PRIORITY ACTION B4 OF THE BUILDINGS BREAKTHROUGH INITIATIVE

Blueprint for a Solutions Deployment Platform

SOLARIMPULSE FOUNDATION

Global Alliance for Buildings and Construction

Contents

Foreword from
Bertrand Piccard

Identifying more than 1500 profitable solutions to protect the environment in the fields of construction, energy, water, agriculture, industry, mobility, digital, waste management and circular economy, was crucial in shifting the debate, but it's only part of the path. Now, the focus must turn on their implementation. This Blueprint for a Solutions Deployment is designed to support that effort in the specific sector of construction, showcasing what is possible, and illuminating the concrete benefits of accelerating the ecological transition.

The building and construction sector accounts for a significant portion of global carbon emissions. Yet, it also holds immense potential for transformation. What we need is a stronger commitment to scaling the solutions, to demonstrate their value in real-world settings, and to align political and regulatory frameworks that can encourage their widespread adoption.

This Blueprint is an important first step in a collective effort to federate key actors around the practical implementation of the relevant solutions. It is an example of what can be achieved when governments, private sector, and experts come together to focus on impact. By presenting replicable and scalable use cases alongside the enabling environments—policies, standards, and financial tools—that support their success, this document serves as a tangible reminder of what can be accomplished today, if only we were to change the current way of thinking and doing.

Bertrand Piccard
Founder and President of the Solar Impulse Foundation

Foreword from
Gulnara Roll

The built environment contributes to 37 per cent of global CO_2 emissions and 34 per cent of energy demand worldwide. While progress in decarbonization and energy efficiency have been achieved–largely through renewables and clean technologies–this progress remains uneven, and outpaced by rapid construction growth in regions like Asia and Africa.

To drive transformative change in the buildings sector, private actors and governments must adopt energy-efficient solutions through a coordinated approach. Large enterprises and governments can set benchmarks, while small and medium-sized enterprises (SMEs) require targeted support to actively participate in this transition. Cities, often at the forefront of the climate shift, are crucial in piloting innovative policies that can later be scaled nationally.

Due to the fragmented nature of the building sector's value chain, collaboration is vital. Coordinated efforts among key stakeholders enhance affordability, competitiveness, and sustainable growth. Systemic changes, especially climate-specific solutions, need reinforcement through enabling frameworks–such as aligned regulations, procurement policies, financial incentives, and capacity-building initiatives.

The UNEP-hosted Global Alliance for Buildings and Construction (GlobalABC), a leading global platform dedicated to achieving a zero-emission and resilient building sector, has facilitated the adoption of the Declaration de Chaillot by over sixty national governments, and coordinates the Buildings Breakthrough, operating under the Breakthrough Agenda. In collaboration with the Solar Impulse Foundation, a frontrunner in deploying energy-efficient solutions, we are advancing these shared priorities with an array of committed partners.

The Buildings Breakthrough offers a powerful opportunity to accelerate progress towards a resilient, zero-emission future. Through global collaboration, innovation, and decisive action, we can transform the sector and ensure climate goals are met through informed decisions and resilient building practices.

Gulnara Roll
Head of Global Alliance for Buildings and Construction (GlobalABC)

DEPLOYMENT

Priority Action B4 of the Buildings Breakthrough

With existing technologies already capable of decarbonising buildings at scale, Priority Action B4 focuses on accelerating their deployment, moving beyond planning and into tangible, on-the-ground action

This means prioritising the scaling of high-impact, replicable solutions that can be adapted across diverse regions and climates. Although significant advances have been made in cleantech innovation, the real challenge lies in the effective deployment of these solutions. Barriers such as regulatory hurdles, financial constraints, and the need for skilled labour in installation and maintenance still hinder widespread adoption. Overcoming these challenges will be crucial to ensure solutions reach their full potential and drive the large-scale decarbonisation of the built environment, making meaningful progress towards global climate targets.

Through real-life use cases, the initial work of this initiative demonstrates the viability and scalability of existing technologies, aiming to build confidence among both public and private sector adopters. By dismantling barriers like fragmented regulations, financing difficulties, and the lack of standardised approaches, the effort creates a clearer path to market for these solutions. The initiative draws on the expertise of member countries, private sector partners, and NGOs, ensuring that innovations are efficiently brought to market and scaled to meet the needs of different regions.

Focusing on deployment is critical to achieving global climate targets for the built environment, particularly in reducing both embodied and operational carbon. By adopting a collaborative, multi-stakeholder approach, Priority Action B4 aims to turn ambition into impactful action, fostering the deployment of technologies that make decarbonisation both practical and scalable, driving progress on the ground.

LEADING

The Solar Impulse Foundation's Role

Driven by a commitment to accelerating the adoption of clean, efficient, and bankable technologies, the Foundation plays a crucial role in guiding and coordinating efforts across various key stakeholders to decarbonise the built environment

As the lead for Deployment in Priority Action B4 under the Buildings Breakthrough framework, the Solar Impulse Foundation mobilises a diverse network of innovators, experts, and solution providers. Its mission focuses on fostering collaboration among stakeholders to address the pressing challenges in the sector.

Central to the Foundation's efforts is a focus on tackling the barriers to adoption that hinder the widespread implementation of clean technologies. By engaging directly with adopters – such as public authorities, businesses, and communities – the Foundation works to build confidence in innovative solutions. This hands-on approach includes providing resources, sharing success stories, and facilitating workshops that empower adopters to implement new solutions to tackle their environmental challenges.

Through Priority Action B4, the Foundation collaborates with member countries, private companies, and NGOs to identify replicable models and share best practices across the network. This collaborative approach extends to facilitating peer learning among members and deploying cleantech solutions in real-world contexts. By leveraging insights from pioneers in the field, the Foundation inspires action and scales successful approaches to drive sustainable change in the built environment.

A FEDERATING APPROACH TO LANDING B4

To facilitate the deployment of innovative solutions in the built environment, through the Buildings Breakthrough initiative, the Solar Impulse Foundation has conducted three virtual workshops. These sessions are designed to promote collaboration and foster the exchange of ideas among members. Participants share experiences, discuss challenges, and explore best practices tailored to their specific contexts. The workshops aim to generate actionable insights that can be implemented in various settings, enhancing the effectiveness of initiatives under Priority Action B4. The following document will provide a sample of these insights, along with concrete outcomes from the workshops, to offer actionable guidance for stakeholders.

FEDERATING

The Members Behind Priority Action B4

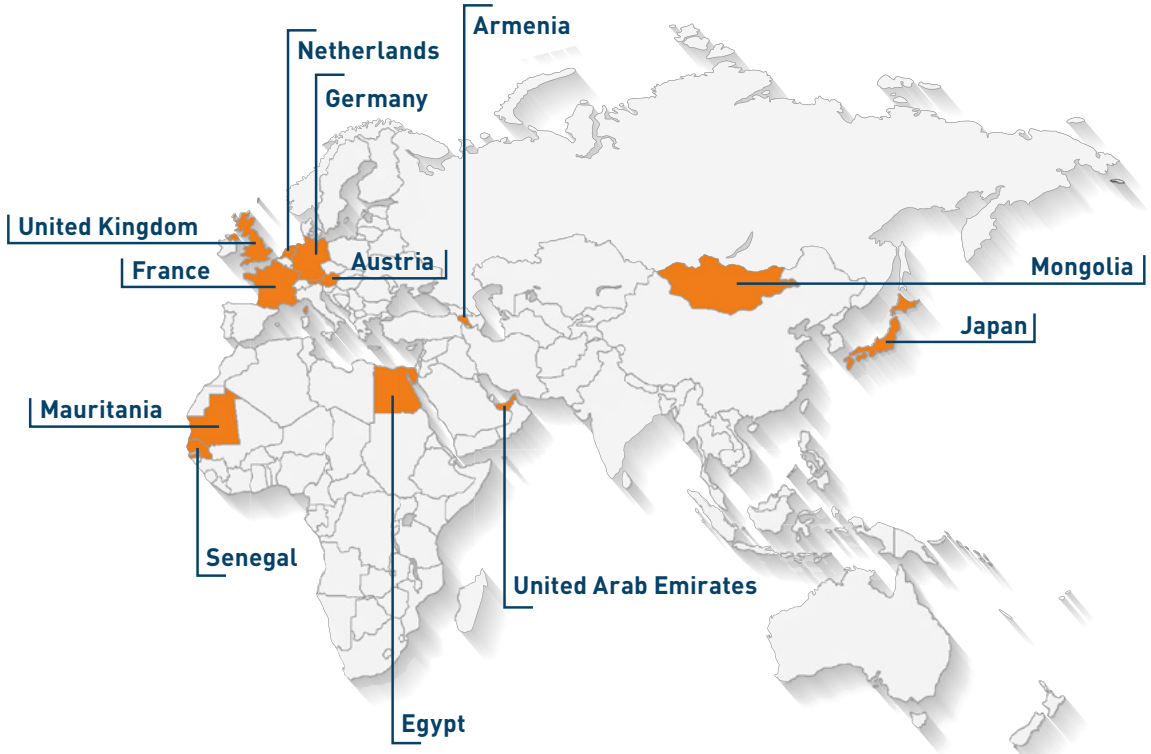
A coalition of global experts, governments, and organisations working together to advance solution deployment in the built environment

The **Priority Action B4 working group** brings together a diverse array of members, including **countries** and **partner initiatives**, all united by a shared commitment to decarbonising the built environment. This multi stakeholder approach ensures that each member contributes unique expertise, resources, and insights, driving collaborative action toward long-term climate goals.

Member countries in the working group provide essential policy frameworks, regulatory support, and pilot programmes that demonstrate leadership in the sector. These national efforts are critical in shaping local and global policy environments conducive to the large-scale deployment of sustainable technologies and solutions.

Private sector partners and NGOs play a complementary role by contributing both high-tech and low-tech solutions, financing mechanisms, and collective advocacy. Together, they share real-world use cases and best practices, creating replicable models for decarbonisation. This collaboration leverages each member's strengths, from policy and technology to financing and advocacy, to catalyse action across the built environment globally.

Through the collective efforts of these members, **Priority Action B4** is establishing a robust, global platform for knowledge sharing and practical deployment of solutions.



12 MEMBER COUNTRIES

Armenia Urban Development Committee

Egypt Ministry of Housing, Utilities and Urban Communities

Austria Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology Egypt - Ministry of Housing, Utilities and Urban Communities

France Ministry for Ecological Transition and Territorial Cohesion

Germany Federal Ministry for Housing, Urban Development and Building (BMWSB)

Japan Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Mauritania Ministry for Environment and Sustainable Development (MEDD)

Mongolia Ministry of Construction and Urban Development & Ministry of Environment and Tourism

Netherlands Ministry of the Interior and Kingdom Relations; Construction and Energy Department

Senegal Ministry for Environment and Sustainable Development

United Arab Emirates Ministry of Energy and Infrastructure

United Kingdom Department for Energy Security and Net Zero & Department for Business, Energy and Industrial Strategy

7 MEMBER NGOS

Solar Impulse Foundation | WBCSD | World Green Building Council | World Resources Institute | C40 Cities | Global Building Data Initiative | Building To COP29

INVITED PRIVATE SECTOR STAKEHOLDERS:

ADEO | Aliaxis | Bekaert | Bouygues | BNP Paribas | Engie | Holcim | Schneider Electric

Construction & Buildings

IMPACT

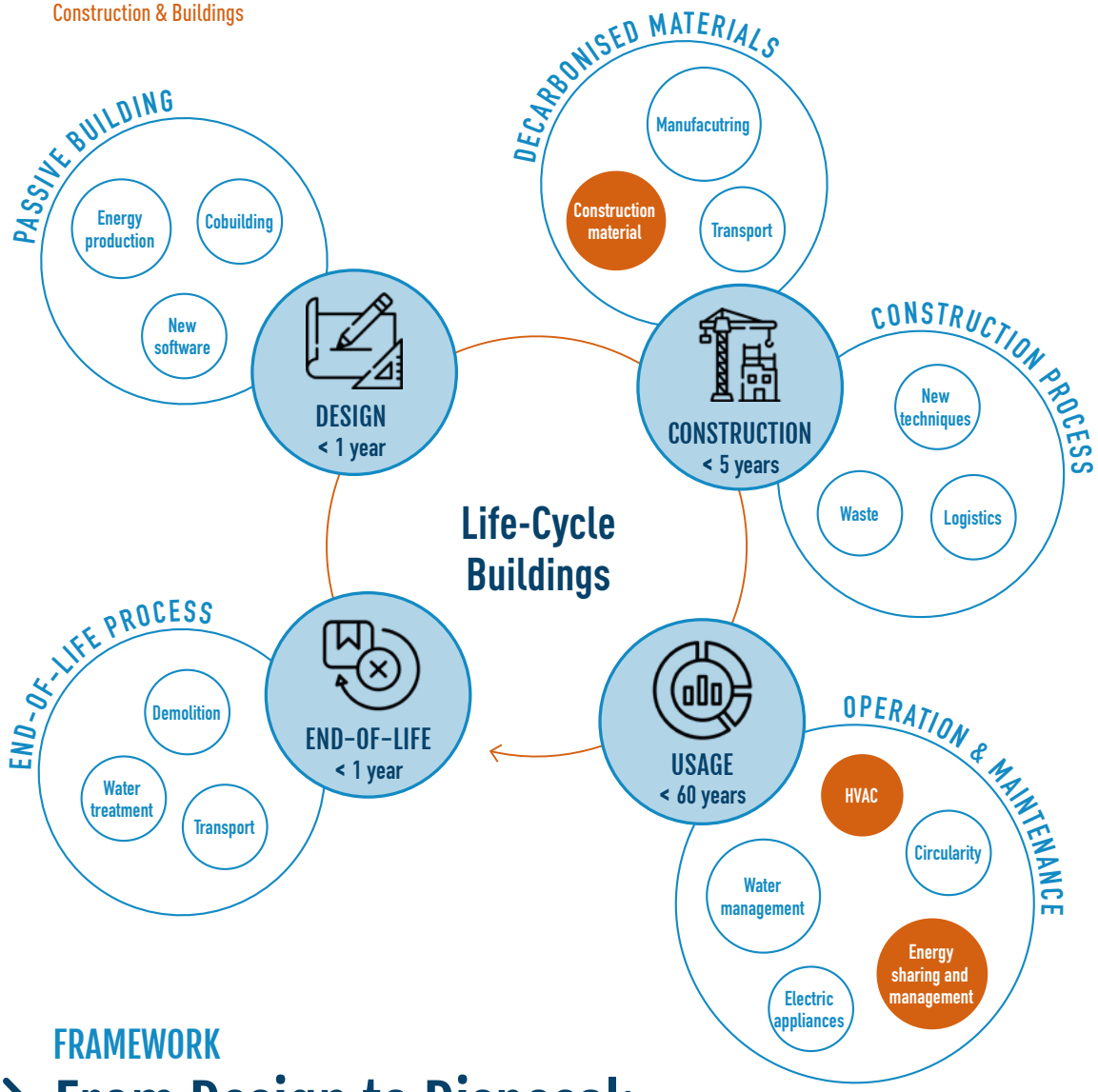
The Environmental Footprint of the Built Environment

As global building demand grows, transforming how we construct, renovate and operate buildings is crucial to curbing climate change

The Buildings and Construction sector is a significant contributor to global climate change, accounting for 37% of energy-related CO_2 emissions and nearly 40% of global energy consumption (GlobalABC, 2022). These figures highlight the urgent need for decarbonisation, especially as urban populations continue to grow and demand for housing increases. By 2050, the global building stock is expected to double, further amplifying the sector's environmental impact unless swift, transformative actions are taken (IEA, 2023).

One of the primary challenges is the reliance on energy-intensive materials, such as cement and concrete, which are widely used in building projects and contribute heavily to emissions. At the same time, inefficient construction practices and outdated building infrastructures increase energy consumption and resource depletion. In rapidly growing regions, the construction of new buildings continues at a high pace, while older structures in more established areas require extensive retrofitting to meet modern efficiency standards.

To mitigate these issues, the sector must adopt integrated life-cycle approaches that focus on sustainable building materials, innovative construction techniques, and the renovation of existing assets. Retrofitting inefficient buildings offers a substantial opportunity to reduce emissions, while shifting towards sustainable materials and construction practices can drive down the carbon footprint of new developments. Collaborative and coordinated efforts across the sector are critical to accelerating this transition and ensuring the future of the built environment aligns with global climate targets.



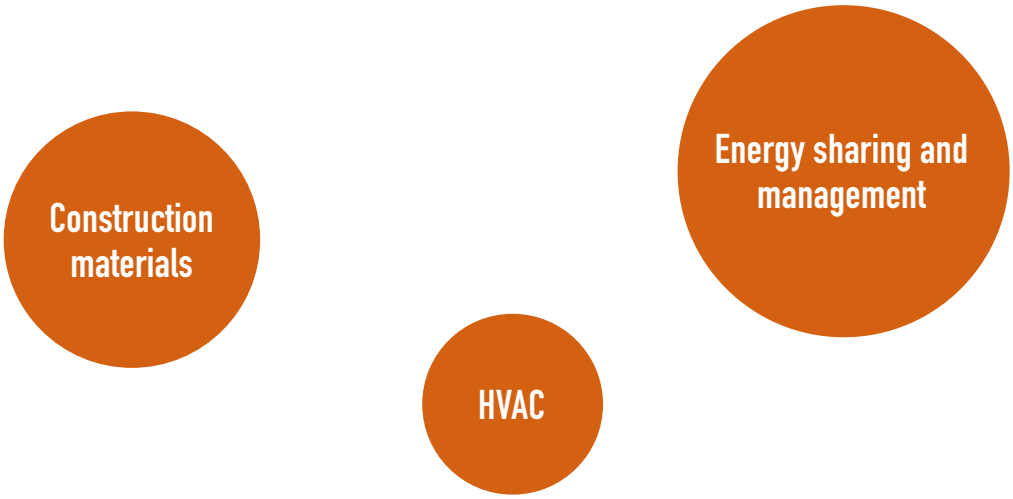
FRAMEWORK

From Design to Disposal: A Life-Cycle Approach

Navigating sustainability challenges through innovative solutions across every phase of the building life-cycle

The Priority Action B4 group operates under a comprehensive life-cycle framework aimed at enhancing the sustainability of buildings throughout their entire lifespan – from design to end-of-life. This framework encompasses four key stages: design, construction, usage, and end-of-life, ensuring that sustainability is integrated at every phase. Central to this framework are five pillars: passive building, decarbonised materials, sustainable construction processes, efficient operation and maintenance, and circular end-of-life strategies. These pillars guide our focus on 17 specific sectors, including energy-efficient design, construction materials, waste treatment, and circularity in building operations, to support a holistic approach to decarbonising the built environment.

As the group evolves, the life-cycle framework will adapt to incorporate new insights, technologies, and best practices, allowing us to meet emerging challenges and enhance our impact on sustainability across all phases of building life cycles.



FOCUS OF THE GROUP

The Priority Action B4 group has selected three key subsectors as initial points of focus: **HVAC, sustainable construction materials, and energy sharing & management.** These areas were identified for their substantial potential to reduce emissions and their adaptability across diverse regions and economic contexts. Moving forward, Priority Action B4 will draw on a global expert network of over 100 specialists from the Global Alliance for Buildings and Construction (GlobalABC) to help prioritise critical life-cycle challenges and direct its initial work in 2025.

Through real-world examples within these focus areas, the group aims to illustrate the effectiveness of scalable solutions, demonstrating their environmental, economic, and societal value. By showcasing successful deployment models, Priority Action B4 seeks to build confidence among adopters and investors alike. Addressing cross-cutting challenges—such as financing, regulatory alignment, and skilled workforce needs—will be central to their strategy, and the group will coordinate with members as well as other priority actions within the Buildings Breakthrough to support these enabling factors.

By spotlighting successful deployment strategies and showcasing effective real-world case studies, Priority Action B4 provides tangible pathways for stakeholders to follow, offering actionable examples of scalable solutions that can be replicated and expanded.
Through these initial efforts, the initiative demonstrates the practical steps and enabling factors needed to accelerate decarbonisation at scale.

HVAC

The HVAC subsector plays a critical role in maintaining comfortable indoor environments while being a major contributor to energy consumption in buildings. As climate conditions change, the demand for more efficient heating, ventilation, and air conditioning systems continues to rise. Innovative solutions, ranging from passive cooling strategies and smart insulation technologies to advanced HVAC systems, offer the potential to optimise energy use and enhance occupant comfort. Depending on the region and context, there is a balance between using high-tech systems and low-tech adaptations, ensuring both efficiency and accessibility.

HVAC is essential during the usage phase of buildings, as it regulates indoor climates. While HVAC systems account for a significant portion of global energy consumption, passive approaches – such as natural ventilation and enhanced insulation – can reduce reliance on energy-intensive systems, offering energy-saving benefits in both hot and cold climates.

Heating, cooling, and insulation account for up to 40% of global building energy demand (IEA, 2022)

CHALLENGE

Enhancing Energy Efficiency Through Heating, Ventilation, and Air Conditioning Solutions

Promote the adoption of innovative heating and cooling techniques

OBSERVATIONS

As climate change intensifies, optimising HVAC systems in buildings is crucial for reducing energy consumption and improving comfort. Implementing efficient cooling solutions can significantly lower energy costs while maintaining indoor air quality. Technologies such as district cooling and reflective roofing can reduce peak cooling loads and enhance building resilience against rising temperatures. All of these methods can lead to energy savings of up to 30% when implemented effectively.

OBSTACLES

High upfront costs associated with upgrading HVAC systems deter building owners, particularly in the global south. Additionally, inconsistent building codes and a lack of awareness about efficient technologies can hinder the adoption of innovative solutions.

OPPORTUNITIES

Passive cooling strategies can reduce energy demand in tropical regions by up to 60%, depending on building design and climate conditions (IEA, 2023). These strategies can be effectively combined with high-tech insulation materials, which UNEP has shown can reduce heating costs by as much as 40% in colder climates (UNEP, 2023). By leveraging both low-tech and high-tech solutions, stakeholders can create a more energy-efficient built environment that enhances occupant comfort while minimising energy consumption. Implementing these measures not only addresses the urgent need for energy efficiency but also contributes to broader sustainability goals within the building sector.

CoolRoof in Senegal: Reducing Heat Stress with Reflective Roofing

Dakar, Senegal
Since 2019

The Story

CoolRoof France's initiative in Dakar, Senegal, began in 2019 with the aim of providing low-cost, energy-efficient cooling solutions to vulnerable communities. Senegal's hot climate exacerbates energy consumption for cooling and contributes to severe heat stress, especially for low-income households and public facilities. CoolRoof partnered with local NGOs and community groups to install reflective coatings on rooftops, reducing the heat absorbed by buildings and enhancing thermal comfort. This simple yet effective solution is easily deployable and requires no skilled workforce, drastically reducing the need for mechanical cooling in urban areas. Over 200 rooftops have been coated, improving living conditions for thousands of residents.

Solution Spotlight

CoolRoof is a reflective, solar-resistant coating that is applied to rooftops. This reduces indoor temperatures by up to 6°C, cutting the need for fans or air conditioning and thus lowering energy costs for households. It's an affordable, scalable solution that can be applied to both new and existing structures.

Efficiency Gains

Environmental

- **Reduces energy consumption for cooling by up to 30%, lowering overall carbon emissions**

Economic & Social

- **Decreases electricity costs for low-income families, reduces heat-related health issues, and enhances comfort within public buildings (e.g. schools and hospitals)**

How Was It Financed?

The project was funded through a combination of local government support, international climate funds, and private contributions from CoolRoof's partners. This mix of financing helped scale the project rapidly across Dakar's urban areas.

What Made It Possible?

Several enabling factors contributed to the success of CoolRoof in Senegal. First, strong partnerships with local NGOs ensured community buy-in and effective on-the-ground implementation. Public awareness campaigns helped residents understand the benefits of the technology, and government support facilitated the roll-out of coatings in public buildings. Furthermore, the scalability of the CoolRoof solution, combined with the availability of local materials and workforce, ensured that the project could be implemented quickly and cost-effectively.

LEARN MORE HERE

National Programme for Efficient Cooling in the UAE

United Arab Emirates
Since 2023

The Story

The Efficient Cooling Programme was launched in the UAE to tackle the rising demand for sustainable cooling solutions. With cooling systems accounting for about 60% of the nation's energy use, the program aims to enhance cooling technologies and promote District Cooling (DC) and Efficient Cooling (EC) systems. Its primary goals include reducing energy consumption and CO_2 emissions while supporting the UAE's sustainability targets. By retrofitting existing buildings and implementing DC systems in new developments, the program aims to achieve significant energy savings of 27 TWh and water savings of 38 Mm^3 by 2050.

Solution Spotlight

To address high cooling energy demand, the programme promotes advanced district cooling systems utilising innovative cooling storage, recycled water, and time-of-use (ToU) tariffs. New regulations will support the integration of DC and EC systems in both new constructions and retrofits. Stakeholder engagement, including government support, ensures a unified approach to energy efficiency.

Efficiency Gains

Energy Savings

- **Reduction in cooling energy demand by up to 38% in key emirates by 2050**

CO_2 Emissions

- **Anticipated decrease of over 2 million tons of CO_2 emissions annually**

Refrigerants

- **Phasing out of harmful refrigerants like CFCs, improving air quality**

DC and EC Penetration

- **Anticipated increase to 19% of the built environment by 2050**

Noise Pollution

- **Reduction in noise pollution levels by up to 30% with advanced cooling systems**

Economic Impact

- **Projected energy savings of 27 TWh and water savings of 38 Mm^3 by 2050**

How Was It Financed?

The program introduces financial incentives like ToU tariffs and explores financing mechanisms for retrofitting existing buildings, leveraging public and private partnerships.

What Made It Possible?

Successful implementation relies on collaboration between public and private sectors, a DC regulatory framework implemented in 2019 with the most recent 'Water Management in District Cooling Plants' policy, and public awareness campaigns that highlight the benefits of district cooling. This coordinated effort fosters the adoption of efficient cooling solutions throughout the UAE.

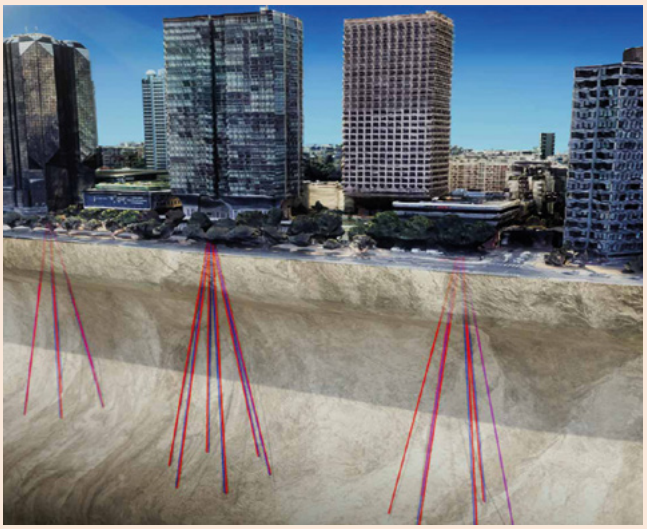
LEARN MORE HERE

Celsius Energy: Harnessing Geoenergy for Sustainable Heating and Cooling

South-East Region, France
Since 2020

The Story

Founded in 2019 within SLB, Celsius Energy leverages SLB's expertise to innovate geothermal heating and cooling for buildings, aiming at building decarbonisation. Since installing the first system at a SLB campus near Paris in 2020, Celsius Energy has completed over 15 systems, including a 7,600m² corporate headquarters renovation. This project, featuring a ground-source heat pump, surpassed the client's energy-saving goals, showcasing geoenergy's role in reducing carbon footprints and boosting energy efficiency.



Solution Spotlight

Celsius Energy's system integrates a borehole heat exchanger (BHE), connected heat pump plant room, and a digital energy management system. The inclined BHE geometry minimises surface space requirements, making it ideal for constrained sites. Digital solutions allow for comprehensive monitoring and optimization of energy use throughout the system's lifecycle.

Efficiency Gains

Environmental

- **Reduces carbon emissions by up to 95% compared to traditional heating and cooling systems**
- **Local, reliable source of energy**
- **Long-life installation (50+ years)**
- **Reduces stress on the electricity grid**

Economic

- **Reduced headquarters' energy consumption by 73%**
- **Reduced energy bill by 52%**

Social

- **Enhances occupant comfort during heat waves**

How Was It Financed?

The client funded the project, supported by government funding for up to 30% of costs. Celsius Energy's partners also contribute through Energy-as-a-Service (EaaS) financing.

What Made It Possible?

Key factors included Celsius Energy's space-efficient BHE design, collaboration with the construction team, and government funding, enabling efficient project completion within eight months.

LEARN MORE HERE

Enabling the deployment of sustainable solutions

Germany's Funding Programme for the Installation of Heat Pumps

The Kreditanstalt für Wideraufbau (KfW) supports the installation of climate-friendly heating systems in Germany, through a public funding programme. Individuals, housing and real estate companies as well as municipalities are eligible to apply. In addition to heat pumps, the funding program also includes solar thermal systems, biomass heating systems and hydrogen-capable heating systems. The funding amount varies depending on the applicant group and measure, but the basic funding amounts to 30% of the total eligible costs for all of them. In addition, there can be various bonuses. The funding is provided through direct financial grants, and low-interest loans can also be used in addition. Climate-friendly heating systems are economical in the long term and actively contribute to climate protection through lower greenhouse gas emissions.

LEARN MORE HERE

UK Overheating Standards and Their Role in Deployment

The UK's Chartered Institution of Building Services Engineers (CIBSE) is a professional engineering association for the built environment sector. CIBSE brings together leading scientific and professional expertise to develop guidance and technical memoranda to inform and support design of healthy, resilient and energy efficient buildings. These technical memoranda and guidance play an important role in promoting energy-efficient practices in building design and operation, by outlining best practice approaches for designers and practitioners to follow. Indeed one recent example is CIBSE's guidance on assessment of overheating (TM59) which was built upon in the new Approved Document O of Building Regulations introduced in 2021 to prevent the risk of summer overheating prioritising passive measures. In this way CIBSE can leverage the expertise of professionals and experts in the field to facilitate a smoother transition to sustainable practices within the built environment.

LEARN MORE HERE

Construction Materials

The construction materials subsector emphasises the sustainable sourcing and use of materials in building construction, playing a critical role in minimising the environmental impact of the built environment. Incorporating waste materials from local industries and promoting circular economy principles enhances resource efficiency and supports local economies.

Sustainable construction materials significantly influence the design and construction phases; for example, low-carbon cement can markedly reduce the embodied carbon in building structures. By addressing the challenges of material sourcing and production, this subsector paves the way for construction projects that are more environmentally responsible and economically viable, supporting advancements in sustainability across the industry.

Traditional cement production contributes to 8% of global CO_2 emissions. Low-carbon alternatives can reduce this by 40-60% (GCCA, 2021)

Embodied carbon from building materials can represent up to 50% of a building's life-cycle emissions (WGBC, 2019)

CHALLENGE

Addressing Carbon-Intensive Material Use

Incorporating low-carbon materials into the construction process

OBSERVATIONS

The transition to the use of sustainable construction materials is vital for reducing the environmental impact of buildings. Low-carbon alternatives, such as recycled aggregates and innovative cements, can significantly decrease emissions during construction, with potential reductions of up to 60% compared to traditional methods (IEA, 2022). By incorporating circular economy principles, construction projects can enhance resource efficiency and support local economies, fostering a more sustainable built environment.

OBSTACLES

Several obstacles hinder the widespread adoption of these materials. High costs can deter construction firms, especially in developing countries with tighter budgets - hence the importance of highlighting viable economic models in these contexts. Inadequate recycling infrastructure and supply chain disruptions can limit access to sustainable options, while resistance from conventional sectors may slow the transition to low-carbon solutions.

OPPORTUNITIES

Despite these challenges, opportunities abound for advancing sustainable materials. Emphasising circular economy practices can drive resource reuse and waste reduction. Public-private partnerships can stimulate innovation and improve access to low-carbon materials. Additionally, regulatory incentives can boost demand, while growing consumer awareness of sustainability can encourage construction firms to adopt greener practices. By leveraging these opportunities, the construction materials subsector can play a crucial role in achieving broader sustainability goals.

LC3 cement in Colombia: Pioneering Low-Carbon Construction

Rioclaro, Colombia
Since 2020

The Story

LC3 (Limestone Calcined Clay Cement) is a groundbreaking low-carbon cement solution developed in Switzerland, that has been making strides in Colombia since 2020. Cementos Argos, one of Colombia's top cement producers, led the way in implementing this technology, which replaces a significant portion of clinker with calcined clay and limestone. The initiative aimed to curb the construction sector's reliance on high-emission Portland cement.

Solution Spotlight

LC3 reduces the clinker content in cement, cutting CO_2 emissions by up to 40%.
By utilising locally available raw materials, LC3 minimises production costs while maintaining the structural integrity of traditional cement.

Efficiency Gains

Environmental

- **Reduces CO_2 emissions by 30-40% compared to conventional cement production**

Economic & Social

- **Utilises local materials**
- **Lowers production costs**
- **Supports local jobs while promoting sustainable construction practices**

How Was It Financed?

The LC3 project in Colombia was funded through private investment from Cementos Argos.

What Made It Possible?

Several factors enabled the success of LC3 in Colombia. First, Cementos Argos invested heavily in research and development to ensure the material met local regulations and technical demands, supported on the scientific work developed by École Polytechnique Fédérale de Lausanne (EPFL) and others working on LC3. Lastly, LC3's use of abundant local materials—limestone and clay—made it a cost-effective alternative for builders, facilitating its acceptance in the market.

LEARN MORE HERE

Reducing Material Use with Dramix Steel Fibres

Jena, Germany
Since 2024

The Story

Zeiss Hightech location in Jena, Germany, embarked on a significant expansion, adding 110,000m² of working space. The expansion required highly specialised construction techniques to meet demanding requirements, such as vibration-absorbing floors, clean rooms with crane systems, and other advanced technical facilities.
In collaboration with STATIX GmbH, Bekaert's Dramix® 5D steel fibers were chosen to reinforce the industrial mat foundation and elevated transfer slab. These steel fibers offered a more efficient and durable alternative to traditional reinforcement, enhancing the construction process while reducing materials and time.

Solution Spotlight

Dramix® 5D steel fibres enhance concrete performance mainly by reducing cracking and increasing resistance and, consequently, the load capacity. When used alongside traditional rebar, these fibres optimise concrete structure, leading to improved durability and efficiency. This technology reduces material use and emissions through faster installation, making it a sustainable choice for modern construction projects.

Efficiency Gains

Environmental

- **Reduced use of traditional reinforcement by up to 50%, decreasing steel consumption**
- **Reduced CO_2 emissions through more efficient construction practices**

Economic

- **Accelerated construction timeline, leading to significant time and cost savings**
- **Optimized material usage, lowering overall project costs**

How Was It Financed?

The Zeiss Hightech facility in Jena was fully funded by Zeiss, with a total project budget of approximately €350 million.

What Made It Possible?

Collaboration with STATIX GmbH and Bekaert's expertise in steel fibre reinforcement were key. On-site support and a custom design solution helped address complex structural needs, ensuring faster execution and optimal results.

LEARN MORE HERE

Composite Bamboo-based Shear Wall (CBSW) System

Philippines, Colombia, Costa Rica, Nepal
Since 1990

The Story

The construction industry contributes significantly to CO_2 emissions and generates substantial construction waste from conventional building methods. The CBSW system aims to provide durable, affordable, sustainable and earthquake- and typhoon-resilient housing, appropriate for tropical developing countries worldwide.

Solution Spotlight

Key practitioners include architects, engineers, contractors, and researchers from organisations including Arup, Asociación Colombiana de Ingeniería Sísmica, Base Bahay, Coventry University, INBAR and Proyecto Nacional de Bambu. The CBSW system employs bamboo and timber to create shear walls codified in international building codes for high-risk seismic and typhoon areas. To date, over 5,000 homes have been constructed worldwide, demonstrating its effectiveness and versatility.

Efficiency Gains

CO_2 Emissions

- **Approximately 45-55% lower than conventional masonry or reinforced concrete housing**

Cost

- **Comparable costs to conventional materials, with potential savings in specific projects**

Sustainability

- **Utilises locally sourced bamboo and timber, bolstering local economies while reducing environmental impact**

How Was It Financed?

The project was funded through various governmental organisations, NGOs and educational institutions, with ongoing efforts to secure funding for further research and development.

What Made It Possible?

The project has involved international collaboration among many stakeholders. The project succeeded through international collaboration among various stakeholders, focusing on several key activities: conducting full-scale structural and earthquake testing to ensure resilience, performing life cycle assessments (LCAs) to measure environmental impacts, and actively involving local communities in the design and construction phases to ensure both suitability and acceptance. Additionally, the development of international standards for the CBSW system aims to promote broader adoption and standardisation globally.

LEARN MORE HERE

Scaling Material Reuse: Cyneo's Innovation in Circular Construction

Vitry-sur-Seine, France
Since 2022

The Story

Each year in France, the construction industry generates 46 million tonnes of waste, with 80% having potential for reuse, yet only 1% is repurposed. Bouygues Construction aims to address this challenge through Cyneo, a network of technical centres designed to scale the reuse of construction materials. Launched at the Ardoines site in Vitry-sur-Seine, the first centre spans 2,700m², and future centres are planned across France. Cyneo serves construction suppliers, project managers, local authorities, and associations focused on circular economy practices, creating a platform to foster material reuse, reduce waste, and promote more sustainable building practices.

Solution Spotlight

Cyneo technical centres offer production, storage, prototyping, and display spaces for reused materials. The centres also provide insurance, legal frameworks, and training.
A digital platform connects suppliers and consumers of reused materials, streamlining the development of reuse channels.
Cyneo aims to mobilise key players in the construction sector while raising awareness of sustainable practices.

Efficiency Gains

Environmental

- **Reduced carbon footprint in the construction industry thanks to the reuse of construction materials**
- **Driving construction industry players to a more circular model (eco-conception)**

Economic & Social

- **Supporting young companies and startups who propose innovative solutions for circular economy in the construction sector**
- **Direct and indirect job creation**
- **Financial gains by optimising the value of construction materials**
- **Sharing best practices among industry stakeholders**

How Was It Financed?

Cyneo is funded through Bouygues Construction and supported by public funding from regional authorities and ADEME, the French Agency for Ecological Transition. The initiative combines private expertise and public backing to expand its operations and is expected to achieve financial independence as it grows.

What Made It Possible?

The initiative's success is underpinned by Bouygues Construction's leadership and partnerships in the circular economy.
Key enablers include a strong network, scalable models, and the ability to showcase tangible benefits to industry stakeholders.

LEARN MORE HERE

Airium Construction Material Improving Thermal Comfort and Efficiency in Algerian Buildings

Oran, Algeria
Since 2018

The Story

In Algeria, energy consumption more than doubled from 305 TWh in 2004 to 705 TWh in 2023, with nearly 30% going to the residential sector and 70% of that for heating and cooling. To address this, a small roof renovation using Airium™ mineral foam at a school in Oran grew into a large-scale initiative. Now, over 250,000m² of schools, hospitals, and homes have been insulated, saving 31.5 million kWh of energy and preventing 11,300 tons of CO_2 annually.
The material's 13 cm thickness boosts winter and summer comfort by up to 3°C and cuts heating and cooling needs by circa 40%, enabling substantial energy savings.

Solution Spotlight

Airium™ mineral foam is an on-site produced insulation for new builds and renovations. Made with portable equipment, it reduces waste and ensures continuous insulation without thermal bridges. It's four times lighter than traditional insulation and fully recyclable, offering an eco-friendly option for large-scale projects.

Efficiency Gains

Environmental

- **Reduces heating and cooling needs by circa 40%** (varying according to local climate and geographical considerations)
- **Material is foamed on-site, reducing the need for importing, transporting, and storing**
- **Unlike polystyrene, Airium™ is fully recyclable and can be ground with demolition waste like concrete**
- **Achieves annual energy savings of 31.5 million kWh**
- **Prevents 11,300 tons of CO_2 emissions**

Economic & Social

- **8% to 12% more affordable in total installed cost per m² compared to traditional alternatives**
- **Savings of €50 per year in heating and cooling costs for a 107 m² house**

How Was It Financed?

The project used Capex funding to purchase 13 pumps, enabling insulation across sites.

What Made It Possible?

The main enablers were: 1) close engagement with design offices and certification bodies, including technical approval from CNERIB; and 2) targeted training for both users and applicators. Rental pumps were made available, ensuring a direct route to market via construction sites and an indirect route through distributors.

LEARN MORE HERE

Cradle-to-Cradle (C2C) Approach for Reinforced Concrete Elements

Berlin, Germany
Since 2023

The Story

Germany's construction industry generates significant CO_2 emissions from production and construction of new reinforced concrete buildings. Demolition produces large amounts of mineral waste, some of which is recycled, while much is used as road fill or dumped. This research project, led by Universität der Künste Berlin, introduces a method to salvage reinforced concrete elements from buildings marked for demolition, reusing components in new structures. This approach allows reinforced concrete elements to function structurally in new buildings, contributing to a Cradle to Cradle (C2C) approach.

Solution Spotlight

The focus is on in-situ concrete buildings, where components must be cut for reuse, a more complex process than for precast elements. A digital tool aids in planning with salvaged concrete, generating a component catalogue for new builds and a guide with design, construction, and legal recommendations for projects using recycled concrete elements.

Efficiency Gains

Environmental Benefits

- **Reusing reinforced concrete elements can mitigate CO_2 emissions by up to 36% compared to using new concrete, according to a building-level case study (excluding HVAC)**
- **Avoidance of new cement and steel production, preventing significant greenhouse gas emissions**
- **Reduction of mineral construction waste through the reuse of existing building materials**
- **Approx. 33% reduction in the use of primary resources**
- **Preservation of raw materials that would otherwise be extracted for new reinforced concrete production**

Waste Reduction

- **Reuse of building fabric significantly reduces the need for new materials and minimises construction waste**

How Was It Financed?

The project was funded by the German Federal Institute for Research on Building, Urban Affairs, and Spatial Development on behalf of the Federal Ministry for Housing, Urban Development, and Building under the "Zukunft Bau Forschungsförderung" programme.

What Made It Possible?

The project was carried out in the period from 2022 – 2024. It was assigned to the field of basic research. A trial with specific project partners on a specific building is currently being prepared.

LEARN MORE HERE

Enabling the deployment of sustainable solutions

The Rwanda Institute for Conservation Agriculture Programme

The Rwanda Institute for Conservation Agriculture (RICA) exemplifies a transformative approach to deploying sustainable building solutions, emphasising local materials and fostering a circular economy in the construction sector. By engaging 90% of its 1200 person workforce from the Bugesera district, RICA not only stimulates local economic growth but also empowers communities through targeted training in natural building techniques, effectively deploying these solutions on a large scale. After construction cooperatives continue to use these skills on projects throughout the country.

The project has successfully addressed the cultural stigma surrounding natural materials, demonstrating their viability and aesthetic potential in high-quality construction. In partnership with government entities, MASS Design Group, the architect and engineers for the RICA project, contributed to the development of the Adobe Building Code, creating a regulatory framework that legitimises earth construction. This initiative enables builders to access loans for sustainable projects, facilitating the deployment of eco-friendly practices across the region.

Additionally, the integration of 58% female leadership within the construction workforce promotes gender equity and supports the deployment of inclusive development solutions. RICA serves as a model for future initiatives, showcasing how sustainable building practices can be effectively implemented to benefit both the environment and local communities in Sub-Saharan Africa.

LEARN MORE HERE

The GCCA Concrete Roadmap

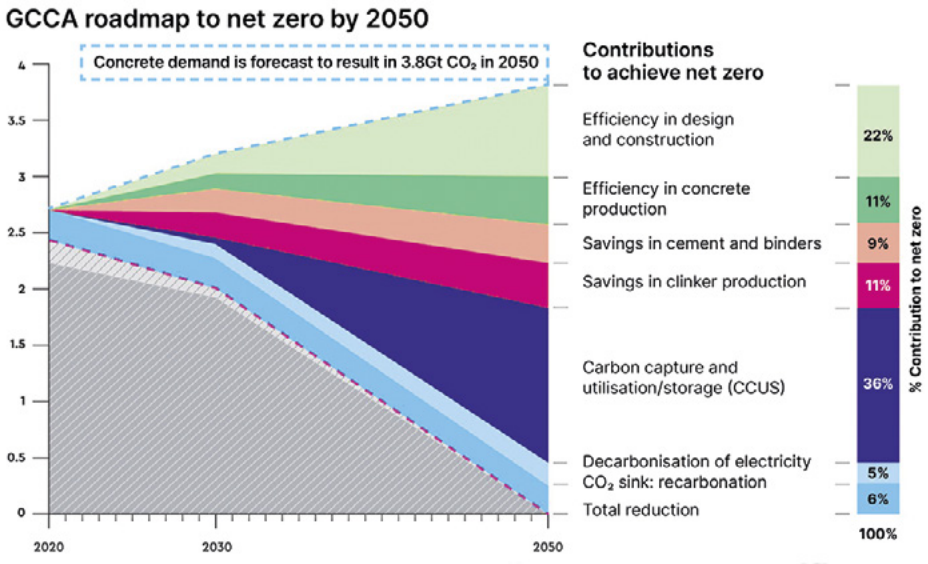
The Global Cement and Concrete Association (GCCA) Concrete Roadmap is a strategic plan to decarbonise the global cement and concrete industry by 2050. It outlines key steps for reducing carbon emissions across the value chain, from material production to construction practices. The roadmap encourages collaboration between governments, industry leaders, and financial institutions to create favourable conditions for scaling low-carbon solutions. This includes setting supportive policies, providing financial incentives, and establishing clear industry standards. By fostering this enabling environment, the roadmap helps ensure that innovative technologies and sustainable practices can be deployed effectively and at scale. It provides the structure necessary for the cement and concrete sectors to meet global climate targets and transition toward net-zero emissions.

LEARN MORE HERE

Building Demand for Low-Carbon Materials: Germany's Climate-Friendly Construction Incentives

Climate-friendly and durable construction products must not only be developed, but also demanded and used. One way to support introduction and market transformation is through funding programmes that provide financial support for the design and construction of low carbon buildings. Through their performance-oriented and technology-open approach, they stimulate the demand for low-carbon products. There is an example of this in Germany. The funding programme KFN "Climate-friendly new construction" is part of the federal funding programme. The programme is aimed at projects for the construction of new residential and non-residential buildings. "Climate-friendly" here means buildings, comply with strict requirements for limiting greenhouse gas emissions in the whole life cycle, including embodied carbon. Compliance must be proven with a life cycle assessment result.
The funding is provided through low-interest loans. In order to achieve the goals of climate protection by means of sustainable construction, there are extended requirements. Compliance with these requirements is checked by a QNG-certificate (Quality Seal for Sustainable Building) to be presented.

LEARN MORE HERE



Energy Sharing & Management

The energy sharing and management subsector is vital for enhancing energy efficiency and sustainability, particularly in the global south where energy access and reliability remain significant challenges. This sector is primarily situated in the operation and maintenance phase of the building life cycle, focusing on optimising energy generation, distribution, and sharing across buildings and communities. Efficient energy management and the integration of renewable energy systems are key to reducing operational carbon emissions, especially in energy-intensive buildings, which are common in rapidly urbanising regions. By leveraging innovative technologies and local resources, this subsector facilitates the transition to sustainable energy practices, enhances resilience, and promotes equitable access to energy.

Energy-sharing models and smart grids can reduce building energy consumption by 20-30% through improved efficiency and load management (IEA, 2023)

CHALLENGE

Optimising Energy Usage Through Decentralised Energy Sharing

Promote innovative energy management systems

OBSERVATIONS

As cities expand, effective energy management becomes increasingly vital for reducing carbon emissions and enhancing overall sustainability. Decentralised energy-sharing models empower communities to meet their energy needs, improving resilience and efficiency while fostering renewable energy adoption. These systems enable local energy production and consumption, leading to lower costs and enhanced grid stability. Innovative technologies are being developed that illustrate how strategic energy management can lead to substantial environmental and economic benefits.

OBSTACLES

Despite their potential, the development of effective energy-sharing initiatives often faces challenges, including fragmented energy systems and insufficient regulatory frameworks. Additionally, public resistance to adopting new energy management practices can hinder the implementation of these systems, as communities may be hesitant to shift from traditional energy models.

OPPORTUNITIES

The rise of smart grid technologies presents significant opportunities for enhancing energy sharing and management. By integrating these technologies, cities can improve energy efficiency and reliability while facilitating community engagement. Collaborations among stakeholders—including government bodies, private companies, and local communities—can drive innovative solutions tailored to regional energy needs. Emerging initiatives in the sector demonstrate the potential of collaborative energy management strategies to yield substantial environmental impacts and economic growth, paving the way for broader adoption of sustainable energy practices. These advancements will be critical in transforming how energy is produced, consumed, and shared in urban settings.

Stockholm's BECCS Plant: Carbon-Negative Heat and Power

Stockholm, Sweden
Since 2021

The Story

Stockholm's Bio-energy with Carbon Capture and Storage (BECCS) project, set to begin operations in 2028, aims to remove greenhouse gases while providing clean energy to the city's district heating network. By utilising sustainably sourced biomass residues, such as sawmill and paper production waste, the plant will generate heat and power for residents. It captures CO_2 from flue gases and stores it underground in deep geological formations, with an expected removal of nearly 8 megatonnes of carbon dioxide within the first decade. As the first deployment of this technology in the region, Stockholm's BECCS project is laying the groundwork for a Carbon Capture and Storage (CCS) value chain in Northern Europe.

Solution Spotlight

The BECCS plant will burn biomass residues to produce renewable energy while capturing and storing carbon dioxide, supporting Stockholm's sustainability goals.

Efficiency Gains

Environmental

- **Expected removal of nearly 8 megatonnes of CO_2 over ten years**
- **Supports the decarbonisation of Stockholm's energy grid through renewable biomass**

Economic & Social

- **Provides a reliable and sustainable heat and power supply**
- **Reduces air pollution, fostering a cleaner urban environment**
- **Creates jobs in the operation and maintenance of the BECCS facility**

How Was It Financed?

The project secured €180 million from the European Union Innovation Fund and is bidding for state aid from the Swedish Energy Agency through a reverse auction process. Additionally, the company is selling Carbon Dioxide Removal credits (CDRs) to businesses ahead of their 2030-2035 net-zero targets.

What Made It Possible?

Stockholm Exergi combined two established technologies: Carbon Capture and Storage (CCS) and bio-fuelled Combined Heat and Power (CHP). Initial feasibility was tested at a smaller facility, supported by the Swedish Energy Agency. Subsequent EU funding was awarded due to the project's innovative nature and alignment with sustainability objectives. Engaging local communities through public surveys ensured community support.

LEARN MORE HERE

Dalian Pioneers China's First Large-Scale Flow Battery Energy Storage System

Dalian, China
Since 2022

The Story

In 2022, Dalian launched China's first large-scale flow battery energy storage system (BESS), featuring an initial capacity of 100MW/400MWh, with plans to expand to 200MW/800MWh. This system addresses a critical challenge in the renewable energy transition: efficiently storing intermittent energy to align supply with fluctuating demand. By harnessing excess energy generated from wind and solar, the flow battery converts electrical energy into chemical energy during optimal generation periods. This stored energy is then converted back into electricity during peak demand, stabilising the grid and enhancing energy reliability. Dalian's project sets a precedent for cities globally to explore large-scale energy storage solutions and advance grid decarbonisation.

Solution Spotlight

Dalian's flow battery energy storage system is the largest of its kind globally, designed to stabilise the grid and facilitate a higher integration of renewable energy sources.

Efficiency Gains

Environmental

- **Enhanced grid efficiency by balancing energy supply and demand**
- **Increased renewable energy usage, reducing greenhouse gas emissions**

Economic & Social

- **Stabilised energy prices by alleviating peak demand pressures**
- **Improved energy reliability for businesses and households**
- **Created new job opportunities in the local energy sector**

How Was It Financed?

The project was developed by the Dalian Institute of Chemical Physics and manufactured by Dalian Rongke Power. Investments were garnered from public and private sources, including the Chinese National Energy Administration, underscoring a commitment to advancing clean energy technologies.

What Made It Possible?

Planning, design and construction of the project took six years before the system was finally connected to the grid in 2020. The technology, developed by the Dalian Institute of Chemical Physics, was approved by the Chinese National Energy Administration in 2016, and is aligned with the national government's goals to expand the use of new energies to decarbonise energy supply.

LEARN MORE HERE

Optimising Building Performance with Automated Control Systems

Multiple Sites, UK
Since 2022

The Story

EQUANS, in partnership with VIVO, has installed industry-leading Building Energy Management Systems (BEMS) across UK military bases to support the MOD's Net Zero and Energy Resilience goals. An audit identified that high-energy plant items required upgrades. Consequently, EQUANS and VIVO launched an ambitious programme of hardware upgrades to the BEMS, yielding considerable energy and carbon savings while improving military personnel's workplace experience and wellbeing. Additionally, a reduction in reactive maintenance visits has led to operational savings. Currently, 14 sites are complete, with around 80 total upgrades planned across the UK over three years.

Solution Spotlight

The smart BEMS optimises energy usage by integrating with a building's infrastructure, such as heating, ventilation, and air-conditioning (HVAC) systems. The system collects live energy consumption data that is graphically represented, enabling a holistic view of each building across the estate in real time. This allows operatives to make informed data-driven decisions regarding energy usage and facilitates augmentations to plant operation. Data analytics providing anomaly detection ensure that sites remain optimised, maintaining energy resilience. The BEMS's open protocol architecture accommodates future expansions for new use cases, such as IoT, enhancing interoperability of sensors, devices, and BEMS to increase energy efficiencies and carbon savings.

Efficiency Gains

Environmental

- **Decarbonisation of estate because of reduction in energy usage**
- **Remote monitoring and maintenance**

Economic & Social

- **Energy Savings between 20-40%**
- **Extended plant asset lifecycle**
- **Predictive maintenance**
- **Reduction in maintenance costs**
- **Increased occupant comfort and experience for service personnel**

How Was It Financed?

The initiative is funded by the Defence Infrastructure Organisation (DIO) as part of the £1.6 billion Future Defence Infrastructure Services (FDIS) Programme. EQUANS provided a clear business case supporting a strong return on investment through reduced energy bills alongside benefits from plant efficiency and resiliency.

What Made It Possible?

Leveraging EQUANS's technical expertise, VIVO Defence, in partnership with EQUANS, was successfully awarded the opportunity as part of the FDIS programme.

LEARN MORE HERE

Reducing Energy Waste in Buildings with Zypho by Aliaxis

Douglas, Isle of Man, UK
Installed in 2019

The Story

The Premier Inn Hotel in Douglas, Isle of Man, has equipped all 85 bedrooms with Zypho's drain water recovery device integrated into each bathroom pod. As shower water flows out, Zypho recovers the heat in the wastewater to preheat the cold water for the shower mixer, reducing energy consumption and heating costs. This system, suitable for various facilities, cuts energy use for heating shower water by up to 75%, lowering energy bills and carbon footprint. With a payback time of 2-3 years, it provides a cost-effective, sustainable solution that meets budget and sustainability goals. This scalable technology is becoming a key component of energy-efficient building solutions, significantly contributing to cost savings and sustainability across sectors.

Solution Spotlight

In each shower, wastewater carries heat used to reach a comfortable 40°C. Zypho captures up to 75% of this heat and transfers it to the cold incoming water (10°C), preheating it to 33°C. This preheated water is directed to the mixing tap or boiler, significantly reducing the energy required for heating. The system integrates seamlessly into existing plumbing setups, delivering substantial energy savings and reducing carbon emissions.

Efficiency Gains

Environmental

- **An 85-bedroom hotel typically consumes around 20,000 kWh per month to heat shower water**
- **Zypho's heat recovery system saves up to 33% of that energy, significantly reducing the hotel's carbon emissions**

Economic

- **The reduction in energy consumption leads to lower operational expenses, translating into substantial energy cost savings for the hotel. The Zypho system offers a cost-effective solution for meeting energy efficiency standards**

How Was It Financed?

Zypho was selected by Premier Inn to reduce energy costs and CO_2 emissions related to heating shower water. In partnership with Dandara Developments/Walker Modular, Zypho units were installed in 85 bathroom pods, ensuring proper integration with the plumbing systems. The heat recovery system can be integrated into similar hotels and large-scale buildings, further expanding its impact on energy efficiency.
By preheating cold water using wastewater heat, Zypho effectively lowers operational costs and meets the demand for energy-efficient solutions in the hospitality industry and beyond.

What Made It Possible?

The installation was an exclusively private investment by Dandara Developments, benefiting from Zypho's excellent ratio for the SAP score. SAP stands for "Standard Assessment Procedure," determining the overall energy performance of a building, expressed in the EPC rating. Zypho products offer a positive ratio between the investment required versus the SAP score compared to other Domestic Hot Water solutions.

LEARN MORE HERE

Harnessing Energy: Montgomery County's Microgrid for Sustainable Infrastructure

Montgomery County, Maryland, USA
Since 2024

The Story

Montgomery County leads in sustainable infrastructure with the David F. Bone Equipment Maintenance and Transit Operations Centre, the largest renewable energy-powered transit depot in the U.S. The facility will include a 5.65 MW microgrid with solar power, battery storage, electric bus charging, and a hydrogen electrolyser. Supporting 200 hydrogen fuel cell electric buses by 2035, the depot reduces emissions and ensures continuous operations during outages, setting a new standard for sustainable transit infrastructure.

Solution Spotlight

Advanced construction methods integrate energy-efficient design and renewables across five operational buildings.
The microgrid powers electric bus charging and optimises depot energy use, enabling grid independence. This model highlights the role of renewable energy in decarbonising transit and construction sectors.

Efficiency Gains

Energy Savings

- **Facilitates a shift to renewable energy, significantly reducing reliance on fossil fuels for building and operational needs**

CO_2 Emissions

- **Anticipated reduction of 4,000 metric tons of CO_2 emissions annually, demonstrating the effectiveness of integrating sustainable practices within the construction sector**

Fleet Transition

- **Supports 200 zero-emissions buses, contributing to improved air quality and alignment with green building standards**

Job Creation

- **Generates local employment opportunities through training programmes related to the project's construction and ongoing operations**

How Was It Financed?

Utilising an Energy as a Service (EaaS) model, the project mitigates upfront capital costs, providing predictable operating expenses and performance guarantees. This approach promotes sustainable building practices without imposing financial burdens on the County.

What Made It Possible?

Collaboration among Montgomery County officials, AlphaStruxure, and utility partners has been pivotal to the project's success, setting a benchmark for future infrastructure initiatives that synergise energy sharing and management in both transit and construction.

LEARN MORE HERE

Enabling the deployment of sustainable solutions

Tokyo's Cap and Trade Programme for Decarbonising Large Buildings

The Tokyo Metropolitan Government's Cap and Trade programme, launched in 2010, exemplifies an enabling environment for sustainable urban development. As the first of its kind in Asia, the programme emerged from a comprehensive feasibility study and is designed to reduce greenhouse gas emissions from large buildings through increasingly stringent, compliance targets over five-year cycles. Approximately 1,200 facilities participate, employing energy efficiency measures such as advanced heating and cooling systems, natural ventilation, and smart monitoring technologies. The programme's success is evident, with a 32% reduction in emissions reported in the 2022-2023 financial year, resulting in approximately 5.3 million tonnes CO_2e saved since inception. The programme's targets and compliance pathways were recently reviewed by a committee of experts ahead of the upcoming 2025-2030 cycle, with a view towards the city's broader target to halve its greenhouse gas emissions by 2030. This market-driven approach not only encourages compliance through trading carbon credits but also fosters innovation in sustainable building practices across the city.

LEARN MORE HERE

Monitoring for Carbon Neutrality in London's Construction Sector

To support London's net-zero carbon target by 2030, the 2021 London Plan introduced stringent policies for major new developments to reduce emissions throughout their lifecycle. This includes the "Be Seen" initiative, requiring developers to monitor and report energy use from design through to operation. Projects must follow a four-step energy hierarchy: "be lean" (use less energy), "be clean" (efficient energy supplies), "be green" (renewables), and offset any remaining emissions. The "Be Seen" element ensures transparency, with continuous reporting of energy performance. The initiative helps track compliance, mitigate energy inefficiencies, and verify that developments meet the city's carbon reduction goals. By doing so, London has halved emissions across major developments compared to national building regulations, avoiding nearly 60,000 tonnes of CO_2e in 2022. This policy framework fosters accountability and data-driven approaches, key to reducing London's construction-related carbon footprint and aligning it with global climate commitments.

LEARN MORE HERE

Scaling Sustainable Solutions

Pathways to Deployment

WORLD RESOURCES INSTITUTE
Roxana Slavcheva
Global Lead for Built Environment

Harnessing Data for Effective Decarbonisation Strategies

Strengthening data and evidence-based decision-making tools for policymakers, particularly in the Global South, is crucial to sector-wide building decarbonisation. To this end, we must champion actions that pinpoint and address knowledge deficiencies through joint initiatives, ensuring that research, development, and demonstration efforts from the public and private sectors align with shared policy objectives.

Efforts should focus on establishing data, knowledge or implementation capability gaps and synchronising research priorities at global, regional, and local levels. Evaluating essential technologies and innovative approaches and facilitating public-private pilot initiatives can provide insights and experiences, ultimately helping to minimise investment risks.

In this context, WRI's recent research roundtable on decarbonising India's building sector, held during the Accelerating Clean Energy event in July 2024, provided valuable insights from experts. Key discussion points focused on existing innovative research, for example exploring the use of agroforestry waste in construction, reusing construction and demolition waste, improving brick manufacturing, and adopting prefabrication techniques. Raising awareness, building trust, and enhancing capacity remain vital for the adoption of low-carbon materials. Crucially, experts in attendance agreed that policymakers and pilot projects are needed to validate these technologies, while governments develop sustainable procurement policies, public guidelines for low-carbon materials, and codes for alternative materials and waste management.

C40 CITIES
Helen Dugmore
Manager Energy and Buildings

Harmonising National Policies with Local Actions

Cities are home to the majority of the world's population as well as the greatest concentrations of buildings and infrastructure. Therefore, regardless of the level of government at which building decarbonisation policies and programmes are developed, implementation in this sector will primarily take place in cities. As the form of government closest to the people, cities are also well-placed to assess and respond to the needs of local residents, ensuring that building decarbonisation actions are viable, equitable, and inclusive.

In addition, cities worldwide are already leading the way in developing, testing and implementing decarbonisation solutions for buildings and construction - including adopting whole-life carbon approaches, developing codes and standards for new construction and retrofit programmes to decarbonise existing building stock, rolling out neighbourhood-scale interventions and testing new technologies. National and local governments should work together to share existing knowledge and co-design policies and programmes that work at

the local level but can be scaled across national and regional contexts for greater impact. As we look to accelerate building decarbonisation in the coming years, national governments will play a critical role in creating enabling environments (including through access to finance) for cities to expand their impact as implementers in their local contexts.

WORLD GREEN BUILDING COUNCIL
Audrey Nugent
Director of Global Advocacy

BeBoldOnBuildings in your NDC

To effectively limit global warming to 1.5°C in accordance with the Paris Agreement, substantial action on buildings is essential. Currently, the built environment accounts for nearly 40% of global energy-related emissions and half of all extracted materials. Despite the critical role that buildings play, many countries are not sufficiently integrating this sector into their climate action plans, known as Nationally Determined Contributions (NDCs).

Although 161 out of 195 NDCs mention buildings, these measures often fall short of what is necessary to align with a 1.5°C pathway. The implementation of current NDCs is projected to result in a temperature rise of approximately 2.5°C, highlighting the urgent need for more ambitious commitments.

In response, the World Green Building Council is calling on all countries to #BeBoldonBuildings – encouraging nations to strengthen their NDCs ahead of the 2025 update deadline to ensure that buildings are a central focus in climate strategies.

To support this call to action, alongside our network of Green Building Councils (GBCs) we are developing an 'NDC Scorecard for Sustainable Buildings'. This tool will allow all policymakers, GBCs and others to assess and compare their countries' NDCs, and reveal where further action is necessary on the built environment. This research will enable governments to increase the ambition and effectiveness of their NDCs and national policies so they are putting the sector on a trajectory for 1.5°C.

SOLAR IMPULSE FOUNDATION
Jean Constantinesco
Managing Director Political Affairs

Efficiency: The Compass for a Sustainable Transition

To decarbonise the built environment, efficiency is about more than cutting energy use—it's about achieving more with fewer resources. Efficiency in energy, materials, building design, and business models must guide every decision. It's the fastest, most cost-effective way to cut emissions while maintaining economic resilience.

Today, our economies still rely on outdated industrial-era practices, created for a time of unchecked resource use. Now, we need solutions that maximize resources, minimize waste, and foster sustainable growth. Existing efficient technologies and designs already let us construct buildings using fewer materials, lower energy demands, and reduce lifecycle costs.

But true innovation means going beyond technology. We must rethink business models to make efficiency accessible and attractive. "As-a-service" models, where companies sell use rather than ownership, create incentives to provide maximum service quality rather than more units. Servitisation is one way to embed efficiency into daily practices.

To accelerate adoption, policies and market incentives must prioritize efficiency. By aligning political frameworks with new business models and tech advances, we can create systemic change, building a decarbonised environment that not only meets climate goals but also unlocks economic potential for future generations.

WHAT'S NEXT

Moving from Ambition to Action

This document has outlined various real-world projects that are effectively advancing the decarbonisation of buildings and infrastructure worldwide. What significance does this hold for the group moving forward?

The real challenge ahead is not just acknowledging these solutions—it is about scaling them, replicating them across regions, and integrating them into national and local policy frameworks.

As the community looks toward COP30 and beyond, the next steps are clear: to build on these examples by curating a catalogue of key innovations, practical knowledge, and deployment strategies. This will serve as a vital resource for governments, businesses, and organisations, guiding them in reducing the risk of investment, building confidence, and ensuring that successful, bankable solutions can be implemented at scale.

By coordinating closely with the Technical Expert Committee (TEC), the team will also accelerate the development of public-private pilot projects that showcase best practices and provide evidence of success. These pilots will not only promote adapted contracts, financing models, and regulatory reforms but also prove that a carbon-neutral built environment is achievable.

Heading into COP31, the plan is to map out existing tools and resources to boost investment in pilot R&D projects. These efforts will lay the foundation for long-term innovation and global collaboration, turning bold climate ambitions into tangible, impactful results for cities, countries, and communities worldwide. Now, it is time to act.

> Glossary

CIRCULAR ECONOMY
A system aimed at eliminating waste and continually reusing resources, crucial for reducing the environmental impact of the building life cycle.

DECARBONISATION
The process of reducing or eliminating carbon emissions, particularly in building materials, construction, and operation phases.

EFFICIENCY
Maximising output while minimising input by optimising resources and processes for sustainable solutions in cleantech.

EMBODIED CARBON
The total carbon emissions associated with the production of building materials, from raw material extraction to manufacturing, transport, and installation.

ENABLING ENVIRONMENT
The combination of policies, financial incentives, infrastructure, and cultural factors that support the successful deployment of sustainable solutions.

GREEN BUILDING STANDARDS
Guidelines and certification systems (e.g., LEED, BREEAM) that encourage environmentally responsible construction and design practices.

LIFE-CYCLE ASSESSMENT (LCA)
A method used to evaluate the environmental impacts associated with all the stages of a building's life, from material extraction to demolition and disposal.

LOW-CARBON MATERIALS
Building materials, such as low-carbon cement or recycled aggregates, that have significantly reduced embodied carbon emissions.

NET-ZERO
A goal or standard where the total amount of carbon emissions released is offset by actions that remove or reduce carbon in the atmosphere.

OPERATIONAL CARBON
The emissions resulting from the energy consumption of a building during its use phase, including heating, cooling, and electrical systems.

PASSIVE DESIGN
Architectural techniques that leverage natural resources, such as sunlight and wind, to heat, cool, and ventilate buildings without relying heavily on mechanical systems.

REPLICABILITY
The ability of a solution to be applied in different contexts or regions while maintaining its effectiveness.

RESILIENCE
The ability of buildings and infrastructures to adapt to and recover from adverse events such as extreme weather, while maintaining functionality.

RETROFITTING
The process of updating existing buildings with new technologies and materials to improve energy efficiency and reduce environmental impact.

SCALABILITY
The capacity of a solution to be expanded or implemented on a larger scale without losing effectiveness or efficiency.

SMART GRIDS
Electricity networks that use digital technology to monitor and manage the distribution of energy more efficiently, integrating renewable energy sources and supporting energy sharing.

Blueprint for a Solutions Deployment Platform

Project Direction
Eliott Carruthers

Concept & Research
Eliott Carruthers
Jean Constaninesco
Jonathan Derain

Writing
Eliott Carruthers
Members of Priority Action B4

Graphic Arts
Bontron & Co – Geneva
www.bontron.ch

Discover more
Solutions

Blueprint for a Solutions Deployment Platform

solarimpulse.com

SOLARIMPULSE
FOUNDATION