



Setting Standards for
Retirement Communities

Grey going green?

Longevity for our planet and people through
Integrated Retirement Communities





About ARCO

Founded in 2012, ARCO (Associated Retirement Community Operators) is the principal body representing both not-for-profit and private operators of Integrated Retirement Communities in the UK. Integrated Retirement Communities combine independent living for older people (through them renting or owning their own property) with 24/7 onsite staffing, CQC-registered domiciliary care for those who need it, and a wide range of communal services and facilities.

ARCO | Advisory Council

About the ARCO Advisory Council

The ARCO Advisory Council was established in 2020 to provide a new engine room of collaboration and insight between Integrated Retirement Community operators in the UK and their supplier and advisory partners. The Advisory Council meets throughout the year to offer advice and recommendations on the key issues for the sector, and draws on expertise as wide-ranging as technology, construction, architecture, healthcare, law and much more.



Longevity: for our planet, as well as our people ARCO	1
--	----------

Collaborators	2
----------------------	----------

Are you in the race to Net Zero? Apetito and Wiltshire Farm Foods	4
--	----------

Net Zero through offsite construction NHBC	6
---	----------

Strategic design principles to aid achieving Net Zero Carbon Nicol Thomas	8
--	----------

Learnings from working with IVG on their Net Zero Carbon Strategy Urban Edge	10
---	-----------

Establishing Net Zero and sustainable outcomes for Integrated Retirement Communities (IRCs) Life 3A	12
--	-----------

Offsite manufacturing, use of timber frame and why it should be a consideration for Zero Carbon Local Homes	14
--	-----------

Using technology to meet the Net Zero Challenge TIS	16
--	-----------

Uniting water and carbon savings Hansgrohe	18
---	-----------

How do you make carbon reduction a commercial reality? MGAC/RLF	20
--	-----------

Longevity:

for our planet, as well as our people



In the Integrated Retirement Community sector, we often talk about longevity. The opportunities and challenges that come with greater longevity of life for older people. The need to provide housing and care settings that enable older people to flourish and stay healthy during these extra years.

But this is not the only meaning of longevity for our sector. Just as important for our planet - and the people living on it - are the steps Integrated Retirement Communities are taking, and can take in the years ahead, to preserve and protect the environment on behalf of future generations.

A sector which has over 70,000 homes for older people, and which is set for rapid growth in the next decade, has a key role to play in helping our country reach Net Zero Carbon. We are pleased that many of ARCO's Members are already prioritising this vital mission.

At the ARCO Advisory Council meeting held early in 2022, we heard from two such Members about their Net Zero strategies. Inspired Villages are currently targeting 'Net Zero regulated energy' as a first stepping stone, and exploring modern methods of construction, technology and much more to help them be green. Retirement Villages Group have drafted a supply chain charter focused on Net Zero, and are exploring the introduction of green leases for new developments, among other steps.

But the purpose of zooming in on Net Zero Carbon through the Advisory Council was not to look at what Members are already doing, give them a pat on the back, and move on. It was to understand the key challenges and questions that our Members have on this issue, and to draw on the vast and wide-ranging expertise contained in the ARCO Partner network to show a way ahead.

In this brand new report, we are lucky to be able to feature insights on Net Zero Carbon from a multitude of lenses. Each organisation that has written a piece on the following pages explores a different aspect of the Net Zero Challenge, and what Integrated Retirement Communities can be doing to achieve it.

We hear from Apetito about travel and logistics, food and agriculture, and how we can reduce waste. We hear from NHBC and LoCal about the role of offsite manufacturing, and how sustainability can be improved, investors convinced, and why timber frames and alternative heating systems are crucial. We hear from expert architects Nicol Thomas, Urban Edge and Life3A about the basic design principles that can help achieve Net Zero, how thermally efficient buildings can be designed, and the importance of modelling water use, energy use, embodied carbon and more.

It would be wrong to focus on Net Zero without examining technology, which Total Integrated Solutions (TIS) and Hansgrohe do in their different ways through an analysis of topics including procurement, smart buildings, ecosmart bathroom supplies and much more. And it would be equally mistaken to ignore the steps that need to be taken to make Net Zero a commercial reality, as MAG – RLF lead us through, by focusing on project team structure and delivery processes.

As these pieces will collectively demonstrate, the truth is that Net Zero thinking needs to be embedded at every stage of creating and operating an Integrated Retirement Community. From the initial designs and conceptions through to construction and the full operation of the community, Integrated Retirement Communities cannot avoid the imperative to help save our planet.

What this publication is certainly not is a final blueprint. As all of our partners and members will attest to, work to tackle the Net Zero Challenge is ongoing and constantly evolving. New solutions will become apparent over time, and there are still key questions to answer for our sector.

How do we change consumer behaviour? Will residents be happy to pay for changes to help reach Net Zero? What are the best materials to build with? How do you recycle materials when you're dealing with 125 year leases? Do operators already have the technical skills inhouse to achieve the desired Net Zero agenda, or will they have to recruit externally? When will the energy grid decarbonise, and is it better to keep using the grid in the hope it will decarbonise, or turn to our own solutions? The list goes on.

But the ambition of this report is to help set the Integrated Retirement Community sector on the right track; to provide a strong foundation from which operators of all kinds can draw expertise and put Net Zero right at the heart of their work.

Integrated Retirement Communities can't just have the longevity of older people as their mission. They must also have the longevity of our planet right at their core.

Collaborators:

Strategic Partners



Making a real difference



From nurseries and schools, to care homes and hospitals, Apetito provide exceptional meals to organisations catering to the young and the elderly. Their meals are expertly crafted by their dietitian and chefs, then frozen to lock in the goodness. Through Apetito's collective commitments, they are determined to play their part in improving ethical and sustainability standards across the industry.



The UK's leading provider of warranty and insurance for the new homes industry, NHBC identify and manage technical risk in developments through NHBC Standards. Their Retirement Living warranty and insurance policy offers comprehensive standard coverage for core protection against building or structural defects plus valuable optional benefits that protect your investment and revenue streams.

nicol thomas

Nicol Thomas is a well-established multi-discipline professional practice with offices located in Birmingham and Oldham, delivering architectural design and project management services nationally. In the last 20 years Nicol Thomas has delivered over 1200 units in extra care/close care housing, and over 3750 apartments in 18 retirement villages nationwide. They are committed to promoting carbon neutral strategies that will help to reduce negative impacts on our climate.



Total Integrated Solutions are an independent systems integrator and consultancy, combining innovative technology solutions with sector, regulatory, and technical expertise. They design, install and maintain market leading, smart, reliable and highly-compliant solutions. They are experts at unlocking the potential of smart, converged life safety, security and communications systems for Integrated Retirement Communities.

Collaborators:

Partners

The logo for Hansgrohe, featuring the word "hansgrohe" in white lowercase letters on a teal rectangular background.

Hansgrohe focus on responsible business practices, social responsibility and ecological awareness. With 121 years of innovation, design, and quality, they are a reliable sanitation industry partner and a leading manufacturer of showers, shower systems, bathroom and kitchen faucets, and kitchen sinks. They aim to take everyday moments and make them extraordinary with innovative design, quality and service.

The logo for Life3A, with "Life" in a large pink font and "3A" in a smaller pink font to its upper right.

Life3A offer architecture and interior design as their main services, but as experts in the later living sector, also offer strategic advice. In collaboration with other experts and using research carried out for clients, Life3A aim to create solutions that support older people in living their best lives, where people have a sense of belonging and are empowered to make their own choices.



LoCaL Homes offer high quality, high performance, low carbon housing solutions across the UK. Run on social enterprise principles and housed within a social landlord, LoCaL Homes provides closed panel, modular timber-frame panel systems and bathroom pods, that not only deliver cost, time and quality certainty, but offer customers an added social value housing solution.

The logo for rlf, with "rlf" in a large, lowercase, sans-serif font, and the tagline "Building Futures" in a smaller font below it.

MGAC | RLF are a property and construction consultancy whose core focuses include project, cost and construction management, and health and safety. Their sector specialists working on Retirement Living (including Integrated Retirement Communities) draw on up-to-date market knowledge and real-time data, which means they hit the ground running and contribute regularly with insights into the current and emerging issues operators face.

The logo for URBANEDGE, with "URBANEDGE" in a bold, sans-serif font, and the tagline "architecture / masterplanning / design" in a smaller font below it.

Urban Edge Architecture are an established practice providing architectural and landscape services. Specialists in both later living and urban regeneration, they have spent the last 10 years designing and delivering Integrated Retirement Communities for operators across the UK. Their landscape and architectural teams work collaboratively to develop considered solutions which integrate seamlessly into the urban environment.



Are you in the race to Net Zero?

The Health and Social Care sector is said to be responsible for around 6% of all carbon emissions in the UK. In the wake of COP26 and as sustainable sourcing, waste issues, and the question of carbon footprints continue to dominate our media headlines, Apetito is working in partnership with its customers to support their sustainability commitments. We share some of that here, as well as suggesting guidance for how Integrated Retirement Communities can make a real difference and take some easy steps when entering the race to Net Zero.

The importance of moving to Net Zero

One of the first questions we are always asked is WHY – why should the climate change agenda be important to me as an Integrated Retirement Community? A decade ago, Net Zero was a phrase that very few of us were familiar with. And now, the question is, “Does Net Zero matter to me and my organisation?”

Whether young or old, whether an employing business or an employee – climate impacts us all. Understanding why is critical for any organisation to embrace the work that needs to be done – there are legal, moral, financial, health, environmental and many more reasons to address climate change and these will vary by business and by individual.

For us here at Apetito, our overriding ethos is that ‘it is the right thing to do’. Business should be sustainable; we have a duty of care for next generations, and it is important to everyone in our organisation.

What many businesses are coming to realise is that there is also a compelling business case to move to Net Zero – through creating real competitive advantage. At a time where recruitment is proving more challenging than ever, employees are looking for organisations with real social purpose – attracting and retaining talent is key to any business and a commitment to Net Zero will prove to be a key factor in making your business stand apart.

We must also recognise that the care sector is a competitive space, and that occupancy is king – what makes families and residents choose your community as a home for their loved ones? Undoubtedly a commitment to addressing climate change will become increasingly important over time and more importantly set you apart from those that don’t choose to “lead” in this space.

The pressures that Covid has brought to bear on homes and Integrated Retirement Communities over the past two years, has meant that in many cases, sustainability may not have been at the forefront of immediate decision making. Safety of residents and staff and ensuring consistency of service has understandably

been paramount. But COP26 has brought the issues of Net Zero full circle, and no one can fail to be aware of the importance of taking action – and taking it now.

So, the question is, where do we start?

The key thing here is to focus on doing the right thing, in the right way, with measurable data. In recent months too many organisations are making uniformed or hollow “Net Zero commitments” that are simply not backed up with credibility or action. The Competition and Markets Authority have recognised this, revealing that up to 40% of green claims made by businesses are misleading customers – and they are seeking to clamp down on those that do so.

Making a REAL difference

It may sound daunting but there are some straightforward steps to take that will make a difference. As an Integrated Retirement Community, there are obvious places to target when it comes to reducing your carbon footprint and interestingly, many of these generate financial savings as well.

The first place to start is by gaining the necessary support and commitment from everyone in your organisation and particularly in the C-suite. The importance of this can’t be underestimated – once you have sorted the “why” for your organisation and employees, gaining traction is so much easier.

Then you need to manage your current carbon footprint – in simple terms you cannot manage what you cannot measure. There are tools and organisations that can help you do this regardless of size and scale of your business, including free resources. For example, check out the Business Climate Hub¹ or the Carbon Trust² with its SME Carbon Footprint Calculator.

You then need to set your targets for decarbonisation and ensure that these are consistent with a 1.5-degree pathway required to meet Net Zero. Businesses can easily fall into the trap of making a “commitment” without science-based targets – having no idea what they need to achieve. Science-based targets are driven by climate science and ensure that you focus on actually removing greenhouse gases, and not simply offsetting.

Once you understand your footprint and the targets you need to achieve, you can focus on action and projects to remove carbon from your own operations and supply chain. One important factor is that in order to support Net Zero commitments, groups will need their suppliers to mirror their same values and food providers have a major role to play. Here at Apetito, we are proud of our progressive stance to reducing carbon in our own business, as well as the work we are doing to support our customers in this respect.

In 2021 we set out our clear carbon commitment to Net Zero. By setting out our three-stage carbon commitment we're taking action now; being held accountable for our actions and not just making claims without a commitment to act. All our targets are independently validated by the Science Based Targets initiative to actually decarbonise our business on the right pathway. We believe our three-stage carbon commitment is one of the strongest of any company in the UK.

Enjoy cost benefits with four areas to focus upon!

Whilst every organisation will vary in terms of where its carbon comes from, there are certainly four key areas Integrated Retirement Communities can look at – importantly, these will generate cash savings hand in hand with carbon savings.

Energy

Energy efficiency is likely to be a significant contributor towards the carbon footprint of your business. The BRE Trust³ – a charity which focuses on research, standards, and qualifications to make the built environment a better place, with funding from BEIS – have created a bespoke energy assessment tool. They can identify energy efficiency improvements, find funding where available, as well as provide information on suppliers and contractors. The BRE Trust is a government sponsored scheme so you can be sure of its reputation and according to their claims you could recoup your investment in less than one year, which is an attractive proposition.

Here at Apetito we have increased the efficiency of our kitchens while reducing the energy used and therefore carbon produced. We've moved forward with two cutting edge projects and a £4.8 million investment which involves upgrading the kitchens with new technology to meet our challenging Net Zero targets.

For example, new cooking vessels with direct steam injection speed up cooking times and reduce the total energy required for each kilogram of sauce or casserole produced - all saving approximately 100 tonnes of CO₂ per annum. Investing in new boiler technology also increases efficiency and reduces our carbon footprint. The efficiency of steam production will increase from 79% to 95% and the new boiler will save 348 tonnes of CO₂ – a near 20% improvement in carbon emissions compared to the previous system.

Travel and logistics

The second opportunity is likely to be travel and fuel. Prior to the pandemic, the Health and Social Care sector was responsible for 5% of all road journeys. At a corporate level, it's useful to consider an electric vehicle fleet – with the move away from diesel and the development of battery technology, EV's are a real alternative, not to mention they create massive tax advantages for each employee. Making a commitment to an electric fleet is one way to signal your intent.

Your employees' commute to work will also impact on your organisation's carbon footprint; therefore question what can you do to promote better commuting, such as a simple introduction of a cycle to work scheme.

As a key partner to the care home, healthcare and social care sectors here at Apetito, we have taken steps within our own business: We're working hard to reduce the carbon footprint of our distribution by over 2,000 tonnes of CO₂ per year by 2025, with a focus on three key projects to help us achieve this.

Since 2021, we've started introducing electric delivery vans into our Meals on Wheels business when the current vehicles are replaced. In early 2022, we also began using electric delivery vans for some of our customers. Our ambition is to have at least 50% of our fleet of vans electric by 2025. As an organisation, we're not only responsible for the preparation of our food, but the distribution and delivery to our customers.

Food and agriculture

It will come as no surprise that one of the biggest areas where savings can be made is in the provision of food within an Integrated Retirement Community.

It's also true that agriculture has one of the largest impacts on carbon emissions. Animal proteins and in particular, red meat and dairy, have real carbon challenges. There has been much talk of the need to move to plant based diets to help tackle climate change, but this comes with its own challenge when it comes to residents' choice, availability, and cost.

Waste not, want not!

All of us can identify strongly with the issue of waste and especially that of plastic and recycling. It is estimated that by 2050, there will be more plastic in our oceans than fish. It's important that we all look to 'reduce, re-use and recycle'.

However, the reality is that UK recycling infrastructure is simply not up to the task of tackling the levels of recycling that we require. The UK has inadequate facilities and inconsistent collection and recycling regimes across the country. At the moment in the UK, we only recycle 50% of the plastic packaging that's put on the market and we send 61% of our plastic packaging abroad for 'processing' amidst much doubt as to what actually happens to it.

The key message here is that whilst important, "recycling" is the bottom "rung" on the ladder of the "reduce-reuse-recycle" approach.

The UK Plastics Pact has identified key plastics that need to be eliminated and highlighted substitutes or alternatives that can be used. It's worth taking time to look at how you can make changes within your business through taking some easy steps.

It's estimated that in the UK, we throw away 30% of the food that we buy and it's worth checking out WRAP (The Waste and Resource Action Group)⁴, which has some excellent materials which can help support targets and goals. Guardians of Grub⁵ is another initiative with many tools to help businesses with savings calculators – all designed to help reduce waste.

Communication is key

There is a strong business case for entering the race to Net Zero but it's also important to communicate what you are doing – as (aside of being the right way to do business), this can add significant value to your community's appeal for residents, friends, and family.

Collaboration

The reality here is that no one has all the answers or a simple blueprint of how to address the challenge of climate change. More than in any other space, the importance of collaboration is key – find yourself industry bodies and best practice groups, use widely available resources and work together trialling solutions for your industry.

We are incredibly proud of the work we are doing here at Apetito which enables us to deliver our customers' meals that are not only superb quality, delicious and are enjoyed by thousands, but meals that are sustainable, support the very core of our environment and are created with the utmost care and respect for our planet.

The old proverb "together we are stronger" is never more poignant than when considering the impact of how, by working collaboratively across the industry with partners, suppliers, and manufacturers, we can help tackle climate change, support our environment, represent best practice, and importantly make a real difference before it is too late.

¹See: <https://businessclimatehub.org.uk/>

²See: <https://www.carbonfootprint.com/>

³See: <https://www.bretrust.org.uk/>

⁴See: <https://wrap.org.uk/>

⁵See: <https://guardiansofgrub.com/>



Net Zero through offsite construction

Sustainability in construction has been a widely discussed topic over many years – it was a surprise to learn that BREEAM (Building Research Establishment Environmental Assessment Method) was created over 30 years ago. And in housing we came close to a step change with the Zero Carbon Hub, launched in 2008, but it prematurely closed in 2016. We all understand the huge impact the housing industry has in generating carbon emissions; it is directly responsible for 25% of the UK's total carbon footprint.

So, it has taken a shift of mindset from the public, demanding action against the climate emergency, to lead to the Net Zero target for 2050.

While the industry is under no illusion of the scale of the challenge ahead - there is undoubtedly a steep hill to climb - we are now equipped with the necessary skills, knowledge and emerging technologies to successfully make the shift.

At NHBC, we have been working closely with policymakers, developers and industry bodies to explore how homes can be built to meet the Future Homes Standard. But while there are many viable options with “traditional” forms of construction, there is no doubt that the use of Modern Methods of Construction (MMC) or offsite manufacture will be a key part of the solution.

Driving residential innovation

When it comes to residential innovation, MMC will be central in building the new homes we need, and at the scale and speed that is required to combat the housing crisis. The UK and devolved governments have set ambitious targets with MMC as a strategic deliverable and in England, land procured from Homes England mandates 25% of homes to be built with MMC.

Tackling embodied carbon

The argument for MMC in tackling climate change is compelling. Homes built offsite can be manufactured to tight tolerances, the quality of assembly should be higher as they are built in controlled environments to a standard design, and framed systems lend themselves to better thermal performance as they can incorporate insulation within the structural walls.

Building confidence in MMC

However, these benefits can only be realised if the assumption of quality is achieved. Unfortunately, this is not always the case. We have extensive experience in the review of MMC systems, both in the factory and on site and the picture on quality is decidedly mixed. There are some excellent systems, and they typically have the following qualities:

- Design based on established, robust construction details.
- Design for Manufacture and Assembly (DfMA) that simplifies assembly and minimises opportunity for error.
- Quality controls that extend beyond the factory gate, to storage, transport and erection.
- Coordinated and experienced site teams to ensure interfaces on site are managed.

We have found that the only way to be confident in construction quality is through a detailed and ongoing review of all aspects of the system, and we do this through NHBC Accepts. The NHBC Accepts service provides confidence in the quality of MMC systems by closely inspecting the design, manufacture and construction of these systems – then doing it some more. The pressure on a manufacturer to change their design, whether through material shortage, planning conditions or efficiency drives, means that we can't just accept a system and walk away. It is only through ongoing and frequent "eyes on the ground" that we can be confident in the quality of these systems.

When this quality benchmark is achieved, the benefits of MMC become apparent, both in programme and efficiency gains, and in excellent performance in use. This drives us further down the road to Net Zero.

Improving sustainability

With the potential benefits of offsite and other MMC innovation more widely understood - and the pressure to deliver sustainable schemes continuing to grow - 2022 is likely to see an increasing number of developers eschewing traditional bricks and mortar construction for a wide range of schemes, from large-scale Build to Rent projects through to Integrated Retirement Communities, social housing and student accommodation. Already, we have seen a doubling in the use of MMC during the last two years (granted from a small base), but we expect approximately 10% of homes to be built with volumetric or closed panel systems by 2025.

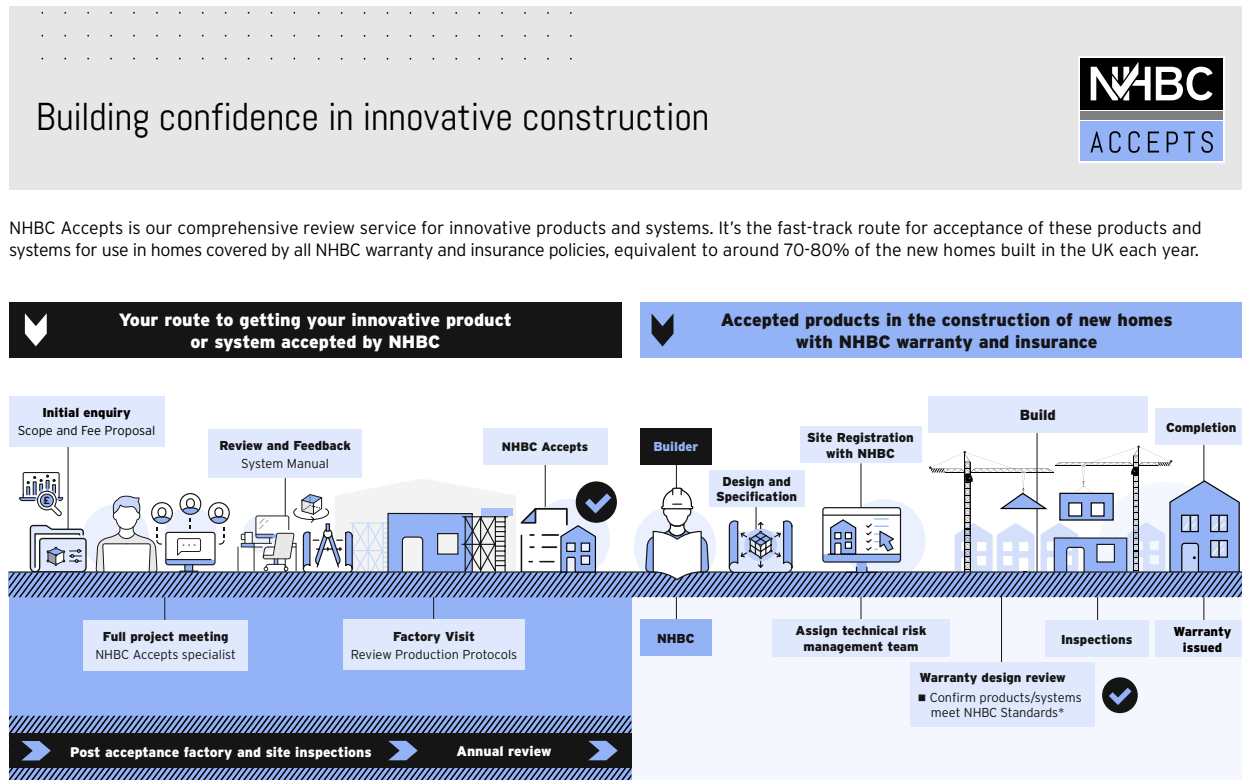
Convincing investors

For investors and funders, there is also another consideration in the form of Environmental, Social, and Governance (ESG).

ESG already plays a key role in decision making when pursuing new schemes, new investments and expanding portfolios - residential developments are likely to remain a safe-haven for capital, with those schemes that are sustainable and designed for the future representing a strong long-term investment.

However, developments that lack the right environmental credentials are unlikely to see the same interest, which will be reflected in valuations.

COP26 targets and the drive for Net Zero will prove a major catalyst for furthering the use of MMC and offsite in the UK - sustainability will continue to grow in importance, and offsite will be a vital tool in the industry's ability to play its part in cutting carbon emissions.



* NHBC Accepts demonstrates a product or system can meet NHBC Standards. Other certification is acceptable as set out in NHBC Standards Chapter 2.1 and Technical Guidance note 2.1/01



Strategic design principles to aid achieving Net Zero Carbon

Climate change and global warming is real

There is no doubt that we are living in unprecedented times with the climate emergency well publicised. We are now the first generation of architects/designers/developers/builders who must act to reduce the impact of climate change; to look for innovative ways to reduce the damaging impact the construction industry currently imposes on our climate; to design and deliver our buildings in a way that reduces both embedded and operational carbon; and to design to Net Zero Carbon.

Integrated Retirement Communities (IRCs) play a key role in sustaining community cohesion (social sustainability) and are now accepted as a credible option for supporting an ageing population that enables healthy independent lifestyles with support if needed. But this alone is not enough. We now need to step up to the plate and design and deliver IRCs to support the planet as well as people.

We need a re-think of how to solve the problem

There is no denying that designing, building, and operating IRCs is deceptively simple. The large-scale mid-market product (where 250 units + communal facilities is not unusual) is particularly complex, combining both a commercial and residential element, sometimes within a single building. The drive to design to Net Carbon Zero is a further layer of complexity and this transition cannot be achieved via the current typical model of delivery. Fundamentally, we must rethink our approach to design, construction, and operation, and look for ways of delivering IRCs that are both efficient and environmentally friendly. These key environmental decisions must begin at the high-level strategic stage, before designs and viabilities are signed off, and must continue right through to completion and beyond, including building in operation strategies. It requires commitment, collaboration, and clear targets identified from the outset, ideally referencing the four principles illustrated below:

1. PASSIVE

- form, fabric, and landscape...
- location, orientation, massing, daylighting, acoustics...

2. Gentle Engineering

- responsive systems...
- minimise use of materials and energy demand...

3. On Site Renewables

- solar, wind, ground or air source heat pumps...

4. Simple to Use

- avoidance of complicated systems...
- involve future building managers...

The decision to achieve Net Zero will require early decision making, close control and strong management. The form of construction will be an early commitment and cannot be left to the main contractor to decide what might be the most cost-effective solution (via a typical Design and Build procurement process). But note, early commitment to the construction method will impact on the building footprint, and so prior to design sign-off and planning submission, it's critical to ensure that features such as wall/floor/roof build up thickness are accurately represented on drawings (improved thermal performance will inevitably result in increased wall thickness), and renewable energy systems are clearly identified.

Tackling the challenge

Some of the biggest challenges when designing Integrated Retirement Communities are heating and cooling. Problems such as overheating and draughts with fluctuating temperatures can cause dissatisfaction for residents, impacting their day-to-day experiences. The changes to Part L of the Building Regulations (The Future Homes Standard) set to be introduced in June of this year, and the drive to increase building fabric performance, will help to address some of these issues but be under no illusion, the performance of the building envelope will be key to achieving Net Carbon Zero.

A thermally efficient building must be well built and will require attention to detail and quality assurance on site. To ensure that high levels of airtightness are achieved, designs should avoid features that introduce weakness to the external fabric (such as bay windows, dormer features etc) and aim to resist over complex layouts. Look to design 'simple' compact building envelopes with good solar orientation, reduced complexity of detailing that enables continuous insulation and airtightness, and avoid thermal bridging. As a rule, the more compact the building the more efficient it will be. This naturally supports an apartment design with a massing of three stories or more. Note also that window/door openings/wall and roof penetration are all potential envelope weaknesses (particularly with traditional methods of construction) and highly dependent on on-site quality of workmanship. Consider ways of overcoming or reducing this by introducing offsite fabrication/prefabricated systems.

Modular or modern methods of construction (MMC) is becoming a serious strategic opportunity for building sustainable, safe and affordable Integrated Retirement Communities, offering higher levels of quality workmanship and greater control over predictability. In theory, this will enable us to take a more controlled approach to achieving Net Zero. However, if we are to capture these benefits we need to procure and deliver buildings with greater collaboration. It will require all parties to work together towards that common goal, working in ways to enable us to design to prefabricated efficiencies. The opportunities are undoubtedly exciting, but this is a decision that requires commitment at the outset before any layouts have been produced. It will require engaging in long-term partnerships with specialist manufacturers; collaborative designs that respond to the standardised product (bathroom pods/kitchen pods/whole unit prefabrication/elevational elements etc); commitment to early appreciation of technical detailing and systems; and a planning system that appreciates and accepts the benefits of offsite fabrication and repetitive systems. However, such systems should also recognise the need for flexibility and adaptability such that ageing residents/homeowners are supported as their individual needs change.

Determination and drive

In conclusion, the IRC sector can 'set the standard' for Net Zero home delivery, making it an even more attractive later living consideration. Whilst ethically attractive, it also offers residents a more efficient home, making it cheaper to maintain. But the ambition of Net Zero can only be achieved with early decision making and commitment to the process.

The RIBA has launched its 2030 Climate Challenge version 2. It identifies performance trajectory targets of buildings in operation that align with LETTI and the Whole Life Carbon Network. The following diagram is a good tool to help guide Net Zero targeted sustainable outcomes.

COP26 targets and the drive for Net Zero will prove a major catalyst for furthering the use of MMC and offsite in the UK - sustainability will continue to grow in importance, and offsite will be a vital tool in the industry's ability to play its part in cutting carbon emissions.

"... we cannot solve our problems with the same thing that created them ..." Albert Einstein

Diagram 2: RIBA Sustainable Outcomes, Gary Clark

RIBA Sustainable Outcomes							
Environmental Sustainability			Social Sustainability				
Whole Life Net Carbon		Economic Sustainability					
Net Zero Operational Carbon	Net Zero Embodied Carbon	Sustainable Water Cycle	Sustainable Connectivity & Transport	Sustainable Land Use & Ecology	Good Health & Wellbeing	Sustainable Communities & Social Value	Sustainable Life Cycle Cost
kWh/m²/y kgCO₂e/m²/y	TCO₂e Embodied	Litre/person/year Potable water	kgCO₂e/km/per occupant	Species added Enhancement	Various Metrics	Various Metrics	£/m² value
<div>1. Prioritise deep retrofit of existing buildings</div> <div>2. Prioritise Fabric First principles for building form and envelope</div> <div>3. Fine tune internal environment with efficient mechanical systems</div> <div>4. Provide responsive local controls</div> <div>5. Specify ultra low energy sufficient appliances</div> <div>6. Specify ultra low energy sufficient IT</div> <div>7. Prioritise maximum use of onsite renewables appropriate to context</div> <div>8. Demonstrate additionality of offsite renewables</div> <div>9. Offset remaining carbon through recognized scheme</div>	<div>1. Prioritise building re-use</div> <div>2. Carry out whole life carbon analysis of building elements.</div> <div>3. Prioritise ethical and responsible sourcing of all materials</div> <div>4. Prioritise low embodied carbon and healthy materials</div> <div>5. Minimise materials with high embodied energy impacts</div> <div>6. Target Zero construction waste diverted to landfill</div> <div>7. Promote use of local natural materials</div> <div>8. Consider modular off-site construction systems</div> <div>9. Detailing to be Long life and robust</div> <div>10.Design building for disassembly and the circular economy</div> <div>11. Offset remaining carbon emissions through recognized scheme</div>	<div>1. Provide Low flow fittings and appliances</div> <div>2. Provide Waterless appliances where possible</div> <div>3. Provide Leak detection</div> <div>4. Provide Rainwater and greywater recycling and attenuation but consider operational implications of complex systems</div> <div>5. Provide on-site black water cleansing and recycling if viable</div> <div>6. Create Sustainable Urban Drainage that supports natural aquatic habitats and human amenity</div>	<div>1. Create comprehensive green transport plan including digital connectivity</div> <div>2. Prioritise high quality Digital Connectivity to avoid need for unnecessary travel</div> <div>3. Prioritise site selection with good proximity to public transport</div> <div>4. Provide high quality pedestrian links to local amenities</div> <div>5. Provide end of journey provision for active travel runners and cyclists (showers, dry lockers etc)</div> <div>6. Provide infrastructure for electric vehicles as a priority</div> <div>7. Provide car sharing spaces</div> <div>8. Provide suitable onsite personal storage</div>	<div>1. Leave a site in better 'regenerative' ecological condition than before development.</div> <div>2. Prioritise Building and site re-use</div> <div>3. Prioritise Brownfield site selection</div> <div>4. Carry out sustainable remediation of site pollution</div> <div>5. Retain existing natural features</div> <div>6. Create mixed use development with density appropriate to local context</div> <div>7. Create a range of green spaces (green roofs, vertical greening, pocket parks, green corridors)</div> <div>8. Create habitats that enhance bio-diversity</div> <div>9. Create 'productive' landscapes for urban food production</div> <div>11. Zero local pollution from the development</div>	<div>1. Provide spaces with strong visual connection to outside</div> <div>2. Provide responsive local controls eg. opening windows, or local control</div> <div>3. Design spaces with appropriate occupant density for activity</div> <div>4. Design spaces with good indoor air quality</div> <div>5. Design spaces with good indoor daylighting, lighting and glare control</div> <div>6. Design spaces to adaptive thermal comfort standards</div> <div>7. Design spaces with good acoustic comfort</div> <div>8. Design spaces that are inclusive and universal accessible</div> <div>9. Prioritise active circulation routes-eg. stairs, cycling provision, walking routes etc</div> <div>10.Provide indoor and outdoor planted spaces</div>	<div>1. Prioritise placemaking that expresses identity and territory</div> <div>2. Create secure places for privacy</div> <div>3. Create places for social interaction</div> <div>4. Create vibrant mixed use places</div> <div>5. Provide high quality permeable links to social amenities</div> <div>6. Provide High quality pedestrian public realm</div> <div>7. Create inclusive Places for community interaction</div> <div>8. Create Secure Places with overlooking views</div>	<div>1. Carry out whole life cycle analysis of key building systems</div> <div>2. Carry out Soft Landings Graduated to Handover and aftercare</div> <div>3. Measure energy costs</div> <div>4. Measure management and maintenance costs</div> <div>5. Measure overall running costs</div> <div>6. Measure added value of occupant health and wellbeing</div> <div>7. Measure added value of sustainable outcomes of building</div>
Performance Verification: Publicly disclose energy use and carbon emissions	Construction Verification: Construction measurement and offset	Performance Verification: Measure potable water usage in operation	Performance Verification: Post Occupancy Evaluation occupant survey	Construction Verification: Measure bio-diversity enhancement in use	Performance Verification: Post Occupancy Evaluation	Performance Verification: Post Occupancy Evaluation questionnaire	Performance Verification: Measure operational running costs



Learnings from working with IVG on their Net Zero Carbon Strategy

In June 2020, Legal & General (L&G) announced its ambition to make all of its new housing stock operational Net Zero Carbon by 2030, including its later living business, Inspired Villages. As part of this process, Urban Edge is working with Inspired Villages to deliver the UK's first Net Zero Carbon (regulated energy) Integrated Retirement Community at Millfield Green in the village of Caddington, Bedfordshire.

This scheme – and other similar Integrated Retirement Community (IRC) schemes we are working on in the Inspired Villages portfolio – has been a major learning curve for both parties and has taught us some valuable lessons. Inspired Villages has focused its immediate attention on reducing the operational energy consumption of its developments and Millfield Green will benefit from the installation of ground source heat pumps to generate renewable energy, alongside on-site photovoltaics and mechanical heat vent recovery units to make it as energy efficient as possible. However, integral to achieving the required energy efficiency is the thermal performance of the building fabric and ensuring the thermal performance levels match those proposed in the Future Homes Standard.

This is where we, as the project architect, can have our greatest influence, using our technical knowledge and commercial insight to integrate the right solutions in the best possible way. When we consider that residential – and retirement living buildings in particular – consume most of their energy from heating, cooling and lighting, it brings into sharp focus how important design solutions are. The right orientation, simple and compact built form, and window type and size can all impact the thermal efficiency of a building, as well as influence energy consumption and demand.

The greatest opportunity to influence energy efficiency comes at the design stage. It is therefore imperative that we start thinking about sustainable design strategies at the outset of any project, as they can be increasingly challenging to retrospectively incorporate once a design has been developed. Early involvement and collaboration with architects, energy specialists and contractors is key, and can help in reviewing early design decisions and maximising the energy efficiency of the building. It is also a great opportunity to brainstorm ideas and think about all the elements of the building, highlight issues that might spring up later, and devise solutions for every potential eventuality.

Following L&G's Net Zero Carbon announcement there were some immediate challenges for us to address, for instance having to adapt Inspired Villages' standard apartment layouts to incorporate the required mechanical and electrical systems. Indeed, advances in data and technology are seeing mechanical, electrical, plumbing and heating (MEPH) systems evolving at pace, requiring designs to evolve in unison to accommodate.

Following the Grenfell Tower Inquiry, a directive to source and specify alternatives to PIR insulation was a particular challenge at Millfield Green, as it came midway through the preparation of tender documents. We had to consider non-combustible alternatives, such as mineral wool insulation, and assess the impact of this specification change on our details and construction methodologies. To achieve the same thermal performance of PIR, a greater thickness of mineral wool is required, and we had to use our experience and knowledge to minimise the impact on the overall building envelope.

Our work for Inspired Villages on its Net Zero Carbon schemes has also seen us exploring opportunities for the use of innovative building solutions such as standardisation of product, prefabrication and modular construction. In its bid to revolutionise the later living offer in the UK and address the chronic shortfall in supply, Inspired Villages' schemes need to be brought forward at pace, but designed and delivered in such a way as to not contribute further to the climate crisis. Modular construction presents a huge opportunity to produce high-quality homes faster with far more precision, far less cost on site and excellent thermal standards. Not only can it reduce the time it takes to build on site, but it can also dramatically reduce construction waste and the emissions generated by transportation.



More broadly, we have found planning policy and its implementation to be inconsistent. Whilst the National Planning Policy Framework (NPPF) states that the planning system should support the transition to a low-carbon future, it gives little guidance on how this should be achieved. At the same time, sustainability and Net Zero Carbon policies in development plans can vary from one local authority to another. Some local authorities have declared a 'climate emergency' and will do whatever they can to ensure developments achieve Net Zero Carbon, whilst others are still on a journey of understanding. Balance needs to be struck in how design principles are enforced and what concessions can be made to allow Net Zero Carbon technologies – such as solar panels – to be incorporated in sensitive design environments.

The reality is that there is no perfect, one-size-fits all solution – site and location can heavily impact on whether a scheme can accommodate the elements required to achieve a Net Zero Carbon status. It is also a reality that we all have much more to learn in our journey to Net Zero Carbon.

Until post occupancy studies and operational data is evaluated from this first tranche of schemes, we do not fully understand how the decisions we make today will impact the performance of these buildings in two years' time. This is of particular concern during a fast-paced development programme when we have to commit to a series of schemes built along similar design principals. Going forward, it would benefit if lessons learnt are published and past policies and outcomes are peer reviewed so we can continually evolve our approaches and do things more efficiently in the future.

We also need to better understand the embodied carbon for each project and take those learnings forward, balancing maintenance and life-cycle costing with low embodied carbon materials, systems and construction methods. This is further complicated by Environmental, Social and Governance (ESG) policies that can sometimes appear contradictory; for example, post-Grenfell restrictions on certain types of cladding can lead to alternatives being specified that meet fire-safety standards but may not be the most environmentally friendly and perhaps have higher levels of embodied carbon.

If the route to Net Zero Carbon sounds complex, well, it can be and there are a number of serious questions clients who haven't yet embarked on this path need to ask of themselves. Foremost is the question of their willingness to change. To achieve a Net Zero Carbon target, clients need to consider whether they need to adapt their product, such as apartment layouts and their operational design; will they need to invest in new technologies and by how much?

Perhaps a more fundamental question for those businesses still yet to engage is whether they are willing to change the structure of the company and commit the business to Net Zero Carbon as a long-term goal. Without a common set of values, full commitment and buy-in from stakeholders, it makes the challenge of developing Net Zero Carbon in Integrated Retirement Communities even harder.

That commitment must start at the very top and, as we have witnessed working for Inspired Villages, L&G's long-term vision and funding has a strong influence on the push to Net Zero Carbon across all its businesses. This feeds into Inspired Villages' purpose-driven ethos and its intent to deliver the best products and environments for its residents. They are always open to ideas and willing to invest to improve products and processes. They drive us to consider new approaches and ask us how we can help implement change. They also have a strong development team who understand the design and development process that, in our experience, makes for a good client relationship.

In sharing this common set of goals, we can work together to ensure that the route to Net Zero Carbon is both practicably and commercially achievable, meeting the needs of investors with an increasing focus on ESG solutions and discerning customers who want homes that are cleaner, greener and healthier.



Establishing Net Zero and sustainable outcomes for Integrated Retirement Communities (IRCs)

Setting the scene from the get-go

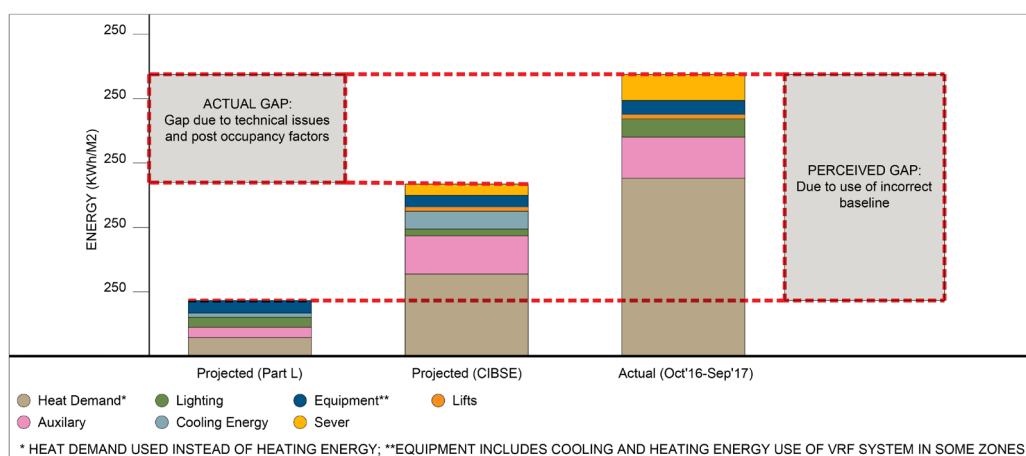
As specialist architects in the IRC sector, Life3A places importance on creating a clear understanding of project design objectives on achieving Net Carbon Zero Operation and Development. Establishing outcomes from these objectives as Key Performance Indicators and identifying their strategic points of delivery from the get-go is crucial. It assists in setting clear design and procurement pathways to be followed, monitored, and developed consistently by the investment, design, and construction teams, as well as the supply chain and end-user throughout the various RIBA work stages and during use.

The upfront investment required to measurably deliver improved carbon efficiency and meet the requirements of a Net Zero Carbon agenda remains an unknown and can depend on other factors outside of the project. Fossil fuel energy used for operating and developing buildings contributes significantly to overall global CO₂ emissions. Operators/developers can consider the following questions at the early stages of a project. The answers can assist with developing the project brief and ensuring the Net Zero Carbon aspirations can align to the project's viability.

How do your organisation's leadership and key investment stakeholders value...

...accurate Modelling of Operational Energy? (kWh/m²/y) High / Medium / Low

IRC developments generate high demands on energy use during operation due to their scale, provision for residential facilities, onsite care, and residents generally spending substantial time in their apartments. A baseline building design and construction detailing can further increase operational energy use. Typically, operators are concerned about ongoing running costs and end-users have concerns over increasing service charges. CIBSE TM54¹ energy modelling tools can be used to assist with understanding the building's energy usage, predicting requirements for using onsite and offsite renewable energy and delivering greater operating energy use efficiencies and operating cost certainty.

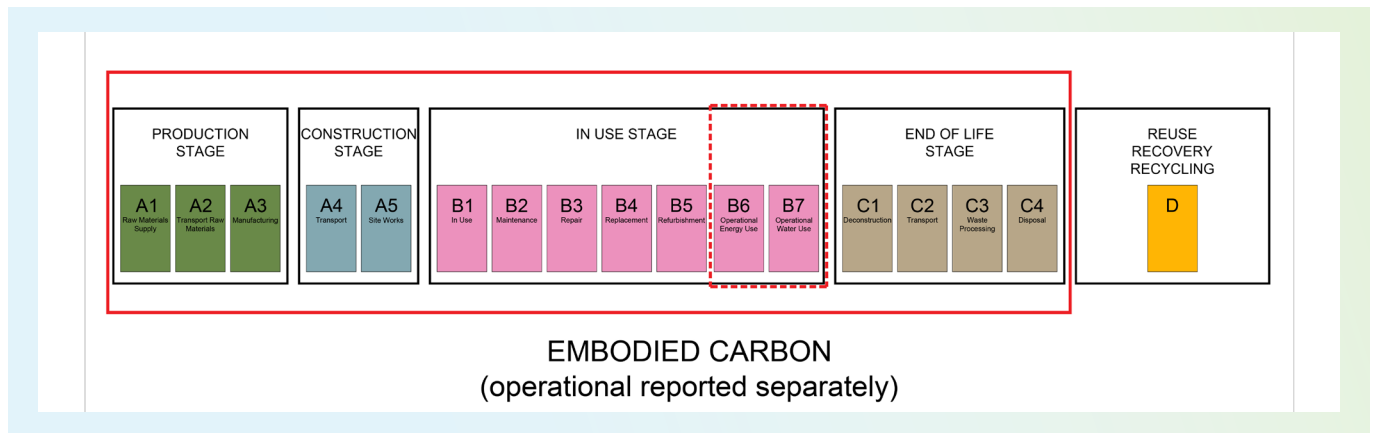


...potable water use (litres/person/day) High / Medium / Low

Understanding the use of water in IRC development is important when considering water conservation and sustainability and is comparable to operational CO₂. The amount of mains water used in the operation phase and construction phase of IRC buildings must also be considered equally. CIBSE guide G² can be applied during the early stages of design development to reduce mains water consumption and CO₂ by offsetting mains water using onsite recycled water strategies.

...measuring Embodied Carbon Dioxide? (kgCO₂e/m²) High / Medium / Low

All buildings carry embodied CO₂ produced by the energy used on the extraction, fabrication and transportation of materials used during the construction process. The RICS Whole Life Carbon Analysis³ can be used to effectively measure embodied CO₂ in the key elements of a building, including the façade, structural frame, roof, building services, interior fit-out and use of recognised carbon offset schemes to gain a holistic view of embodied CO₂ and the building's design life. IRC projects can benefit from this approach, allowing the building design to be recyclable, flexible and adaptable to change in use, and high in quality to reduce CO₂ resulting from operational use, maintenance and repair over the building's life.



...the UN Sustainable Development Goals and ESG? High / Medium / Low

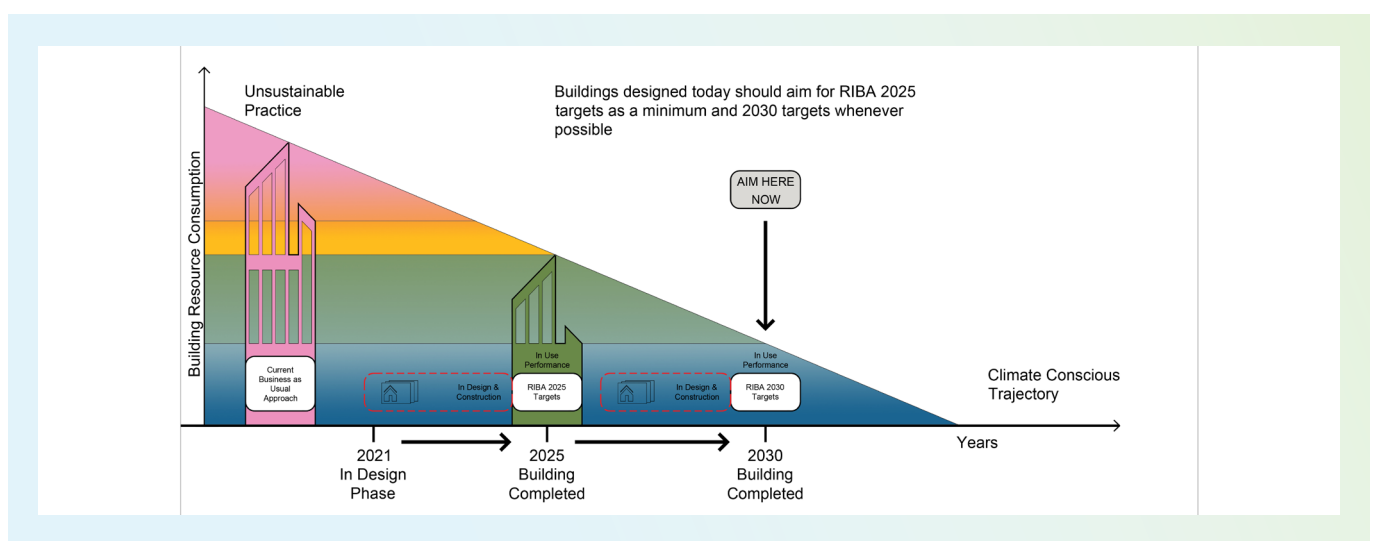
In 2015 the Sustainable Development Goals (SDGs)⁴ were adopted by the UN as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. It is important to acknowledge that the construction, health, and care industries depend on contributions of foreign skills, labour, and manufacturing. Aligning project goals to the UN Global Goals and ISSB ESG Standards⁵ will ensure operators/developers recognise key investment decisions must be balanced with social, economic, and environmental sustainability.

...the climate change trajectory? RIBA Project Target⁶

High: 2030 Let's Smash It! The project takes leadership to set an example for the IRC sector to meet 2030 Net Zero Carbon and outperforms corporate policy ESG targets.

Medium: 2025 Go Above & Beyond! The project achieves better than regulatory compliance standards (+5 years beyond current regulations) and exceeds corporate ESG policy targets.

Low: 2021 Design to Compliance! The project meets the current minimum regulatory compliance standards and corporate ESG policy targets.



Footnotes:

1. CIBSE TM54: <https://www.cibse.org/news-and-policy/cibse-revises-energy-performance-guidance>
2. CIBSE Guide G: <https://www.cibse.org/Knowledge/knowledgeitems/detail?id=a0q20000008I7oUAA5>
3. RICS Whole Life Carbon Analysis: <https://www3.rics.org/uk/en/journals/construction-journal/the-rics-whole-lifecarbon-assessment-for-the-built-environment-how-why-and-what-next.html>
4. UN The Sustainable Development Goals: https://www.undp.org/sustainable-development-goals?utm_source=EN&utm_medium=GSR&utm_content=US_UNDP_PaidSearch_Br_and_English&utm_campaign=CENTRAL&c_src=CENTRAL&c_src2=GSR&gclid=CjwKCAiApeQBhAUeIwA7K_UH2numB8fVCM35PoBmsFTvXzQzZkUvxCPU4FsB986VAC4_YEoJuRYxoCgugQAvD_BwE
5. ISSB ESG Standards: <https://www.ifrs.org/groups/international-sustainability-standards-board/#>
6. RIBA Project Targets: <https://www.architecture.com/about/policy/climate-action/2030-climatechallenge/resources>



Craig Currie
Executive Director of Development



Offsite manufacturing, use of timber frame and why it should be a consideration for Zero Carbon

Achieving zero carbon using closed panel timber frame

Our group strategy for our new build developments has focused on a 'Fabric First' approach through the supply of a closed panel timber frame. This underpins our sustainability policy and targets reduction in carbon emissions while seeking to minimise fuel costs for our residents. We have a zero carbon strategy in place to support both our new build and current stock.

The Lo-Cal Homes closed panel timber frame panel has been developed to offer a futureproofing of stock by delivering improved thermal performance and air tightness levels. Thermal wall performance values of 0.18 down to 0.11 are being supplied to both our in-house developments and external clients.

By delivering over 25% of the project value through offsite manufacturing, it benefits from the factory-controlled automated process and high-quality performance. As the construction workforce reduces, and availability of both products and labour impacts on project timescales, ensuring reliability of delivery, cost and performance shall further increase the use of offsite manufactured products.

A modular Lo-Cal Homes panelised system gives flexibility to the building design and allows external materials to be factory applied, reducing the construction build process significantly. Our manufacturing facility has the capacity to deliver 3,000 units from its automated plant in the West Midlands.

Developments and innovations in alternate heating systems

Even with a Fabric First approach there is still a need for some form of space and water heating in a property – this is perhaps the greatest unknown in delivering zero carbon, where a cost-effective heating plan to replace gas is required.

A selection of our new build developments have installed alternative heating systems and we continue to monitor their performance. These include:

- Biomass boilers/CHPs
 - Reliability problems with both running cost maintenance and fuel supply issues.
- Air or Ground Source Heat Pumps
 - User issues due to residents having to change behaviour to suit the technology rather than the technology working in harmony with the resident.
 - Maintenance issues in relation to the filters and variability of performance.
- Solar Thermal Hot Water and Heating systems
 - Generally reliable - expensive to repair.
 - Excellent carbon saving technology.
- PV and Batteries with Electric Radiant Heating
 - Low maintenance, relatively low installation cost and, when fitted with smart heating controls, deliver very low carbon usage.



Heating design considerations:

- Heat pumps, hot water tanks and battery storage take up more space so may require an additional 1m².
- Ground source heating will also require adequate space around the property or suitable ground.
- Photovoltaic and solar thermal require the correct roof orientation to maximise benefits.

Cost considerations:

- While running costs of heating systems do not vary greatly, the installation and whole life cycle costing vary significantly resulting in up to three times the cost of a current gas boiler system.
- Therefore it is key that not only the fabric but also the heating strategy is agreed at the onset of a new project.

General considerations:

- Early engagement in the design process is key, so that suppliers can offer our experience to optimise the project cost and performance.
- We recommend the use of our architects / manufacturing / construction teams to ensure a partnership approach to the project.

Positives in whole life cycle costs

Whole life cycle costs reports are available for the Lo-Cal Homes system. They have been independently compiled by Savills and detail the comparison to traditional methods – identifying no difference. Insurers and funding lenders also do not make a distinction between the Lo-Cal Homes system and traditional methods.

Timber frame has the lowest CO₂ emissions of any commercially available material and during construction uses less than a quarter of carbon when compared to concrete construction. Whole life carbon assessments detail that using timber frame wall panels saves over 5 tonnes CO₂ whole life carbon emissions over concrete walls.

Case studies for our latest new build properties are available at: <http://www.localhomes.co.uk/case-studies-and-testimonials>



Simon Morris
Head of Design and Consultancy



Using technology to meet the Net Zero Challenge

Technology Partners

The Department for Environment, Food & Rural Affairs (Defra) suggests that 2% of all greenhouse gases are caused by digital tools and equipment, with this figure expected to double every three years unless remedial action is taken. On a positive note, the same research shows that ICT based technology such as CCTV, fire, intruder, warden call, telephony, broadband, and other similar services, when delivered properly, has the potential to reduce overall carbon by 15%. This demonstrates why a well thought out technology action plan implemented by ARCO operators could have measurable impacts on overall carbon use in new build facilities as well as retro fitted facilities.

Any plan implemented by ARCO operators needs to consider three key areas where technology can help reduce net carbon usage:

- Procurement
- System Design
- Process

Procurement

Reducing net carbon usage should be borne in operators' minds at project conception. When considering engaging with a partner to deliver a technical solution, the power to insist on several requirements sits with the operator.

One of the key considerations is to ensure that a partner has achieved or is working to a nationally recognised Carbon Neutrality accreditation such as PAS 2060 and operates to an Environmental Management System accreditation to BS EN ISO 14001.

Is the partner able to support the contract locally or with reduced travel? Where travel is required, the operator should insist that the partner achieves Net Zero Carbon across its vehicle fleet.

At the point of procurement, operators should look not only at price and quality measures, but also look at social value measures. Within the social value measures the operator should seek to engage with partners who have a Net Carbon Zero strategy and a commitment to offset energy carbon. Defra suggest that suppliers should 'demonstrate sustainability both

in terms of their own practices and by those of their suppliers' i.e., where the whole supply chain is considered, does the partner operate a Supply Chain Charter with emphasis on carbon neutrality?

In the area of technology, it is important to make deployment (and therefore installation and management) as integrated as possible. By linking together multiple systems on a converged network, the volume of equipment and materials is lower, power consumption is lower, heat output is lower, the installation time is reduced, and the number of engineers, staff, and travel required to operate, support, and maintain the system is lower.

System Design

Intelligent design and the use of technology can help with the Net Zero Carbon challenge and help operators meet the Net Zero Carbon obligations put on them by their investors and stakeholders.

Sustainable materials – The use of sustainable materials like fibre for the building infrastructure can reduce the overall carbon load in any project. Copper, which still serves 97 per cent of premises across the UK, is significantly more carbon intensive than fibre at all stages of its lifecycle, from extraction, manufacture, and installation, to operation, maintenance and even decommissioning.

Embodied carbon – All processed materials and equipment has an amount of carbon embodied within it. This comes from collection and processing of raw materials, the manufacturing process, and the supply chain. Looking at the embodied carbon of materials and designing with this in mind can help reduce the carbon footprint of a development.

Multi-function devices – Historically, devices were single function. Think of an old camera, telephone, VCR, record player. Each of these separate devices contain their own embodied carbon and consume energy individually. Combining multiple devices together into one multi-function device, such as today's mobile phones and smart home hubs, drastically reduces both the embodied carbon and the overall energy usage.

Energy efficiency – Reducing the energy used by equipment has a two-fold effect. Less direct energy consumed means less carbon released into the environment, but an indirect product of energy usage is heat, and heat load created by electrical equipment can be quite significant, especially in high density



areas like communications and server rooms. More energy efficient equipment means less heat, and less heat means less active cooling required. Air conditioning has a very high carbon load operationally from the energy used, but even more significantly from the gas used. Relatively, air-con gas has 800-10,000 times more impact than CO₂.

Smart buildings and Smart Homes – When multiple systems and devices are connected and all talk to each other, buildings become smart. Setting the intruder alarm can lock all doors and turn off all the lights. Heating and ventilation can adjust to the number of people in an area/room. Lighting can automatically adjust to the use of the room. This sort of automation can save energy, money, and time.

Cloud based networks – Moving storage and server functionality away from physical on-site servers to virtual servers in data centres removes the need to rely on costly, ageing, inefficient servers that take up space and resources on site. Aggregating server services in large data centres is more energy and carbon efficient than running several local servers independently. Research by the Carbon Disclosure Project found that, by moving to cloud-based networks, large companies could cut CO₂ emissions in half by 2020, delivering annual energy savings of £1.2 billion in the UK alone.

Process

Remote diagnosis – With internet connected devices, systems can be interrogated remotely to ascertain system health, diagnose faults, or even forecast failures. This reduces the number of site visits required by specialist contractors and directly diminishes the service and maintenance costs.

Staff – By utilising intelligent design and technology, the reliance on manual operations can be reduced. Combine that with staff being connected to all systems all the time, and a reduction in staff numbers can be achieved with no reduction in safety, compliance, or operational efficiency. This can reduce the development's operational carbon footprint by 6.5-tonnes CO₂/year/staff member. The same applies to specialist service providers when smart technology is used to reduce the need for physical service visits.

Remote working – Smart technology can facilitate smarter working. From experience during the Covid-19 pandemic, we have seen that many employee functions can be carried out very successfully from home, or locations other than the workplace.

When employees no longer need to commute to work to carry out their duties, and when large meetings can be carried out virtually, rather than requiring people to travel from several locations, a significant reduction in carbon emissions can be achieved.

Total Integrated Solutions Ltd's environmental commitment

We are accredited to 14001:2015 and developed an Environmental Management System (EMS) compliant to this. We are working towards the PAS 2060 accreditation. The EMS details our expectations from all employees in helping to reduce our environmental impact in house and for our clients, ensuring that we are an environmentally responsible company.

We have processes and systems in place to add value and environmental benefit to our contracts in terms of maintaining a sustainable environmental practice across IRC developments and subsidiary buildings. Our local offices reduce travel times (carbon footprint), costs, time, and support local businesses through our supply chain.

We encourage and influence our suppliers to investigate the environmental impact including resource use, waste energy and climate change and then to adapt practices that reduce that impact. We engage with our supply chain to use sustainability criteria including more sustainable products. We encourage the assessment and monitoring of our supply chain to ensure that our sustainability risks includes Health and Safety, ethical, environmental, and social sustainability measures.

Our design and procurement teams constantly monitor and review new technology and how our partnerships with suppliers are working, looking for consistently innovative solutions, energy efficient / environmentally sustainable alternatives whilst considering obsolescence, energy efficiency, failure rate of parts, and life cycle analysis. This also includes our considerations to WEEE and RoHS.

Our EMS contains our commitment to being a greener company and achieving continual environmental improvements.



Uniting water and carbon savings

Hansgrohe has a department called the Green Company, sponsored by our CEO, driving carbon reduction within our business. The headline of the strategy is that by the end of 2022 all worldwide locations will be climate neutral and by 2030 the entire company, including the products, will be climate neutral, although some of this will be achieved by offsetting. We are associated with the European Water Label which measures products by their efficiency and awards them a label that is consistent for energy and water.

Elements for IRCs to consider

Operational Carbon:

- Has the product been tested at the flow rate or is it just restricted?
- Is the user experience impacted? If so, they will just change products or remove regulators.
- Flow rates need to be considered in line with usage; kitchen sinks, for example, need more water and reducing the flow rate will only extend the time of tasks like filling a kettle (this also applies to baths).

Embedded Carbon:

- This includes transport carbon and so country of origin needs to be considered in detail as products can be made in China, assembled in the UK, and described as British Manufacture. This transport has a high carbon content within the product.
- Product life is also a major consideration – if you need to buy the product twice then the carbon content doubles. If you can service, you are minimising additional carbon content.
- Packaging is also an area of focus; any single use plastics are bad and over packaging leads to extra waste. Balance here is required to protect the product as damaged products will need replacing with an additional 100% of the carbon cost.

How Hansgrohe can deliver improved carbon efficiency to IRCs



'EcoSmart' is a technology that we have been using since the mid 1980's which applies to showers and basin mixers. This technology restricts the flow of water coming through the product to a lower level. All basin mixers are regulated to 5 litres per minute but can be adapted to as low as 1 litre.



EcoSmart showers are regulated to 9 litres per minute, and we are now developing more and more showers at 6 litres per minute which we term 'Green'. Regularly we combine low flow with 'AirPower' which volumises the water with air, making it feel much more luxurious.



On basin mixers we also have 'CoolStart' which changes the position of the cartridge so that the lever is over the spout in the closed position. This means that the user operates the tap in the cold position for handwashing, reducing the amount of heated water used.

With 'EcoSmart' and 'CoolStart' products based on a Logis Basin Mixer (Figure 1) and a Crometta Green (Figure 2) the total reduction in CO₂ would be 15,718 KG per annum over standard flow products. This excludes kitchens as it has been based on a hotel operation and whilst we do low flow kitchen taps, we do need to consider that the function of the kitchen tap is to fill things so there are fewer savings.



Our quick clean technology uses silicone nozzles on all our showers and most of our basin mixers, this only requires a quick rub to remove limescale alleviating the need for harsh chemicals which is important to marine life biodiversity, and the quality of our water.



These reduced flow rates are innovated with function in mind, every shower and mixer are tested to ensure exacting standards of performance despite low levels of flow, they are tested in our spray lab to ensure there is no spray deformation and that they are fit for purpose. You can see the difference between 'EcoSmart' and our standard 'PowderRain' spray in Figure 3. We do this with a cartridge delivering water to every part of the head not simply filling the head with water and hoping for the best. We are also able to demonstrate this on our test rig at The Water Studio in Clerkenwell.

Although not directly Net Zero Carbon, we are also about to introduce a product that monitors water supply into a building and an internet connection would let the homeowner know if an unusually high-water flow is happening or if water is being used at an unusual time. This is effectively leak detection and allows the user the option to close a stop valve on the main supply early on, avoiding further damage in the building. This also protects our most valuable resource, water.

Embodied carbon is more difficult to understand which is why we are in the process of paying for many of our products to be independently assessed under Environmental Product Declarations which will give us a clearer picture of the carbon. We know that our product has less embodied carbon in the transport phase than many of our competitors, as our product is manufactured in Europe rather than Asia. This is a crucial step in working out where more carbon savings can be made, and we are already looking at some detail in the performance of metals versus plastics.

All of our concealed products have basic sets so that they can be easily maintained, and replacement products can be installed, if required, without disturbing the surroundings, alleviating waste in the form of tiles and wall boards, and avoiding the need for new boards and tiles to be procured. We also offer installation training so that these products are fitting optimally on the first installation, again avoiding waste.



Finally, our 15-year spare part guarantee means that the products will not need replacing, as they can be maintained over this period. Further, the guarantee starts from when the last product using the spare is discontinued. This means that fewer products are purchased during the life of the building.

Figure 1: Water and carbon saving using Logis 100 EcoSmart Baisn mixer with CoolStart over typical

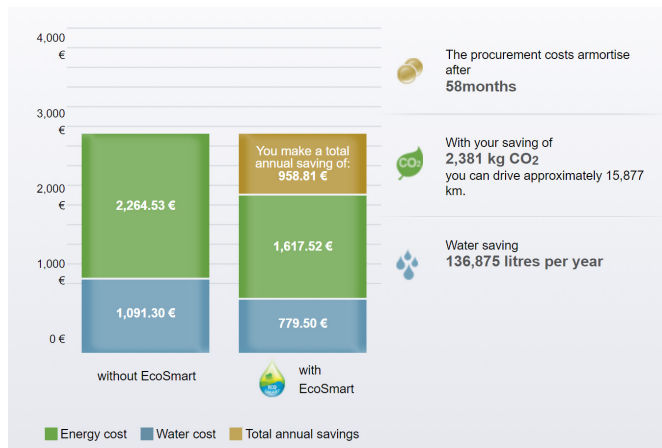


Figure 2: Water and Carbon savings using Crometta Vario Green hand shower over typical

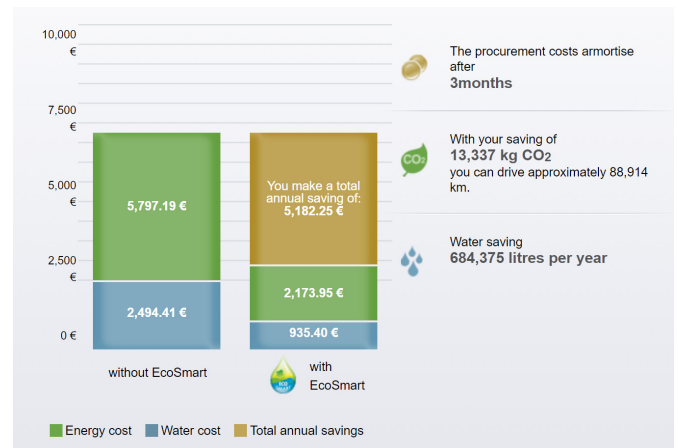


Figure 3: Despite less water volume, little difference in spray between typical 'PowderRain' (left) and 'EcoSmart' (right)





How do you make carbon reduction a commercial reality?

Our most recent project and cost management experience with the IRC sector includes working with Retirement Villages Group on their first Net Zero Carbon (NZC) development at West Byfleet. Our guiding principle, as it is with all our projects, is to keep the project team focused on delivering a successful commercial outcome. We have set out below our insights and opinions based on our work in the sector and the wider market.

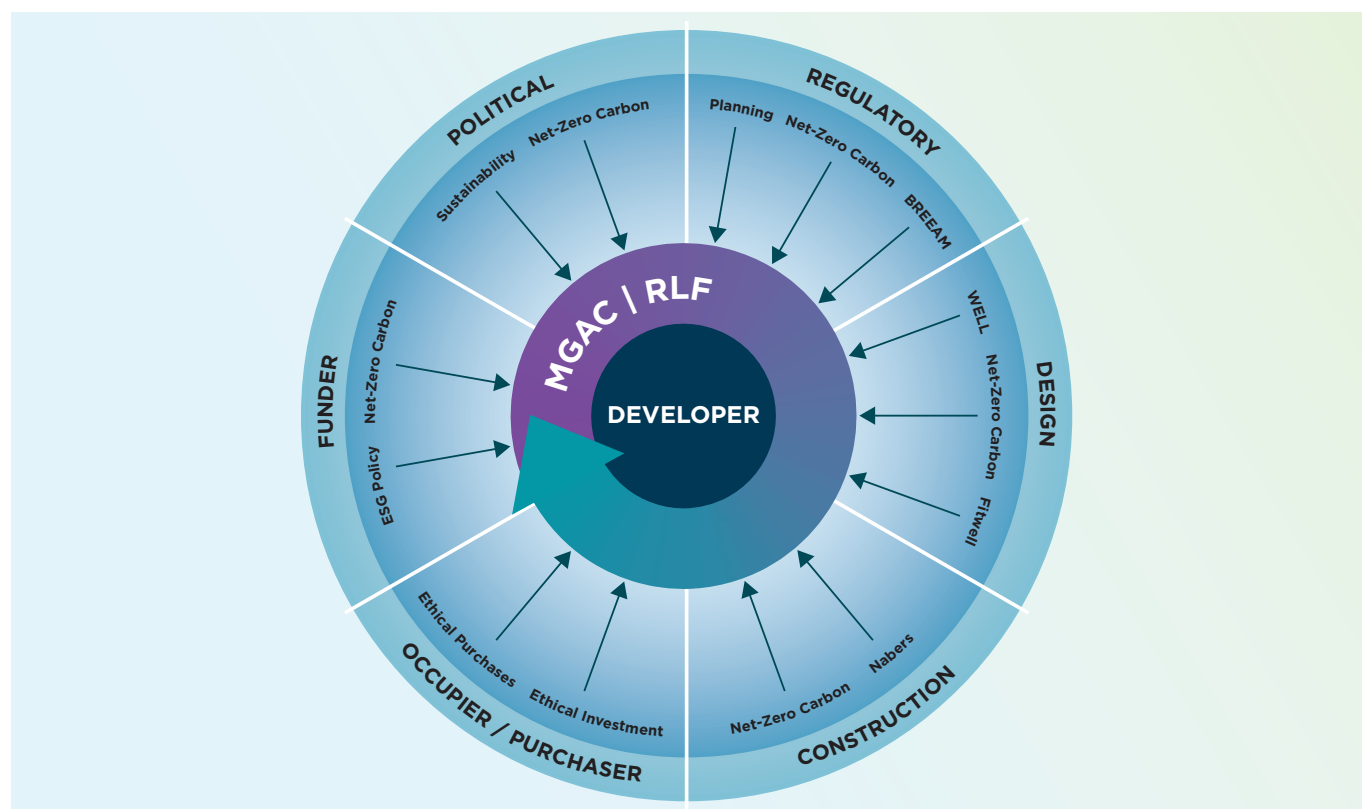
The carbon reduction agenda already touches every aspect of the development lifecycle and the strive for ever more sustainable low carbon or NZC development will continue to increase over the coming years and become both more regulated and more integrated.

Responsible investment is becoming the norm following a major refocusing of the investment fund market over the past two years. Investors are demanding more from institutional funders with regards to the demonstration of ethical and sustainable investment. As a result, the institutional funders have in turn needed to screen their investments, but are finding that the

application of Environmental, Social and Governance (ESG) screening has actually reduced their exposure to environmental or regulatory risks and poor performance. There is an increasing view that businesses with higher ESG scores can be seen as an indicator of both sustainability and quality.

Alongside this move in the approach of institutional funders, recent surveys of consumer attitudes to environmental and ethical sustainability (including one by Deloitte) have also shown that consumers are placing more importance on sustainable and ethical purchasing.

At all points in the development lifecycle (from the initial capital investment to the final capital purchase) there is increasing pressure to demonstrate a measurable commitment to sustainability and to NZC development: securing funding from the growing body of funders with stringent ESG-policies; adapting to the changing political and regulatory landscape; designing with consideration to both embodied and operational carbon; delivering certified sustainable assets; right through to the realisation of a product or asset addressing the increasingly ethical choices and sustainable expectations of the communities you serve.



As you set out on your journey towards the delivery of a sustainable IRC that meets the demands of institutional funders and ethical investors alike, you will need to consider the measurable processes that will assist in certifying your project's sustainable credentials through NZC, BREEAM, WELL, Fitwel and potentially newer measurement tools such as NABERS.

Net Zero Carbon - Seeking the quick wins

The journey to achieving a commercially viable Net Zero Carbon asset is extensive, so it is critical that your project is set up to achieve your goals, starting out on the front foot.

To set up for success, it will be important to utilise the experience of ARCO and ARCO's Partner network to leverage their experiences to help you to identify and engage the right consultants, utilising the most appropriate measurement tools for your specific project and being able to identify the early 'quick wins' that will drive the most practical, commercially viable and sustainable outcomes. Whether you do this through in-house expertise or through the early engagement of project and cost managers to work with you to identify your needs, you need to be able to identify early and clear ESG, NZC and sustainable aspirations. This will help you to secure the most appropriate design teams, consultants and contractors who can provide you timely, commercial and pragmatic advice to identify the 'right' solutions that are compliant, but also cost effective, while addressing and creating sustainable, commercial outcomes that will benefit both you (ARCO Members or other IRC developers) and your customers.

With a design team fully assembled, it is critical to formulate a clear brief that clearly sets out your measurable ESG, NZC and wider value management (VM) parameters, to enable early work to be undertaken that sets the foundations of the project strategy going forward. In the early design phase of each project, you will need to review the impact of every design decision through the lens of Embodied, Operational and Whole Life Carbon, with the impact on each of these being considered in every element of the design.

The below diagram covers just a sample of some key considerations you are likely to face on any development. This gives a flavour of the nature and depth of dialogue that needs to be undertaken in the very early phases of design development to flush out and develop a robust Value Management hierarchy to set clear parameters and potential constraints for the project.

There are a myriad of interconnecting decisions that will need to be made on any project, each with their own impact on the wider goal of NZC and potential to create unforeseen knock-on impacts on other aspects of project viability.

All projects will have their own unique set of NZC, cost and viability drivers and each project will have a different tipping point for the viability of various design decisions, where this can be impacted by location, scale, massing, planning constraints and multiple other factors unique to each of your projects.

Our role as external project and cost managers will be to guide you through this process, absorbing all of the increasing external funding, regulatory, environmental and commercial forces imposed on you as sustainable development becomes more regulated and measurable. We will facilitate robust early discussions with your project team to identify key decisions to drive your project through its full development lifecycle to a timely and commercial outcome that delivers on your sustainable aspirations for the Integrated Retirement Communities you create.

		X No ✓ Yes X/✓ Potential	
KEY DESIGN PRINCIPLE	METHOD	IMPACT ON	
		EMBODIED CARBON	OPERATIONAL CARBON
Reducing Air Permeability	Triple Glazing	X	✓
	Off-Site Production	✓	✓
	Off-Site Assembly	✓	✓
Improve Overheating Credentials / U-Values	Triple Glazing	X	✓
	Passive Heating Solutions	X/✓	✓
	Passive Cooling Solutions	X/✓	✓
	Wall Thickness / Insulation*	X	✓
Energy Consumption Focusing on Product Selection	Air Source Heat Pumps	X	✓
	Ground Source Heat Pumps	X	✓
	PV Panels		✓
	Timber Buildings	X/✓	✓
	Low Energy Services	X/✓	✓
Replacement Strategies	Plant and Building Services	X/✓	✓
	Lifts	X	✓
	Windows / Doors	X/✓	✓
	Flooring	X/✓	✓
Carbon Offsetting		X	X

*Note: Additional insulation (i.e. thicker walls) need to be balanced against loss of Net Saleable Area

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