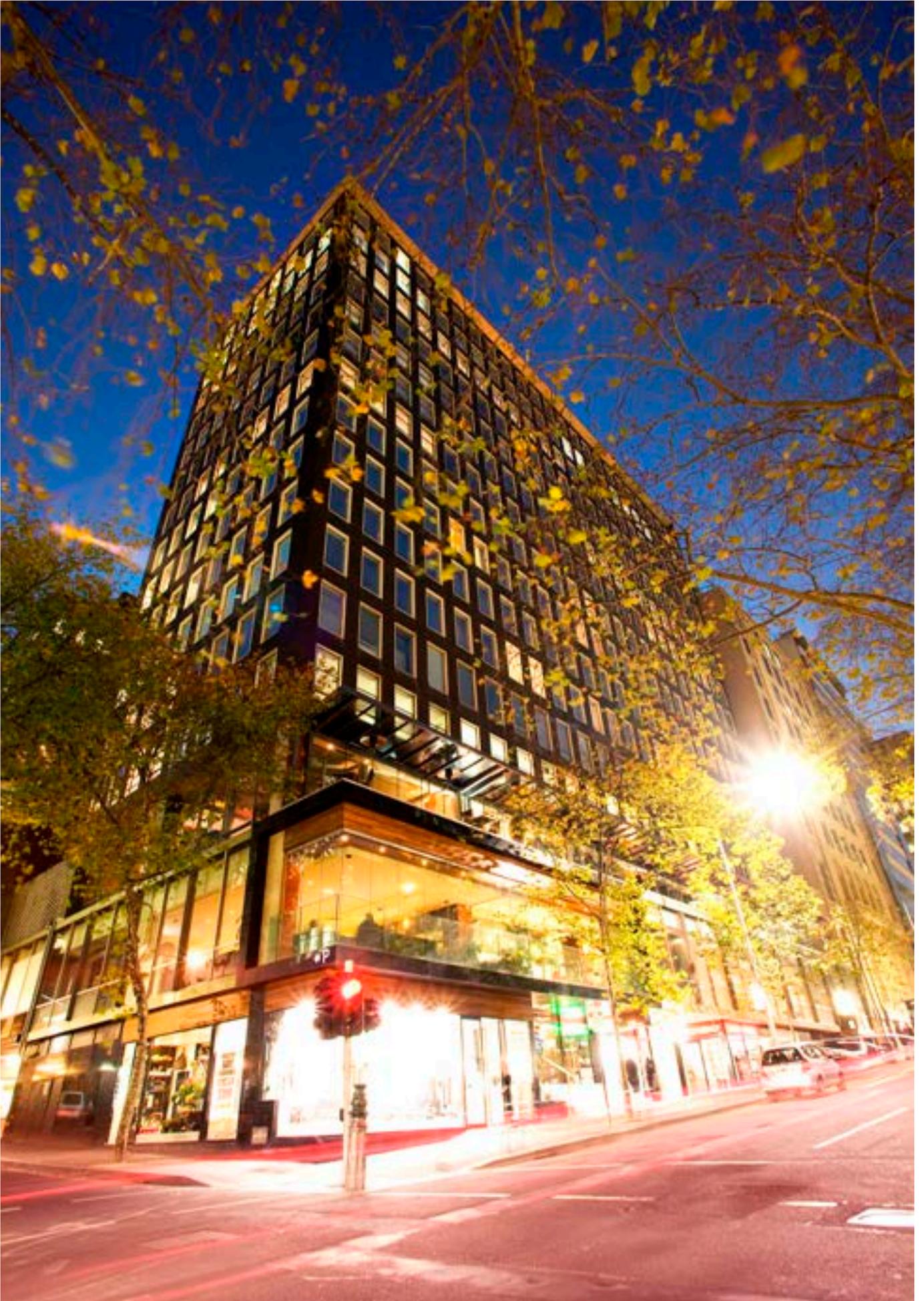
"All super funds are looking at divestment," says Wilder. "They see it as very important and don't want to invest in an asset that can become stranded – that's the key issue."

Industry funds such as Cbus Super, HESTA and First State Super have all announced decarbonisation strategies and investment in more sustainable assets.

Cbus Super has set carbon neutral targets for its property portfolio and is looking to set similar goals for its infrastructure assets before applying them across the entire portfolio by 2050, while HESTA recently announced its divestment from thermal coal.

Super funds decarbonising

In January, First State Super released its updated portfolio transition plan aimed at reducing the carbon footprint of its \$100



billion fund. The fund, which has a large key worker base, has been partnering with property developers to invest in sustainable affordable housing and retirement villages.

Liza McDonald, First State Super's head of sustainable investment, told The Fifth Estate the fund has had a strong focus on addressing climate change since 2014.

"We had the view back then that climate change was one of the most systemic risks that could impact our portfolio across all sectors and all regions. Five years on we did a rethink on how we make that transition to a net zero economy and what we can do as investors.

"We introduced some high level targets, advocating for a 45 per cent emissions reduction in our portfolio by 2030. To do that one of the most immediate activities was to divest from thermal coal mining.

"We also looked at our listed equities portfolio, which is 40 per cent of our entire portfolio, and how we could reduce emissions in this aspect of our investments by 30 to 50 per cent by 2023."

The fund is now taking a sector-by-sector approach, adopting emissions reduction strategy in property, infrastructure and private equity.

"We had the view back then that climate change was one of the most systemic risks that could impact our portfolio across all sectors and all regions. Five years on we did a rethink on how we make that transition to a net zero economy and what we can do as investors."

McDonald says the property sector has led the way in sustainability in terms of emissions reduction, energy usage, waste, resilience, adaptation and social connection to community.

First State Super has invested in sustainable precincts such as Barangaroo and Darling Square in Sydney and Two Melbourne Quarter on Collins Street in Melbourne.

The fund has also been actively investing in affordable housing for key workers across Sydney and Melbourne as well as retirement villages. It has partnered with Oak Tree Retirement Villages in NSW and Queensland with a focus on doing sustainable upgrades.

“

We had the view back then that climate change was one of the most systemic risks that could impact our portfolio across all sectors and all regions.

Five years on we did a rethink on how we make that transition to a net zero economy and what we can do as investors.

This includes installing solar panels on existing retirement units and ensuring new developments have high sustainability targets.

Ultimately, the philosophy behind First State Super's investment approach is to get the best returns for members while also having a positive effect on the environment and community, McDonald says.

"Anything we put in our property portfolio has to meet our target returns and overall objectives. We're here to provide retirement savings and we want to provide sustainable returns to our members, so investing in sustainable buildings and companies really just

flows from that investment philosophy.”

Having an impact through investment

Blending strong financial returns with deep environmental and social impacts is the philosophical basis of funds manager Impact Investment Group, IIG. The fund focuses on three key areas – renewable energy, venture capital for socially and environmentally-focused early to mid stage businesses, and sustainable property.

Mitra Anderson-Oliver, IIG’s head of design and strategy, says the fund has three key strategies for property investment – buying sites and developing them, buying buildings and upgrading them, and partnering with other developers to deliver buildings as a funder or owner.

“In all those models we’re looking to develop property that performs to the highest environmental standard, champions water and energy efficiency and design quality, as well as materials durability,” says Anderson-Oliver.

“We also target social equality and social impact. We do that by seeking value-aligned tenants in commercial buildings.”

IIG’s parent company, Small Giants, is active in sustainable residential property such as The Commons Brunswick. A multi-residential building focused on sustainability and community, The Commons was developed in partnership with Jeremy McLeod from Breathe Architecture, founder of sustainable residential model, Nightingale Housing.

A hallmark development for IIG was the Younghusband Woolstore in Kensington, Melbourne. The 100-year old heritage



“

You can get some financial returns from doing green buildings because you attract a higher quality of tenant ... and we have proved that by getting market returns for our \$1 billion investment in green buildings.

building was acquired by IIG four years ago and repurposed as a sustainable, creative industrial with commercial, retail and public spaces. Key to the success of the project was consultation with the community, including development of the masterplan.

“The community didn’t want to lose the creatives who had been in the building at low rent. We looked at how to combine creatives with high value commercial tenants and retail and also provide public spaces for the community,” Anderson-Oliver says.



Even before developing the building IIG looked at ways to achieve this, curating events and festivals to make it accessible to the community. On the back of that the funds manager/developer looked at how to offer existing creative tenants a subsidised rental and still achieve good returns for investors.

The creative industries breathe life into a precinct and bring value, glamour, sexiness."

"It has to be a blend," says Anderson-Oliver. "A proportion of the building is rented at subsidised rates so that returns are profitable."

"The creative industries breathe life

“
The creative industries breathe life into a precinct and bring value, glamour, sexiness.

into a precinct and bring value, glamour, sexiness," Anderson-Oliver says.

"This converts into buzz, builds profile and attracts press and events. Most importantly, it ensures goodwill in the community. Community goodwill is invaluable – it also reduces planning risk, which can be a huge cost for a development."

A key priority was creating a carbon, water and waste neutral site. Passivhaus principles were applied to achieve lower operational costs and greater health benefits for tenants. This involved combining energy efficient heating and cooling systems, rainwater harvesting, greenery, productive community gardens, green travel plans, innovative water management systems and green leases. A smart building system provides live data streams and performance monitoring.

Such developments attract higher quality tenants and have

66

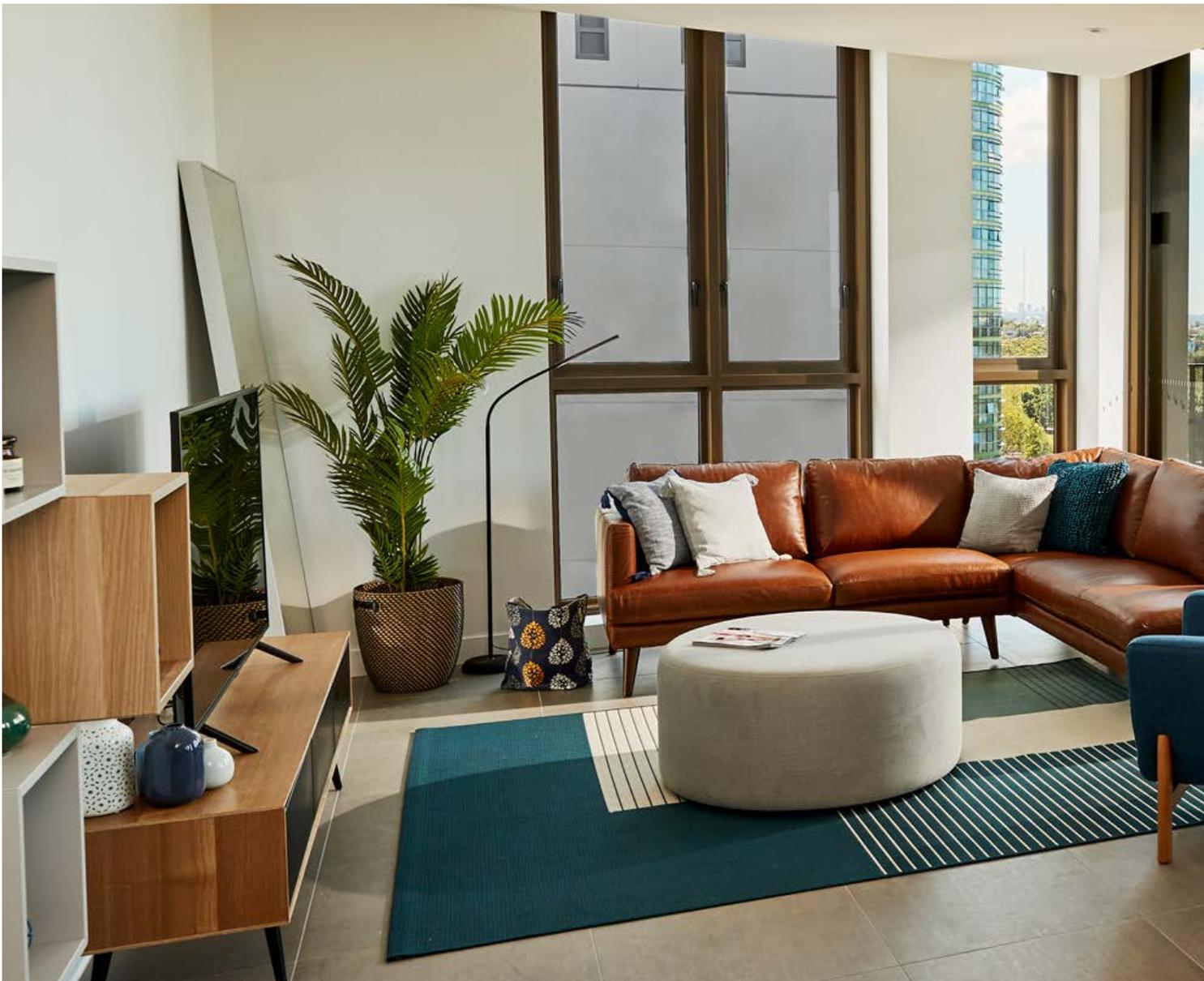
Every dollar invested by IIG in subsidies, \$1.85 is created in economic benefits for tenants and the community.

lower vacancy rates, reducing the cost of achieving sustainable outcomes.

Returns are strong, according to research by Swinburne University commissioned by IIG. It showed for every dollar invested by IIG in subsidies, \$1.85 is created in

economic benefits for tenants and the community. The report also found that tenants at Youngusband generate 14 per cent of their business income through cost savings and new sales as a result of clustering and collaboration.

Anderson-Oliver says systemic change is needed to boost investment in sustainable property, largely through regulation and higher sustainability requirements. IIG was particularly disappointed in the missed opportunity to fund sustainable residential upgrades with the federal government's HomeBuilder program.



“What we would have liked to see was \$25,000 grants to households to do a complete environmental upgrade on their properties, including insulation, a solar system, double glazing and energy efficient appliances.

“Instead, the government gave a free kick to high value conventional upgrades without any link to environmental performance. Surely, we've reached the time where we don't do that any more,” Anderson-Oliver says.

She believes a more suitable approach than government grants could be a loan backed by private investors, which

householders repay through savings in their energy bills.

Renters benefit from sustainable focus

Large property developers such as Mirvac have been ramping up their sustainable developments and venturing into new areas such as Build-to-Rent. Common in Europe, where tenants historically have stronger rights than in Australia, the BTR model focuses on maintaining a steady rental income stream for building owners rather than making money on the increase in the building's value.

This encourages a long term investment view, and an emphasis on providing a



LIV Indigo build-to-rent development in Sydney Olympic Park by Mirvac



quality product for renters.

Mirvac's Liv Indigo project in Sydney, built in partnership with the Clean Energy Finance Corporation, incorporates energy efficiency features such as double glazing, energy usage signposting and LED lighting.

Units are offered on standard 12 month leases but they are rolling leases and tenants have first right of refusal on renewal. Rental increases are capped at 4 per cent a year and tenants are encouraged to move within the building if their rental needs change.

Mirvac has more BTR projects coming up, including a 490 unit development in the Queen Victoria Market precinct, set to open in 2022.

Financing older building upgrades is vital

But it is the upgrade of older building stock across Australia where the heavy lifting is in the push for carbon emissions reduction. This is where the biggest difference can be made and is also the most complex to achieve.

Scott Bocskay, CEO and managing director of the Sustainable Australia Fund, has been a key player in this space, with his work on environmental upgrade finance.

The Sustainable Australia Fund started life as the Sustainable Melbourne Fund in 2002 when the City of Melbourne set out to invest in increasing the sustainability of the city's buildings. This led to the creation of Environmental



Upgrade Agreements, or EUAs, designed specifically to overcome many of the barriers to environmental upgrades, including business cashflow and the split incentive between landlords and tenants.

The fund was renamed in 2019 in line with its ambition to expand nationally and has recapitalised with a \$200m loan facility backed by Bank Australia.

It has partnered with 40 councils in Victoria and is looking to expand into NSW and South Australia, with one already signed up in Kyogle in northern NSW.

According to Scott Bocskay, the awareness of EUAs is still growing and it has taken a while for the market to stop seeing the product as complex.

"At the end of the day an EUA is just a loan

“

But it is the upgrade of older building stock across Australia where the heavy lifting is in the push for carbon emissions reduction.

that is repaid via council rates. We've been focusing on simplifying it."

The fund now has three EUA products – finance for solar installations, finance for building upgrades and a capital fund product. The latter targets property

“

Covid has changed a lot of things. Building owners are less willing to spend their own cash on upgrades.

developers participating in a total capital solution for repositioning buildings as opposed to straight retrofits.

“When we first launched EUAs it was about retrofitting for sophisticated investors but what we’ve found is they actually have very good access to capital and are on that journey of Green Star buildings. Now it’s more the corporates and family owned businesses – operating businesses.”

Bocskay says there are two types of businesses the company deals with – those in the business of property, and operating businesses that are concerned with containing their costs.

“We target agriculture, food manufacturing and commercial and industrial property. The people who own and operate those buildings are the ones that run the business as well as the building and they’re the ones that are suffering from the energy input costs.”

Covid has changed a lot of things. Building owners are less willing to spend their own cash on upgrades.

EUAs have an advantage here, particularly when they are structured over 20 years, making repayments more manageable during uncertain times. Customers that pre Covid wanted five to seven year loan terms now want 12 to 15 years.

The real growth, says Bocskay, is in solar installations on large industrial rooftops.

“We’re seeing a whole range of new customers, from agriculture to food manufacturing, where there are big roof spaces. More and more businesses are looking at batteries in their solar installation as a way of load shifting and participating in energy markets and opportunities like virtual power plants. EUAs, with their long payback periods, make these investments more feasible,” according to Bocskay.

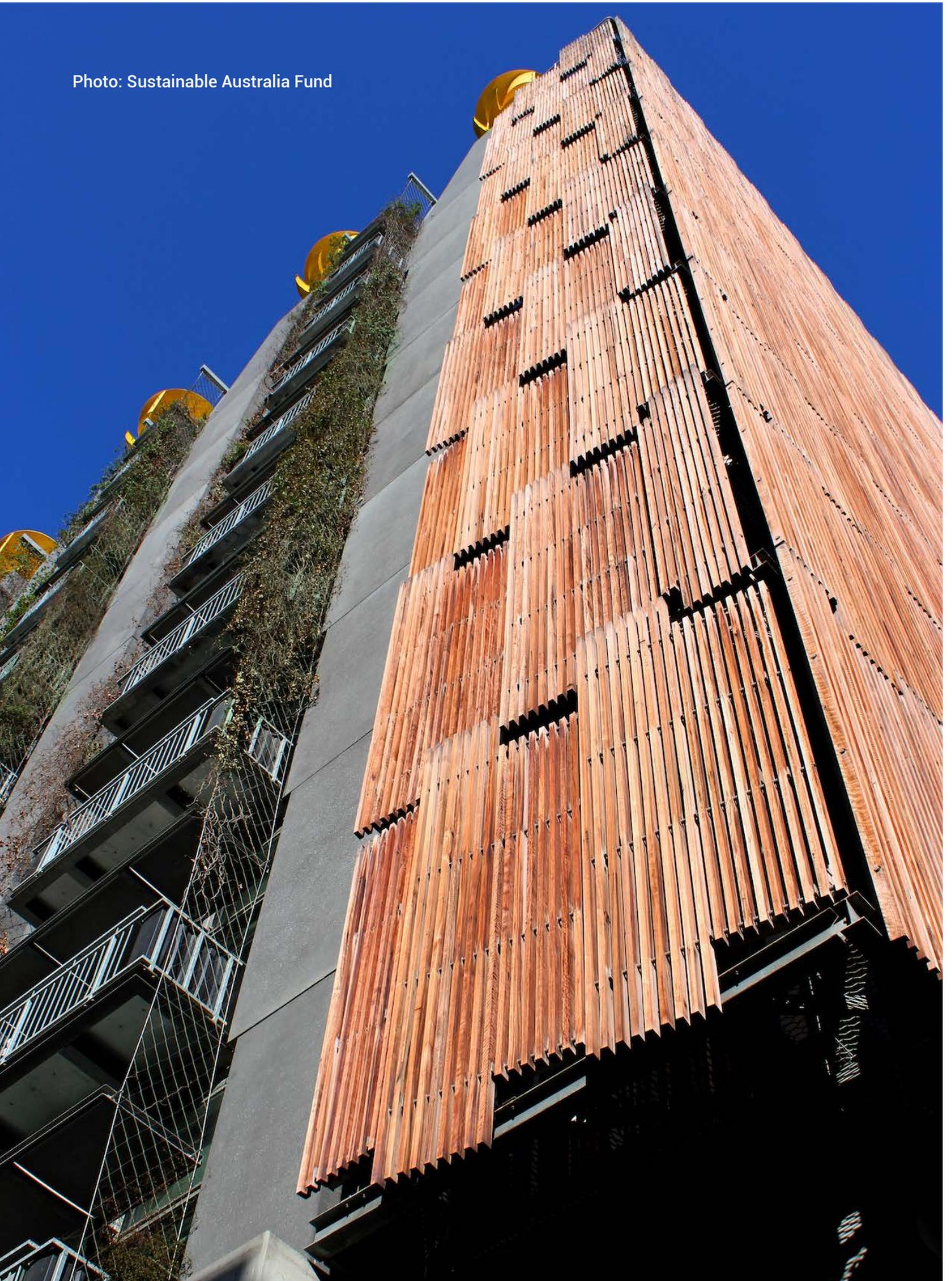
The Victorian government recently passed legislation to allow EUAs to be used in the residential sector. Bocskay sees potential for new residential builds if the legislation around EUAs is changed to include projects on vacant land. Currently they are restricted to projects where there is an existing building.

“We are advocating councils and governments to broaden EUA legislation to help with a green recovery. This would allow for a range of potential opportunities in both residential and commercial such as community scale solar, soil carbon projects and zero net carbon home developments,” Bocskay says.

“We’ve done a lot on providing zero net carbon homes for the same price as a six star home, funding the marginal difference in an EUA.

“If we’re aiming for a zero net carbon economy, targeting all these sectors and avoiding carbon lock-in on new builds makes a lot of sense.” [n](#)

Photo: Sustainable Australia Fund





BZE's Heidi Lee on knocking down the barriers to net zero

LYNNE BLUNDELL

Something that all climate change experts agree on is the urgent need for a meaningful timeframe to reach net zero carbon emissions if we are to avoid catastrophic climate change.

This urgency is uppermost in Heidi Lee's mind in her role as industry investment lead and project leader of the Million Jobs Program at Beyond Zero Emission.

In June BZE launched its Million Jobs Program, with an ambitious aim of creating over one million jobs and reinvigorating the national economy through a range of projects that help modernise industries, re-skill the workforce and reduce household energy bills.

In the built environment this includes:

- national housing retrofit program targeted at eliminating bills for 2.5 million low-income households
- 150,000 new zero-energy social housing dwellings
- building an electrified transport infrastructure such as electric bus fleets with localised and regional manufacturing

Central to BZE's plan is the golden opportunity provided by Covid.

"There is a lot of talk right now about the economic stimulus benefits of building affordable housing but we have to ensure any retrofit or any new building is net zero energy," Lee says.

"If we do this we have market stimulus to do all the upskilling we need [in sustainable upgrades] and can also fast track net zero emissions across the economy. That's what we need to legitimise the proposed new National Construction Code, which has a trajectory to net zero."

According to Lee there are enormous untapped resources in the private finance sector to drive this. Super funds, for example, are keen to invest in affordable housing and the build-to-rent market, which already attracts institutional investors overseas and is just starting to appear in Australia.

The long-term investment profile of the BTR sector is ideal for super funds and also conducive to quality net zero builds. Lee says these new sustainable builds also remove the split incentive problem inherent in sustainable upgrades on existing buildings, where landlords are unable to recoup the costs of installing elements such as solar panels but tenants gain the benefits.

One of the biggest barriers to getting more sustainable projects off the ground is the gap between those with the great ideas – often community groups – and the people with the expertise in building business cases for renewable energy projects and tracking down finance.

“At BZE we’re looking at ways we could pull together the investment resources from institutional investors who have project development money to spend and great community project ideas,” Lee says.

As part of the research for the Million Jobs plan, the organisation did a call-out to community groups for zero carbon projects ideas. From this it began developing template investment pathways for different types of community projects.

It now has around 700 projects in its database and is categorising them into themes and typologies to help match them with suitable investment.

“Because we’re working with a reference group of investors that includes super funds, capital investment groups, impact investors and big and small banks we can now begin to match these with projects. We need to show there is a pipeline of projects to solve the investment pathway problem for hopefully hundreds of community projects.

“Sometimes the barrier is that the

business case hasn’t shown the benefits well, sometimes it is a structural problem, or if it’s a policy issue we can campaign for that.”

Lee says she has a “very grounded optimism” that Australia will find a way to achieve net zero emissions but she is impatient for it to happen faster.

“If ever there was a time for action it is now. Covid has turned everything on its head. We’ve had other transitions and opportunities for change, such as the global financial crisis, but this time we are so much further down the path regarding climate change action. There is much

“

One of the biggest barriers to getting more sustainable projects off the ground is the gap between those with the great ideas – often community groups – and the people with the expertise in building business cases.

more impetus from large investors, the regulatory environment and insurers.”

Reaching zero emissions is not about if but when, says Lee.

“We can do it, we just need to want to and to do it faster. If we really want it the federal government, state governments, local councils, businesses, communities – all of us – will be collaborating like never before. And we’re going to make some real change.” n

PARTNERED CONTENT WITH STIEBEL ELTRON AUSTRALIA



Steibel Eltron provided geothermal heat pumps to University of Melbourne's Trinity College



Why you should future proof apartments with electric instantaneous

Hot water can be a pain point in the pursuit of low carbon apartment buildings but with modern electric instantaneous hot water systems, there's really no need for fossil fuel-intensive alternatives.

Developers have a few choices when it comes to hot water in apartments. The first is between centralised or decentralised systems, with the former storing hot water in a plant room connected to each apartment through pipes.

Then there's the fuel source used to heat the water, with gas and electricity both common.

While it's usually possible – but not always easy – to swap from gas to electric hot water systems, the same can't be said for decentralised to centralised systems. The pipes and infrastructure are so different, it's not usually viable to retrofit.

“

Compared, like-for-like, decentralised hot water systems beat the centralised alternative hands down.

Centralised hot water storage a relic of the past

Up until around 16 or 17 years ago, the default option for supplying hot water to apartments was a centralised hot water storage system.

That was until the industry woke up to the advantages of instantaneous (or continuous flow) hot water systems.

Compared, like-for-like, decentralised hot water systems beat the centralised alternative hands down.

For a start, centralised systems are energy guzzlers are expensive to run. For STIEBEL ELTRON Australia national sales

manager Glenn Day, it's "simple physics".

That's because when someone turns the hot water tap on in their apartment, hot water has been traveling all the way from the centralised storage unit through a network of pipes. This is a long way for hot water to travel, and heat is lost along the way.

Keeping the water warm 24/7 is also an inefficient use of energy, ramping up costs and the emissions created by the building.

Bulky water storage tanks also take up valuable real estate in space-constrained urban areas. Because developers are unlikely to sacrifice saleable apartment floor space, this typically means forgoing common areas.

It doesn't help that engineers typically cater for peak demand – that is, storing hot water for worst possible peak that may never occur. When everyone hits the showers at once.

Even though peak demand is highly unlikely in an apartment block because people have varied showering schedules, there's a tendency to play it safe and install a hot water system big enough to handle peak demand.

Decentralised systems put these problems to bed

Decentralised hot water systems put these concerns to rest.

Instantaneous hot water heaters lose very little heat pumping delivering the hot water from the tank to the nearby washing machines, kitchen sink and bathroom taps and shower.

Similarly, peak demand is no longer a concern because water is heated on demand to required flow rate and temperature using

Stiebel Eltron provided electric instantaneous hot water units at 1 William Street, Brisbane





“

In the wake of the horror summer bushfires, low carbon housing is top of mind in Australia. Sustainability might have been a nice-to-have before but consumers are now demanding it.

electricity and gas, with each dwelling only paying for what they use.

Day says that the efficiencies gleaned by a decentralised system can slash energy use by as much as 50 per cent compared to a centralised alternative.

The consumer also ends paying for exactly what they use, with centralised alternatives often billed through an end-to-end pricing system that tries to account for the energy to keep the water warm and what's lost transporting it around.

Instantaneous hot water cylinders systems don't take up much space and aren't too obtrusive, often hidden away in laundries or beneath the kitchen sink.

Better for prefab and Legionella-free

Other lesser known benefits of decentralised hot water systems is

that they work well with future building techniques such as prefabricated and modular, where building components are put together in a factory offsite and craned into place.

Decentralised hot water systems make for simplified offsite bathroom construction, with the technique used to build one of Melbourne's tallest skyscraper, the 69-level 568 Collins Street.

Unlike in centralised systems where warm water can be left sitting around in pipes, there's no or little risk of a Legionella infection when using instantaneous units.

Electric is the way forward

In the wake of the horror summer bushfires, low carbon housing is top of mind in Australia. Sustainability might have been a nice-to-have before but consumers are now demanding it.

Forward-thinking developers should be looking for opportunities to decarbonise, and this means fossil fuel-free hot water. Gas can be used for both decentralised and centralised options but when teamed with renewables, electricity is the lower carbon option.

The trouble is, unlike in a detached home, putting renewables on the roof is not really an option. Typically, there's only enough roof space atop an apartment block to power the common areas. Fortunately, there are other options. Residents can purchase renewable energy via Greenpower, for example.

The other point to consider is that the emissions profile of grid electricity is only going to decrease as the penetration of renewables increases, which means an all-electric home is a future proof home. [n](#)

One One One Eagle Street in Brisbane



Decarbonisation of the grid has left the station are we all aboard?

LYNNE BLUNDELL

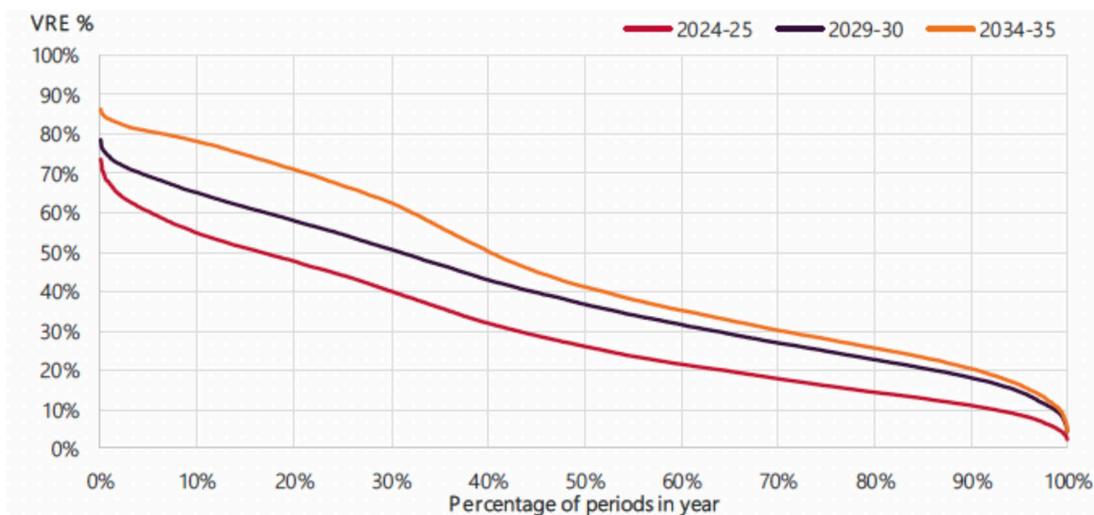
Australia's energy pathway to net zero carbon emissions has been fraught with conflicting interests and inertia. And the battle is far from over. Fossil fuels are on the way out – the only question is how quickly. This depends on how the transition to renewable energy sources is managed.



According to the Australian Energy Market Operator, AEMO, in its 2020 Integrated System Plan, released in July, Australia could be 90 per cent powered by renewable energy sources by 2035. But it requires the will to get there.

Currently our energy mix is around 7 per cent hydro, 8 per cent wind, 8 per cent solar, 9 per cent gas, 52 per cent black coal and 16 per cent brown coal.

The AEMO plan sets out the actions and investments necessary to make the transition to renewables. If enacted, it will result in \$11 billion of savings to consumers in reduced energy bills, says AEMO. It would also ensure energy system reliability and easily meet current emissions reduction targets. Significantly, it includes a diverse mix of renewable technologies that AEMO says will cost



Source: AEMO 2020 Integrated System Plan

much less than replacing existing coal-fired generators with new thermal generation.

Gas is included in the plan but AEMO cautions that high prices could make gas uncompetitive in the future. With the price of batteries predicted to keep declining, they may be a more viable alternative to gas for ensuring system reliability during peak energy use.

This contrasts with the federal government's push for a gas-led economic recovery post Covid. This has caused concern among members of Australia's scientific community who see gas as a destructive global warming fuel.

Following a recent address by chief scientist Dr Alan Finkel to the National Press Club, in which he advocated for gas as a critical part of Australia's energy transition, a group of leading Australian scientists, including lead authors with the Intergovernmental Panel on Climate Change, wrote to him saying his support for gas "is not consistent with a safe climate."

Steep learning curve but it can be done

Professor Alistair Sproul, head of the School of Photovoltaic & Renewable Energy Engineering, University of NSW, says it has been a steep learning curve to enable renewable energy to comprehensively connect to the grid, but it will happen.

"Governments are still trying to catch up but it is inevitable," says Professor Sproul. "They just need the will to do it. Mostly it will be the market that determines it anyway."

Incorporating a tiny amount of gas in the transition might be part of the solution but it is not inevitable. Sproul says consumers

have been misled about gas being the best and cheapest option for their energy needs. At 16 cents per kilowatt hour compared to 2 cents for rooftop solar, it is now extremely expensive.

"There has been a 90 per cent reduction in the cost to heat a home with rooftop solar over the past decade," says Sproul. "Property developers like Mirvac and Lendlease know it is a no brainer to install

“

Not everyone in the building industry has caught up. Some in the construction industry are still working out how to make a faster typewriter while we in the PV industry are saying get a very fast computer.

renewables. Rooftop solar is now so cheap to install – around 1 per cent of the cost of building a new house. In high rise the best option is to buy GreenPower."

A key barrier to renewables has been regulatory. For example, the requirement for a solar or wind farm to connect to the grid has been the same as for a massive coal-fired power station. Some of these barriers will be removed with reform of the national electricity market, the NEM, in late 2021.

Despite the barriers, there has been dramatic change in the built environment over the past decade, Sproul says.

"Ten years ago everyone thought the best way of getting buildings to net zero was

through energy efficiency and behavioural change because the photovoltaics and wind power industries were too small and too expensive. This has changed dramatically – the cost of tackling it through energy efficiency is similar to a decade ago but now the PV and wind industries are ten times larger and 90 per cent cheaper.

“Not everyone in the building industry has caught up. Some in the construction industry are still working out how to make a faster typewriter while we in the PV industry are saying get a very fast computer.”

For most large buildings or university campuses, the quickest and cheapest way to get to net zero is by signing a Power Purchase Agreement, or PPA, with a solar or wind farm. UNSW, for example,

frown on PPAs as a cop-out but that is no longer the case. If every company bought green energy off the grid it would be a revolution,” Sproul says.

Pumped hydro and hydrogen

Other renewable energy sources will play an important role across the grid. These include pumped hydro, which involves recycling water rather than relying on rivers and wilderness areas. Professor Sproul believes it could be a future revenue source for farmers by providing areas of their land for pumped hydro generation. Ideally it would put an end to other unsustainable intensive farming practices such as rice and cotton growing.

A recent paper, Pathway to 100% Renewables, written by a team of renewable energy experts, predicts pumped hydro could provide far more energy than the world requires. The paper's authors include Andrew Blakers, engineering professor at Australian National University, and identifies 616,000 promising sites for off-river pumped hydro around the world. With a combined storage capacity of 23 million GWh, these sites could generate twice the amount of energy necessary to support 100 per cent global renewable energy.

“This is significant because pumped hydro storage is the lowest cost storage method and is available off-the-shelf in large scale,” says the paper. “Australia is deploying PV and wind at a rate of 250W per year per capita, which is four to five times faster than in the European Union, the USA, Japan and China. This is significant because it demonstrate that rapid deployment of PV and wind is feasible,

“

Professor Sproul believes pumped hydro could be a future revenue source for farmers by providing areas of their land for generation. Ideally it would put an end to other unsustainable intensive farming practices such as rice and cotton growing.

can get four per cent of its energy needs from rooftop PVs and the remaining 96 per cent through a PPA.

“People in the building industry used to

with consequent rapid reductions in greenhouse gas emissions.”

Professor Sproul believes pumped hydro could be a future revenue source for farmers by providing areas of their land for generation. Ideally it would put an end to other unsustainable intensive farming practices such as rice and cotton growing.

Hydrogen is also being touted as a renewable energy source, particularly as a replacement for gas. In November last year the CSIRO released the National Hydrogen Roadmap, which proposed that clean hydrogen could enable deep decarbonisation across the energy and industrial sectors. Historically, hydrogen production relied on fossil fuels to run an electric current through water to split it into oxygen and hydrogen, but now hydrogen can be produced using renewable energy and seawater.

However, a lot more research is needed before hydrogen can be used in buildings, NABERS director Carlos Flores told participants in The Fifth Estate's Flick the Switch conference. NABERS is currently working on a net zero certification.

“In the process of working on this certification many people have asked us about the role of decarbonised fuels – whether than can and will happen. Today there isn't a credible certification scheme for decarbonised fuels available in Australia. Whether we can have that is a big part of the debate and if it did exist I think a lot of people would be supportive,” Flores says.

“Every building is different and it is hard for some buildings to go all electric so they need other options. But right now there's no green gas. We can create clean hydrogen but a lot of research needs to

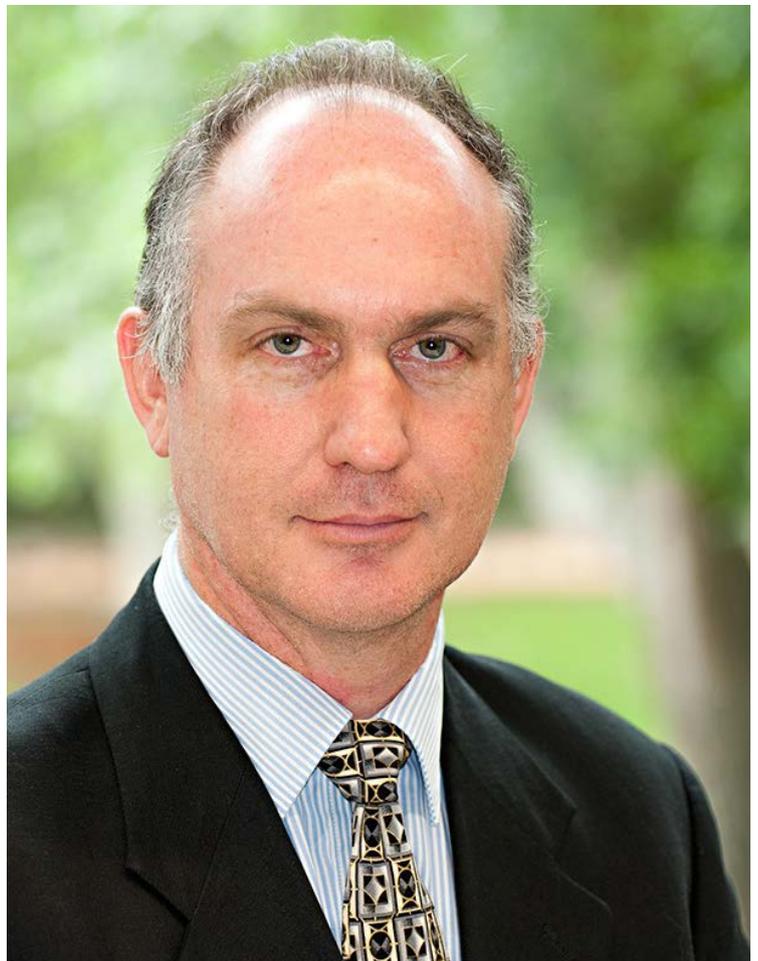
be done and we need robust credible standards before NABERS can recognise things like hydrogen.”

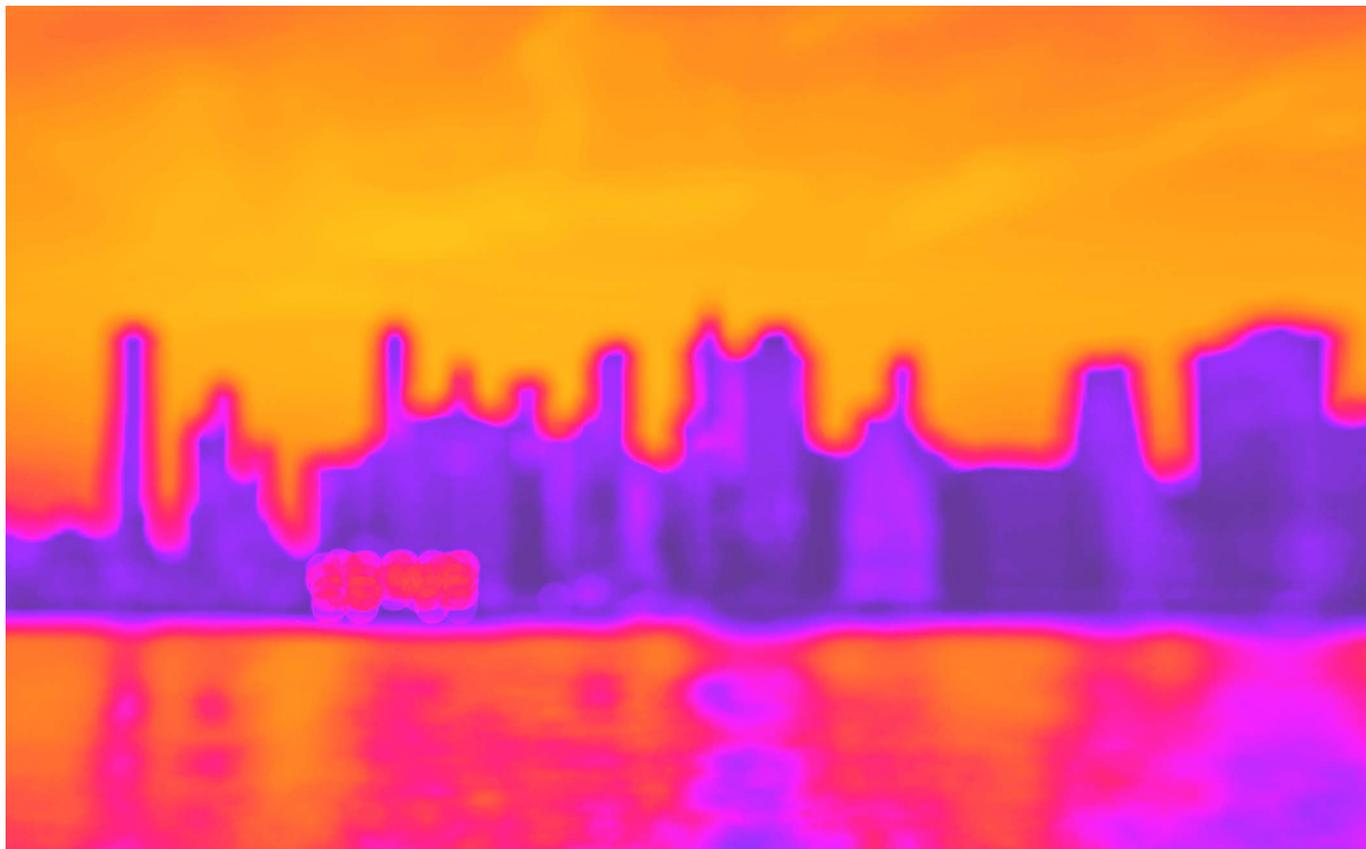
Controlling demand key to transitioning

A critical part of the transition to renewables is the advance in technology that enables demand response. Also referred to as demand side participation, this involves consumers altering their usage patterns so they use more electricity out of peak usage times

“

Over the next 12 to 18 months we will see an emerging energy ecosystem in the supply chain with considerable load shifting.”





when it is cheapest. This helps ensure grid reliability and supply shortages by smoothing usage patterns.

AEMO predicts demand side participation will at least double, and possibly quadruple, across Australia's energy market by 2040. This will be driven by advances in information and control technology and by market reforms. As part of market reform, the Australian wholesale electricity price will settle every five minutes instead of every 30 minutes from October 2021. This will benefit batteries and demand response measures.

Craig Roussac, chief executive officer of Buildings Alive, told Flick the Switch participants the reforms will change the market immediately.

"From next October anyone who reduces their demand can sell energy into the grid like an operator. As soon as this happens price volatility will reduce dramatically," Roussac says.

Buildings will play a major role in the new regime by maximising energy use in the middle of the day when usage across the system is lower and prices cheaper and balancing the grid. This also makes the best use of solar, which is at its most productive during the day.

It helps to know how much energy is being consumed first

Using smart meters and software to monitor their energy usage patterns already empowers building owners to make more effective decisions about how to maximise new technologies. This trend will only accelerate, according to Alex Houlston, co-founder and director of energy services company Boom Power.

Boom Power's software simplifies energy performance assessment. It was developed by Houlston after years of working in energy procurement and assessment for government and the private sector, and being frustrated at how time consuming and expensive

it was for energy professionals to understand and implement solar, batteries and energy efficiency at scale and then verify the results.

Initially seed funded through the Victorian government's New Energy Jobs Fund in partnership with the Community Housing Industry Association Victoria, Boom's software underpinned the assessment process for the \$3 million Victorian Property Fund's sustainable housing funding. It is now widely used in affordable housing schemes, the aged care sector as well as private sector development projects.

The software measured carbon emissions reductions and cost savings from rooftop solar installation across six Victorian Property Fund community housing projects. Emissions reductions ranged from 164 to 489 tonnes per year.

Houlston sees the role of technologies like Boom's as promoting understanding of the cost and other benefits of renewable energy and accelerating their uptake. He believes there is enormous potential for the use of such software in the commercial and industrial sectors where there is a high energy load and large roof space for solar installation.

In line with this, Boom is launching a new program in Queensland targeting industrial businesses, from SMEs to aluminium smelters. While its software is focused on rooftop solar and lighting, it will partner with a company that has expertise in Power Purchase Agreements. The two complement one another to get buildings to carbon neutral, says Houlston. The Boom software empowers asset managers to push for renewable energy solutions.

"An asset manager with minimal training

can manage the process of implementing solar and energy efficiency across a whole portfolio," says Houlston. "They're able to report on it, understand where they're making savings and where they're best to spend their money. And they can, on an ongoing basis, present the benefits to executives or board."

“

Tenants also play a huge role by putting pressure on building owners to aim for carbon neutral buildings.

Don't forget the tenant

Tenants also play a huge role by putting pressure on building owners to aim for carbon neutral buildings. NABERS' Carlos Flores says tenants' influence on the energy supply chain is hugely important.

"Just as embedded carbon is an important aspect in achieving net zero for building owners, the base building is that for tenants. Finding ways for tenants to put pressure, or offer incentives, to building owners is something that can be done at relatively low cost and effort. It's done at the leasing stage and could have an enormous impact." [n](#)

Demand response goes back to the future

CRAIG ROUSSAC, BUILDINGS ALIVE

Load management has been a concern for electricity networks since the very beginning. In the late 19th century, before the advent of tiered electricity tariffs, it was common for a quarter of the load on distribution systems to occur for fewer than two hours a day.

So, in 1888, only a few years after the world's first electric utility company was launched, the British generator manufacturer R.E.B Crompton led calls for the creation of "off-peak" loads to keep the furnaces burning and supply costs down. Use of electricity started being promoted for non-lighting purposes like cooking, heating and industrial processes and, thus, "demand management" was born!

Throughout the world, and for the best part of a century, the early problems were largely solved by introducing stable overnight loads from sources like street lighting and water heating that took advantage of cheap off-peak power, coupled with electrification of domestic, commercial and industrial processes during the daytime.

Enter the "Duck Curve"

Fast forward 130 years and our electricity networks once again face significant challenges. The proportion of electricity coming from renewable sources like solar and wind is increasing while fossil-fuelled generators are retired. Demand for air conditioning is growing rapidly, and

previously large and stable loads from equipment and appliances are dropping as their efficiency improves.

The evolving daily demand profile has a name: the "Duck Curve". Typically, demand on the network rises in the morning as households and industry wake up and then it drops during the middle of the day due to the contribution of photovoltaic (PV) panels (tail to back). It then rises again to a peak late in the afternoon (the head) as residential and commercial users continue to draw large volumes and the generation from PV panels drops away. The situation varies from location to location and according to the time of year, but that is what causes the duck curve and it is a huge threat to grid stability, it drives up infrastructure costs, and it devalues the contribution of renewable energy.

Is there a solution?

Happily, yes! And it holds the promise of lower bills, fairer distribution of benefits, and a fast-track to a cleaner, more sustainable, environment.

As was the case in the late 19th century, innovation around pricing and an efficient transfer of savings will be key. Currently the wholesale price of electricity on the Australian National Electricity Market (NEM) – the price that electricity generators and retailers trade electricity at to sell to consumers – is extremely volatile. It can range from less than \$50/

MWh (<5¢/kWh) when demand is low to \$15,000/MWh (\$15.00/kWh) at times of peak demand. This 300X spread in pricing, which can happen within a period of hours, reflects the fact that consumer demand is generally unresponsive to price signals because consumers pay fixed contract rates for their electricity. Furthermore, wholesale electricity is traded in half-hour blocks, even though system components (including batteries) can add and remove load in seconds.

In Australia, all this is about to change. From October 2021, the wholesale market will be opened up to commercial and industrial customers (through intermediaries) who will be able to bid 'demand response units' into the market as a substitute for electricity generation. What? Play that again?

Electricity consumers will be able to sell the electricity they avoid using for premium rates as though it were generation.

And in addition to that, the market will shift from half-hourly settlements to 5-minute settlements. Combined, these changes will lead to the emergence of a genuine two-way market that will operate in near-real-time, unlocking the full potential of information technology, emerging generation and storage technologies, new business practices and human ingenuity.

What will this mean for buildings?

Large buildings with complex or centralised heating ventilation and air



Craig Roussac, Buildings Alive

conditioning (HVAC) systems can, and should, play an integral role in the future electricity system. Just like batteries (both stationary and those contained in electric vehicles), buildings have capacity to draw, store and release energy in a managed way.

During the middle of the day, when PV generation rises and wholesale prices drop, buildings can increase their demand on the network by driving more fresh air through their systems for better ventilation and thermal comfort. Later in the day they can trim loads by using the stored energy in building fabric and chilled water reticulation systems. Furthermore, with forewarning based on advanced data science and machine learning, the most sophisticated building operators will adopt strategies to take advantage of market price fluctuations to cut their cost of electricity to below zero.

And that is the truly exciting part. Active efficiency strategies designed to minimise cost will also accelerate progress to net zero carbon as loads are shifted to clean renewable electricity and away from the expensive and highly polluting technologies of yesteryear.



80 Ann Street, Brisbane. Supplied: Mirvac



Net zero is no walk in the park but that's not stopping Mirvac

POPPY JOHNSTON

In 2014, Mirvac announced an ambitious target to be net positive carbon by 2030, and in 2019 released its plan on how it intends to get there. It's a goal that has already triggered an all-electric, energy efficient office development run off 100 per cent renewables in Brisbane, currently under development.

The real estate investment trust has a plan to reduce its emissions profile while still growing its portfolio, starting with the adage "the cheapest tonne of CO₂-e for your purse and the planet is the one you don't emit."

Not only is energy efficiency the least expensive way to reduce emissions, an energy efficient building tends to be a more comfortable and productive one, provided airtightness is teamed with adequate ventilation to promote good air quality.

According to the REIT's sustainability manager David Palin even a 0.5 NABERS Energy increase can translate into generous savings for office tenants, creating valuation uplift for building owners.

When it comes to the pushing the boundaries of thermally efficient building envelopes, Palin says one of the areas the real estate group is experimenting with is façade design. In new builds, façade design is key to achieving the top NABERS ratings, he says.



One experimental facade that Palin says is “performing really well” is EY Centre’s closed cavity façade with timber shades at 200 George Street. This high performance solution, with its three panes of glass and two distinct cavities, is the first of its kind in Australia.

When designing façades, it’s all about the unique conditions and climate of the site. In warm sunny Brisbane, for instance, it’s all about shading.

When it comes to the business’s scope one emissions, eradicating gas (used mainly for heating and domestic hot water) to run buildings off 100 per cent renewable electricity (both onsite and offsite) is a pain point, especially in cooler climates and in existing buildings.

While the pathway out of gas is always building specific, Palin says at this point

“

Not only is energy efficiency the least expensive way to reduce emissions, an energy efficient building tends to be a more comfortable and productive one, provided airtightness is teamed with adequate ventilation to promote good air quality.

a heat pump in a central plant location as the main heat source is often the best option.

The other major barrier to heat pumps is that compared to Europe, where the technology is common, there’s nowhere near the expertise and knowledge.

They also take a bit more space, which makes them a little tricky to swap out for a gas boiler in an existing building.

Once the heat pump is in there it’s a matter of setting up the controls and bringing facility managers up to speed.

“Heat pumps do work a bit differently to gas so it’s a bit of a jump in knowledge.”

Although Palin says renewable gases such as hydrogen will likely have a role to play in a decarbonised built environment, the technology comes with “a lot of challenges”.

He says at this stage, all electric buildings run off 100 per cent renewables is the most straight forward and safe way to get to net zero, with any remaining emissions from the lies of diesel backup generators to be offset.



80 Ann Street, Brisbane. Supplied: Mirvac

CASE STUDY

Sirius Building, Canberra

Retrofitting the Sirius building at 23 Furzer Street, Woden, ACT – your questions answered

On the road to net zero buildings, its undoubtedly the existing building stock that will be the hardest to decarbonise.

But energy efficiency measures and proactive facilities management can bring the emission's profile of an existing building down significantly. This is what Mirvac set out to illustrate at 23 Furzer Street in Canberra, which it claims was the first major office building in Australia to achieve a 6 star NABERS Energy rating without GreenPower or cogeneration.

Purpose built in 2010 for the Department of Health and Ageing, energy efficiency improvements have been instrumental in the achieving the top NABERS Energy rating in the city of climatic extremes.

What energy and emissions improvements were done on the building?

- LED lights with integrated microwave sensors installed that turn on only when required;
- chiller plant optimisation used that continuously monitor and optimise performance across the chilled water plant operations;
- time units for domestic hot water systems were installed that prevent operation outside of the tenant's usage periods;
- an 80kW solar PV system was installed in 2014; and
- offsite renewable energy procured.

Why was the retrofit work done in stages?

The efficiency works were completed over a few years due to:

- emerging technology, such as chiller plant optimisation / LED lighting quality; and
- falling technology costs, for example, solar PV.

“

...overall electricity usage has reduced by 26 per cent from the first year of operation. This has resulted in energy cost savings of over \$100,000 per annum, which would give a return on investment of under three years.

What was the cost of the upgrade?

The capital components of the efficiency works were valued at \$290,000 in total.

- PV \$150,000
- Chiller optimisation \$105,000
- LED and Sensor fire stair lighting \$35,000
- Gas domestic hot water timers \$3500

What was the return on investment?

The original, calculated return on investment for the capital efficiency works was just over five years. However, with electricity and gas price increases, the

return on investment has fallen to about three and a half years.

In conjunction with operational efficiency initiatives (such as night audits, optimising timer schedules, control strategy adjustments, and continuous monitoring of performance), overall electricity usage has reduced by 26 per cent from the first year of operation. This has resulted in energy cost savings of over \$100,000 per annum, which would give a return on investment of under three years.

What were the sustainability outcomes?

The sustainability outcomes were 6 Star NABERS Energy, 5 Star NABERS Water, a 6 Star Green Star Performance and an incredible carbon emissions reduction of 66 per cent since 2013.

What was the building worth before the upgrade?

In FY12 the property valuation was \$240 million.

What is it worth now?

At the end of FY20 the property was valued at \$309.3 million.

Did the upgrade affect the rental at review time?

The tenant had a long term, gross lease in place – the efficiency outcomes certainly improved the returns for Mirvac as the building owner (through the gross lease structure the company pays for base building energy – this is the typical lease structure in Canberra).

Recognition for the property's performance did help in negotiating a new long-term

lease with the premium grade tenant, taking the new lease out to 2035.

What is the rental value?

The gross office rent at the end of FY20 was \$544 a square metre.

Were tenants disrupted throughout the retrofits? If so, how was that managed?

There was no tenant disruption. Mirvac liaised with the tenant to agree efficiency works and optimise building performance. For example, the company implemented shorter timer schedules for lift lobby lighting, after discussions with the tenant.



Sirius building at 23 Furzer Street, Woden, ACT

CASE STUDY

80 Ann Street, Brisbane

When building physics and subtropic climate get in the way, you get more creative.

As part of Mirvac's net positive plan, the company set itself the challenge of making all new office developments all electric, highly energy efficient and eliminating all scope 2 emissions by procuring 100 per cent renewable electricity.

Its latest office development, 80 Ann Street in Brisbane anchored by banking and insurance firm Suncorp, is the first to get the net positive treatment.

Although Mirvac's David Palin says a gas hot water system was originally planned, the company's net zero targets steered it towards high-efficiency heat pumps for hot water instead. ANZ sustainability practice leader Adriaan Window suggests that it makes no sense to install fossil-fuel burning systems in a new building, essentially locking in 20-30 years of carbon emissions. Smart design needs to consider the decarbonising electricity and energy markets.

As ESD consultants on the project, AECOM worked hard to drive to lower carbon intensities within the project scope. But with a 35-level building, Window notes that building physics gets in the way of achieving carbon neutrality without looking beyond the site boundary.

While some floors are designed for mixed-mode operation, energy consumption is still required to provide the comfort conditions expected for this kind of development. Furthermore, thermal comfort pre-conditions of

the WELL Platinum drive that comfort requirement harder.

Unfortunately, the taller a building gets, the more the ratio of on-site generation potential to energy demand decreases, Window says. As long as the national electricity grid is dominated by coal and gas-fired sources, renewable supply agreements are the key to carbon neutral certification.

That hasn't stopped the consultants trying to bring the building's carbon footprint down as low as possible through a façade-first, energy efficiency approach. The building is targeting a 5.5 star NABERS rating, which includes a high-efficiency R-1233zd(E) hydrofluoro olefin (HFO) chiller plant – with the added benefit that this refrigerant has a near zero global warming potential to eliminate whole-of-life fugitive emissions.

The building has a predicted energy intensity of 64.5 kWh a square metre a year, which is substantially lower than the average minimum compliance office building in the area that might consume more than 130 kWh a sq m a year.

Window says that the building makes the most of Brisbane's temperate months, with several floors able to maintain comfortable working conditions using mechanically assisted natural ventilation for at least 25 per cent of business hours.

"That's no small feat in this subtropical climate."

The building's façade will also work hard to minimise heating and cooling requirements by limiting the transfer of solar radiation.

With a completely electric building, it's possible to run it off emissions-free renewable energy. The building maximises onsite roof area for a solar PV system but to cover the bulk of the building's electricity needs, a 100 per cent renewable energy supply agreement has been secured. However, a final cautionary note for proponents of electrification: as a climate solution it is only as good as the custodians of the buildings it's designed for.

"Without their commitment to renewable energy supply and the absence of carbon pricing mechanisms, flicking the switch

“

The building makes the most of Brisbane's temperate months, with several floors able to maintain comfortable working conditions using mechanically assisted natural ventilation for at least 25 per cent of business hours.

may result in unintentional increase of the current coal-fired electricity emissions.”

As well as targeting carbon neutrality, the real estate group is aiming for a 6 Star Green Star rating, 4.5 Star NABERS Water rating and WELL Platinum at 80 Ann Street.

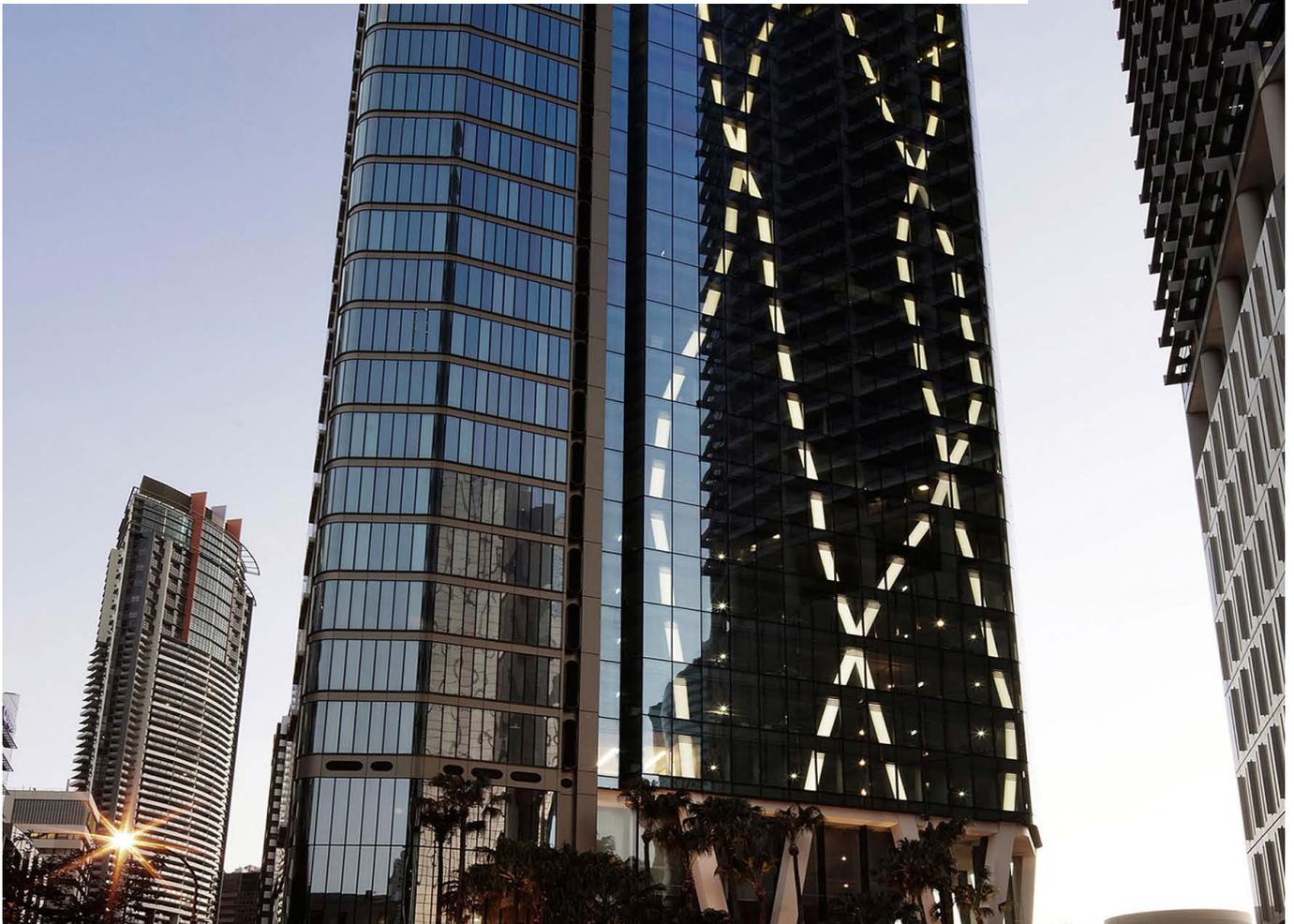


111 Eagle Street, Brisbane. Photo: GPT

GPT ticks off carbon neutral buildings along the eastern seaboard

POPPY JOHNSTON

It's been no easy feat but GPT now has three certified carbon neutral buildings: One in each of Melbourne, Sydney and Brisbane.



CASE STUDY

According to GPT Group head of sustainability and energy Steve Ford, reaching carbon neutrality is a three part process that always starts with eliminating as many direct emissions as possible (through technologies such as energy efficiency and onsite solar) followed by securing 100 per cent renewable energy contracts.

From there, any leftover emissions from elements such as burning gas, waste to landfill, water consumption, diesel backup generators and occasional fugitive emissions like refrigerants are offset.

Workplace6 in Sydney and 8 Exhibition Street in Melbourne were the first two office buildings in Australia to achieve carbon neutral certification under NABERS and Climate Active Certification, which aligns with the Greenhouse Gas Protocol.

In June, the property giant welcomed a third building, 111 Eagle Street in Brisbane.

Central to the Brisbane project's low carbon credentials is an innovative demand response program and 100 per cent renewable electricity, both onsite and offsite.

This will see the building respond to peak demand events, namely scorching hot days, by pre-cooling occupied spaces so that less energy is required in peak demand times, such as the middle of the day and early evening.

Not only do these strategies reduce the peak demand charges for a building, but it's also alleviating pressure just when the grid needs it most.

The Brisbane building also sports an energy efficient, vine-like design that makes the most of natural light so that there's less reliance on artificial light.

Along with carbon neutral certification, it's also got a 6 Star Green Star rating, 5.5 Star NABERS Energy rating and a 4 Star NABERS Water rating.

Developed by GPT in 2009, Workplace 6 at Pymont was a green trailblazer from the start as the first 6 star Green Star rating (Design and As Built) in NSW.

Since then, it's reduced its energy intensity by 32 per cent by using Solpod's portable solar pods. It's now got a 6 star NABERS Energy rating (including GreenPower), a 4.5 star NABERS Water rating and a 4 star NABERS Waste rating. The NABERS data was used in the carbon neutral certification calculations.

Its green credentials have attracted the likes of Google, which has made strong public commitments to sustainability.

The company's premium office tower 8 Exhibition Street in Melbourne has also been certified carbon neutral. Under the company's management since 2014, 8 Exhibition has seen a 22 per cent energy intensity improvement between 2014 and 2019.

It owes much of this energy performance increase to a widespread LED lighting upgrade in 2018 that cut common area lighting electricity use by 75 per cent and brought down the building's energy and maintenance costs by around \$7800 a month.

The building has achieved a 5 star NABERS Energy rating without GreenPower, a 3.5 star NABERS Water rating as well as a 4 star NABERS Waste rating.

Royal Hobart Hospital Redevelopment, Tasmania.
Supplied: AECOM



Sian Willmott

An ESD consultant's guide to net zero in office buildings

The challenge to deliver net zero all-electric buildings is a formidable one. And no-one knows that better than an ESD consultant.

Victorian based AECOM principal sustainability consultant Sian Willmott is well familiar with the task. Her remit in all-electric projects stretches from education to healthcare and the commercial sector.

When it comes to office buildings, she says, the first variable to consider in designing a fossil fuel-free office building is the climate in its location. So many of the outcomes depend on that.

In colder climates, office buildings rely heavily on gas for heating and hot water. That's because the electric alternative to gas boilers, heat pumps, become less efficient as the temperature starts to drop (moving heat from a very cold area to a warmer one takes a lot more energy than the inverse).

In Melbourne, a heat pump might struggle to warm the building up on a chilly winter morning, when the mean minimum temperature can hover around 5-7 degrees Celsius.

Willmott says a heat pump working under these conditions is typically operating at less than 300 per cent efficiency, falling short of the 500 per cent efficiency it needs to be operating at consistently to be as carbon efficient (in Victoria) as a traditional gas boiler.

"This means an investment in energy efficiency is needed elsewhere in the

design to reach the same carbon targets until the grid decarbonises" she explains.

Warmer climates are easier because buildings don't need as much heating, and airconditioning has always been an electric solution.

The sticking point for warmer climates is usually hot water, but Willmott says this is typically a low energy portion for a large commercial building.

The real challenge is transitioning existing office buildings to all-electric.

First barrier is the issue of space: heat pumps equal to the task of meeting the



Sian Willmott, AECOM

same peak demand for heating and hot water as a gas boiler, need up to five times more space in the plant room.

The second is location. Heat pumps need generous ventilation to reject heat efficiently. Compared to gas boilers, which only need minimum ventilation for combustion and to meet gas code requirements, heat pumps aren't particularly flexible on location.

"This means a heat pump solution is easier when you have more space; which is unfortunately rare when you're looking at high rise developments – as they're usually in a tight CBD infill, not the suburbs," Willmott says.

In these situations, developers may face less net lettable area, with impact on income.

"Heat pumps are generally easier in homes, schools, and other places that have more space to work with."

Heating and hot water are the big gas users but in some commercial buildings there might also be cooking facilities, with food and beverage tenants particularly attached to gas.

The final hurdle is backup generators, which are commonly diesel. Willmott says there's currently no viable carbon neutral alternative.



AECOM worked on Ballarat GovHub. Image: John Wardle Architects



CASE STUDY



Gillies Hall: The star of Monash University's electrifying net zero plans

POPPY JOHNSTON

Monash University has set itself the challenging target of getting its campuses to net zero by 2030 and unlike some other organisations that set similar goals, it has a plan to get there.

CASE STUDY



Gillies Hall, Monash University. Photo: AECOM

Top of the list for Monash is the low hanging fruit of energy efficiency, followed by building electrification and procuring/using 100 per cent renewable energy. Once the building has its emissions profile as low as possible, remaining emissions will be offset.

One new build that neatly captures this vision is award winning student accommodation building Gillies Hall at Monash University.

Gillies Hall has attracted lots of attention – and a couple of awards – for taking two major risks: going for the ultra-low energy use Passive House certification on a large building (the first in Australia) and using cross laminated timber (CLT), a low carbon material that was fairly new to the industry at the time.

The gamble has paid off financially. Recent lifecycle assessments show that over a 30-year period the student accommodation building will cost less than a standard build.

According to building services engineer on the project, AECOM associate director Nick Bamford, it was a marginal cost improvement but for a building that came with high risk premiums attached, it's a win.

"It's still a thumbs up for Passive House on a 30-year lifecycle basis," he told *The Fifth Estate*.

Interestingly, despite using an unfamiliar construction technique and material, the build itself was only slightly more expensive than a traditional build. One reason for this, according to Bamford, is that the lower floor to façade ratio Passive House requires for thermal performance reasons also means significant savings on expensive façades.

Crunching the numbers revealed that the building was consuming more electricity than expected.

The likely explanation is the building's operability and a massive variation in temperature in student rooms, with students choosing to heat rooms



AECOM's Nick Bamford

CASE STUDY

“

An ongoing education program for residents of the building includes offering students ways to manage energy use in both cool and warm seasons to more effectively use the natural ventilation and passive heating and cooling.

anywhere between 17 to 27 degrees overnight.

According to Rob Brimblecombe, the head of the university's net zero program, while there's no “active” heating or cooling in the accommodation, the university wanted students to have choice and control over their thermal comfort.

He says that while PH's heat recovery ventilation system provides excellent air quality even without relying on occupants to open windows and doors, the university wants students to be able to open windows or use supplementary heating such as a panel heater if they wish.

And it's clear the students have made full use of the operability.

Even so, and even with this wide temperature range, Brimblecombe says the building is still “outperforming by a long shot”.

An ongoing education program for residents of the building includes offering students ways to manage energy use in both cool and warm seasons to more effectively use the natural ventilation and



Gillies Hall, Monash University

passive heating and cooling.

Timber and Passive House – a winning combo

While Passive House was always part of the plan for Gillies Hall, timber wasn't. Pretty late in the design process, the university took the opportunity to try this low embodied carbon material.

According to Nick Bamford the choice of timber aligned with time constraints and the desire to minimise disruption. In addition, the choice of cross laminated timber (CLT) in particular, offered a much quicker and quieter construction material than steel or concrete.

But the late decision on timber meant going back to the drawing board on the design.

“It was right back to first principles,

CASE STUDY



City. Supplied: AECOM

which was good and bad,” Brimblecombe explains. “It meant more work but also that the building was designed from the ground up.”

Timber turned out to be super compatible with Passive House requirements around airtightness, insulation and thermal bridging. It has inherent insulating properties and low thermal conductivity, which made the material more forgiving in the few instances construction didn't go to plan and the interior was pegged right back to the timber façade.

CLT also comes as an airtight product, which de-risks and speeds up the task of achieving airtightness.

Compared to the upper floors that relied on timber for airtightness, it took far longer to achieve airtightness on the ground floor podium made of concrete,

metal studs and precast.

The façade, made of CLT panels with a continuous moisture barrier, cladding of cement sheeting and shading structures, also works hard to deliver a high thermal performance.

It took a couple of attempts but in the end, the building comfortably passed Passive House airtightness benchmarks with 0.53 air changes per hour (buildings must be below 0.6 air changes per hour to pass).

The building also has an all electric thermal plant and rooftop solar. For the remainder of its energy needs, it relies on the university's power purchase agreement with the Murra Warra Wind farm – making the residences powered 100 per cent by renewable energy.

CASE STUDY



Gillies Hall, Monash University. Supplied: AECOM

“

It's important to aim for Passive House in Australia because "if you don't aim you won't get close"

It's not all about operational costs: Feedback from students show most are happy with the building and its superior indoor air quality, with continual fresh air supplied by the heat-recovery ventilation system.

Both Passive House and CLT maturing

Back in 2017, when the building was in the design phase, both Passive House and CLT were very new to the industry. Since then, CLT, in particular, has come a long way as major construction companies such as Gillies Hall builder

Multiplex clamoured to catch up with market leader Lendlease.

Since then, the CLT market has found a solid footing in the industry.

Familiarity with Passive House has a bit further to go, but Brimblecombe says the risk premium laid over PH airtightness requirements is reducing as the market matures.

It's important to aim for Passive House in Australia because "if you don't aim you won't get close".

He also says the Gillies Hall experiment set the university up to keep delivering Passive House buildings.

The university has since developed two more buildings according to the rigorous standard, the new Technology and Design Building and the Chancellery Building,

CASE STUDY



both on the Clayton Campus.

For Brimblecombe, it's important to aim for Passive House in Australia because "if you don't aim you won't get close."

He says the certification serves as a quality assurance mechanism in a market that still struggles with high energy performance construction.

"If I was in Germany I probably wouldn't bother certifying because in Germany if you specify high performance you'll get it. But in this market you need to go all the way because otherwise you'll quickly erode back to where you were."

Bamford adds that these sorts of projects also push the market to offer cheaper PH-compliant windows, doors and other expensive componentry that benefit the green building movement in its entirety.

The exceptional outcomes – both tangible and intangible – for the three PH designed buildings means the university will keep requiring Passive House design in its new builds.

"It's hard to go back now."

Passive House retrofits a whole other challenge

What's more difficult for Passive house, Brimblecombe says, is retrofits.

In 2014 the university attempted a Passive House retrofit with 30 Research Way, a warehouse built in the 1960s. Passive House principles were applied but it got "nowhere near certification".

But again, it's still a far more comfortable, healthy and energy efficient building compared to the original, and a useful learning experience for future deep energy retrofits.

The difficulty with PH retrofits, he says, is that there are so many variables. His thinking is the better option is finding the sweet spot to maximise performance is probably more practical than chasing PH certification.

Precincts are central to the goal of electrifying existing buildings and the net zero plan

The university is following a fairly well-established blueprint to reach its net zero ambitions, starting with minimising its energy usage via energy efficiency measures. While the university has not completely ruled out renewable gases such as hydrogen and biogas to fuel a bus network or meet heating needs on those occasional subzero mornings that heat pumps struggle with, Brimblecombe

CASE STUDY

“

The university is electrifying its campuses on a precinct scale rather than a building scale, which includes using centralised electric hot water systems.

says that widespread electrification serviced by 100 per cent renewables (both onsite and offsite) is the best decarbonisation option on the table at this point.

Electrifying existing assets is one of the more difficult tasks.

As much as a challenge as the new builds have been, electrifying existing buildings to get to net zero is where the real heavy lifting is happening on the campuses.

The university is electrifying its campuses on a precinct scale rather than a building scale, which includes using centralised electric hot water systems. Brimblecombe says that for a whole campus of existing buildings, precinct level electric heating can stack up.

It's a more viable option for widespread electrification retrofits because it overcomes common barriers to swapping a gas boiler with a heat pump in individual buildings (namely, space constraints in the plant room).

On something like a university campus, it's possible to reach the economies of scale to make such a system viable. But it's not a one-size-fits-all solution.

“You need to get the right scale

so efficiency gains aren't offset by distribution losses.”

It also doesn't make sense to connect the ultra-efficient buildings, such as Gillies Hall, to centralised systems because they barely need any heating at all.

Demand management/response a robust argument for electrification

At this point, electrification and renewables form the most straightforward technological pathway to net zero that will, most critically, help the decarbonisation of the entire grid.

The university's ARENA-backed microgrid for the Clayton campus showcases the benefits of connecting its rooftop solar, automated energy management systems in buildings, battery storage and electric vehicle charging stations through a smart embedded network that is able to respond to peak demand periods, such as extremely hot or cold days.

Brimblecombe says that extremely efficient and dynamic buildings allow the university to be more flexible in its energy profile – that is, a Passive House building is well insulated against extreme temperatures, helping to smooth the peak demand for the building and broader precinct. [n](#)

Gillies Hall, Monash University. Supplied: AECOM



CASE STUDY

EG on how a B grade office building is not a problem, it's an opportunity

POPPY JOHNSTON

While the premium market has become almost synonymous with sustainability the mid-section of the market typically misses out on the benefits of energy efficiency upgrades.

Australian real estate fund manager EG, founded by Adam Geha and Michael Easson, has discovered improving the energy performance of B-grade office buildings can deliver robust commercial returns, especially if it's likely to attract sticky government tenants.

The fund manager got a taste for energy efficiency-focused refurbishments at 2-14 Elsie Street in Sydney's Burwood, a stock standard B-grade office building built in the late 80s.

Fully tenanted by the state-owned RailCorp at the point of sale, EG fund manager Michael Noblet said the company spied an opportunity to improve the 3 stars NABERS rating of the 6401 square metre (net lettable area) building to align with the 4.5 stars NABERS Energy minimum energy performance mandated in the public sector for tenancies over 2000 metres square.

With a midterm review approaching, in June 2010 the fund manager snagged the asset for \$25.35 million.

It contracted Inter-Chillers to put in new chillers, pumps, variable speed driver and building management system. It also made some modifications to the perimeter heating system so that it was

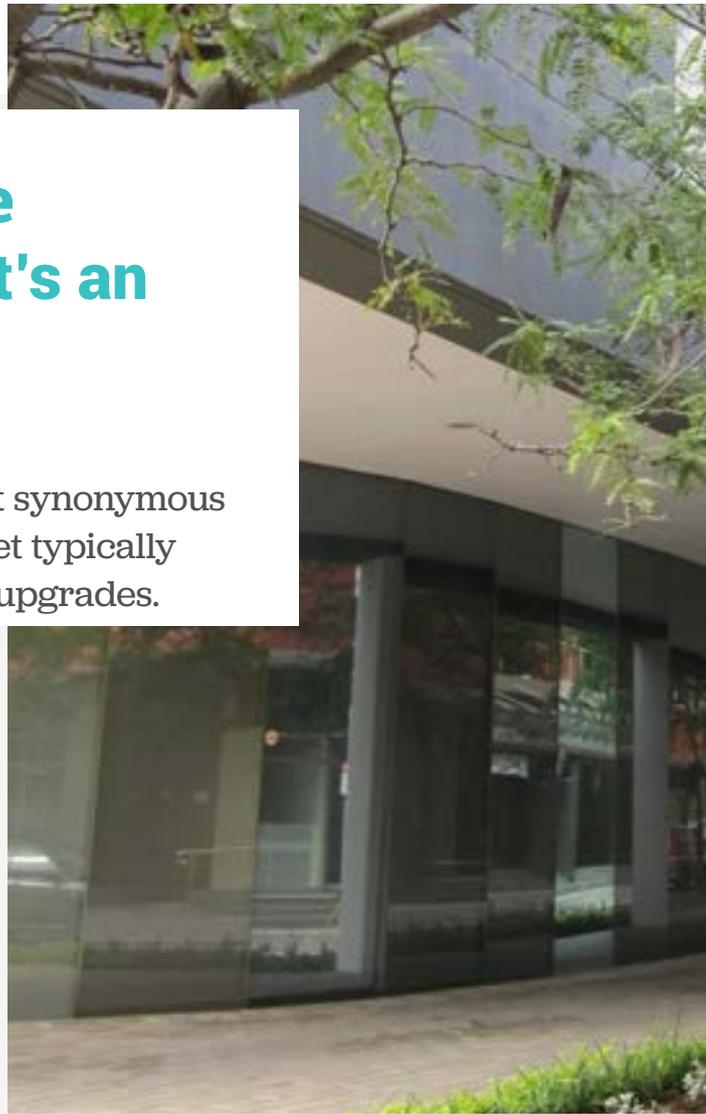
more adjustable (before, it could just be turned on or off).

Completed under budget, the \$600,000 in total capital investment paid off, with the building achieving the 4.5 NABERS rating. Delivering this energy performance outcome prompted the government tenant to stay on.

In July 2014, the fund sold the building for \$35.6 million, generating a 24 per cent equity internal rate of return.

EG always factored in the energy efficiency strategy from the point of acquisition. It was key to the strategy.

The focus on energy efficiency as part of a run-of-the-mill asset upgrade was new to the fund manager but Noblet said the opportunity to keep a government tenant



CASE STUDY



2-14 Elsie Street, Burwood, Sydney

Made from concrete and a steel glazed façade, 2-14 Elsie Street wasn't a "clear glass box" that needed expensive upgrades to its fabric to improve its energy performance, Noblet says.

"As long as we fixed the mechanical services it would be a strong building."

Aurecon was brought on as consultant to do the thermal modelling and helped specify the upgraded system. Noblet says the upgraded systems were a cut above like-for-like replacements to meet the energy efficiency requirements, but still didn't amount to huge extra cost. The company didn't run a lifecycle analysis over the new kit but he expected a short payback period.

The asset manager worked closely with the property manager, CBRE, to improve operational energy use and partnered with environmental performance company Buildings Alive to drive energy efficiency improvements in buildings.

The company's software analyses the raw data from each individual building to provide active feedback that prompts facility managers to continually tune the building.

Noblet says this project helped the company realise the full impact

on a long term sticky lease made the investment particularly attractive.

"EG always factored in the energy efficiency strategy from the point of acquisition. It was key to the strategy."

It helped that the state government has a large footprint in Burwood so that

66

In July 2014, the asset fund sold the building for \$35.6 million, generating a 24 per cent equity internal rate of return.

even if RailCorp moved on, chances are the vacancy would be filled by another government tenant looking for 4.5 NABERS rated office space.

Another attractive quality of the building was its thermally efficient bones.

facility management can have on energy performance.

Doubling down on sustainability

The Burwood success story whet the company's appetite for more sustainable investments that

“

Noblet says that the premium end of the market is well serviced by Green Star and other environmental rating tools but these tools aren't well suited to B-grade office buildings.

outperform market returns.

In 2016 the company launched the ethical investment fund High Income Sustainable Office Trust with the support of the Clean Energy Finance Corporation as a cornerstone investor.

The fund's schtick is to bring B-grade Australian office standards up to a high NABERS rating through active asset management to add value.

Noblet says that the premium end of the market is well serviced by Green Star and other environmental rating tools but these tools aren't well suited to B-grade office buildings.

"We wanted to come up with our own criteria for these secondary buildings because these tools don't encapsulate them that well.

"This is a great opportunity to transition B-grade assets."

EG took the idea to the government-owned green bank a few years earlier and pitched the idea of taking on assets as an equity participant rather than providing debt finance, allowing the bank to exert influence over the asset's ongoing operational emissions profile.

The fund has also attracted Uniting Financial Services, Deakin University and more recently Tasplan Superannuation Fund.



Michael Noblet, EG

The fund has invested in four assets so far that fit the brief: two in Canberra (the National Archives building, 1 Queen Victoria Terrace, Parks, and 42 Macquarie Street Barton) one in Sydney (965 Botany Road, Rosebury) and one in Brisbane (95

“

An emerging trend is that investors are interested in a broader definition of ESG, it's no longer just about energy efficiency.

North Quay, Brisbane).

Like the Burwood building, Noblet says the fund has gravitated to assets that are already tenanted by a public sector organisation or consultants to government, which are also fairly sustainability-minded.

Lawyers have also been attracted to the assets but typically for the low operating costs, not the sustainability credentials.

ESG investment market maturing

One trend that Noblet has noticed is

CASE STUDY

that investors are interested in a broader definition of ESG. It's no longer just about energy efficiency.

It will also be interesting to see how these older office assets fare in a post-pandemic world when plenty of fresh air circulating via adequate ventilation (mechanical or windows) will be a necessity.

Noblet says older office building can be tricky to retrofit to improve fresh air intake

because it often comes down to the existing sizes of fans and ducts. To meet fresh air requirements for safe Covid operations, the whole core might need to be adapted, which is likely to be cost prohibitive.

There will be cheaper solutions such as CO2 sensors but ultimately there's a limit to how much fresh air you can bring into some older buildings, he says.



2-14 Elsie Street, Burwood, Sydney

Quintessential Equity

on how to find the sustainability jewels amid the unloved

TINA PERINOTTO

Shane Quinn's Quintessential Equity took a building in Adelaide from 3 stars NABERS energy to 4.5 stars, minimum, and one in Brisbane from 0 NABERS energy to 5 stars. Strong engagement with the tenants was key to both projects.

When 431 King Williams Street in Adelaide was built in about the late 1980s, it was one of the biggest buildings in the city, "quite a landmark" according to Noah Warren, general manager asset management of its new owner, Quintessential Equity.

Over time, though, it missed out on refurbishment; "it got no love".

It didn't so much become decrepit, Warren says, but it fell into need of an upgrade especially from a mechanical and aesthetic standpoint.

"In so many ways this building was no different to the state of most buildings that draw the attention of QE when we go in.

"They haven't had the money spent on them and they're in need of some capex [capital expenditure] to improve them and, most important, the base building and the mechanical systems."

The things that provide good comfort levels to the existing and prospective tenants.

The fund manager bought the 15-storey building in December 2018 from interests associated with property billionaire Con Makris on a 10.5 per cent yield.

In early 2019 it embarked on an \$8 million refurbishment with sustainability and tenant wellbeing at the centre of intended outcomes. The



431 King William Street, Adelaide. Supplied: Quintessential Equity

CASE STUDY



Noah Warren, QE

Noah Warren, QE

goal was to take the building from a 3 star NABERS energy to 4.5 NABERS energy rating, but with hopes to significantly outperform that when the first set of numbers come in after a full year of operation.

The building is in South Terrace, across from a major park, so part of the plan was to encourage exercising in the park by providing good facilities.

On day one of the strategy, the plan was to engage fully with the 28 tenants that occupy the building, Warren says.

"We met with every tenant in the building, unless they were not available and said, 'this is who we are. Tell us about your history, why you're in this building, what you like about it and what you don't like'.

"We understand it's the first time we've met, and you probably think we're giving you empty promises here, but please tell me."

Right up front, this builds a relationship with the

“

If we don't have tenants, we don't have business.

tenant. "Our business is centred around the tenants. They need to be comfortable; it's their building. They live and breathe it. We're based in Melbourne."

"We don't see it as rocket science. It's 101 communications.

"If we don't have tenants, we don't have business.

So the team set to work sharing ideas from aesthetics to mechanical consulting and then creating "meaningful plans" to minimise disruptions



431 King William Street, Adelaide. Supplied: Quintessential Equity

for instance with installation of new lobbies and bathrooms, but not to the point where tenants drive the agenda entirely.

"It's more a case of keeping them informed and being transparent," Warren says. And turning complex mechanical work into simple language.

The items of most concern for the tenants were the airconditioning, lifts, cleaning and car parking.

The car parking?

"You'd be amazed – people are very protective of their car parks."

The chillers and boilers were in urgent need, dating back to the late 80s and clearly running on "band aid" fixes.

"The chillers in particular probably didn't have another summer left in them. And Adelaide gets very hot in summer.

"We needed to work quickly." This meant getting road permits to bring in the kit and a lot of "crane lifts".

For the engineering side of the work

the company chose Lucid Consulting Australia.

The company came highly recommended, but it was probably Lucid's ability to demonstrate a collaborative approach that won the day, Warren says.

"I'm not an engineer, but what I really want to engage with the work and to work with people who can explain things to us and bring us along on the journey."

The engineers

Harry Williams, an associate with Lucid who led the work, says the project needed skilled handling, especially in the swapping of redundant old kit for the new. With the plant room on top of the building, the big challenge was negotiating multiple crane movements and street closures.

All up, there were three cooling towers, two water cooled chillers and boilers for the heating – plus the associated plant to deal with.

It was decided to replace the 30-year-old Trane chillers – weighing four tonnes

each – with magnetic bearing centrifugal chillers from Smardt, produced locally in Australia (instead of Italy or China).

Then came a week of “shuffling” equipment to get it to fit, using an “airskate”, a kind of hovercraft placed under that chillers enabling the workers to “push them around like they weighed nothing”, Williams says.

The atmospheric gas fired boilers were replaced with modular condensing boilers, which allows the energy in the hot flue gases to be recovered to provide the first stage of water heating to gain additional efficiency from the gas, Williams explains.

In addition, floor by floor air handling units were provided with new variable speed drives to control the fans, however further improvements may be made by replacing fans in the future.

Lighting is not part of this process, although some LEDs were installed.

Sustainability and improving the NABERS rating “drove all the choices,” Williams says.

Sustainability is always part of the conversation now

According to Adam Greaves, Lucid’s director in charge of the South Australia region, that’s the case more broadly too. “There are not many office buildings where sustainability and energy efficiency are not part of the conversation and where there is not a sustainability consultant on the team,” he said.

The move to all electric buildings is important where 20 per cent of energy consumption for boilers and heating is still gas, he says.

Covid might have thrown a spanner in the works but the momentum behind

energy efficiency remains strong. This is especially so if the owner is a long term asset holder such as government or university or other institution.

“They tend to be more focused on long term operational energy and the life cycle of buildings and their systems. Whereas some developers in the residential markets are not incentivised.”

On the flip side, some residential developers do care. For instance, the Nightingale Housing project at Bowden that he’s working on.

“It all comes down to the owner. And the

“

The chillers in particular probably didn’t have another summer left in them. And Adelaide gets very hot in summer.

values of the owner. The likes of QE want to have long term relationship with their tenants.

“Quite often in the commercial market, once you’ve signed your lease you feel like you’re a pain [to the owners] ... until it’s time to move.”

In Adelaide there have been a lot of family based commercial building owners who are not so engaged. Greaves is reluctant to go there.

But we get the point.

The tenants

At the end of the upgrade project it was the most sceptical tenants who were the most enthusiastic, Warren claims.

CASE STUDY

66

“I’m not an engineer, but what I really want to engage with the work and to work with people who can explain things to us and bring us along on the journey.”

One tenant in particular was crucial to making the whole project viable, Waterhouse Lawyers, which recently moved in signing up for about 17 per cent of the space through QE’s preferred agency Colliers.

Knowing the legal firm was in the market helped underpin the purchase of the property and take current valuation to a

high \$50 million range.

The building is now 84 per cent leased with asking rents of \$425-435 a square metre.

Remit for sustainability

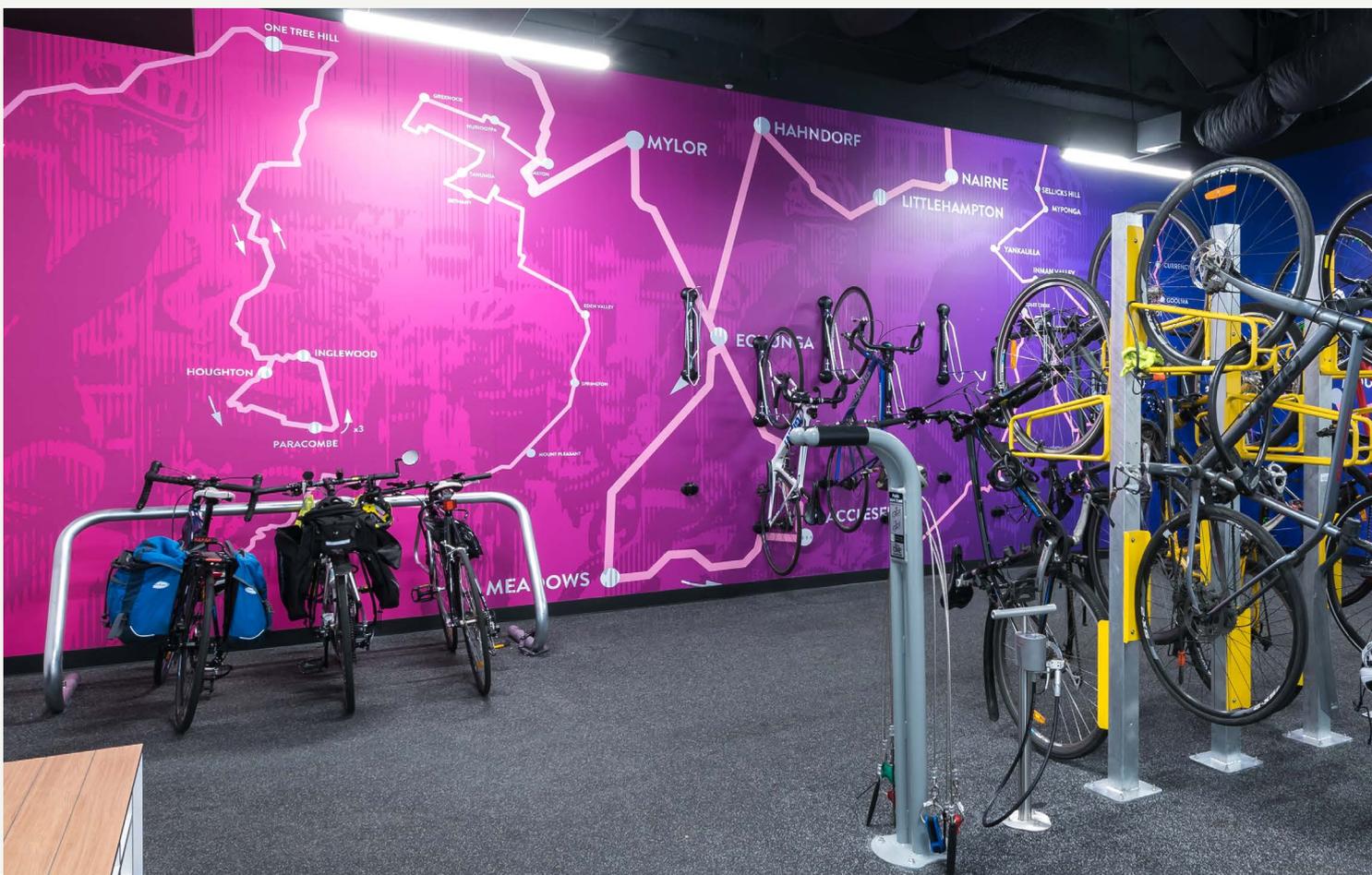
According to Noah Warren properties bought by the company need to have the potential for a sustainability uplift.

“They’re not end of life, but they are in need of a refurb.

“When the team is in due diligence we delve deeply into the costings and strategies that tell us what’s possible from a financial point of view but also that physically you can do it.

“We ask if we can do the work we need to do to hit a certain NABERS rating.

“The value we’ve been able to create is to ensure we are in the best position to



retain tenants and by retaining them, attract others.”

A fast turnaround in Brisbane

With 8 Gardner Close in Milton, a suburb of Brisbane, Quintessential Equity was able to turn around a building's fortunes in not much time at all.

In 2017 it bought the rundown 1990s office building that had a 0 NABERS energy rating and turned it into a 5 star rated NABERS energy rating, verified after it was sold in May 2019 to Harmony Property Syndication.

The company paid \$10.5 million for the building, with 4271 square metres in net lettable area and 102 car parking spaces, at a time when the suburb had a vacancy of about 32 per cent and the building had just 20 per cent occupancy.

According to Noah Warren, the attraction

was the property's potential for a capital works investment.

“We felt the price we paid allowed us a really great platform to go to the market and be very competitive for tenants who wanted to be close to the city.”

The team refurbished the lobby, bathrooms and services in a similar pattern to the company's building in King William Street Adelaide.

The building was fully leased within 12 months to a range of tenants taking from 200 square metres to 1000 sq m.

Face rents were \$460-465 a sq m but the net effective rents are undisclosed.

QE used Energy Action for the engineering and Colliers for the property management.

Tenant support

The company has another trick up its sleeve. In recognition that small businesses are working flat out on their own businesses and don't know much about office fitout, it manages all this for them, teaming up with local companies – in Brisbane Urban Fitouts – to supply the plans, final delivery and even the move itself.

This eliminates the most painful part of moving, Warren says.

The tenants can be as involved, or not, with QE paying for everything up front and the costs captured in the rent incentive. The engagement incidentally helps forge the close relationship with tenants that the company focuses on.

Sale price of Gardners Close, almost fully leased, was around \$25 million.

But Warren cautions it's not all profit. The upgrade works were around \$4 million, incentives for new tenants came into



431 King William Street, Adelaide.
Supplied: Quintessential Equity

CASE STUDY

66

The move to all electric buildings is important where 20 per cent of energy consumption for boilers and heating is still gas.

play, around \$4-5 million, and there were holding costs.

"Suddenly a \$10.5 million [purchase price] looks like \$20 million."

Still, the internal rate of return was 17.8 per cent.

The investment fund

On its mandate to investors the company estimates an IRR of around 8 per cent, a figure the company has been "fortunate enough" to generally outperform, Warren says.

In one case the IRR was 25 per cent and the weighted average across 30 properties that have passed through the portfolio is 22.2 per cent.

These numbers are great, he says, but what's more important is what the company buys the building for.

The appeal of buildings with no immediate apparent appeal

Typically, company founder Shane Quinn does the assessment of whether the property's characteristics lend themselves to a good upgrade. It helps that he's an engineer by profession.

"First thing he looks at before the cash flow – because the cashflow can come and go – is how it is from an engineering point of view. Is it well built?"

The purchase price is important, because, "What we buy it for allows us to upgrade and optimise the building."

In Brisbane the vendor was a "quasi" institution – not a Tier 1, but a step below – that did not have the capital to spend on the building.

"So we were able to go in there and bring it back to market and remove the stigma around it."

Stigma?

"When we buy these older buildings, typically they have a stigma around them; for instance, the airconditioning isn't good, and so on..."

"I love buying a building with stigma because I can go and spend the money to bring it back to a higher standard."

In a highly competitive market Warren says it's also a good thing to stay well clear of Melbourne and Sydney CBDs.

What's attractive are the more "challenging" buildings, he says, especially in markets that might be struggling. For instance, Perth, with its 20 per cent vacancy rate, would not put QE off, nor the Adelaide market with vacancies in their "teens".

Some tenants care about sustainability

Do tenants really care about sustainability?

"A big legal firm, yes," Warren says, "government tenants, yes. Typically, they will have mandates in the leases and will have to have it."

"But a 200 sq m accountancy firm? Not so much. They wouldn't have it in the lease, but do they care? I think they do."

In the next couple of months a tenancy survey that will be sent out by the company will hopefully reveal more insights into those sentiments.

8 Gardner Close, Brisbane. Supplied: Quintessential Equity



55 Russell Street, Brisbane. Supplied Forza Capital



Forza Capital's 6 star NABERS Brisbane rating shows how to make sustainability a value add

TINA PERINOTTO

Amid darkening clouds on the office market horizon it seems you can still find room for a major uptick in sustainability ratings and do well financially.

In what might be a first for Brisbane, Forza Capital, a fund manager with a penchant for taking older buildings and bringing them up to high sustainability and efficiency standards, has achieved a six star NABERS energy rating for an office building in South Brisbane.

The 4081 square metre building at 55 Russell Street was bought for \$23.5 million in early 2019, with 33 per cent vacancy.

It is now fully leased for around \$500 a sq m gross to government tenants and can offer a rare (and it's claimed the only) 6 star NABERS rating for a whole existing building, and only one of six buildings in all that can boast the highest NABERS rating.

What's more impressive, though, is the upgrade from around 4 stars (according to

internal company calculations) to 6 stars has been at very low cost – at least by comparison with the purchase price.

Company director Adam Murchie said the upgrade was “not much”, around just \$100,000, thanks to focusing on the “low hanging fruit” in the scope of work.

Was additional value recognised for the property from a valuation perspective, given that rentals have not moved from their original level?

“I think the building does manifest that extra value,” Mr Murchie said. It now offered efficiency gains and the security that there would be no big surprises down the track for the owners, he said.

“We're not doing it for charity;

economically we think it works – and from a holistic view, not just monetary.”

The work was relatively simple. “It was pretty much rejigging the 100 kilowatt solar array on the roof, bits and pieces like working on the metering, retuning the building,” Mr Murchie said.

“It was going back to what Craig Roussac [of Buildings Alive] was saying: making sure the BMS (building management system) works properly. And having LED lights with sensors and better metering of the space so you know what’s common space and what’s tenant space.”

Fellow director Ashley Wain said that many of the sustainability improvements had come at relatively minimal cost, “yet these improvements allow us to reposition



I think people are generally alive to the issue [of sustainability] and trying to do the best they can in terms of upgrades.

the asset and, in some cases, improve operating cash flows”.

The work was handled in partnership with K2 Private Property, whose senior facilities manager Aidan Lambeth said it is “often about ensuring a building runs the way it is designed, and the plant is efficiently maintained and monitored”.

Forza said other buildings with the same rating are 111 Eagle Street, 123 Eagle Street, 1 William Street – all in the CBD – and 100 Skyring Terrace, Newstead, and 2 King Street, Bowen Hills.

Mr Murchie said the process of

transformation was a perfect fit for the team.

“We are just delighted with the rating outcome. ESG (environmental social governance) is an important part of our business and we enjoy extending ourselves to improve existing assets,” he said.

At 420 George Street, Brisbane, the team had turned a 0 NABERS star rated building into a 5 Star rated building.

At 10 Browning Street in South Brisbane, in the same block as the company’s Russell Street building, also with a 100 kW solar array, the company hopes to turn the 11,200 sq m office from a NABERS rating of about 3 stars to 5 stars. Bought for \$65.5 million in 2016, additional work includes adding end of trip facilities and upgrading lighting in the building’s large car park with LEDs.

Mr Murchie said the idea of sustainability as a driver was growing.

“I think people are generally alive to the issue [of sustainability] and trying to do the best they can in terms of upgrades. We probably take it a step further than that. We

seek out whatever is possible and where we can maximise value.”

Since the bushfires, coronavirus and black lives matter, there’s been a bit of pushback on sustainability, he said. But will it come back?

“It has to. The question is when it does, is it too late?”

First published in The Fifth Estate.



Midtown MacPark. Image: Frasers



Frasers Property is going all electric apartments, in a big way

DAMIAN CLARKE

Frasers Property Australia is no stranger to iconic, adventurous developments, as Central Park in Sydney and Burwood Brickworks in Melbourne demonstrate.

This same spirit of adventure is now being applied to energy supply in its residential developments, with a switch to all-electric utilities – that's no gas – for its Midtown project in North Ryde of about 3500 units and a proposed 4500 unit development in Telopea, both in NSW.

Part of the inspiration for going all-electric at Midtown was NSW Land and Housing Corporation's aspirations for the performance of the community housing on the 8.2-hectare site. The NSW government requires no more than a 30 per cent community housing mix at Midtown, equating to a minimum of 950 community housing dwellings and 128 affordable housing dwellings.

"We picked up on that and saw it as an opportunity to set a new benchmark for what zero carbon developments could look like," Rory Martin, sustainability manager at Frasers Property says.

"It helped set us apart from our competition and can deliver better health and wellbeing outcomes for our residents."

Paolo Bevilacqua, general manager of Real Utilities, Frasers Property's utilities arm, says further advantages for residents will include a lower cost of living when residents consume locally generated electricity. sian

"We will set up the site as an embedded network and be the initial embedded network operator on site," he says.

"We propose to own, maintain and operate the solar installation on the rooftops. Residents will get power that is 100 per cent certified carbon neutral – supplied by the rooftop solar and supplemented by off-site renewable energy, for a lower price than the major three energy retailers."

For residents, there is little noticeable difference between an



There is no silver bullet for sustainable building.

all-electric apartment and one with a gas connection, Martin says.

“Perhaps the most noticeable differences are having an induction cooktop instead of a gas hob, and a mains switch near the door that can shut everything off – like in a hotel room.

“For some people there is a learning curve there, but we also see people in our other developments replacing gas with induction cooktops, along with other high-spec appliances that deliver even lower energy consumption than expected.”

Otherwise, residents are not aware that their hot water is being delivered through an air-source heat pump instead of a gas boiler, or that there is an energy management system in the background switching between solar, battery and the grid.

For a developer, the benefits of only connecting one utility are obvious – there are cost and compliance savings from eliminating gas mains connections and kilometres of copper piping throughout a large development, along with simpler design. But there are complications too.

“We’ve had to strike a balance between base building design and services, and appliance specifications, to achieve the desired energy efficiency targets,” Martin says.

In Midtown, the community housing will be heated using centralised radiant heating – a deliberate initiative to ensure that vulnerable tenants have access to low-cost or no cost heating in winter. The private housing is most likely to use high-efficiency split systems for

thermal comfort. Centralised air-source heat pumps will provide hot water with metering for each apartment. The apartments, while well insulated and built to a high specification to achieve net zero carbon consumption and, though will be built to high NatHERS scores, it will not aim for standards like Passive House (though the company is trialling PH in a project in Melbourne).

“We’re currently looking at a range of sustainability options for our developments,” Martin says.

“Midtown will be built to a high standard, going beyond NSW building code requirements, and be all electric. In another development in Victoria we have two identical townhouses – same aspect and design, one street apart – except one will be built to Passive House standard and the other one a standard build.

“We will monitor their performance for 12 months to better understand the performance differences. At Fairwater, in Blacktown, we have built over 600 houses with ground source heat pumps, and are participating in an ARENA funded study by Climate Kick to assess the performance and cost implications against standard systems. Anecdotal evidence from some residents suggests cost savings of up to 60 per cent for heating and cooling per annum, which may offset the cost premium for installation, but we will have to wait for the study for accurate numbers,” Martin says.

He adds that there is no silver bullet for sustainable building. The aim of its experimentation and research on new developments is to arm Frasers Property with a toolkit of different development options and the knowledge of how to apply them to different sites for the best result. [n](#)



Midtown MacPark. Image: Frasers Property Australia





ACT's all-electric revolution is shaking up the system

DAMIAN CLARKE

A big change in thinking and a small change to legislation have paved the way for new developments in the suburbs of Canberra to go ahead without gas reticulation for the first time in history. But before the changes, things got off to a rocky start.

Two steps forward

On the North West outskirts of Canberra, where the Murrumbidgee River meets Ginninderra Creek, the creek's namesake suburb is establishing itself as a beacon of sustainable development with so many sustainability elements on the 1600 hectare site that it deserves its own nationally spotlighted case study. But one of the more subtle aspects of the development is one of its most revolutionary, at least on the surface.

No gas and electric rooftops

One of Ginninderry's aims is to be a beacon for future developers to follow, and eliminating gas was an important part of that package. The original specifications called for no gas reticulation, and, after Stage One, none will be installed other than the trunk main into the main commercial centre.

After considering options like solar farms on open-space areas, Ginninderry settled on rooftop solar





Strathnairn Neighbourhood 1

Legend

- Metro (min 14m frontage, 280m²-427m²)
 - Villa (min 12.5m frontage, 347m²-427m²)
 - Courtyard (min 15m frontage, 415m²-446m²)
 - Streetscape (min 12.5m frontage, 346m²-466m²)
 - Streetscape Plus* (min 15m frontage, 446m²-577m²)
 - Classic (min 15m frontage, 462m²-871m²)
 - Flexi-living series
 - Multi Unit Site
 - Terrace
 - Green Link
 - Display Village
 - Bus Stop
 - Sub Station
 - Bicentennial National Trail
 - Future Urban Areas
 - Strathnairn Arts Association
- *Dual occupancy with studio

Disclaimer: The Suburban Land Agency (SLA), Riverview Developments (RD) and Riverview Projects (ACT) Pty Ltd (RP) make no warranty to the accuracy or completeness of information contained herein and recommends obtaining independent legal, financial and accounting advice before considering purchasing or making an offer to purchase land or a house and land package. The plans, examples and information contained herein are for illustrative purposes only and should not, without further inquiry, be relied upon as to their ultimate accuracy, to the extent permitted by law; the SLA, RD and RP will not be responsible for any loss or damage that may be incurred as a result of your reliance upon this material.



Strathnairn
Ginninderry

to generate 40 megawatts by the time all the rooftops are constructed – more than the rest of the ACT combined in current solar generation, according to Jessica Stewart, sustainability manager for Riverview Developments, the joint venture company between the ACT Government and a subsidiary of Corkhill Bros Pty Ltd developing the site. Demand management systems by Reposit, Evergen and Solahart currently control the ebb and flow of the power generated.

“

Discussions with Evoenergy were, largely, fruitless and Evoenergy enthusiastically installed gas mains through the entirety of Stage 1 where they remain unused.

To further encourage sustainable housing, Ginninderry offers a front garden landscaping package to all home buyers in Strathnairn, the first neighbourhood to be released, and where gas has been reticulated, on the condition that home owners build to the Ginninderry Housing Development Requirements – which precludes gas connection.

The electric economy

Building on all-electric housing, the development also includes electric vehicle charging infrastructure, an electric bikeshare scheme, and in-home and centralised battery storage. Space has also been left for retrofit future technologies into the current properties, that will be 40-years old when the development is complete.

One step back

“Going all-electric was on the cards from the start – in line with the [ACT] government’s aim to be carbon free by 2045. We were all ready to go on Stage 1 with no gas when we discovered that we had to – it was a legal requirement,” Stewart says.

Discussions with Evoenergy were, largely, fruitless and Evoenergy enthusiastically installed gas mains through the entirety of Stage 1 where they remain unused.

Sources in the ACT development community say that poor communication between Evoenergy and developers has also been a sticking point in other developments too. The Capital Airport Corporation’s Denman Prospect development mandated three kilowatts of solar on every rooftop and caused all kinds of grid instability until variable tap changers were retrofitted.

Leylann Hinch, manager of strategy and operations at Evoenergy explains, “In recent times, we’ve seen a rapid increase in the number of solar and batteries connected to our electricity network, which has changed the way energy flows. This presents network safety and reliability challenges that we’re working through, but we also recognise the great benefits that come when Canberrans have flexibility and control over the generation and use of their own renewable energy.”

In another new suburb, Whitlam, the not-quite-sustainable experience has been similar. Lofty, all-electric goals have been slightly undermined by gas reticulation installed in the streets in front of the houses. A source at the ACT’s Suburban Land Agency says this is largely because the long lead-time of the development





meant that gas reticulation was a legal requirement during planning and design.

Two steps forward again

On 17 January 2020, the ACT removed the requirement for gas mains in new developments.

“From today, we have removed the requirement for new suburbs to have a gas connection. This makes it possible for new suburbs to be zero emissions and is an important step in combating climate change,” Minister for Climate Change and Sustainability, Shane Rattenbury, said, at the time.

Sources say that Evoenergy seemed to enter a new era of sustainable cooperation over the last year.

“I’ve been working at Evoenergy for eight years and nearly 40 years in the energy industry, and this transition we’re going through is significant—like nothing I’ve seen before. We’re looking forward to continuing our collaboration with the community, the energy industry and the government to plan and evolve our energy networks to ensure our energy system meets our needs now and into the future,” Hinch says.

While gas was reticulated through Whitlam, the development is encouraging residents to go all-electric with \$10,000 rebates – informed by lessons and dollar values from Ginninderry – and a further \$4000 grant from the ACT government if they install a household battery.

The suburb of Jacka has gone further, proposing centralised battery storage.

Both Whitlam and Jacka’s electric infrastructure is being developed in cooperation with Evoenergy to make these innovations work. (Evoenergy will not run the “Jacka Battery” as the ABC

“

We’re looking forward to continuing our collaboration with the community, the energy industry and the government to plan and evolve our energy networks to ensure our energy system meets our needs now and into the future.

called it in June, as it will be a contested service, but is working with developers to find an operator.)

“We know Canberrans want innovative, sustainable and low-cost energy solutions, so rather than build more poles and wires, we’re shifting to focus on a more proactive and flexible approach to balancing electricity supply and demand, enabling the integration of renewable energy, and working with industry partners to develop non-network solutions that help meet the additional capacity we require as our community grows,” Hinch said.

Perhaps the greatest indicator of Evoenergy’s shift in world view is its 2021 five-year Gas Network Plan, which aims for Net Zero supply, and does not include plans for reticulation through new suburbs.



All-electric sustainable luxury in Brisbane

DAMIAN CLARKE

A former minerals explorer turned developer is proud that each home he and his team builds is more sustainable than the last. With a new luxury home called Vanquish in the Brisbane suburb of Auchenflower, this has culminated in a Passive House certified home that was offered to market for \$3-\$4 million.



Vanquish, a speculatively built Passive House at Auchenflower in Brisbane has stirred up a lot of interest since it came to the market with a sale price of between \$3 million and \$4 million.

Its sustainability features clearly intrigued, but so too the luxury positioning of the house.

Developer Harley Weston of Solaire says luxury is an important aspect of the property.

"The sustainable elements of these properties are expensive and, until we can convince people to pay five to 10 per cent more for their homes to be sustainable, we have to build premium houses in premium locations that can absorb the cost."

“

If you're paying for a premium product you want an unequivocal level of enjoyment from being in it – that's what Passive House brings to the home

Passive House consultant on the project John Moynihan of Ecolateral says sustainability is important to the luxury.

"If you're paying for a premium product you want an unequivocal level of enjoyment from being in it – that's what Passive House brings to the home.

"It's quiet, it's well ventilated, while maintaining a comfortable humidity and temperature and no allergens because the air is filtered down to a few microns."

Surfaces are natural stone, low VOC painted finishes and New Zealand wool carpet. The tiles and porcelain benchtops are zero waste, manufactured with 60 per cent recycled water and 40 per cent recycled material. Even the tapware throughout the house is zero-waste Sussex brass.

Among the features are carbon reduced concrete, FSC and PEFC certified timbers, low VOC carpets and paint, carbon positive



timber-based Weathertex cladding for the building fabric, and high-performance, thermally-broken windows and doors. Even excess Gyprock is recycled back into a soil conditioner that is used for food production just West of Brisbane.

The rooftop solar array is managed by a Control 4 management system coupled to an Australian made Redback energy three-phase, 10kW hybrid inverter and battery system.

The inverter and storage was about 40 per cent cheaper than the Tesla Powerwalls and paired 5kW inverters that Solaire has used in its previous projects.

Another innovation is a “green switch” that shuts down standby appliances when the occupants go out but leaves power on to the DC variable speed, solar optimised pool pump, dishwasher, fridge, washer and dryer that can run while you are out.

Water heating is by an innovative air-source heat pump, developed by Stiebel Eltron, that incorporates a heating element. On sunny days, excess solar power super-heats the hot water supply to act as an energy sink, before exporting to the grid.

There is a pool that functions off-grid for days at a time and an overall net zero grid power consumption.

Even the electricity used to build the house was sustainable – sourced via an arrangement with the owner of La Fleur, next door, an earlier Solaire development.

Harley Weston says Solaire has been a sustainable developer from its first project at 85 Agnes Street, also in Auchenflower – a classic Queenslander that opens out into a modern rear extension – that sold for \$1.9m in December 2017.

“I used to work in mineral exploration

“

I saw people spending their lives paying off expensive, poorly built and poorly performing houses. They were being sold pigs with lipstick, and that wasn't fair. We knew we could do better.

where I was able to witness the carbon cycle in person. It brought home how important it is to bring carbon dioxide emissions under control.”

Weston teamed with project manager James McElhenny and builder Paul McElhenny to do something about his convictions.

“I saw people spending their lives paying off expensive, poorly built and poorly performing houses. They were being sold pigs with lipstick, and that wasn't fair. We knew we could do better,” Weston says.

“We could see that the industry was heading towards net zero so we thought we would get ahead of the pack. Every house we've developed has been more sustainable than the last, with Vanquish achieving Passive House certification.”

Every house has also been a test platform for sustainable technologies and techniques that Solaire can use on future projects, with the aim of increasing performance while reducing cost.

The challenge

Moynihan said that converting architect Joe Adsett's original design to Passive House was a challenge.

The property has the typical high glass to wall ratio (R value around 0.8 to R value of about 2.5) that you would expect in a luxury Brisbane house with views from each floor, and standard thickness



“

But the final result is great because we have this stylish, comfortable, sustainable, low-energy building that's desirable for a broad range of buyers – not just those attracted by sustainability

timber frame walls required the highest performing membranes and insulation.

“But the final result is great because we have this stylish, comfortable, sustainable, low-energy building that's desirable for a broad range of buyers – not just those attracted by sustainability.

Another project by Solaire is next door, La Fleur. It is of a similar size, orientation, build standard and uses passive design, but without being certified Passive House.

The juxtaposition of the houses has inspired a research proposal by the University of Queensland Centre for Energy Data Innovation to compare energy

performance, air quality and comfort levels of both houses.

Other Solaire projects include Bellevue in Paddington, a Queenslander renovated beyond recognition, with sustainable features that earned it the title of “Brisbane's most socially responsible home” by the Courier Mail, which sold for \$2.36m in December 2018.

Cheval, at Ascot, an arts and crafts Queenslander on the outside and best described as looking like the Guggenheim Museum inside, renovated with sustainable materials, solar and battery storage system and underground pool water storage tanks under its tennis court, was sold as a house and land package with an undisclosed price believed to be around \$7m.

La Fleur, was sold for \$2.935m in 2018 and may be quietly on the market again, following the interest in Vanquish, for a price between \$3m and \$4m.



Rating tools

A guide to rating tools and how they help or hinder the all-electric, net zero transition

POPPY JOHNSTON

On the journey to net zero, it's hard to go past environmental rating and benchmarking schemes to keep the stragglers on track.

Are the rating tools helping or hindering the transition to all electric, net zero buildings and cities?

NABERS

At the moment, NABERS, the federal government's program that pits buildings against similar buildings to see how they perform on energy and other metrics, does not account for the doubling of renewables in the grid since the 90s.

The tool is being updated to account for the true emissions profile of grid electricity, which will see gas and electricity use in buildings on fairer footing.

According to NABERS director Carlos Flores, the benchmarking tool is designed to have a seventh star and that star will essentially be zero emissions. He said that the organisation is currently working on exactly what the seventh star will look like.

Flores said that NABERS recognises that the top rating for the tool will need to recognise efficient buildings running on renewable energy. This means that for most buildings buying GreenPower will need to be part of the equation. Tenants will also be involved in the net zero certification.

Green Star

The Green Building Council of Australia is also revising its voluntary Green Star environmental rating scheme to encourage a net zero carbon future for the built environment.

In the upcoming "future focus" refresh of the tool, by 2020 a 6-Star Green Star building will have to be as efficient as possible and use 100 per cent renewable electricity to meet certification requirements. By 2030, even 5 star rated buildings will have to source 100 per cent renewable energy.

The tool will also reward buildings that reduce reliance on fossil fuels as much as possible before offsetting.

For homes, the organisation is releasing a new Green Star standard that will denote carbon neutrality. Still in pilot phase, a home with the Green Star for Homes stamp will also be healthy and climate resilient.

NatHERS, BASIX and the National Construction Code

The environmental performance of homes is regulated through a few different mechanisms, including NatHERS (Nationwide House Energy

Rating Scheme) and NSW's BASIX (the building sustainability index).

In residential dwellings, the National Construction Code requires an energy rating of at least 6 stars using a software tool accredited under the federal government's NatHERS program.

Following calls to raise the minimum thermal performance standards, in July 2019 state and territory building ministers agreed to develop stronger minimum energy standards for new houses and apartments.

In NSW, BASIX is used instead of NatHERS to regulate the sustainability standards of its homes (although a NatHERS rating can be used for thermal performance component of a BASIX rating).

The [accuracy and effectiveness of both BASIX and NatHERS](#)

“

Existing homes have largely been left out of the energy efficiency conversation so this will potentially see the energy performance of the existing housing stock improve.

[has been in question](#) with some recommending updates and more stringent minimum requirements. For example, BASIX has been criticised for effectively disincentivising heat pumps and other electric systems in its existing form.

Perhaps the biggest concern from

a net zero perspective is that both BASIX and NatHERS can be considered reactive in nature and do not account for future climate data or the fact that the grid is expected to decarbonise, with a business-as-usual scenario expected to deliver a 74 per cent renewables share by 2040 according to AEMO's latest Integrated System Plan .

This could lock people into homes with gas heating and cooking that might be lower emissions now while the grid still relies heavily on fossil fuels but in the not-so-distant future, will most likely need to be retrofitted to electric alternatives that run on 100 per cent renewables.

NSW Minister for Planning and Public Spaces Rob Stokes has recently signalled updates to NatHERS and the potential alignment of NatHERS and BASIX for a consistent national approach to home environmental regulations.

The other [new development in the residential space is the inclusion of Victoria's statewide energy scorecard in NatHERS](#), which will see more accurate energy ratings for existing homes.

Existing homes have largely been left out of the energy efficiency conversation so this will potentially see the energy performance of the existing housing stock improve.

The NCC also dictates energy standards in commercial buildings, with minimum standards strengthened by around 35 per cent in the 2019 edition of the code.

Resource Guide

Here is a guide to some of the companies and services working towards a Net Zero future.

CONSULTANTS

[A.G.Coombs](#) Australian building services company that provides an integrated range of whole-of-life technical services for all systems in buildings

[Australian Energy Foundation](#) National for-purpose organisation dedicated to accelerating the clean and equitable energy transition via a range of services, including local and state government programs, energy advice for households and advocacy services

[Ausnviro](#) environmental rating consultants specialising in commercial

property assets

[Ecolateral](#) sustainability consultancy that specialises in environmentally sustainable development

[Energetics](#) specialist in energy and carbon management that has helped many clients achieve carbon neutrality

[Energy Action](#) provides energy procurement, contract management, environmental reporting, energy advisory services and energy efficiency projects

[ERM Power](#) Queensland-based power company that has an advisory & engineering team to help achieve carbon emissions targets, design tailored energy roadmaps, develop detailed engineering studies to drive operational efficiencies, deliver feasibility studies, business cases, financial modelling and funding models, manage climate-related reporting requirements and achieve greenhouse gas emission reduction targets. The company helped GPT develop its Energy Master Plan

[Flux Consultants](#) independent environmental design and advisory practice

[Kinesis](#) powerful urban analytics and modelling platform that drives the decisions that make cities more sustainable, equitable and productive

[Ironbark Sustainability](#) a sustainability consultancy that focuses on councils, helping them to reduce greenhouse emissions, tackle climate change and implement sustainability projects and programs

ECOVANTAGE

Energy services company, with over 12 years servicing the Australian market. As an experienced, trusted and passionate organisation, we take pride in supporting a consumption and lessen their ecological footprints, minimising energy bills and improving economic energy productivity.

We help our customers access local, state and federal-based government incentives to ease the transition toward energy efficiency through carbon-abatement, and can support the move towards net zero with our wide range of services including lighting upgrades, measurement and verification projects, HVAC and heat pump upgrades, and solar and battery installations.

With experienced teams in three states, working across the nation, we can manage your project from start to finish.

HFM ASSET MANAGEMENT

HFM is an engineering consultancy that offers tailored solutions to improve the efficiency of assets across all sectors, making them cheaper to run and a healthier place for people, with a reduced impact on the environment.

This Australian company was founded in 2003 by Ian Knox, an experienced Engineer (marine, mechanical and electronic), who has been responsible for many industry-changing developments and initiatives over the past 25 years.

HFM helps their clients focus on their core business, while the HFM team develops tailored solutions in areas such as: asset management, facility advisory, energy & water, renewable energy, building improvement, NABERS & BEEC.

“Building efficiency requires continual assessment and strategies for improvement.”

HFM offers a wide range of technical solutions and has developed an internal process called “The Building Efficiency Roadmap”, which consists of various services spread across 6 steps (review, verify, comply, procure, perform and improve) that assists clients manage their buildings and assets in an efficient manner.

The company has overseen several renewable energy projects across Australia. As a truly independent feasibility consultant and project management team it has added over 61,000 kW solar capacity for customers.

To find out more about how HFM can help, call 1300 021 420 or email info@hfmassets.com.au

[SUHO](#) provides consultancy services to the commercial and residential building industries

[Team Catalyst](#) Sydney-based consultancy with expertise in the field of energy efficiency in commercial buildings

[The Footprint Company](#) offers whole-of-life (embodied and operational) carbon management services for building projects

[Thinkstep](#) specialises in lifecycle assessments and environmental product declarations

ARCHITECTS AND ENGINEERS

[Arup](#) a multinational professional services firm that provides engineering, architecture, design, planning, project

[Aurecon](#) an engineering, design and advisory company with a strong track record on sustainability

[Cundall](#) International multi-disciplinary consultancy with a strong background in sustainability

[Envirotecture](#) Architecture studio that designs sustainable, low energy and comfortable buildings, mainly homes. It launched the Passivehaus

Design & Construct as an innovative adaptation of the old "design & construct" business model to get early control of cost for the ultra low energy Passive House standard

[environa studio](#) Architectural practice with an emphasis on the triple bottom line of social, environmental and economic responsibility

AECOM

The roadmap to a net-zero future always has the same end goal, but the journey is different for every client. It requires thoughtful and early analysis of all potential options and their associated benefits, costs and risks. We develop bespoke strategies based on an understanding of the physical assets and the people that use them. We work with our clients and partners to search beyond a sole focus on operational emissions and take opportunities to transition from fossil fuels to more sustainable sources. The challenge is constantly evolving, and as the grid continues to decarbonise, we are recognising the increasing significance of the impact of water, waste and embodied emissions in our quest towards net zero.

Whether it's for a building, a city, or an entire country, we are driven by a common purpose to deliver a better world. We are planners, designers, engineers, consultants, scientists and construction managers whose projects span buildings, transportation, water, governments, energy and the environment.

[FG Advisory](#) Strategic asset planning, building services engineering and technical project management consultancy. The company was the lead consultant on GPT's Melbourne Central Retail's development that aligns with the developer's fast tracked target of net zero emissions by 2024

[fitzpatrick+partners](#) Architecture studio dedicated the design that minimises the impact on the environment

[Grun Consulting](#) Melbourne-based building consultancy with a focus on sustainability and Passive House.

[Josh Byrne and Associates](#) delivers projects with an integrated approach to landscape architecture, environmental engineering and sustainability, community engagement and communications.

[Urban Fitouts](#) specialists in commercial fitouts of any nature. The company also provides full design & construct services, as well as construct-only

DIGITAL SOLUTIONS

[Buildings Alive](#) works at the intersection of data science, building science and behaviour science to provide real time feedback about a building's environmental performance to drive iterative improvement

[Evergen](#) renewable energy software that optimises solar and battery system performance

[Schneider Electric](#) energy and automation digital solutions for efficiency and sustainability

[Reposit](#) provides smart controller that helps households make more effective use of battery systems.

FINANCE

[Sustainable Australia Fund](#) offers fixed-rate, long-term loans for environmental upgrades, covering up to 100 per cent of the capital costs, paid back through council rates

SUPPLIERS AND PRODUCTS

[Interface](#) is a global flooring company specialising in carbon neutral floors

[Paarhammer Windows and Doors](#) provides high-performing windows and doors solutions

[Solpod](#) prefabricated solar pods that are craned and positioned onsite

[Smardt](#) manufactures high efficiency, oil-free chillers

[Inter-Chillers](#) HVAC solutions including

chiller and other HVAC equipment rehabilitation, repair and replacement services via its network of approved agency contractors and suppliers

[Tesla's Powerwalls](#) are an advanced home energy storage option.

DEVELOPER

[Charter Hall](#) is an Australian fully integrated property group

[Dexus](#) is an Australian real estate investment trust managing a high-quality Australian property portfolio of office and industrial properties.

[Fraser's Property Australia](#) is a diversified property group covering the development of residential land, housing and apartments, commercial, retail and property management

STIEBEL ELTRON

Stiebel Eltron is a family-owned company driven by innovation and maintains a clear focus on environmentally responsible, efficient and convenient building services. With a rich heritage of more than 95 years in manufacturing innovative home appliances, Stiebel Eltron has become synonymous with high-quality, well-engineered and energy-efficient products, including heat pumps, electric instantaneous water heaters and heat recovery ventilation

As early as 1976, Stiebel Eltron began developing heat pump technology for energy-efficient hot water, heating and cooling. This heat pump technology has been tried and tested in Germany for over forty years to ensure consumers receive real energy, environmental and money savings.

Stiebel Eltron Australia has been providing energy-efficient solutions to the commercial and residential markets Australia wide since 1995.

[GPT](#) owns and manages a portfolio of retail, office and logistics property assets across Australia

[Hip V Hype](#) is a group of companies that design sustainable and socially responsible property development solutions, aiming to “leave our cities and regions in a better condition than we found them”

[Investa](#) is an Australian owner and manager of commercial real estate

[Lendlease](#) a globally integrated real estate and investment group

[Nightingale Housing](#) provides apartments that are socially, financially and environmentally sustainable, it believes that “homes should be built for people, not profit”

[Stockland](#) is a diversified Australian property development company.

Brisbane-based [Solaire](#) builds homes “where luxury, environment and technology meet seamlessly”.

MIRVAC

Mirvac has a goal to be net positive carbon by 2030, and this means developing all-electric buildings that run on 100 per cent renewable energy. A key component of this also involves maximising the energy efficiency across its portfolio, with the view being that “the cheapest tonne of carbon is the one you don't emit.”

Energy efficiency is something Mirvac excels at, driven by a passionate team of sustainability experts who continuously strive to improve asset performance. For example, the team regularly undertakes night audits across the portfolio to physically identify opportunities to optimise efficiency and performance. Utility usage is also monitored extensively through sub metering, analytics and a diagnostic platform, helping Mirvac's in-house team of sustainability engineers and facility managers to scrutinise performance, and identify and rectify any system anomalies. This approach, combined with prudent capital expenditure, has delivered market-leading NABERS performance, with three 6 star and four 5.5 star NABERS Energy ratings across the portfolio.

Mirvac is also looking to transition its office, retail and build-to-rent assets to 100 per cent renewable electricity from 1 January 2021. Mirvac's first build-to-rent development, Liv at Sydney Olympic Park, has a renewable energy supply agreement with ERM and more are planned as the portfolio grows.

FLICK THE SWITCH
©2020 The Fifth Estate