

Start-ups Key Role in Slashing Carbon Emissions from Buildings

Walk past a construction site, office building, home or factory and it might not seem like they're spewing out any carbon dioxide at all. In reality, those buildings [account for](#) nearly 40 percent of global carbon dioxide emissions and more than a third of energy usage. To reduce their impact on climate change, leading-edge startups in Southeast Asia and globally are at the forefront of developing innovative solutions to reduce emissions from buildings.

Buildings can Cause Climate Change and Illness

The greenhouse gas (GHG) emissions from buildings that you may not see come from a multitude of sources. Building materials such as concrete and windows, energy for heating and cooling or light, water usage, and waste from construction companies are just some of the causes of the huge volume of emissions coming from office, residential, industrial and other types of buildings. The buildings sector's energy-related CO₂ emissions total around 10 gigatons of CO₂ globally every year, [according to](#) the UN Environment Programme.

The buildings sector in ASEAN, China and India accounted for about 24 percent of total energy-related carbon dioxide (CO₂) emissions globally and 27 percent of final energy use, according to the IEA (International Energy Agency), even after excluding emissions from manufacturing building materials. Energy efficiency and the decarbonisation of electricity in Asia alone could reduce annual global emissions from buildings in 2040 by almost 3 gigatons of CO₂.

The impacts of buildings on individual countries are also massive. In Vietnam, for instance, Vietnam Briefing [noted](#) that buildings use 30-40 percent of energy production, half of raw materials, 17 percent of fresh water and a quarter of the wood harvest in the entire country. The Hong Kong Green Building Council (HKGBC) says buildings consume 90 percent of electricity and cause 60 percent of carbon emissions in the territory.

Start-ups are Creation Solutions

Decarbonising buildings to reach net-zero carbon emission for both the materials to construct the buildings and the resources to run them would require a transformation of the buildings and construction sector, as the IEA [describes](#) it in its 2020 GlobalABC Roadmap for Buildings and Construction in Asia. The transformation needs to include urban planning, new and existing buildings, building operations, appliances, systems, materials, resilience, and clean energy. And difficult as all that might seem, the IEA said the changes are indeed possible.

While large companies are working on solutions, innovative start-ups may have an even greater impact on reducing emissions. Their solutions fall into a number of categories, including:

Category	Components
Building materials	Low-carbon concrete
Renewable Energy	Solar, wind, geothermal
Energy Efficiency	Energy efficient insulation, HVAC (air conditioning & heating)
Architecture	Natural ventilation, green rooftop, design optimisation software
Waste Reduction	Prefab construction, easier recycling
Indoor Air Quality	Ventilation, air purifiers, Sensors and software to manage air quality
Water	Water-efficiency systems & software
Certification	LEED standards (LEED gold buildings emit 34% less CO ₂ & use 11% less water)

Start-ups have Solutions Across the Sectors

Taking a look at start-ups in many of these sectors provides a snapshot of the types of innovations underway and their potentially huge positive impact on the building sector.

Lighter and More Efficient Materials Improve Construction

Solutions such as lighter concrete and bio-based materials to construct buildings [could reduce](#) carbon emissions by more than 30 percent and increase carbon sequestration by 70 percent. New materials and practices are already available, and more are under development.

Autoconz, for instance, is developing 3D printing and digitisation for construction that can provide effective and efficient solutions for the construction sector in Indonesia.

Another is CeEntek, which produces nanoengineered ultra-high-performance concrete with advantages including low porosity, dense structure, impermeability, chemical resistance and a potential useful life of more than a century.

Nodis commercialises nanoparticle-based smart glass and display technology that reduces energy costs and CO2 emissions. It has expanded significantly since its founding in 2014 and is exploring diverse product applications such as display and camouflage glass.

Prefabricated homes are a key part of improving efficiency and reducing waste, and a number of companies that have been around for years provide examples. Stilt Studios in Bali, [Indonesia](#), for example, was founded in 2019 and helps individuals create sustainable modular homes including studios and multi-story family homes, using standard components in a process similar to assembling Lego bricks.

Revolution Precrafted in the Philippines, which launched in 2015 and became the first unicorn in the country, works with architects and designers to create prefab structures ranging from pavilions and holiday cottages to full-sized homes that can be delivered in a few months.

Renewable Energy Reduces GHG Emissions

While solar panels do produce renewable energy and reduce carbon footprints, many companies and homeowners can't easily afford them. Start-ups make purchases easier.

Renewables Capital Asia, for instance, assists companies with financing, constructing, installing solar energy projects that it owns and operates, across Asia.

GetSolar also makes solar more accessible by providing Solar-as-a-Service. It takes care of everything from installing to maintaining the solar with no initial expense, and property owners pay a fixed monthly fee that can be less than their current electricity bill.

Xurya in Indonesia similarly offers installation and upkeep of panels with a 20-year contract that enables clients to install renewable energy without initial costs. Xurya [told](#) East Ventures that 80 percent of customers are motivated by cost savings, not reducing emissions.

Energy Efficiency reduce Cost and Complexity

Start-ups are also developing new cooling solutions and energy management software that bring down energy usage and costs significantly.

Ecoline [says](#) its Therm-Aire solution is the world's first solar thermal hybrid air conditioning system, provides cost-effective sustainable green cooling solutions at affordable prices and can reduce energy consumption by up to 55 percent.

Ampotech in Singapore uses IoT and computing technology to help energy, operations, and facilities managers improve building performance through controlling consumption by appliances, spaces, or machinery, which can reduce electricity costs. Its hardware and software help businesses collect, analyse and integrate building and machine electricity usage data for reporting, benchmarking, automation and facilities management.

Singapore-based Resync Technologies similarly aggregates and monitors energy assets in real time on a cloud platform to create a sustainable and digitalised energy grid. Its AI-driven analysis and forecasting of energy usage can help improve efficiency.

IoTTeamVN in Vietnam helps and save on energy consumption by providing IoT solutions that collect data and monitor energy usage in real time to identify opportunities for saving energy, such as by optimising lighting or HVAC systems.

And SensorFlow provides sensors and analytics platform automate buildings to save energy, provide insights into operations and send alerts for preventive maintenance. It says it has helped resorts, hotels, hostels and apartments save up to 30 percent on their energy costs.

Waste Reduction Lowers Costs and Increase Income

Blue Planet Environmental Solutions deploys its [technologies](#) across the entire waste management value chain, including industrial, municipal, plastic, inert, electronic and other types of waste. Its whole-systems approach can modernise how facilities work and turn waste into additional income streams.

Better Air Quality Increases Productivity and Staff Retention

Other start-ups work on improving internal climate and air quality, which helps staff. Nearly 80 percent of office workers in ASEAN said their building's indoor air quality has a direct impact on their health, according to a Honeywell [Survey](#).

SmartClean provides IoT and AI-based cleaning solutions using real-time data collection, analytics and maintenance solutions to enable data-driven operations. It offers air quality, dispenser monitoring and wetness detection sensors as well as feedback modules.

Singapore-based SenSING uses IoT and data analytics solutions for offices, hospitals, hotels, industrial facilities and warehouses that offer real-time end-to-end solutions related to environmental conditions and spatial analysis.

Building Management

Qi Square says it facilitates decision-making through digital twinning technology, which it leverages to use models to achieve high performance buildings. Its cloud-based platform 'BtrLyf' digitises its AI-enabled tech platform. The 'Digital Twins' of buildings provide low-cost instant green assessment scenario simulation with impact quantification and Smart solution-matching.

Reaching Targets through Innovation

These and the many other start-ups focused on improving the built sector have a major role to play in mitigating climate change and give hope that positive change can happen far faster than many people might expect. The solutions are good for the planet and, very importantly, for building managers' profitability.

The writer used ChatGPT to generate ideas for this article. The content is his own.