CLIPSAL

Schneider Electric White Paper

Building homes of the future

Life Is On | Schneider Electric

> We see homes evolving from smart to smart and sustainable."

Schneider Electric is a company with a purpose firmly rooted in sustainability. That's what's shaping our vision for the home of tomorrow. We see homes evolving from smart to smart and sustainable, where technologies are interconnected to not only provide greater comfort, but also reduce their environmental impact.

To progress the evolution of homes, we need to address four main challenges: sustainability, resilience, efficiency, and personalisation.

First, we need to equip homes to become more sustainable and reduce their impact on the planet. The second challenge, resilience, covers two aspects: safety from electrical faults and the continuity of power supply, even in severe weather conditions.

The third challenge is efficiency. Electricity consumption is increasing as we spend more time at home and add loads like EV charging. Thankfully, there are huge opportunities to use energy smarter, and limit the increase in use and costs.

Finally, there's personalisation. Home is no longer just where we live, but also where we play, work, and study. This means we need better personalised, modular spaces that flexibly adjust to different activities.

At Schneider, we fully recognise these four challenges and are actively working to address them. Through Wiser - our platform for smart and sustainable homes - we are linking digital with electric to allow homeowners to take better control of their homes, their carbon footprint, and their wallet.

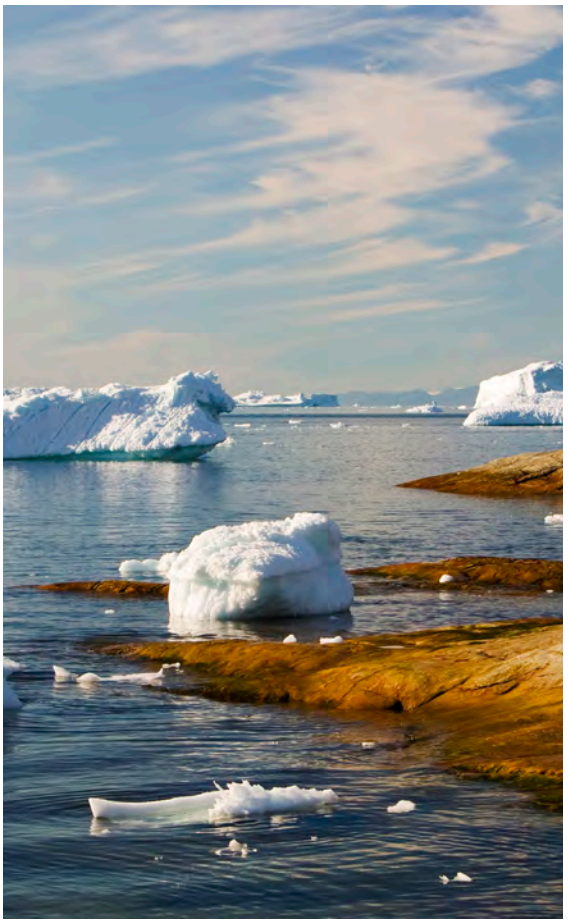
As a Home Builder, you have a great capacity to advocate for the sustainable transformation of homes and support the global fight against climate change. Let's go on this journey together and make it happen.

YiFu Qi
Executive Vice-President, Home and Distribution Division, Schneider Electric

Where do we stand?

Climate Crisis

Greta Thunberg's thought-provoking words sparked debate on social media about climate change and the greenhouse effect. Climate Change and Global Warming are among the most pressing issues in the world. They require immediate attention and contribution from each of us to bring about lasting change. What we need to understand is, climate change will not be saved by a single action. We all have a role to play in creating a cleaner future.



Recently NASA has observed increases in the amount of carbon dioxide and some other greenhouse gases in our atmosphere. Carbon dioxide (CO) is a greenhouse gas which traps heat in the atmosphere and makes the planet warmer.

Scientists have calculated that 350 ppm (parts per million) is a safe level of CO in the atmosphere,[1] yet we have already reached 410 ppm,[2] and this has contributed to the global temperature rising by 0.89 °C.[3]

The increase in global temperature has led to significant climate change activity. For example, throughout 2019, Greenland lost a million tons of ice sheet per minute[4]. Further, in 2020 alone, we saw:

A **heatwave** in Antarctica in which the temperature rose to 20 °C.[5]

One of the worst **bushfire seasons** ever recorded in Australia.[6]

Wildfires in California that filled the sky **with dense polluting smoke**.[7]

Warm ocean temperatures helped fuel a record Atlantic hurricane season in 2021, as well as rapidly intensifying tropical cyclones in the Indian Ocean and Asia Pacific.

About 40% of the global population lives within 100 km of the coast and sea level rise is increasing vulnerability to hazards like storm surge.

As global warming continues, global average sea level rise persists at a rate of 3.3 mm (0.13 inches) per year. Again, that's similar to adding roughly 2.5x the water in Lake Erie (Lake Erie is the fourth-largest lake of the five Great Lakes in North America and the eleventh largest globally) to the ocean every year, or around 25x that amount per decade.

Japan just recorded its earliest cherry blossom bloom in 1,200 years. The famous pink cherry blossoms of Kyoto reached full bloom this year on March 26, 2021, the earliest date in the 12 centuries since records began. Japanese university scientists claim that this is a symptom of the larger climate crisis.

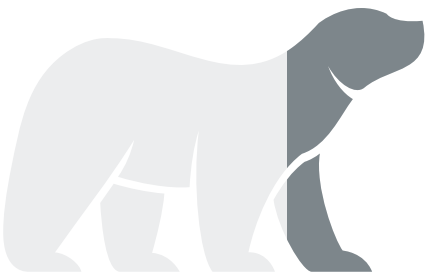
And this is just the tip of the iceberg. According to Amos Tai, associate professor of Earth System Science at the Chinese University of Hong Kong, early bloom of cherry blossoms is the beginning of a worldwide phenomenon that could destabilise natural systems and countries' economies. There are two sources of increased heat, which is the main factor making the flowers bloom earlier: urbanisation and climate change. With increased urbanisation, cities tend to get warmer than the surrounding rural areas, in what is called the heat island effect. But a bigger reason is climate change, which has caused rising temperatures across the region and the world.

With January 2020 going in the record books as the warmest January in 141 years, researchers believe there will be more local extinctions across the globe. And with summer heat waves potentially becoming more dangerous in the coming decades, the possibility for loss of life will likely only grow from here.

> “Japan just recorded its earliest cherry blossom bloom in 1,200 years.”

68%

loss of mammal, fish, bird, reptile, and amphibian populations between 1970-2016.



Environmental events are responsible for 68% loss of mammal, fish, bird, reptile, and amphibian populations between 1970-2016.[8] What's more, as there is a time lag of 50-years between CO emissions and their effect on pollution and temperature levels, the global changes we are seeing now are just the start of the problems we are going to face in the future.[9]

Burning fossil fuels like coal and oil is one of the main causes of CO levels rising.[10] Fossil fuels contain carbon that has been extracted from the atmosphere by plants through photosynthesis (capturing CO and turning it into sugars) over millions of years. By burning them, we return the carbon to the atmosphere too quickly for the nature system to keep up with, throwing the biosphere out of balance.

Step Up and Save The Word

The Paris Climate Agreement

The Paris Agreement is a landmark international accord adopted by almost every country in 2015 to combat climate change and its negative consequences. The agreement seeks to significantly reduce global greenhouse gas emissions in order to restrict the rise in global temperature to 2 degrees Celsius above preindustrial levels in this century, while looking for ways to keep the rise to 1.5 degrees Celsius.

All major emitting countries have agreed to reduce their climate emissions and strengthen their commitment over time as a part of the agreement. The pact establishes a mechanism for consistent monitoring, reporting, and ratcheting up of countries' individual and collective climate targets, as well as a roadmap for developed countries to assist developing countries in their climate mitigation and adaptation efforts.

The Paris Agreement formally came in to effect on November 4, 2016. The Agreement has been signed by 190 countries as of January 2021.

But is this enough?

Since the first climate talks in the 1990s, officials have debated which countries - developed or developing - are more responsible for climate change and, as a result, should reduce their emissions.

Developing countries contend that, over time, developed countries have released more greenhouse gases. They argue that since they were able to expand their economies without constraint, these developed countries should now shoulder a greater share of the burden.

Indeed, the United States has released the most carbon dioxide over the course of history, closely followed by the European Union. China and India, along with the United States, are now among the world's largest annual emitters. Developed countries have proposed that they must act sooner rather than later to combat climate change.

Most analysts believe that these countries' commitments are insufficiently optimistic and will not be implemented fast enough to keep global warming below 1.5°C or even 2°C.

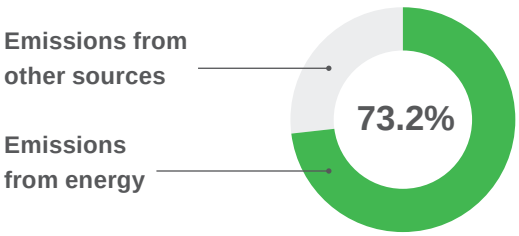
Energy Use in the Home

Focus: Australia & New Zealand

In 2020, 8% of Australia's energy was consumed by the residential sector and 11% of New Zealand's. On average, over the last decade the residential energy consumption has been growing +0.5% annually, whilst per-household energy consumption declines due to increasing use of energy efficient lighting, heating and cooling, water heating and appliances. [11]

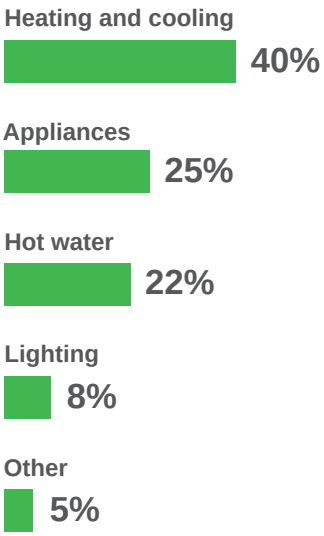
Research on global greenhouse gas emissions by sector indicated that 73.2% of the global greenhouse gas emissions were from energy (electricity, heat, and transport).

GLOBAL GREENHOUSE GAS EMISSIONS



Heat accounts for half of the global energy consumption. In fact:

- Data from 2016 showed energy use in buildings make up 17.5% of global greenhouse gas emissions, with **10.9% coming from residential buildings** from the generation of electricity for lighting appliances, cooking, and heating at home.[12]
- As of 2019, modern renewables are only supplying 11% of the energy for heating, and so fossil fuels continue to dominate and heat use still has a large environmental impact, contributing 40% of global CO_2 emissions.[14]
- A 2021 survey carried out in Australia by the Department of Industry, Science, Energy and Resources found that 40% of household energy use was down to Heating and Cooling; 25% for Appliances with cooking just over 4%.[15]
- In 2020, 47% of heat consumption in buildings was for space and water heating. [16]
- Whilst data from 2018[17] suggests that the distribution of energy consumption within Australian & New Zealand households was the following:



In order to limit the global temperature rise to 1.5 °C (as set out in the Paris Climate Agreement), by 2030 we will need to improve all of this by 30%. And, whilst we are seeing a yearly improvement of 1.5% for the building sector's energy intensity, the global built environment floor area grows faster, at a rate of around 2.3% each year. If we keep this going, by 2050 the carbon emissions from buildings will double.[19] In an attempt to combat this, the Australian Government have called for low carbon heating solutions to be placed in all new homes built after 2025.[20]

> "If we keep this going, by 2050 the carbon emissions from buildings will double."

Health and Well-being

There are two ways of looking at this. On the one hand, health and well-being are affected by the natural world and, in this case specifically, the impact of climate change. And on the other, health and well-being are affected by our built environments — in this case specifically, our homes. So, there's not much escaping it, and ignoring both of these facts will only cause more issues.

The impact of climate change on human health and well-being

The field of ecopsychology looks at people's psychological relationships with nature and how this affects health and well-being. With the seemingly insurmountable challenges and issues that we face, it is no surprise that the effects of climate change are causing harm to our mental health. Suggested solutions are to take action and also to connect with nature to reduce feelings of powerlessness and the anxiety that comes with it.[21]

Many of us are experiencing eco-anxiety, something that the American Psychiatric Association (APA) has described as a "chronic fear of environmental doom."[22] A 2020 survey by Global Action Plan found that one in three teachers is noticing high climate anxiety in students, and 77% of students report feeling

anxious about climate change.[23] Whilst a cross-generational study of 913 Americans and Australians found that 93% feel concerned for the environment, with plastic pollution (40.1%), biodiversity loss (39.1%), and climate change (38%) seen as the three most pressing issues. What's more, 77% of respondents reported a desire to learn more about living sustainably, although 79% believe it is up to governments to take the lead.[24]

And what about our physical health? Well, the EU Environment Agency estimates that 13% of deaths in the EU are linked to some form of pollution.[25] The World Health Organization estimates that currently 4.2 million people worldwide die prematurely from outdoor air pollution every year.[26] and that nine out of ten people breathe highly polluted air.[27] What's more, new research has found a connection between COVID-19 deaths and air pollution.[28]

The impact of the built environment on human health and well-being

As a result of urban living, we now spend around 90% of our time indoors — be that in our homes, our cars, public transport, workplaces, cafes, bars, restaurants, or gyms.[29] When you look at the research, it's easy to understand that the spaces and things that we surround ourselves with can have a deep impact on our physical and psychological health and well-being. For instance:

- There are 7 million premature deaths annually worldwide due to air pollution,[30] and indoor air pollution can be 100 times higher than outdoors.[31]

- 93% of 16–64-year-olds in the UK have smart technology,[32] and spending too much time in front of screens can disrupt our circadian rhythms; many of us are out of sync with our bodies sleep patterns, which can have physiological, cognitive, and overall health consequences.[33] In fact, a huge 67% of UK adults suffer from disrupted sleep.[34]

- Many household activities can bring air pollutants into the home. For example, carbon monoxide from the combustion of fuels such as gas or wood; fine particulate matter from things like candles, cooking, fireplaces; damp and mold from poor ventilation; and VOCs (volatile organic compounds) are emitted from many materials in the home. These can all have serious health consequences.

- Looking at damp and mould, which is often the result of poor heating and ventilation, research suggests that at least 20% of buildings in European countries, Canada, and the United States have signs of dampness, and 21% of U.S. asthma cases can be attributed to damp and mould in the home.[36]

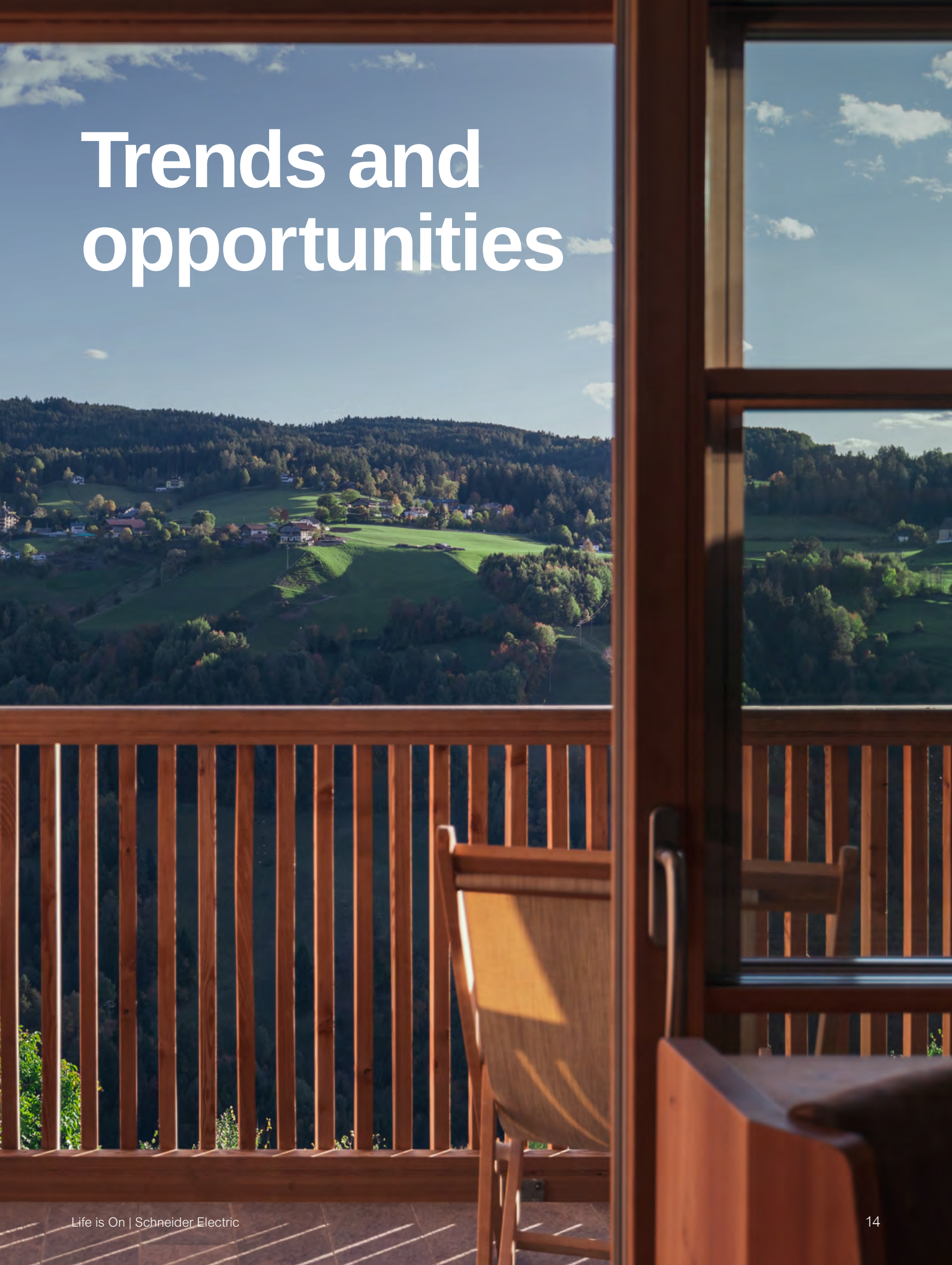
- Findings show that up to 25% of heat is lost through the roof, 10% through windows, 15% through the front door, 35% through uninsulated walls, and 15% is lost through the ground.[37]

- Excess deaths at home are almost three times higher in winter, and other health implications of a cold home include increased cardiovascular and respiratory diseases, such as pneumonia; children are more than twice as likely to suffer from these issues in cold homes compared to children in warm homes.[38]

In terms of energy consumption at home, if we make even relatively simple sustainable home improvements such as insulation, we can create more energy efficient, controllable homes that can help both the planet and our physical and psychological well-being. So, looking to our homes is paramount, as clearly there is room for improvement. It is here that we as individuals can make a difference, and future-proofing our homes is more important now than ever, so that we can live well in spaces we are spending much more of our time.

Because of the increasing reliance on our homes, energy consumption at home is increasing, yet many don't pay much attention to this. In fact, whilst 74% of people are aware of Energy Performance Certificates and EPC ratings — a measure of how energy efficient a home is — only 3% make changes to their homes following EPC guidance.[39] If an EPC isn't motivating people, then we must highlight how energy efficiency in the home is linked to health and well-being, in recognition that this will be a more powerful route to inspire change.

Trends and opportunities



Trends in Home Energy Use

Since the COVID-19 outbreak, people have been spending more time at home, increasing domestic energy consumption. For example, in the US in 2020, whilst nationally the consumption of power dipped by 4% between April and June, household energy use increased by 8% — the highest energy usage for the last decade.[40] This trend, however long it lasts, makes home energy consumption a **leverage point***; the cumulative effect of small changes in energy use in every house, in every neighborhood, in every village, town, or city, in every country, would be enormous.

Our homes offer us an opportunity to be more sustainable: they are where we can all make a difference — by being in control of where our energy comes from, how much we use, when we use it, and even generating our own — to combat the primary source of greenhouse gas emissions (energy).[41]

In systems thinking, ***leverage points** are the places where small changes can have the biggest impact.

> “Our homes offer us an opportunity to be more sustainable: they are where we can all make a difference.”

We are increasingly turning away from high carbon sources of energy such as gas, to low carbon sources such as electricity. It is forecast that we will see an “accelerated transition to low-carbon energy”, “pragmatic investment in carbon capture solutions”, and “the advancement and application of low-carbon technologies.”[42]

In fact, the fossil fuel industry has struggled during the COVID-19 crisis — due to reduced demand from transport and other sectors — yet renewable energy has experienced record growth. It was estimated that:

- By 2025 renewables will become the largest source of electricity generation worldwide as predicted by the International Energy Agency (IEA).[43]
- Global solar thermal consumption to heat water will be 20% higher in 2025 than it was in 2020.[44]

What's more, the International Energy Agency (IEA) reports that in response to the COVID-19 crisis, governments (excluding the EU) have been investing in energy-related stimulus packages worth $220 billion — half of which focus on clean energy technologies, particularly increasing the energy efficiency of buildings.[45]

Government grants and conscious consumers are creating a shift toward greater home energy resilience e.g., the use of solar panels and other renewable technology, smart systems, and systems that enable households to store the energy they capture. What's more, as electric vehicles such as cars, bikes, and scooters gain popularity, this energy resilience means our homes can become the power stations to charge them up, without the worry of energy cost or environmental impact.

***Internet of things** — devices such as sensors, smartphones and wearable technology are connected via a network that enables them to communicate with each other.[47]

Additionally, advances in smart technology are giving households the opportunity to better understand and control the energy used in the home, enabling us to become conscious energy consumers. This is from smart thermostats that enable remote home temperature control, to smart home systems in which all electrical devices are connected in an **Internet of Things.***[48]

Domestic systems can track the energy use of each appliance and times of energy consumption, so households can understand where they can reduce their energy waste and make savings, such as charging an electric vehicle overnight to take advantage of off-peak tariffs.

Wiser energy use, lower bills

Engineered for smart and sustainable homes, Wiser connected home solutions support more efficient energy use through smart automation.

Lighting control

With Wiser, homeowners can set an Away Moment for when nobody's home to automatically turn off all lights. The use of presence detecting sensors for less frequented areas of the house, like storage spaces or the basement, helps make sure no light is turned on and forgotten.

Heating control

Wiser can lower the heating when no one's around and warm up the house before the owners' arrival. The system is also able to detect if a window is open and adjust the heating to prevent energy loss.

Shutter control

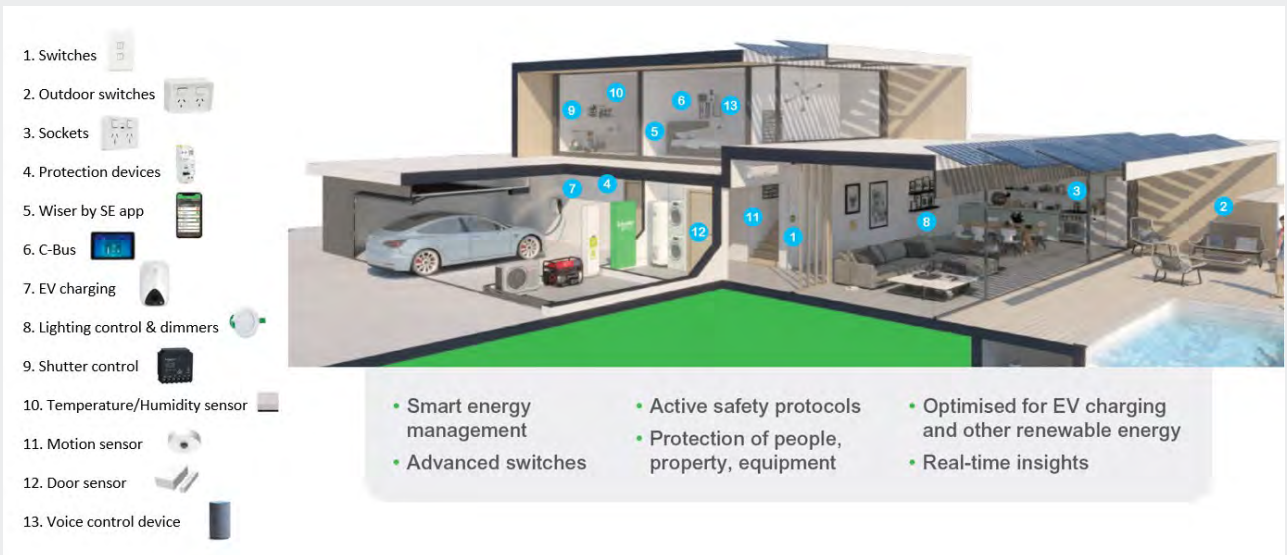
Automated Wiser schedules can also be set for shutters. They can be lowered on a cold day to prevent heat loss, or brought up on a sunny day to warm up the house. In the summer, closing the shutters can help keep interiors cooler and optimise air conditioning.

Appliance control

Remote control of home appliances via an app means homeowners don't have to wonder if they turned them off. They can do it from anywhere to both save energy and gain peace of mind.

Energy management

Wiser offers solutions for greater peace of mind, helping protect your home from extreme weather, potential intruders or even the occasional moment of forgetfulness. With simple smart indoor and outdoor IP cameras, you can monitor the inside and outside of your home from anywhere at anytime all from your Wiser by SE app. You can also integrate sensors to monitor several security parameters including door and window opening/closing, water leakage and motion detection.



Not only is having this kind of control over energy use good for the environment and household expenses, it is also good for your well-being: it can reduce financial stress and create more comfortable environments for all occupants, whilst also giving a sense of control over our environments. This is more important than you might think, as the desire for control is innate in human beings, and anything that undermines it can be harmful to our mental health.[49]

Growth of the Well-Being Economy

It's not just conscious consumerism that is on the rise, so is wellness consumerism:

- Data from 2018 showed the global wellness economy to be valued at $4.5 trillion, including the spa industry, wellness tourism, and wellness real estate.
- Between 2015 and 2017, this rose 6.4% each year, which is almost twice the annual global economic growth (3.6%).
- In terms of global economic output, the wellness industry makes up 5.3%.[50]

40% of Australians struggle to sleep for 7-9 hours, whereas New Zealanders consistently outrank the rest of the world when it comes to getting a good night's sleep. [51 & 5a2]

In 2020, the first research into the mental well-being economy found that it is worth $121 billion, with the senses, spaces, and sleep market accounting for $49.5 billion.[53] The effect of the built environment on human well-being is also recognized in many building standards such as LEED, Greenstar, and DGNB; whilst the WELL building standard[54], which launched in 2013, was to focus exclusively on the health and well-being of building occupants.

The impact of the built environment on physical and psychological well-being is recognized by people in both the well-being and building industries. We have seen a huge rise in interest in biophilic design,[55] which taps into our human evolutionary connection of nature to design built environments that support well-being.

Our approach to biophilic design takes into account how our environments affect us, as experienced through our senses (touch, taste, hearing, smell, sight, balance, and position of the body). We each have different thresholds for sensory stimuli in our environments and can be over or under stimulated if we don't get the sensory levels right for us individually, and this can cause physical and cognitive discomfort.[56]

Our thermal and visual comfort are extremely important for our well-being and having better control over lighting and heating in the home can reduce stress caused by our environments, improve sleep, focus, and thermal comfort, whilst reducing illness due to poor air quality and eye strain. The COVID-19 pandemic has made us all think about our health and well-being as an absolute priority, and looking after our health has become more essential and desirable than ever before.

Whilst the immediacy of the pandemic has both unfortunately, and understandably, put the climate crisis on the back burner for many, it has highlighted how important our homes are. We need them to be multifunctioning, comfortable, and healthy environments where we can sleep, eat, work, exercise, study, and support our relationships with family and friends (be that in-person or remotely).

The growth of interest in both physical and mental well-being is a chance for architects and designers to shine a light on how our environments - particularly our homes - affect us. This is an opportunity to engage clients in sustainability through something close to them — their health and well-being — and demonstrate how their home can support it. For example, insulation doesn't seem like an exciting home improvement, but when clients are made more aware of how much it can reduce wasted energy, and realise the benefit of this on the environment, their thermal comfort and, in turn, their well-being, it becomes a more appealing investment.

Sustainable Living

Focus: Urbanisation & Construction Sector

Cities account for just 3% of the Earth's land surface, but they account for more than 70% of all carbon emissions. We need to design and build our infrastructure, our cities, and our economy in such a way so that they are resilient to the effects of the changing climate. We can only decarbonise our habitat through collaboration between government, the private sector, and local communities, each playing their part.

It is estimated that 80% of the buildings that will exist in 2050 have already been built and are standing today. Existing buildings are responsible for approximately 40% of EU energy consumption and 36% of the greenhouse gas emissions, meaning they are the single largest energy consumer in Europe. As part of its Paris commitments, the UK government pledged last year to reduce greenhouse gas emissions by more than two-thirds (68%) from 1990 levels by 2030.

Similarly, in the United States, buildings and their construction together account for 36% of global energy use and 39% of energy-related carbon dioxide emissions annually, according to the United Nations Environment Program.

According to UN Environment, to meet the goals of the Paris Climate Agreement, the built environment's energy intensity – a measure of how much energy buildings use – will have to improve by 30% by 2030. Globally, the building sector's energy intensity improves by about 1.5% per year; but the number of buildings is increasing, and global floor area increases by about 2.3% per year, which offsets some of those energy intensity improvements. If no action is taken at a large scale, carbon emissions from buildings are expected to double by 2050.

As per the World Resources Institute (WRI), all buildings must be net zero carbon by 2050 to meet the goals of the Paris Agreement. Not even 1% of buildings are considered net zero carbon today.

According to WRI, the first and easiest step in addressing emissions is to reduce consumption through energy efficient design. The next steps would be replacing fossil fuels with on-site carbon-free renewable energy, and off-site renewables. This is a taller order, as it means addressing our energy infrastructure. The final, and least preferred option is purchasing carbon offsets.

There is a pressing need for homebuilders to create sustainable housing. Sustainability is a game changer and an absolute necessity which will transform the construction industry – especially housing. Building and investing in sustainability not only contributes to preserving the environment in which it is built, but homeowners can enjoy energy savings. These savings range from 50% to 70% in the life cycle of a net zero home, with up to 40% less water consumption and a reduction in maintenance costs of between 7% and 8%.

With climate change awareness on the rise, people are very keen to invest in sustainable housing. Putting building construction on the path to zero net energy use is the most cost effective and immediately available strategy for lowering greenhouse gas emissions in the built environment. A green building may be a brand-new construction, or one that has been retrofitted with new mechanical systems, heating, ventilation, and lighting. It is difficult to achieve net zero energy use by retrofitting, and so the onus is on architects and building industry professionals to educate their clients about building sustainable homes from scratch.

Advantages of Sustainable Housing

Reduced Environmental Footprint

Your environmental impact is significantly reduced when you build homes that are built to last. From the outset of construction, green homes have sustainable benefits. Building techniques reduce waste and recycle products, allowing for more productive use. Sustainable homes minimise emissions that contribute to climate change because they are designed with the goal of reducing energy use.

Economically Viable

Operating costs of sustainable homes can be minimised as a result of construction methods that ensure effective use of water and electricity. Sustainable materials and methods are being used in construction projects all over the world, which would save money on utility costs in the future. In addition, most home builders recognise that that sustainable buildings have a higher perceived build quality by customers, are more in line with their values and ethos and will create significant financial savings throughout their occupation. As a result, you save both money and time.

Energy Efficient

Green home construction prioritises energy conservation. Solar panels, high efficiency insulation, enclosed attics, low-emissivity windows, advanced framing methods, and energy-efficient heat pumps are only a few of the features. As a homeowner, the expenses are lowered as your heating and cooling needs are reduced.

Enhanced Quality of Life

More natural light and improved climate protection are features of sustainable buildings and homes, which help to raise morale, improve health, and improve life quality.

Increased Property Value

More and more investors and Home Developers across the world are betting on sustainability by introducing sustainable construction methods and materials, selecting sustainable-recognised suppliers and promoting Net Zero Homes and Sustainable Building Certifications as standards for their developments.

The reason behind this is simple. Many home buyers view sustainable features as “must haves”, so green homes are sold much faster than their counterparts. And in some places, homeowners are willing to pay higher prices when extra features are added to improve their quality of life.

There is a need to build homes and places in such a way that they save money on heating and power, help people live less carbon-intensive lives, and help minimise greenhouse gas emissions that lead to global warming. Future green net zero homes will indeed stem from the clean energy transition, reducing our carbon footprint significantly.

Net Zero Homes: The Future

Over the course of a year, a Net Zero or Zero Energy home can generate as much power on-site as it consumes. As a result, any electricity the building consumes from the electrical grid can theoretically be returned.

Net Zero Homes are more than just about renewable energy sources; they are airtight, well-insulated, and energy efficient to the point that they generate as much renewable energy as they consume in a year, leaving the inhabitants with a Net Zero energy bill and a carbon-free household.

To create a healthier house, a Zero Energy home combines innovative architecture and superior building technologies with energy efficiency and on-site solar panels. Zero Energy homes are ultra-comfortable, safe, peaceful, and environmentally friendly homes that are also affordable. It is important to use resources in a more intelligent and educated manner.

The secret to successfully constructing a sustainable green home is proper planning. In this process, homebuilders are committed to sustainable construction and creating homes that value the natural environment in which they are constructed, with a strong emphasis on architecture and design. Consumers have a preference, and everything they need is included in the carefully considered specification from the start of construction, allowing them to personalise aspects of their new home without incurring extra costs.

When specifications are limited to budget constraints and sustainable features are not reaching the level expected by potential homeowners, Homebuilders can also offer some upgrades during the sales phase to reach these expectations and improve homeowner's quality of life.

Apart from energy efficiency and lowering its carbon footprint - improving life quality is at the heart of building a sustainable home. The buyers would receive a well-designed new home with all of the requisite functions and no need for renovation. They also get to live in an environmentally friendly home with well-thought-out materials, a comfortable indoor atmosphere, and low maintenance and running costs in a sustainable, climate-smart home.

Some of the advantages of Net Zero Homes are:

- Ultimate Energy Efficiency - Homes that are airtight, well insulated, and energy efficient, resulting in a Net Zero energy bill and a carbon-free house for the residents.
- Healthier & More Comfortable - Creates a healthy environment with the cleanest air, the most comfortable temperatures, and the quietest indoor environment free from allergens and toxins.
- Carbon Free and Climate Friendly - Zero Energy homes are one of the cornerstones of a low-carbon, non-fossil-fuel-dependent future.
- Save Money from Day One - A Zero Energy home will shield you from fluctuations in energy prices. Living in a Zero Energy home is less expensive than living in a conventional home.

The New Generation of Environment Conscious Home Owners: What Do They Seek?

Homeowners today, especially the younger generation, who are first time buyers, are more committed to sustainable development goals. They care deeply about environmental sustainability, and this momentum is building at scale.

There is a visible shift in consumer demand in the real estate sector towards more energy efficient buildings, notably since the global lockdown which compelled people to stay indoors. The coronavirus pandemic has revealed the downsides of energy-intensive buildings. Most of the world's population lived and worked from home during this time, which has led to a new demand for green buildings and efficient energy systems.

In a survey conducted by Schneider Electric, where consumers from United States, France, Germany, and Sweden participated, 90% of consumers surveyed are willing to invest to create a more energy efficient home. The study shows that 37% of consumers have considered changing housing since the pandemic, among which 6% have already made a move towards sustainable homes/net zero homes.

The new generation is worried not just about the environment's future, but also about the viability of our cities. Due to the common pitfalls that come with living in an urban environment, such as the rising cost of living, noise and air pollution, many are looking for alternative housing solutions. As per the Schneider study, over 80% of consumers across all the 4 regions where the survey was conducted, cite well-being as a priority for their homes, and energy efficiency and sustainability also remain important factors. Apart from these, safety and data privacy rank high on their preference list.

These days, most consumers are looking into smart home ideas. A smart home is one in which the appliances are connected to a smart home device that automates everyday functions and can normally be operated remotely. It helps you to have more control over your energy use by automating activities such as temperature control, lighting control, and window treatment control. 41% of the consumers surveyed expect a newly built home or apartment to be equipped with smart home products, and 25% consumers are willing to pay more for a home, condo, or rental if it comes with smart home technology.

Home Owners' Wishlist for a Smart Sustainable Home

Higher Energy Efficiency: Consumers want to have more precise control over the heating and cooling of their home. With the **Wiser** app you can adapt the temperature of your home to gain comfort and save energy.

Smart Home Willingness: When the sun sets, lamps and motorised shades can be programmed to transform into an evening setting. Lights can turn on and off automatically as you enter or exit the room, ensuring that you have full control remotely. **Wiser** integrates key smart home controls: lighting, shutters, climate, electrical appliances, home access, and security management. The ability to integrate all your home's electronics into a single app is a huge step forward for technology and home management. Multiple users in one home can create different automation settings and scenarios.

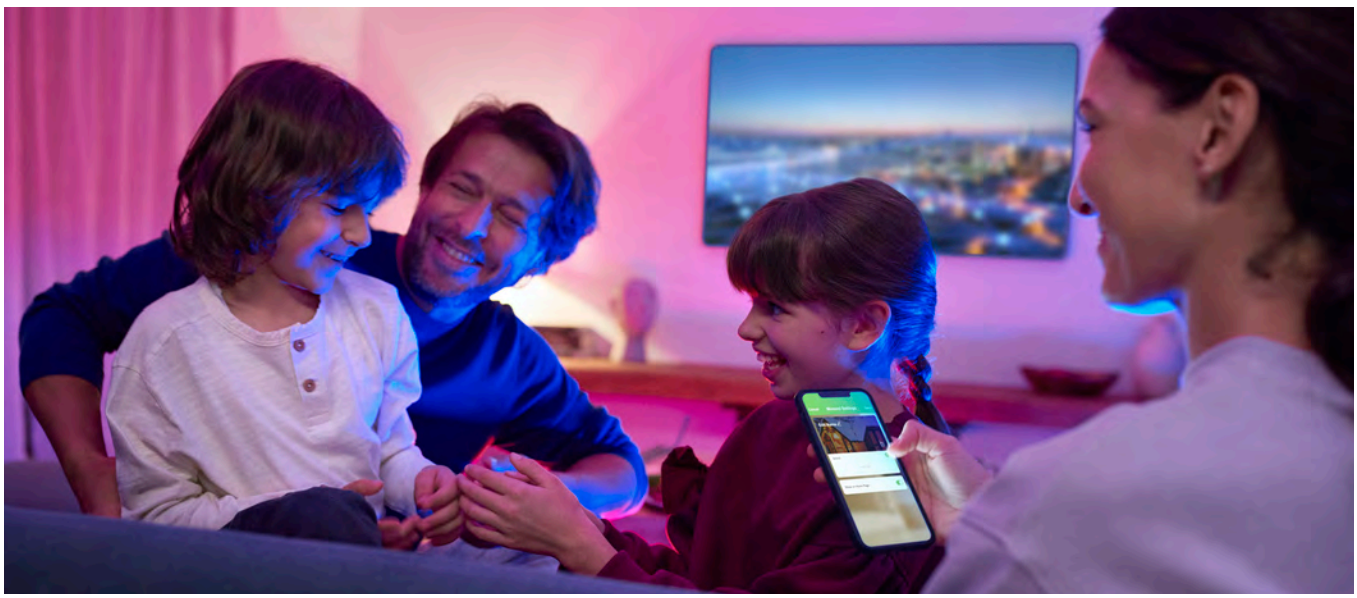
Safety: 67% of the consumers surveyed by Schneider think that smart homes can be a way to ensure safety and security in homes. Homeowners will know precisely what's going on and get real-time notifications thanks to the interconnectivity between smart home technology and real-time detection and tracking. The **Max9** range contains circuit breakers, residual current devices, switches and comb busbars, all aimed at providing electrical protection to residential buildings. Designed with style and ease of use in mind, the range guarantees that you have everything you need to ensure clients are happy with the end result.

Energy Awareness and Energy Consumption Visibility: In order to track electricity usage in homes, homeowners want control in the palm of their hand. **Wiser Energy** is able to track every load inside the home. It doesn't matter if the appliance is smart or not. **Wiser Energy** recognises it and is able to feedback precisely how much energy it consumes. So, it's easy for homeowners to control what matters, while reducing their energy consumption.

Electric Vehicle Charging: As a result of increased environmental consciousness, electric cars have grown in popularity, so having an Electrical Vehicle charging point is a vital part of a net zero home. The easy to install and easy to use **EVlink Home Wallbox** is weatherproof, robust, and the compact design allows it to be used in restrictive environments at home. It's clever design allows the charging cable to be wrapped around the charging station when not in use.

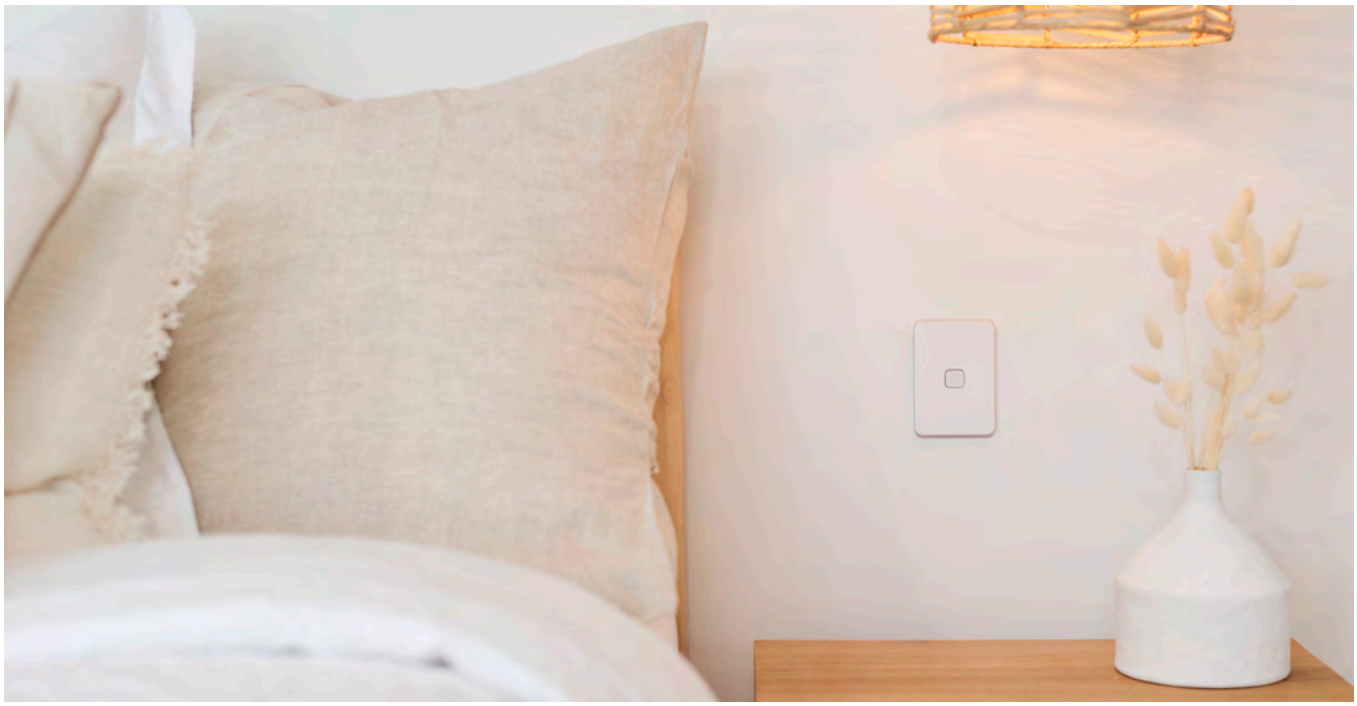
Maximising Solar Consumption, Minimising Bills: Grid-tied solar photovoltaic (PV) panels can power all the energy needs of a home including lighting, appliances, hot water, and heating and cooling systems. An energy management solution that gives users the ability to control the flow of their home's energy, be that solar energy, stored energy, grid energy or generators. By intelligently programming the energy sources to prioritise solar, this will hugely decrease the use of grid energy and save a considerable amount on electricity bills over time. As well as being a sustainable and cost-effective method, it also allows users more control and flexibility over how they use their power. With Electric Vehicles, users have the option for super-fast charging, using a combination of both solar and grid power, whilst still maintaining a power-limit (solar energy use is prioritised). A final bonus is that with smart devices and app notifications and alerts bring enhanced safety from electrical faults.

Insulation: Insulation is the key to energy conservation; a well-insulated home not only saves energy, thus lowering operating costs, but also keeps people more comfortable. Consider three aspects; First, improve the energy efficiency of a home and make it air-tight by super-sealing the building envelope. Second, super insulating the house helps to dramatically reduces energy loss through the ceiling, walls and floors. Finally, the third measure is to consider reduce heat loss through any building openings such as doors and windows - the latter of which can be double or triple glazed.



In a consumer survey conducted by Schneider Electric between July and August 2020 in the United States, France, Germany, and Sweden, it was found that 41% of respondents would expect a newly built home or apartment to be equipped with smart home products. This brings a brilliant opportunity for home builders and developers to upsell and differentiate their projects by incorporating home automation.

The Role of Home Builders



Home builders and home developers have the first-hand responsibility and decision-making power around what the home will stand for. They have to do what is right for the planet, right for society, and right for their clients. Despite current economic challenges and the risk of a global recession as a result of the global pandemic, investment in environmentally friendly, zero-carbon buildings continues to grow, with experts believing that 'reducing a real estate portfolio's carbon footprint is one of the safest ways to contribute positively to the environment'.

The most logical step or way to meet the global climate change targets is to build Net Zero Buildings or Green Buildings. Environmentally sustainable and resource-efficient green buildings use less electricity, water, and other natural resources. As a result, less waste and greenhouse gases are produced, reducing the burden on human health and the atmosphere over the course of the building's entire lifecycle.

For home developers, a sustainable housing approach will require careful planning from the outset to consider both the design and construction but also the ongoing occupation and use of its spaces. Let us look at some of the sustainable housing principles that home builders abide by:

Plan & Design for Sustainability

Preparedness towards environment-friendly methods of utilising minimal non-renewable energy sources, low-operational energy and aiming for a longer lifecycle with accomplishing operational efficiency is paramount for every builder. Regulatory compliance and voluntary certifications can help home developers stay on their sustainability mission such as BREEAM, LEED, WELL standard, etc. Right from the very beginning, home builders can make sure the overall carbon footprint of homes is low by using design Modelling to plan, revise and enforce changes instead of wasting resources. Using Building Information modelling (BIM) data generated over the whole project lifecycle will enable faster, safer, and less wasteful construction; as well as more cost effective and sustainable operation, maintenance, and eventual decommissioning.

Design for an Energy-Efficient Building

Home builders should design the house for energy efficiency; buildings should be equipped to consume less energy and generate power independently for their own consumption:

- Use naturally sourced material for better insulation during construction.
- Install and integrate use of solar power or other renewable generators.
- Design for better air tightness and ventilation as air, and moisture have a huge impact on indoor air quality and comfort.
- Install solar panels and supporting electrical control systems to harness the sun's power and, as a result, optimise energy efficiency.
- Enable use of solar energy storage for self-consumption which is an essential aspect for Energy Positive Building.
- Include installing home automation, energy efficient lighting, electronics and appliances for low energy use along with comfort.

Construct with a Low Carbon Footprint

Home builders should aim to use efficient and environmentally responsible materials and procedures to protect the environment in which a building is built, as well as the building itself They can achieve that by:

- Using more renewable sources of energy during the construction phase; lesser energy consumption and wastage means a lower carbon footprint.
- Use of greener construction materials like bamboo, sheep's wool, cellulose, earthwool, etc.
- Use more recycled or reclaimed construction materials from other projects, such as steel furnace ash (also known as GGBS) as a means of reducing the carbon impact of concrete.
- Use of RoHS (Restriction of Hazardous Substances) and REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) certified products.

Waste Management

Planning ahead to keep waste to a minimum is the most effective strategy to reduce wastage. You will reduce the amount of waste you submit to landfill by using smart construction, repurposing materials, and using recycling centres. Separating waste; holding similar materials together for easier recycling or pickup; and separating non-recyclable and hazardous materials for disposal. Some of the ways to handle waste effectively include partnering with retailers and distributors who produce packaging made of recycled and recyclable materials that can be processed and handled.

Green Building Certification

A green building certification shows a home builder's commitment to building a sustainable home. Green building certifications are used to assess and recognise buildings which meet certain green requirements. These voluntary certifications recognise and reward companies who build and operate greener buildings, thereby encouraging and incentivising them to push the boundaries on sustainability. Some of the more recognised certifications are LEED (Leadership in Energy and Environmental Design), issued by the U.S. Green Buildings Council. Energy star certification is offered by the Department of Energy and the Environmental Protection Agency, and BREEAM (the Building Research Establishment Environmental Assessment Method) is also an international program that recognises sustainable buildings and projects. It is important for home developers to review and make sure regulatory compliance and Certification Approvals are in place before finally handing over the house to its consumer. Green building certification checklists also ensure they do not miss any important parameters or steps in planning a sustainable home.

Home builders have the responsibility to inform and educate their clients on all of the available options and advantages of making their homes more sustainable and net zero. More energy efficiency means lower energy bills and a low-cost sustainable home for customers.

The Role of Architects and Designers

So, we know that people are motivated to be more sustainable and healthier, but they don't necessarily know how to go about it in their homes, and this is where the design of the home is crucial.

To overcome the barriers to action, here are nine things you can be doing for your client:

Audit for carbon emissions and projected energy efficiency — identify opportunities for savings and efficiency measures in their homes as a baseline. For example, in the USA you could use the EPA's Household Carbon Footprint Calculator, in the UK the Carbon Independent's carbon footprint calculator, or a SAP calculation to dig deeper into your EPC rating.[57]

Install smart control systems as part of designing multifunctioning homes — in order to support all occupants' physical and psychological needs and activities, whilst enabling them to understand and reduce their energy use.

Recommend renewable energy sources — as a stepping stone to energy resilience. The first step might be to switch to a renewable energy supplier.

Specify materials that don't run off gas and install air filtration and continuous ventilation systems — to safeguard your clients' interior air quality.

Specify products and materials that are durable and repairable — to help clients shift into the circular economy and save stress and money in the long term — **Schneider Electric** can help you specify products that are made to last.

Create energy resilience — design or renovate homes that generate and store energy and can charge clients' electric vehicles easily.

Stimulate a deeper connection with the wider natural environment — bringing nature in through biophilic design[58] to promote well-being.

Recommend installing electric vehicle charging points — even if a client is not there yet, having the provisions for charging electric vehicles in the future will help them transition.

Use WELL concepts as a checklist — the 10 concepts[59] offer a holistic framework for creating a human-centered environment.

But, how do you get your client on board, so that they want to invest in all these things? We'll look at a business case to sell it to them next.

Case study: Katikati, Bay of Plenty, New Zealand.

Katikati
Location: Bay of Plenty, New Zealand

Nestled in a lush avocado orchard in the rural Bay of Plenty is a modern and energy efficient home with clever technology at its heart.
"We were looking to get back to nature," says owner Alastair. "Coming from Auckland it was a real change, and to build a house as we've done now, it's just transformed our lives."

The power of electric home design

Alastair and Carol spent more than a year planning what they wanted in their home, with careful thought given to lighting, heating, security and other electrical elements.
"Electric home design actually future proofs you within your new build," says Alastair. "The more preparation you do beforehand allows you to enjoy things later. We spent a lot of time thinking about little things that could make a big impact later on."
"We had an idea of some of the functionality of the components we wanted to use but the Schneider Electric Vision Studio showed us how they could work." says Alastair. He also recommends asking your electrician for ideas as you go. "It's really important to understand what your electrician can add to your project. They are all about value-add."

A safe home

Their switchboard and adjacent technology area include products designed to enhance electrical safety and reliability, such as Under Voltage Protection, surge protection and numeric wire and circuit labelling for fault management.
"With the complexity of energy in a new home nowadays, and the fire brigade a long way away, I wanted to mitigate risks," says Alastair.
Their electrical plan included sensor lighting in the bathrooms so guests can always find their way around. Subtle downlights highlight the curated artworks and ornaments, and additional LED strip lighting above the induction hob in the kitchen helps to make prep and cooking easier.

Outside, they used Iconic Outdoor for a stylish weatherproof switchgear solution for their gas-powered hot water system.

An intuitive home

Alastair's plans for a smart home meant finding a system that could bring all the individual parts together in one easy-to-use application. During a visit to the Vision Studio showroom in Auckland, they saw how Wiser Smart Home could achieve that.

"Wiser is about having a home on your phone. It's one touch and the whole house transforms. And it was so easy to use."

Wiser can control and dim lights throughout their house, and control appliances such as the wall heater in the master ensuite. "If we're out and coming home and it's a cool evening, I can actually crank up the heat in the bathroom from my phone, so there's a warm bathroom to shower in," says Alastair.

Even the entrance to their house can be operated via Wiser – an electric maglock secures the large reflective glass front door, which they can see via the security cameras on their phone screen and then unlock remotely.

Some of the Sustainability Project features are:

- Raft floor foundation, which is a raised Qpod slab filled with just under 300kg of recycled plastic from Hawke's Bay.
- Double glazing
- Argon gas
- Laminated recycled timber with Ecoply
- Rinnai Smart Cylinder water heater

An energy efficient home

Alastair says that having touch-screen control from his smartphones is a game-changer and adds to the overall enjoyment of living in their home. “It’s so much cheaper to run a house too and you can run everything very simply.”

He says their power bills have come down thanks to the energy efficient features, and the fact that Wiser lets them control exactly what is on and when. “I think the bills will come down further too, because we’re living within the home’s sustainability programme.”

Style and substance

The overall impression of their home is one of light and space. Large picture windows offer sweeping views over the orchard and out to Mount Maunganui and beyond, while the 2.7m wall stud, pitched ceilings and light timber floors all add to the airy feel.

“I love that when we’re sitting in the lounge area and you look out over the orchard you feel as though you’re suspended in nature – it’s magical.”

For the finishing touch, they chose Saturn Series switches and power points. “We wanted elegance because of the home’s simple lines,” explains Alastair. “The Saturn Series is a beautiful range. It’s touch button and there’s a halo light to show when things are operating.”

The property uses a selection a selection of the Saturn push button switches and powerpoints, with USB charging ports, dimmers and button labels for easy identification of appliances and lighting areas.

The dark tones of the kitchen are the perfect setting for Saturn Zen in Black, which blends beautifully with the black cabinetry, dark stone splashback and black bench tops. Elsewhere in the house, the textural metallic of Saturn Horizon adds a striking contrast.

For owners Carol and Alastair, the time spent on planning and design was well worth it for the energy efficient and technologically intuitive home they have created. “It’s warm, it’s inviting, it looks beautiful. We just love it here, we struggle to leave.”

Clipsal products used

- Saturn Zen switches and sockets
- Full Wiser integration
- EV Link Smart Wallbox (EV charger)
- Iconic Outdoor sockets

Case study: Klemm Homes, Adelaide.

Klemm Homes
Location: Adelaide, South Australia

Inside a builder and interior designer's own home

When it comes to building luxurious new homes, the couple behind boutique builders Klemm Homes put electric home design high on the checklist right from the start.

Builder Troy Klemm and Interior Designer Carmel Siciliano-Klemm pride themselves on building homes in Adelaide with careful attention to detail. From construction materials through to their choice of light switches, they say smart home considerations have played a key role in how they create bespoke homes for their clients.

Building the homes of tomorrow

"We just completed building our dream home" says Carmel. "We're very, very busy people so when we were building it was very important for us to include Wiser Smart Home solutions."

Carmel laughs and adds "Troy thinks he is James Bond by sending a command to turn on the TV when we have a dinner party, and it pops out of the cabinet!"

"To me, the home of the future is a sustainable, energy-efficient, fully automated house," says Troy. "A house that seamlessly integrates with the homeowners."

When the couple build houses, their aim is to create well-designed homes that make use of passive heating and cooling (using the sun and natural shade), as well as quality products for longevity, and smart home automation for energy-efficiency and a more streamlined and enjoyable experience.

Starting with electric home design

The conversation around electric home design starts from the first meeting with clients. "We love to show off our automation solutions so our clients know exactly what they could have in their own house," says Troy.

"Wiser is a scalable smart home solution that can start from one switch, right through to your whole house being automated. You consider a smart home solution because it gives you peace of mind. It allows you to check in on your house from anywhere in the world." he adds.

Wiser Smart Home can link to a range of features such as indoor and outdoor lighting, blinds, alarms, sound systems, garage doors and even heated towel rails, and give you control of them through the user-friendly smartphone app.

It works in tandem with the stylish Iconic switches and sockets to offer a wide range of functionality such as timers, dimming and 'moments', where actions are grouped together for specific occasions: An 'entertaining moment' could dim downlights, turn on music and light up the garden with a single screen tap or voice command, for example.

Their electrician, Ryan Voy of Envy Electrical and Automation also recommends Wiser because of its quality and flexibility. He says it's important to talk to an expert to get an idea of the technology available around lighting and blinds, climate control, security, energy management and home entertainment. "You really want to design the whole installation to meet your family's wants and needs."

He says Wiser can make life easier in so many ways. “You could have the Wiser power point scheduling your Christmas tree lights, or garden lighting being scheduled from sunset to 10pm every night, and even push notifications for your front door opening when your kids get home from school. A smart home simplifies your life, giving you time to do the things that you want to do.”

Stylish and smart

From Carmel’s perspective, electric home design plays an important role in the interior styling and can enhance the experience of a space in subtle ways. “A home is not just a house with downlights. We look at vanities that are lit, handrails that are lit, bulkheads that are lit, and lights that turn on and off at different times as you walk up and down a staircase.”

Increasingly, people are looking for homes that are responsive and enjoyable to live in. “We love Wiser Smart Home solutions, everyone from our little girl through to the teenagers can all use it, and we love how it works in our home.” says Carmel.

She adds that as an interior designer, she’s noted a recent shift in clients desiring their homes to be more of a sanctuary and a return to natural materials. “People are looking for a change from the rendered home and are now looking at textured brick and textured cladding, stone on frontages and even internal walls, and lots of natural light.”

Outside they prefer to use Iconic Outdoor, the stylish but robust weatherproof outdoor range of switches and power points and inside they prefer the Iconic collection. The range is designed to work with a variety of interior design styles, which Carmel says is a huge advantage. “At Klemm Homes, the level of detail for our clients is really important. We look at the perfect tile, the perfect tap, the perfect hinge – and also the perfect light switch. It’s fantastic that Clipsal’s range has so many options to suit the needs and wants of our clients, and they complement the home so well.”

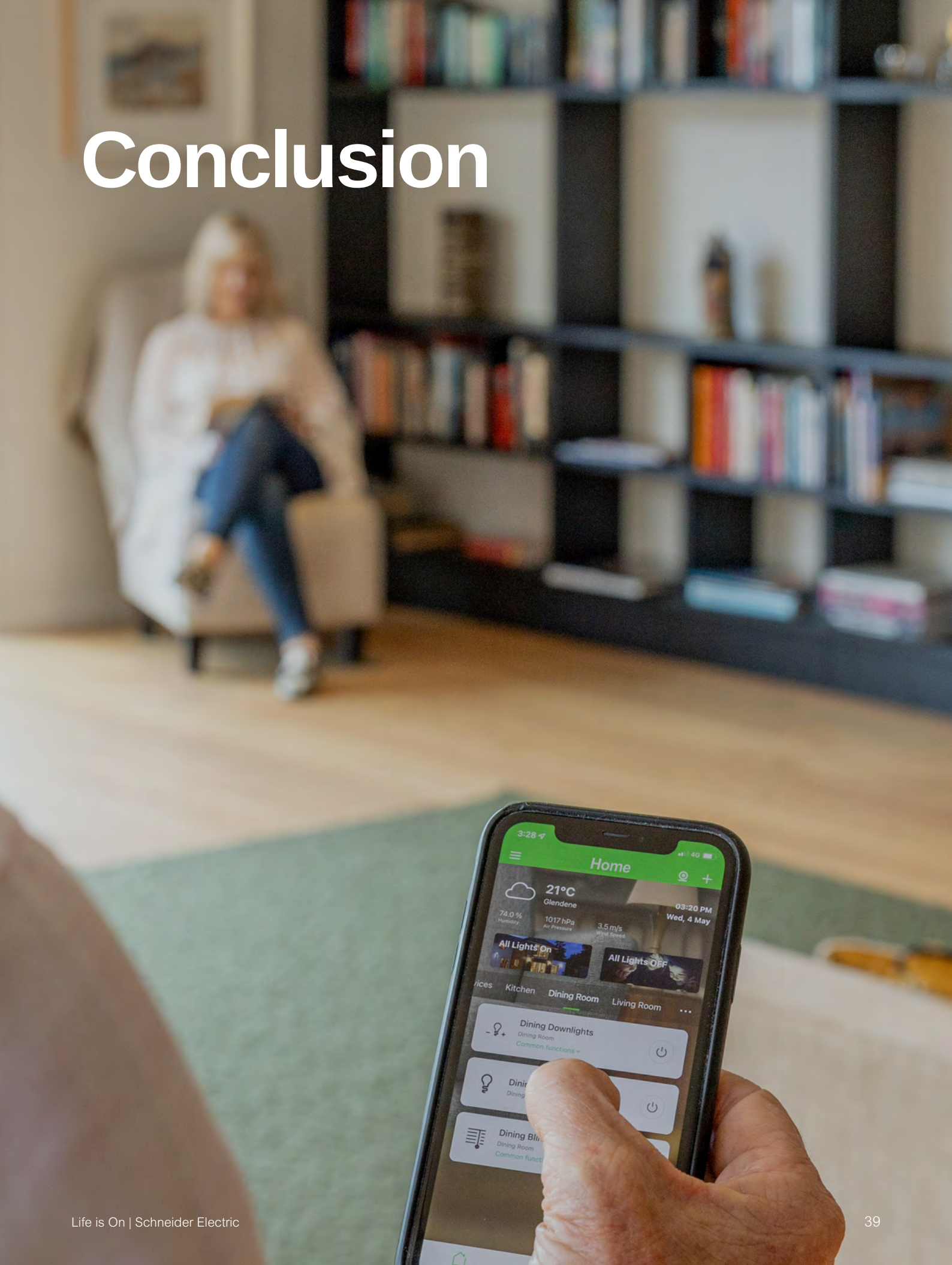
The complete package

Much more than just four walls, a home creates a lifestyle for those who live in it. For Troy and Carmel at Klemm Homes, a focus on electric home design helps them build homes with so much more to offer those who live in them. “Products such as Wiser Smart Home allow our clients to make their lives simpler,” says Troy. “It gives them more time to concentrate on the things they love.”

Clipsal products used:

- Iconic switches and sockets
- Full Wiser integration
- Iconic Outdoor sockets

Conclusion


3:28
Home
21°C
Glendene
74.0 %
Humidity
1017 hPa
Air Pressure
3.5 m/s
Wind Speed
03:20 PM
Wed, 4 May
All Lights On
All Lights OFF
Kitchen
Dining Room
Living Room
Dining Downlights
Dining Room
Common functions

The home of the future is not just efficient; it is also resilient and flexible. What we build today is what we will reap the benefits of tomorrow. It's more than just a home where issues with draughts and poorly designed heating systems have been overcome. There is a need to build well-considered comfortable home that caters for the household's activities, needs, and preferences as they change over time whilst reducing their carbon footprint.

The home of the future is its own power plant. This means it is generative (of energy) rather than just preventative (of energy loss). It is in fact regenerative to people and the planet — supporting the well-being of both. It works with natural elements like available sunlight, water, and heat, and it connects the people within it with natural systems — through awareness of the seasons and how much sunlight there is at different times of day and the year.

The home of the future is

Electrified
— using sustainable renewable energy to power the house and electric vehicles

Efficient
— no energy is wasted, and CO_2 emissions are minimal

Generative
—it harnesses and stores energy from solar panels, and ground or air sourced heat pumps

Comfortable
— it supports the well-being of all occupants throughout the seasons

Personalised
— it is customised to a household's needs, is fully controllable, and makes households aware of their energy use

Flexible
— adapting to both the changing needs of the household as well as the climate

Resilient
— to developments and changes in technology, using upgradeable software and hardware

Robust
— built to last, able to be repaired, and adaptable for future needs

Responsive
— the heating, lighting, and ventilation work in a connected network and communicate with the users

Whilst much of the technology already exists, it isn't yet in use in every home. There is a sense that resilient energy renovations aren't yet accessible for all, either financially or through it seeming too complicated. This is where home builders, architects and designers can help to clearly communicate the benefits and the options to our clients; the only way uptake will increase is by making energy resilience design and renovation simpler.

A holistic approach to energy system design, installation and use from start to finish is needed, one that looks at a home's current energy use and how well it supports the household's physical and psychological well-being and identifies opportunities for improvements. Creating a clear and simple plan for what, how, and when to implement changes is crucial. This requires thinking about the home as a system joining all the elements in a network so that they work together.

> “Creating a clear and simple plan for what, how, and when to implement changes is crucial.”

What is clear is that a sustainable home is better for both the occupants and the planet. At a time when the home is playing an increasingly important role in our lives, its impact on occupant well-being is certainly one macro trend that we all need to focus on.

The construction sector has a serious impact on climate change. If the real estate and building sectors embrace and invest more in sustainability, it will go a long way towards transforming both current and new developments – through education, visibility, supply chain evolution, and mainstreaming green investments.

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