

Decarbonising Australia: A Glimpse into the Net-Zero Push

Introduction:

This article explores the global and national trend to “net zero” to provide a holistic perspective, then the paper will explore the built environment, building and construction and will include examples of government policy and expo products and services in support of the decarbonisation transition.

Voices from COP29

The ASCA-sponsored sustainability stage discussed the most recent commitments and outcomes from the Conference of Parties (COP) [1] meeting held in Baku, in November 2024, known as COP29.



COP29's goal was to garner support for greater financial investment flows from developed to developing countries to support decarbonisation.

Australia pledged \$50 million to the global Loss and Damage Fund, \$125 million to support Pacific nations' renewable energy transition, and entered a new Climate and Energy Partnership with the UK. Australia reaffirmed its 43% emissions reduction target (below 2005 levels) by 2030 and committed to submitting a stronger 2035 target by September 2025, though it faced criticism for ongoing coal and gas project approvals and contributing to what many saw as insufficient global climate finance pledges. [2]

Australia, through Standards Australia and the International Code Council, launched the **Universal Data Protocol (UDP)** to improve data transparency and integration across the global built environment sector. The UDP builds on the UN Transparency

Protocol (UNTP), offering a decentralised, secure, and interoperable framework for sharing verifiable data throughout building design, construction, and operations. Its features include decentralised verification, a shared data language, open-source access, and enhanced digital security, aiming to reduce data fragmentation and support net-zero emissions efforts in the building industry. [3]

COP30, to be held in November 2025 in Belém, Brazil, will focus on strengthening national climate pledges, boosting climate finance, advancing adaptation, protecting nature, reforming global climate governance, and operationalising the loss and damage fund. [4]

Australia's progress to "Net Zero"

Australia's 2005 levels are benchmarked at about **612 million tonnes CO₂-equivalent (Mt CO₂-e)**. This number is the benchmark against which reductions are measured. Table 1 [or image 1] shows Australia's progress towards "net zero". [5,6]

As of Dec 2023	2030 Target	2050 Target
Net greenhouse gas emissions were 432.9 million tonnes of CO ₂ -equivalent, marking a 29% decrease from 2005 levels,	43% decrease from 2005 levels, should fall to about ~349 Mt CO ₂ -e (43% lower than 2005).	100% decrease from 2005 levels, should effectively be zero, but importantly this does not mean literally no emissions; it means any remaining emissions are balanced by removals (like reforestation, carbon capture, or offsets).

As of 2023, net GHG emissions fell 0.5% (2.4 Mt CO₂-e) compared to the previous year to meet the 2030 target, Australia needs to accelerate its annual emissions reduction rate. The Climate Change Authority notes that emissions must fall by an average of 17 million tonnes per year, yet recent reductions have been around 3 million tonnes annually. [7] Achieving net zero by 2050 entails reducing emissions across all sectors—such as energy, transport, industry, agriculture, and buildings—and offsetting any remaining emissions through methods like carbon capture, reforestation, or purchasing carbon credits. This transition is guided by Australia's legislated targets: a 43% reduction in emissions from 2005 levels by 2030, progressing to net zero by 2050.

Australian Federal initiatives of note to accelerate to net zero include:

- **Safeguard Mechanism:** This policy requires Australia's largest greenhouse gas emitters to keep their net emissions below a set limit, which will decrease over time [8]

- **Capacity Investment Scheme:** Aims to underwrite 23 GW of new solar and wind projects and 9 GW of storage from 2024 to 2027, supporting the goal of 82% renewable electricity by 2030. [9]
- **Future Made in Australia:** An industrial policy initiative focusing on transitioning to net zero emissions, with investments in renewable hydrogen, critical minerals processing, and clean energy manufacturing. [10]

The panel felt that we are entering a challenging phase for carbon reduction and abatement into heavy industry and supply chains with the introduction of scope 3 reporting.

Scope 3 emissions reporting

In Australia, reporting Scope 3 emissions has been voluntary under the National Greenhouse and Energy Reporting (NGER) scheme. However, with the introduction of a mandatory climate-related financial disclosure regime, disclosure of Scope 3 emissions is mandatory for certain entities for financial years starting on or after 1 January 2025. [11,12]. Understanding and reporting Scope 3 emissions is crucial, as they often represent the largest portion of an organisation's total GHG emissions. Accurate reporting enables companies to identify significant emission sources within their value chains and develop strategies to reduce their overall carbon footprint. [13]

Carbon reduction and abatement in manufacturing and supply chains with heavy carbon are expected to increase costs, increasing the challenge of maintaining and growing competitiveness, affordability and liveability in this transitory period.

Scope 3 emissions refer to all indirect greenhouse gas (GHG) emissions that occur in a company's value chain, excluding those from purchased energy (which are Scope 2). The Greenhouse Gas Protocol identifies 15 categories of Scope 3 emissions, providing a comprehensive framework for organisations to assess their entire value chain emissions impact and identify where to focus reduction activities. [14, 15]. These emissions result from activities not directly owned or controlled by the reporting organisation but are associated with its operations, such as:

- **Upstream activities:** emissions from the production of purchased goods and services, capital goods, fuel and energy-related activities, transportation, and waste generated in operations.
- **Downstream activities:** emissions from the use of sold products, end-of-life treatment of sold products, downstream transportation and distribution, and investments.

Building and Construction sector transition to “net zero”

A 2022 United Nations report calculated that 37% of all global carbon emissions were generated from the built environment and construction work. The most recent

data in 2024 noted total Global energy-related CO₂ rose to record rates of 37.8 gigatonnes, marking a 0.8% increase from the previous year. The built environment and construction sector contributed to a slightly lower 34% of that total; however, this remains a substantial impact on the overall global carbon footprint. [16,17]

Panel members noted that stopping building was not feasible, especially as developing countries with young populations experiencing high population rates and increased prosperity will fuel global growth. Not enough was being done to abate carbon emissions.

Abatement examples that were recommended included (a) sourcing and manufacturing low-carbon materials, (b) reducing waste, (c) promoting circularity and easy disassembly of high-quality goods for reuse, (d) investment in more energy-efficient or self-sufficient local grids and buildings and (d) innovation in lower carbon design. These initiatives introduce cost at a time when Australia faces an affordability crisis.

The use of expensive materials and energy sources, the use of unfamiliar complex construction methods, and obstacles to a “one size fits all” regulatory environment, such as NABERS, slow impact and challenges to the approval processes. More reforms are needed in government policy, industry standards and government incentives to lower the cost of building and construction whilst maintaining compliance standards, sustainable building practice and room for individual design form and function.

Decarbonisation with Renewable Energy Districts

Standards Australia Smart Cities Advisory Group published a 2022 paper on cities’ security and resiliency.

As cities become more digitally transformed and connected, this offers the opportunity to better monitor and measure progress to net-zero targets with accuracy and credibility; however, it also introduces risks in greater dependency on electrical power and cybersecurity controls and on highly skilled workforces to operate and manage cities of the future. [18].

The International Electrical Commission has commenced early work to develop global standards on Positive Energy Districts, a concept where more renewable energy is generated than consumed to ensure the resilient supply of electricity in the district that can accommodate peaks and demands from adjacent districts. [19]

The boom in generative AI is expanding high computation, electricity and data centre resources, resulting in significant amounts of electricity. Careful management and

forecasting of compute and electrical power will be critical for a sustainable future that is affordable and liveable. [20]

It joins up the energy supply chain at scale to maximise efficiency and minimise waste right to the level of appliance in home controls and novel use of street poles “as a digital/EV charging” network as already demonstrated by PLUS ES/AusGrid and is in trial with Essential Energy in Dubbo, but also to create a democratised energy market where consumers can utilise the EV car batteries to store energy for the home and can control consumption to the appliance level, allowing energy retailers to manage load to reduce bills and minimise blunt blackouts.

All these initiatives are designed to lower the cost of living in environmentally sustainable ways. I do note these come with a cost to mine, manufacture and dispose, this is where scope 3 emissions reporting becomes valuable. The Sydney Expo highlighted several emerging practices and a wide range of solutions to respond to Australia’s commitment.

Sustainable Management of Assets

Managing existing assets is a particular challenge, a panel discussed this at the Sydney Expo.

Architects and Designers explained the concept of the **Building by Layer** framework that views a building as distinct layers (site, structure, facade, services, interiors) that age and can be upgraded at different rates. **Facade upgrades** are crucial for achieving net-zero carbon emissions because the facade controls energy use for heating, cooling, and lighting. By improving insulation, airtightness, shading, and daylighting, facade retrofits can dramatically cut a building’s operational energy demand and carbon footprint, making them one of the most impactful, cost-effective interventions without needing full structural changes.

Their advice was to engage stakeholders early to create a whole of asset lifecycle business model with a decarbonization context, considering the use of **buybacks** where governments or agencies purchasing inefficient buildings to retire, redevelop, or upgrade them to net-zero standards, or **bridge banks (or bridge financing)** provide temporary funding to cover upfront retrofit costs (like facade upgrades) until long-term energy savings or incentives are realized — both help accelerate carbon reduction by removing financial barriers to deep building upgrades.

A key to success here is to embrace systems thinking to break down silos, construct new supply chains and extend the durability and life of assets than dispose of them.

The Australian Government’s Environmentally Sustainable Procurement (ESP) Policy requires that, from 1 July 2024, all Commonwealth contracts for construction services valued at \$7.5 million or more (including GST) must demonstrate circularity and environmental sustainability. Suppliers must submit a Supplier Environmental

Sustainability Plan (SESP) detailing how they apply circular economy principles (e.g., waste reduction, recycled content, durability, reuse). From 1 July 2025, the policy expands to cover ICT goods, textiles, and furniture over \$1 million. [21,22,23]

Accelerating pre-approvals of Sustainable Affordable Homes

The NSW Housing Pattern Book is a government initiative offering pre-approved, architect-designed templates for terraces, dual occupancies, and low- to mid-rise apartments (up to six storeys), aiming to streamline approvals and accelerate delivery of high-quality, climate-responsive, and cost-effective housing across the state. While the designs emphasise natural light, ventilation, and adaptability, the standardised templates place limits on fully bespoke or site-specific features, including extensive biophilic design or individualised architectural expression. However, the Pattern Book allows some flexibility to adapt to community character and local landscape context, balancing speed and quality with some room for minor customisation. [24,25,26]

Improving Renewable Energy Efficiency and Lowering Cost of Living

The Australian Federal Government's **Cheaper Home Batteries Program** will launch on 1 July 2025, offering rebates of up to **\$370 per kilowatt-hour (kWh)** (e.g., ~\$3,700 for a 10 kWh battery) to households, small businesses, and community facilities installing batteries (5–50 kWh usable capacity) connected to rooftop solar, with rebates backdated to installations from 6 April 2025; the batteries must be Virtual Power Plant (VPP)-capable (though VPP participation isn't mandatory), the rebate is not means-tested, and it can be combined with state incentives, with the rebate level reducing annually until the program ends in 2030. [27,28,29,30]

Starting January 1, 2024, the Victorian Government mandates that all new homes and residential subdivisions requiring a planning permit must be all-electric. This includes public and social housing, as well as new government buildings like schools and hospitals. The move is part of Victoria's broader strategy to phase out gas in new buildings and achieve net-zero emissions by 2045. [31].

The ACT Government has announced a ban on new gas connections for residential buildings, effective from 2023. This policy supports the territory's goal to achieve net-zero emissions by 2045. [32] Several NSW local councils have taken action to mandate all-electric new buildings, such as the City of Sydney and councils such as Inner West and Lane Cove have updated planning laws to prohibit gas connections in new developments. [33]

These initiatives reflect a growing trend toward electrification in building construction, driven by environmental goals and the pursuit of sustainable energy solutions.

Circularity Initiatives

Liverpool City Council (NSW) addresses over 20,000 discarded mattresses annually, which previously cost \$800,000 per year to manage.

They have purchased a “Croc” industrial shredder, capable of processing one mattress per minute. It separates materials into Steel (recycled) and Flock (foam and fabric, repurposed into civic pavers, blocks, street furniture, toilet dividers, public art), diverting large volumes from landfill and turning waste into usable products.

Liverpool extends the service to other councils, like Wollondilly Shire, processing 765 mattresses in 6 months (saving 13.8 tonnes from landfill). [34]

The city of Sydney has implemented **Innovative Waste Management** with start-up Goterra to process food waste using black soldier fly larvae, converting waste into compost and animal feed, thereby reducing landfill use. [35]

Biophilic Design for sustainability, health and wellness

Building design that takes account of and brings nature into the homes has benefits for health and wellbeing as well as sustainability.

The expo presented insights from Chris Freeman at Ironbark Architecture. Chris shared the 14 design patterns, such as incorporating curiosity, play and risk elements into the design of space and place, with consideration as it ages over time.

The design presented offers a unique human and earth connection, challenges our way of living and safeguards the removal of plants and wildlife in building and construction. [36, 37]

ASCA Gold Industry Members are already making a difference. Here are some examples with links to more details:

	ICT International, based in Armidale, Australia, delivers advanced environmental monitoring technologies that support sustainable land, water, and ecosystem management. Using IoT sensors and real-time data analytics, they help researchers and land managers make informed, data-driven decisions. Their solutions are applied in diverse areas: monitoring sap flow in forests to understand tree health, measuring fuel loads to assess bushfire risks, tracking soil moisture and pasture health for sustainable grazing, and overseeing water quality in both urban catchments and aquaculture systems to protect aquatic ecosystems. By enabling real-time monitoring of environmental conditions, ICT International helps reduce agricultural runoff, improve nitrate management, and address urban risks like air quality and heat islands. Overall, their technologies empower more sustainable
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	practices across forestry, agriculture, water management, and urban planning, enhancing ecological resilience while reducing human environmental impact.
 Matter	Matter, through its subsidiaries WasteMatters and WaterMatters, has collaborated to enhance waste and stormwater management. The company's AI-driven stormwater management solutions aim to assist councils in optimizing stormwater networks, predicting risks, and enhancing environmental resilience. These initiatives contribute to smarter, more sustainable urban management by leveraging technology to address environmental challenges.
 Minnovation Technologies	Minnovation Technologies collaborates with Australian councils to advance net-zero and sustainability goals through intelligent sensor systems and IoT solutions. Notable projects include the City of Casey : Partnered on the Future Mobility Living Lab trial, implementing AI-powered mobility solutions to enhance urban transport efficiency and safety, the City of Banyule : Undertook a smart street lighting initiative, upgrading infrastructure to improve energy efficiency and reduce emissions and Core Environmental Projects : Developed an autonomous landfill methane extraction system to monitor and mitigate greenhouse gas emissions from waste sites. These initiatives demonstrate Minnovation's role in supporting local governments to achieve sustainability objectives through innovative technology deployments.
 PLUS ES	PLUS ES works with Australian councils to advance net-zero goals by transforming streetlights into smart city nodes, delivering real-time data for urban planning, public safety, and heat mitigation. They also reached a major milestone by installing one million electricity meters across the National Electricity Market two years ahead of schedule, helping create a more affordable, resilient, and sustainable energy future. In partnership with AGL and supported by the NSW Government, PLUS ES is expanding electric vehicle (EV) charging infrastructure, installing 149 pole-mounted kerbside chargers in urban areas like Balmain and Newtown. This makes EV charging more accessible for residents without off-street parking, supporting the broader shift to electric transport and cutting emissions, all while helping councils meet their sustainability and net-zero targets.
 NBN Co	NBN Co has committed to achieving net-zero greenhouse gas emissions by 2050, or sooner, through the Science Based Targets initiative (SBTi). Their near-term goals include reducing Scope 1 and 2 emissions by 95% and Scope 3 emissions per device by 60% by FY2030,

	compared to FY2021 levels. To support these targets, NBN Co plans to purchase 100% renewable electricity by December 2025, reduce annual energy use by 25 GWh by the same date, and transition to electric or hybrid vehicles by 2030. To finance these initiatives, NBN Co issued an \$800 million green bond in April 2022, with proceeds allocated to projects like renewable energy procurement and energy-efficient network upgrades. Additionally, the company is developing a Climate Transition Plan to enhance network resilience and support Australia's broader net-zero objectives.
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ASCA members are encouraged to provide further examples of the important work we are doing to create sustainable, resilient, liveable and safe places, and examples of regenerating biodiversity to safeguard for future generations.

This thought leadership piece was written by James Sankar, Australian Smart Communities Association (ASCA) President.

More information

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- [3] COP30: <https://unfccc.int/cop30>
- [4] Universal Data Protocol Initiative: <https://www.standards.org.au/engagement-events/strategic-initiatives/universal-data-protocol>
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- [15] Scope 3 detailed guidance: <https://ghgprotocol.org/corporate-value-chain-scope-3-standard>
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- [18] Security and Resiliency in Smart Cities:
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- [20] AI and energy: Will AI help reduce emissions or increase power demand? Here's what to know <https://www.weforum.org/stories/2024/07/generative-ai-energy-emissions/>
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