NABERS

ENERGY FLEXIBILITY IN COMMERCIAL BUILDINGS

NABERS Feasibility Study

July 2026

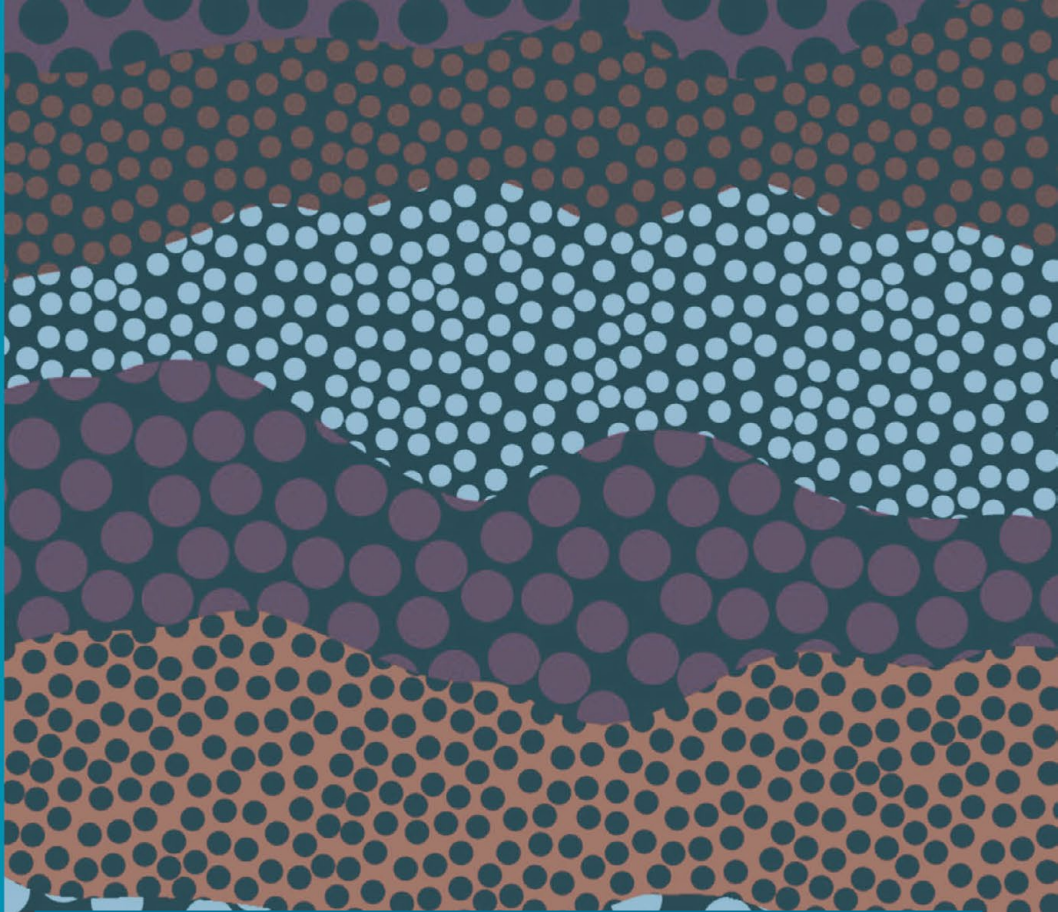
nabers.gov.au

Cover photo: Macarthur Square shopping centre, provided by GPT Group.

NABERS is a national initiative managed by the NSW Government on behalf of the federal, state and territory governments of Australia.

4 Parramatta Square
12 Darcy Street,
Parramatta NSW 2150
T (02) 9995 5000
E nabers@environment.nsw.gov.au

nabers.gov.au



Acknowledgement of Country

NABERS acknowledges the Traditional Custodians of the lands and waters upon which we live and work throughout New South Wales. We acknowledge the Burramattagal people of the Dharug nation, where our main office is located.

We pay our respects to Elders past and present, acknowledging the diversity of First Nations Peoples across Australia. We recognise their ongoing connection to land, waters, biodiversity and culture, and their deep knowledge of how to live with seasonal variability, manage resources responsibly and maintain the balance of the systems that sustain Country.

Acknowledgements

NABERS acknowledges and appreciates the Australian Government for its continued support, the many stakeholders who generously shared their time, expertise and perspectives throughout the research process (including those who reviewed this report), as well as our Energy Flex team whose commitment, curiosity and expertise made this study possible.

Image: iStock.

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Executive summary

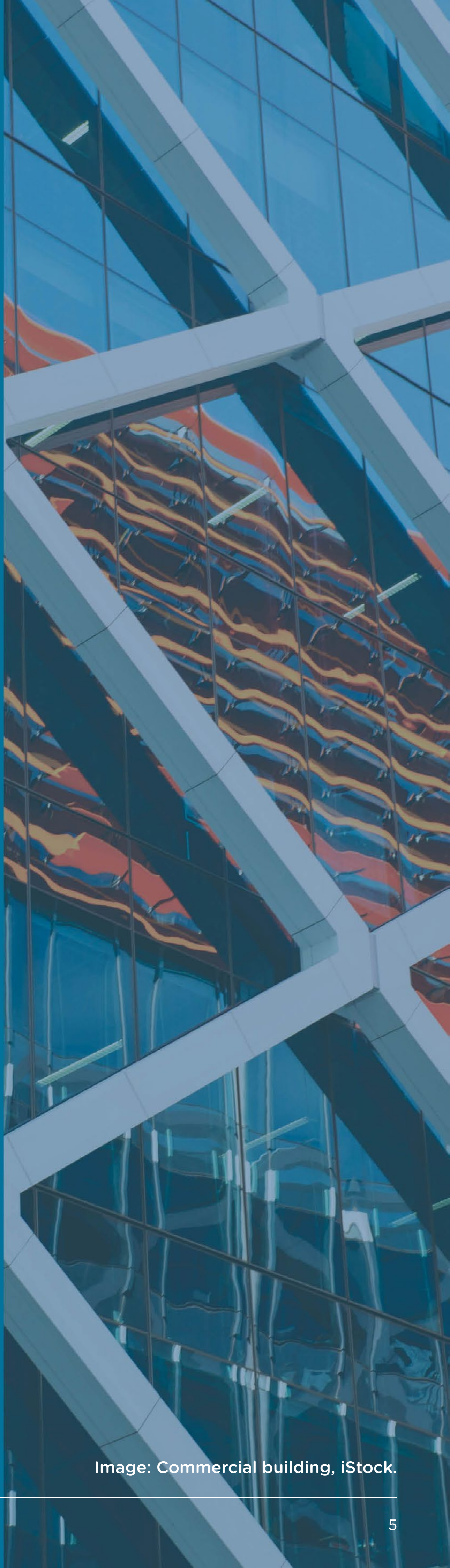


Image: Commercial building, iStock.

Context

Over the past decade, rooftop solar and large-scale renewables have transformed the grid. While these developments have created a more renewable grid, they have also introduced new challenges. When electricity demand is extremely high and renewable generation is low, for example on hot summer evenings, the grid can become unstable, and the risk of power outages increases. Conversely, when solar generation is high but consumer demand is low, renewable energy may need to be curtailed.

These challenges can be managed through additional electricity network infrastructure or greater reliance on fossil fuel peaking plants. However, these approaches are likely to cost billions of dollars, increase energy bills, and slow progress towards renewable energy targets. A lower-cost alternative is energy flexibility: the ability of electricity consumers to change when they use, store or share electricity to better support a stable system powered by renewable energy.

NABERS Energy Flexibility Feasibility Study

Recognising the potential role of energy flexibility in commercial buildings, the Australian Government funded NABERS to undertake an Energy Flexibility Feasibility Study. The study explored the uptake, opportunities and barriers associated with energy flexibility in commercial buildings and identified how NABERS can support, recognise and encourage energy flexibility in the future.

The feasibility study combined an extensive review of Australian and international literature and interviews involving 72 stakeholders from 36 organisations across the property, energy and government sectors.

Feasibility study findings at a glance

Energy flexibility can deliver significant system-wide benefits

The literature reviewed for this feasibility study indicates that energy flexibility can deliver substantial economic, reliability and emissions reduction benefits. Published estimates suggest billions of dollars in avoided network and generation costs and reduced costs for consumers alongside significant reductions in greenhouse gas emissions.[1,2,3] However, the system-wide contribution commercial buildings can make by flexing requires further research.

There are 3 ways buildings can flex

Commercial buildings can flex by:

- **Being energy-efficient** – Reducing overall electricity demand through more efficient building design, equipment and operations.
- **Load shifting** – Moving electricity loads to periods when renewable energy is abundant and away from peak demand events.
- **Providing network support** – Supporting the grid during periods of system instability (e.g., load shedding and virtual power plant (VPP) participation).

Our research suggests buildings are generally better placed to flex when they are highly electrified, have modern controls and automation systems, operate beyond standard business hours, or can adjust energy use without disrupting critical services.

1. IEEFA, 2024.
2. The Australia Institute and Buildings Alive, April 2024.
3. Department of Climate Change, Energy, the Environment and Water, 2024.

Few commercial buildings are flexing today

Energy flexibility in commercial buildings is limited. Many owners and operators target energy efficiency, but few are load shifting or supporting the grid during peak demand events. Uptake is largely confined to a small group of well-resourced large portfolio owners, with dedicated teams and strong support from energy retailers and service providers. Some say this is a grid, not a building, problem. Challenges include limited awareness, competing priorities, capability gaps, uncertain financial returns, concerns about tenant comfort and business continuity, technology challenges, and few environmental, societal and governance (ESG) drivers.

The business case for commercial buildings is becoming more compelling

New time-of-use tariffs, VPP offerings, equipment incentives and emerging market incentives are strengthening the financial case for flexibility. Value is currently difficult to quantify. However, evidence is emerging that shows flexing can be lucrative.[4]

ESG drivers are emerging

Building owners and operators saw little urgency for NABERS to create energy flexibility metrics when interviewed midway through 2025. However, the policy and reporting landscape is changing rapidly. New requirements and frameworks are expected to place increasing emphasis on when electricity is consumed, creating stronger drivers for organisations to understand, measure and improve energy flexibility. Emerging drivers include:

- National Construction Code 2025 energy monitoring requirements for large new commercial buildings
- Proposed Greenhouse Gas (GHG) Protocol time-based Scope 2 reporting requirements
- The shift from "100% renewable energy" claims towards "true zero" thinking
- Time-matched Renewable Electricity Guarantee of Origin (REGO) certificates
- Australian Government expectations for data centres
- Australian Energy Market Operator (AEMO)'s forthcoming *Demand-side Statement of Opportunities*.

There is no consistent way to measure energy flexibility in commercial buildings

The team's research established that there is no standard approach for measuring energy flexibility in commercial buildings, either in Australia or internationally.

Many stakeholders want NABERS to recognise and support energy flexibility

Most policymakers, energy market participants, regulators, industry bodies and research organisations believe NABERS has an important role to play in the development of energy flexibility in commercial buildings. They cite NABERS' strong reputation, market reach and track record of driving measurable improvements in building performance. Some also note that a trusted and consistent framework for recognising and measuring energy flexibility would support future policy development, market growth and industry confidence.

4. ADP Consulting, June 2026.

NABERS is working to recognise and support energy flexibility

In July 2026, NABERS began a three-year program of work to recognise and support energy flexibility in commercial buildings. The work is influenced by the findings of the NABERS Energy Flexibility Feasibility Study and is supported by the Australian Government. **It will involve close collaboration with stakeholders to ensure NABERS' approach is impactful, practical, credible and aligned with the operational realities faced by building owners and operators.** The work centres around 3 priorities.

1. Co-designing and developing metrics that recognise flexibility

Our goal is to **develop trial-ready metrics that are fully functional and ready for real-world use by mid-2029.**

The study identified several potential metrics and work-in-progress principles to guide future decisions. It also highlighted key design considerations, including how flexibility could be measured, how buildings should be compared fairly, how periods of abundant renewable generation could be defined, and how unintended outcomes can be avoided.

We are co-designing early proof-of-concept metrics.

2. Ensuring buildings maintain NABERS Energy star ratings when they flex

Work is underway to ensure that **buildings can maintain their NABERS Energy star ratings** when flexing, starting with a review of NABERS Energy battery rules.

3. Strengthening market capability

NABERS will support research to **quantify the impacts of energy flexibility in commercial buildings**, work with stakeholders to **share insights** and **align with emerging developments**, and **help build market understanding** through education, guidance and resources, including this study.

01.

Introduction

Image: Industrial warehouses, iStock.

What is energy flexibility?

Energy flexibility describes the ability of buildings to adjust when and how they use electricity in response to the needs of the energy system.

Sometimes this means using less electricity during periods of high demand; other times it means shifting energy use to when renewable electricity is abundant. Increasingly, it can also involve storing energy in batteries, sharing energy with the grid, or helping support the electricity system during periods of stress.

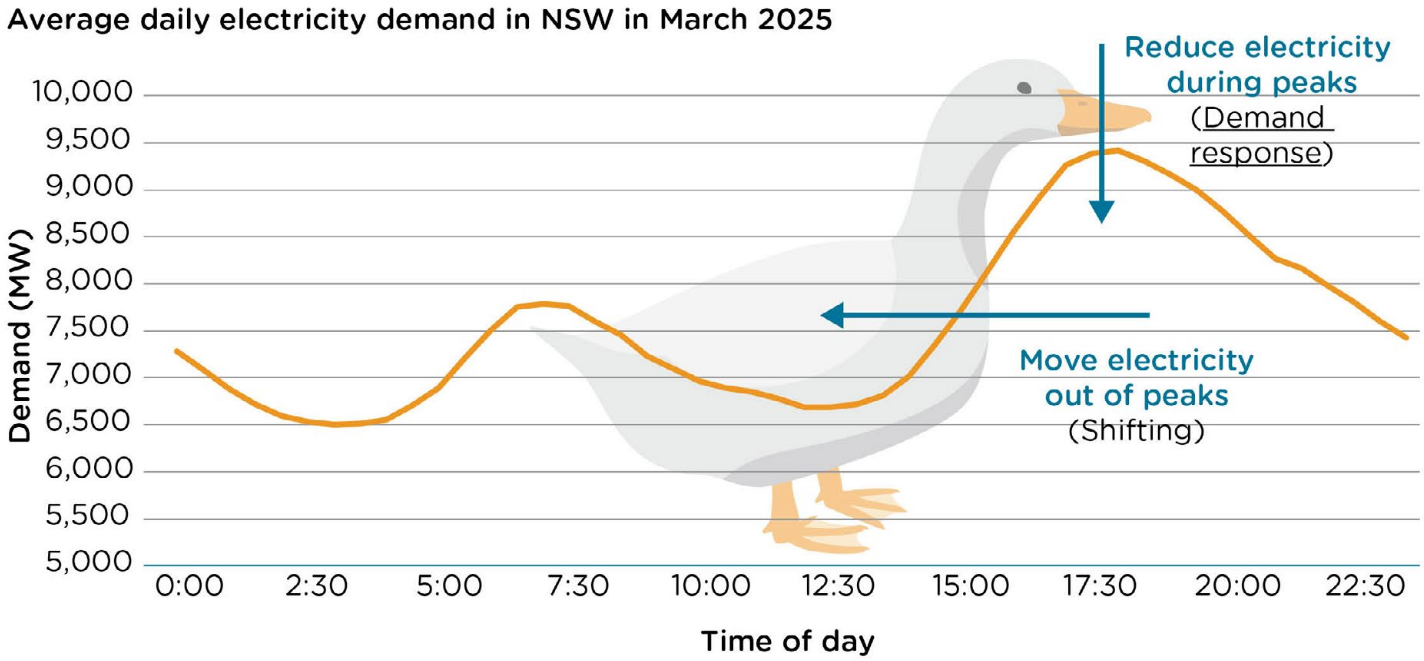
Understanding the duck curve

Figure 1 shows the typical 'duck curve' of daily electricity demand: low in the middle of the day before ramping up sharply in the late afternoon and evening peak on hot summer days.

This pattern has become more pronounced as rooftop solar adoption has grown.

The opportunity is straightforward. If some electricity consumption can be shifted into the middle of the day, when renewable energy is plentiful, and reduced during the evening peak, the electricity system can operate more efficiently and network augmentation costs, consumer energy bills and greenhouse gas emissions can all be reduced.

Energy flexibility is essentially the set of tools and behaviours that make this possible.



Data from AEMO's aggregated price and demand data.

Figure 1. Example of the 'duck curve' in NSW.

Why energy flexibility matters

Australia's electricity grid is the backbone of our economy. Maintaining stability means ensuring power flows to homes, businesses and essential services when needed.

However, the energy system we rely on is changing rapidly.

For more than a century, electricity generation was largely controllable. Coal, gas and hydro generators could generally be ramped up or down to meet demand. As we shift to renewable generation, we reduce greenhouse gas emissions but also change when electricity is available and how the grid operates.

Our challenge is no longer simply generating enough electricity. It is matching electricity demand with a more variable supply of renewable energy while maintaining reliability, affordability and system security. This includes:

- **Managing peak demand:** Electricity demand can rise sharply during periods of extreme heat or cold. In summer, this is often in the late afternoon and evening, when air-conditioning demand is high as solar generation rapidly declines after sunset. Winter peaks, particularly in southern states, occur when heating is needed during extended cold spells that coincide with periods of low solar and wind generation.
- **Managing minimum demand:** When renewable generation exceeds consumption, this pushes system demand below safe operating levels. This happens most often in autumn and spring, when mild temperatures reduce heating and cooling demand while high solar output allows homes and businesses to meet much of their electricity needs on site. Very low levels of grid demand create operational challenges for system operators and increases the risk of renewable energy being curtailed.
- **Maintaining system stability:** As the electricity system becomes more distributed and dynamic, operators must respond to a wider range of fluctuations in supply or demand. Network disturbances, sudden changes in generation and rapid shifts in electricity consumption can all create shocks that require fast-response corrective actions.

These challenges are likely to grow with the shift to electric technologies and vehicles, as more energy-intensive data centres are constructed and as extreme summer heat drives demand. At the same time, rooftop solar will also shape daily demand patterns.

Australia is a global leader in rooftop solar adoption, with more than 4.3 million households and small businesses installing systems as of February 2026. This has implications for the grid, as solar generation drops off quickly around sunset while demand remains high.

Large scale battery installations are helping to stabilise the grid, and more than 236,000 batteries have been installed since the launch of the Australian Government's Cheaper Home Batteries Program in July 2025.[5]

5. Australian Energy Council, March 2026.

Traditional solutions are costly and misaligned with Australia's climate goals

Building more network infrastructure or relying on fossil fuel peaking plants to manage a small number of extreme demand events locks in high costs and emissions. At the same time, renewable energy is often curtailed when it is most abundant, reducing the value of clean energy investments. Together, these dynamics push system costs and consumer bills higher, slow progress toward renewable energy targets, and perpetuate environmental impacts associated with fossil fuel use.[6]

Energy flexibility is a cost-effective, lower emissions solution

Energy flexibility in residential and commercial buildings is a cost-effective, scalable mechanism to support Australia's transition to a more stable, renewable grid.

A 2024 meta-analysis by the Institute for Energy Economics and Financial Analysis (IEEFA) estimated that more effective integration of distributed energy resources – including flexible demand, batteries, EVs and rooftop solar – could deliver more than $19 billion in economic benefits by 2040, while improving system reliability and reducing emissions.[7] This includes $11 billion in avoided network investment and $8 billion in reduced generation and storage costs.

Estimates from the Australia Institute and Buildings Alive state that "if all buildings shifted one third of their peak electricity consumption to the middle of the day, this would save $1.7 billion annually and add additional peak capacity equivalent to 52% of Australia's existing coal generation fleet. It would reduce Australia's greenhouse gas emissions from electricity by 1.9% (2,780,000 tonnes) per year and accelerate decarbonisation by encouraging more renewable energy investment."[8] This estimate is based on all Australian commercial, institutional and residential buildings. The NABERS team is not aware of similar published calculations that purely focus on commercial buildings.

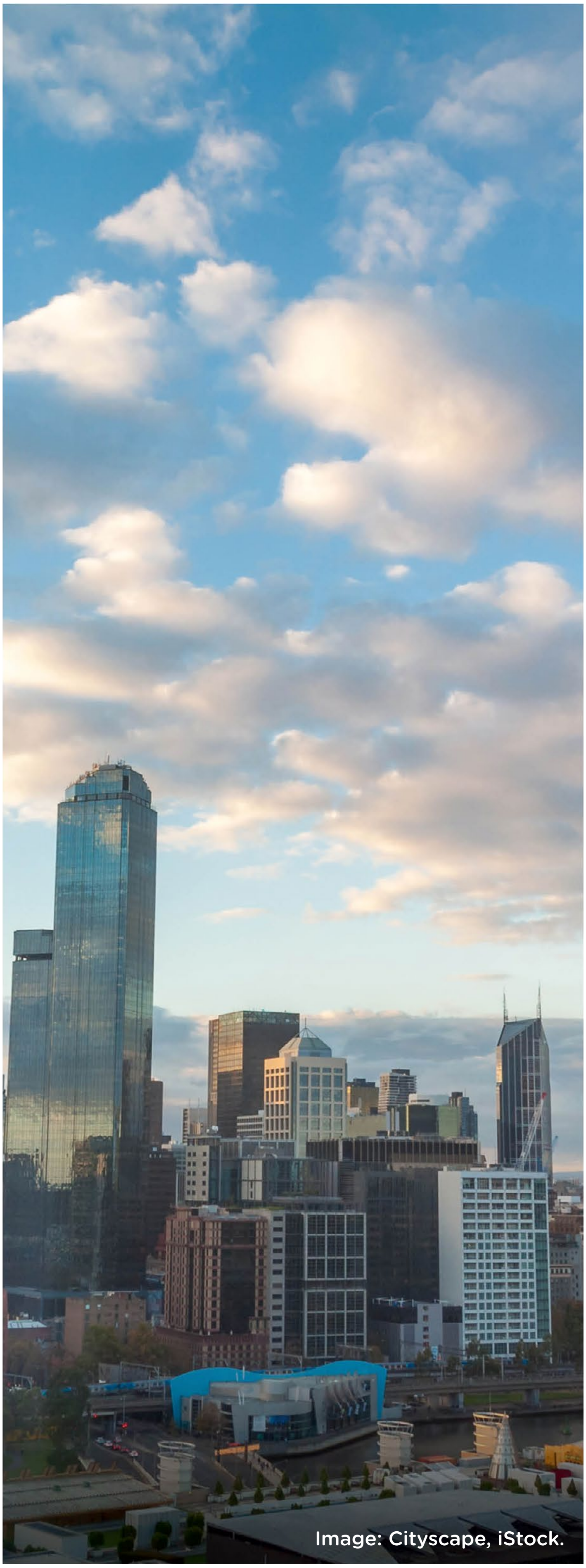


Image: Cityscape, iStock.

6. Energy Efficiency Council, December 2024.
7. IEEFA, 2024.
8. The Australia Institute and Buildings Alive, April 2024.

What this report covers

Section 2 of this report contains information for readers interested in how NABERS will support and recognise energy flexibility in commercial buildings, including details on the design of NABERS' flexibility metrics.

Section 3 of the report is for readers seeking to deepen their understanding of energy flexibility in commercial buildings. It includes insights on how commercial buildings can flex, who is involved in flexing, and which buildings have the most and least capacity to flex. Comprehensive information is also provided on energy flexibility challenges, drivers and enablers.

Image: Cityscape, iStock.

02.

NABERS and energy flexibility

Image: Commercial building, iStock.

How NABERS can support energy flexibility

Three priorities for NABERS emerged consistently across stakeholder interviews: creating metrics to recognise flexibility, ensuring buildings maintain NABERS Energy star ratings when they participate in flexibility activities, and helping to build market capability. The key findings are summarised below.

Designing and developing metrics that recognise flexibility

Stakeholder sentiment

Views were divided on whether NABERS should develop formal energy flexibility metrics.

Many building owners and operators we spoke with in mid-2025 considered this a lower priority for NABERS than improving market understanding and capability.

> *"If you said to me, 'Is this the biggest priority for NABERS?' I would say, personally, no... There are other people working on it."*
>
> **– Building owner and operator**

> *"I love a good rating tool, but I think there's a bigger importance around educating engineering teams, sustainability teams and assessors, and communicating to PMs [property managers] and FMs [facility managers]. It is bigger bang for buck to upskill them, than developing a benchmarking tool."*
>
> **– Building owner and operator**

> *"I don't think [a NABERS energy flexibility tool] would be something that we would particularly focus on. We are more focused on making sure our assets are operational and that we are making the tenants as satisfied as possible."*
>
> **– Building owner and operator**

In contrast, most other stakeholders – including system operators and planners, Commonwealth and state government representatives, energy retailers and energy service providers, building services consultants, peak industry bodies and publicly funded research and innovation organisations – see NABERS as well positioned to provide a trusted and consistent national standard for recognising and measuring energy flexibility. They note that NABERS energy flexibility metrics can drive policy and support the development of an energy flexibility market.

These stakeholders pointed to NABERS' nearly three decades of experience delivering measurable sustainability outcomes across the built environment. They argue NABERS has strong credibility and trust, wide market reach and significant signalling power.

> *"Everyone agrees that if NABERS mandated [flexing], then everyone would jump on board."*
>
> **– Publicly funded research and innovation organisation**

> *"NABERS has the legitimacy of a government program and that is very valuable. So, your signalling matters."*
>
> **– Peak industry body**

> *"NABERS needs to be updated to adequately reflect the emissions benefit of load shifting via flexible time-of-use capabilities."*
>
> **– Energy services provider**

> *"Flexing is commercially valid, operationally valid, achievable, worthwhile – but there is no official recognition for buildings."*
>
> **– Virtual Power Plant operator**

> *"If NABERS says this is important, other parts of government will pay attention."*
>
> **– Peak industry body**

These sentiments align with the Australian Government's Update to the Trajectory for Low Energy Buildings,[9] which identifies NABERS as an effective mechanism for motivating building owners to improve building performance and calls for NABERS to "incorporate time-of-use and energy flexibility considerations into existing and new tools."

Many of the stakeholders urging NABERS to design and develop energy flexibility metrics stress that work to explore metrics needs to occur urgently, rather than waiting for the market to mature, as metrics may take some time to develop.

> *"We want urgency, so you can't just educate the market to 2030."*
>
> **– Research and innovation organisation**

> *"I don't think you need to resolve everything ASAP, because no one has all the answers yet, but you should definitely do all of the exploratory work."*
>
> **– Peak industry body**

Next steps

NABERS will work closely with stakeholders to co-design and develop metrics that recognise buildings that flex. Next steps are to:

- **Produce early proof-of-concept metrics** that explore the impacts of different design decisions and identify approaches that are commercially viable for building owners and operators, can be implemented and assessed by NABERS, and deliver real benefits. **For more information on this please refer to the section on "Designing NABERS' flexibility metrics".**
- **Identify a shortlist of energy flexibility metrics that best align with NABERS' principles**, then collaborate with stakeholders to co-design metrics and assess key design considerations.
- **Ensure NABERS can access, manage and store required data**. This includes matching granular meter data with corresponding grid emissions data. This could increase the number of data points currently collected for a rating from 12 annual meter readings and a single annual emission factor to more than 210,240 data points per rating.
- **Undertake detailed design and development** of trial-ready metrics that are fully functional and ready for real world use.

9. Energy and Climate Change Ministerial Council, August 2025.

Maintaining NABERS Energy star ratings for buildings that flex

Stakeholder sentiment

Stakeholders consistently emphasised the importance of ensuring buildings can maintain their NABERS Energy star ratings when implementing energy flexibility strategies. This is particularly relevant for batteries providing grid stability support, where a small increase in site energy consumption can deliver benefits to the electricity system but may impact ratings.

Several building owners and operators expressed concern that current rating rules could discourage participation if flexibility activities negatively affect a building's star rating.

> *"We had someone come to us years ago. They said, 'If you allowed us to change your demand around, we can save you $20,000, but you'd lose half a star under NABERS.' But we've just spent a couple of million dollars upgrading this building to get that half a star, and we're really quite attached to it."*
> **– Building owner and operator**

> *"If you can exclude what we are doing that's helping the grid, that would be important to us and our tenants because many of them want to move into a 5.5 star building."*
> **– Building owner and operator**

> *"If a building can move their energy out of grid stress times, then that's a good thing. It shouldn't be a penalty on the building."*
> **– Energy services provider**

> *"Flexing will take a bit more energy. We see this as a small risk, but you'd be really upset if this knocked you back to 4.5 stars."*
> **– Energy services provider**

Next steps

NABERS is committed to supporting energy flexibility in commercial buildings by ensuring NABERS Energy rules do not unintentionally penalise building owners and operators that participate in flexibility initiatives.

Our objective aligns with NABERS' mission to support better decisions for positive environmental, social and economic outcomes.

Our initial focus will be to review the rules governing the use of batteries to support grid stability. Batteries provide a clear, measurable starting point, and our research indicates that mitigating the impact of battery losses on NABERS Energy star ratings is currently of most interest to building owners and operators.

Image: Industrial warehouses, iStock.

Building market capability

Stakeholder sentiment

Many stakeholders believe NABERS can play an important role in building market capability in energy flexibility. Interviewees noted that NABERS can leverage its trusted market position to help demystify the concept through research, guides, case studies, industry engagement and other resources.

> *"A role for a scheme like NABERS would be on the information provision side. People will need a lot of hand holding to be able to engage and make the right decisions."*
> **– Energy markets advisory body**

> *"There's a benefit of the communications piece: it helps with transparency and normalisation. This is something that's really great about a lot of NABERS tools."*
> **– Energy markets advisory body**

> *"We can educate customers through sales conversations and by working with partners like NABERS. The education piece is really important."*
> **– Energy retailer**

> *"In a world where a business has to identify its load flex capacity as part of a NABERS' assessment, it would help to start by building literacy."*
> **– Peak advisory body**

Next steps

NABERS will focus on strengthening market capacity and understanding of energy flexibility by sharing research, case studies and practical insights. This includes:

- **Sharing this report widely** to raise awareness of energy flexibility, its relevance to commercial buildings and the role NABERS will play in supporting it.
- **Supporting research quantifying the potential impact of flexibility in commercial buildings** on factors such as grid augmentation costs, emissions reductions and renewable energy targets.
- **Supporting energy flexibility capability initiatives**, including guidance on energy flexibility for buildings delivered through the Better Buildings Partnership and ADP Consulting's report on the benefits of energy flexibility.[10]
- **Participating in energy flexibility industry forums and communities of practice** to share learnings, gather feedback and align with emerging developments.

Image: Solar panels, iStock.

10. ADP Consulting, June 2026.

Designing NABERS flexibility metrics

Our research surfaced questions around how energy flexibility could be measured, what outcomes could be recognised, and how future metrics could be integrated into existing NABERS ratings.

Many building owners and operators stressed that energy flexibility metrics must align with operational realities, support voluntary market uptake and avoid creating unnecessary complexity. The NABERS team understand this.

Importantly, we heard that energy flexibility metrics sit best as part of NABERS Energy rather than in a new, stand-alone tool.

We explored several energy flexibility metric options and have devised a set of work-in-progress principles to guide future decisions.

This section covers potential metrics, principles for decision making and other key considerations.

Principles to guide future development and decisions

This research helped inform a set of work-in-progress principles to guide decision-making as energy flexibility metrics are designed and developed. These principles recognise that NABERS energy flexibility metrics must deliver meaningful outcomes for both building owners and the broader electricity system. Future metrics should be:

- **Impactful** – reducing emissions and supporting a stable, reliable electricity system
- **Independent, trusted and technically robust** – providing confidence and credibility for market use and public reporting
- **Based on measured, operational data** – to align with NABERS principles that recognise outcomes rather than capability or technology
- **Technology agnostic** – recognising multiple pathways to flexing
- **Aligned** – consistent with existing and emerging standards, frameworks and methods for measuring and incentivising energy flexibility
- **Future-proofed** – capable of evolving alongside the energy system and flexing practices
- **Market-relevant** – supporting decisions by building owners, tenants, investors and policymakers
- **Practical** – feasible for the NABERS team to develop and deliver.

Early ideas on potential metrics

Several potential energy flexibility metrics were discussed during the NABERS' feasibility study and will be explored further including:

A modified Renewable Energy Indicator (REI) to encourage buildings to use energy when renewables are plentiful and shift away from peak demand events. This metric could incorporate hourly time-stamped REGO certificates.

A new standalone flexibility metric. Several options can be explored:

- An indicator displaying the proportion of energy used when renewables are plentiful and emissions are low
- An indicator that shows how well buildings can reduce their own peaks
- An indicator that recognises buildings that support the grid during peak demand events.

Adjusted Scope 2 emissions reporting in NABERS Energy to incorporate time-of-use emissions factors.

A time-of-use NABERS Energy star rating. This option, while explored as part of this research, is unlikely to be implemented as the NABERS' National Steering Committee has decided that NABERS Energy star ratings will purely focus on energy consumption from 2030.[11]

11. www.nabers.gov.au/news/changes-nabers-energy-update-2030

Key design considerations

Stakeholder feedback and NABERS' preliminary analysis highlighted several issues that will be particularly important in the design of energy flexibility metrics.

Integration with NABERS Energy

Stakeholder feedback favoured embedding energy flexibility metrics within NABERS Energy, rather than creating a separate tool.

Interviewees noted that NABERS Energy is a well-established and trusted framework for communicating operational performance. NABERS ratings are used to verify compliance with the national Commercial Building Disclosure (CBD) Program, and to support a range of other voluntary disclosure, procurement and performance requirements. Integration would avoid additional cost and complexity, build on existing market understanding, and support broader uptake.

> *"What use is it if it's separate? NABERS Energy is the holy grail of sustainability ratings in Australia."*
>
> **– Building owner and operator**

> *"An additional cost is always hard to get across the line. We would have to get additional assessors, an additional consulting fee and we'd have to sell that to the business."*
>
> **– Building owner and operator**

Stakeholders also stressed that any future energy flexibility metrics should complement, rather than complicate, the existing and well-understood rating system.

> *"Don't break NABERS Energy, it works really well. It's global best practice. Everyone knows it, understands it and trusts it. The fallback from having to unpack what the REI [Renewable Energy Indicator] means has caused so much noise unnecessarily. Adding another layer on that around demand response will really confuse people."*
>
> **– Building owner and operator**

Ensuring fair comparisons between ratings

Trust in NABERS rests on the ability to make fair comparisons. Future energy flexible metrics will need to maintain this principle. Stakeholders told us that comparisons may need to consider normalising by building type, location, hours of operation and the extent of electrification.

Defining when renewables are plentiful

To recognise buildings that use electricity when renewable energy is abundant, NABERS' metrics must first define when those periods occur. While this sounds straightforward, renewable generation patterns vary by region, season and over time. Several approaches were explored, including:

- **A static time window,** such as 9am to 3pm. This would be simple to understand, communicate and align with some frameworks, such as the GBCA's Leadership Challenge. However, it may not reflect grid conditions or align with other frameworks with different time windows.
- **A static window that varies by region or distribution network service provider (DNSP).** This would better reflect what's happening on the ground than a static time window, but could introduce some additional complexity.
- **Time-match actual renewable generation that varies by region or DNSP.** This could use granular grid intensity data or wholesale spot prices as a proxy, and would be more responsive to changing grid conditions, but require more complex data inputs and clear thresholds to define when renewable generation is considered high.

Peak demand metric considerations

- **Defining peak demand events consistently.** Periods of system stress vary by location, season, weather and market circumstances. Buildings can participate in multiple programs that require different responses, making a single national approach difficult to apply.
- **Establishing a fair, credible baseline.** Determining whether a building has genuinely supported the grid during peak demand events may require an understanding of what would have happened had the peak not occurred and is heavily based on assumptions.
- **Measuring performance consistently.** Signals and delivery mechanisms are not yet mature. Many building owners currently respond to ad hoc requests from energy retailers, rather than automated signals that can be systematically tracked and compared.

Avoiding unintended outcomes

Energy flexibility can improve grid reliability, but not all forms of flexibility support decarbonisation.

For example, running diesel generators during peak periods can reduce pressure on the grid, but also increases local air pollution and greenhouse gas emissions. Similarly, low electricity demand in gas-heated markets like Victoria may simply reflect the use of fossil fuels rather than genuine flexibility.

Future NABERS energy flexibility metrics must be carefully designed to avoid incentivising fossil fuel use or discouraging electrification. Flexibility outcomes must deliver real, decarbonisation benefits rather than shifting emissions across fuels.

Image: Industrial warehouses, iStock.

Taking inspiration from others measuring energy flexibility

NABERS is not the first organisation to explore how energy flexibility might be recognised and measured. Several existing frameworks and initiatives provide useful insights into the opportunities and challenges involved.

While these approaches differ in scope and methodology, they share a common focus on understanding not just how much energy buildings use, but when they use it and how those patterns interact with the electricity system.

Green Building Council of Australia, Time of Energy Use Leadership Challenge

The GBCA's Time of Energy Use Leadership Challenge is available for projects targeting Green Star Performance v2 and rewards reductions in real-time grid electricity greenhouse gas emissions by encouraging existing buildings to shift electricity use into periods when renewable generation is abundant and grid-emissions intensity is low.

The challenge introduces the Time of Energy Use Effectiveness Metric (TEEM), which measures the proportion of a building's total annual electricity consumption between 9am and 3pm, expressed as a percentage. TEEM is calculated using at least 12 months of interval electricity data, submitted via an Excel-based tool. While the initial metric uses a fixed daytime window, the GBCA notes that the definition of TEEM is expected to evolve as grid conditions, generation profiles and data availability change.

The challenge also aims to drive progression over time by starting with measuring and reviewing the time of electricity use, to actively managing and reporting on time of electricity use, and ultimately demonstrating improvements in grid optimisation.

Image: Solar and wind farm, iStock.

New Buildings Institute – GridOptimal

The GridOptimal Buildings Initiative was launched in 2018 by New Buildings Institute (NBI) to rethink how buildings interact with the electric grid. GridOptimal emerged from NBI's work on zero net energy buildings: what happens to the grid when many buildings are electricity consumers and producers? The growth of distributed solar, batteries, electric vehicles, and smart systems in buildings presents both a challenge and an opportunity.

First, GridOptimal created a consensus-driven set of GridOptimal metrics to measure how effectively buildings can shed, shift, and flex their electricity load shapes (demand profiles). GridOptimal metrics quantify the degree to which permanent/passive strategies flatten building load shapes (i.e., make the building less "peaky" during grid peak hours) and assess the building's capability for demand flexibility (i.e., how much it can shed or shift load).

These metrics give utilities, regulators, designers, and owners a consistent way to assess grid-interactive efficient buildings. The metrics are used in U.S. Green Building Council's LEED rating system as part of the GridOptimal Alternative Compliance Pathway and have been used to inform model code language in multiple versions of the International Energy Conservation Code (IECC) and multiple ASHRAE standards, as well as in multiple stretch codes at the state level.

To realistically move the needle on adoption, GridOptimal focuses on helping building owners holistically understand that there are multiple value streams from building design or operations choices: Traditional energy efficiency (e.g., insulation) and Demand flexibility (e.g., smart thermostat controls) strategies can deliver energy cost savings, unlock demand response program incentives, enhance resilience and passive survivability, and reduce greenhouse gas emissions.

NBI has published fact sheets and detailed design/operations guidance for architects, engineers, and utility programs including specification-ready recommendations of straightforward, achievable strategies that can help commercial and residential buildings permanently reduce summer and winter peaks by 20 to 40% and automatically shed or shift peak demand by a further 15 to 30%.

NBI has embedded GridOptimal thought leaders in leading utility incentive and technical assistance programs (e.g., the Energy Trust of Oregon Future Ready Buildings program offer) and is leading emerging technology field validations involving distribution grid planning, microgrids, and electric Vehicle-to-Grid (V2G) deployment. The initiative has expanded internationally, through LEED projects in various nations and through the public-private GridOptimal-India project and continues to support utility planning and building decarbonisation strategies aimed at creating more flexible, resilient, affordable, and renewable-ready electric grids. Currently, the GridOptimal Buildings Initiative is focused on deployment of best practices in buildings through pilot projects, program applications, and policy advancement.

Benchmark 8760, New York State Energy Research and Development Authority (NYSERDA)

Benchmark 8760 is a proof-of-concept project, funded by NYSERDA, exploring how the use of hourly data could improve building energy performance benchmarking.

The initiative investigated how hourly electricity consumption, occupancy and grid emissions data could achieve precise, fair and actionable benchmarking. A key objective was to inform potential evolutions of programs such as ENERGY STAR Portfolio Manager and policies like New York City's Local Law 97, which relies largely on annual data.

The project demonstrated that hourly consumption and occupancy data can be collected from commercial buildings. However, progress beyond the proof-of-concept stage has slowed, largely due to changes in the US policy environment rather than limitations of the underlying technical approach.

Image: Cityscape, iStock.

Looking ahead

This report marks the beginning of a three-year NABERS program supported by the Australian Government. The feasibility study found strong interest in energy flexibility but also confirmed that the market remains at an early stage of development.

Over the coming years, NABERS will work with stakeholders to co-design fit-for-purpose energy flexibility metrics, to ensure buildings that flex are able to maintain their star ratings, and help to build energy flexibility capability.

We recognise that technologies, markets, policy settings and stakeholder expectations will continue to evolve. NABERS is therefore committed to a collaborative, staged and evidence-based approach that brings stakeholders together to test ideas, build understanding and develop practical solutions that are credible, useful and aligned with real-world operational needs.

Through this work, NABERS aims to support informed action today while helping lay the foundations for future tools, metrics and frameworks that recognise and support energy flexibility in commercial buildings in future.

03.

Additional information and insights

Image: Industrial warehouses, iStock.

How can commercial buildings flex?

Commercial buildings can flex in three key ways:

1. Energy efficiency improvements	**2. Load shaping and shifting**	**3. Network support**
Reducing overall electricity demand through more efficient building design, equipment and operations.	Moving electricity loads to periods when renewable energy is abundant and away from peak demand events.	Supporting the grid during times of system instability, (such as shedding loads or participating in virtual power plants).

Deploying these flexing strategies in tandem enables commercial building owners and operators to maximise emission reductions and financial payoffs.

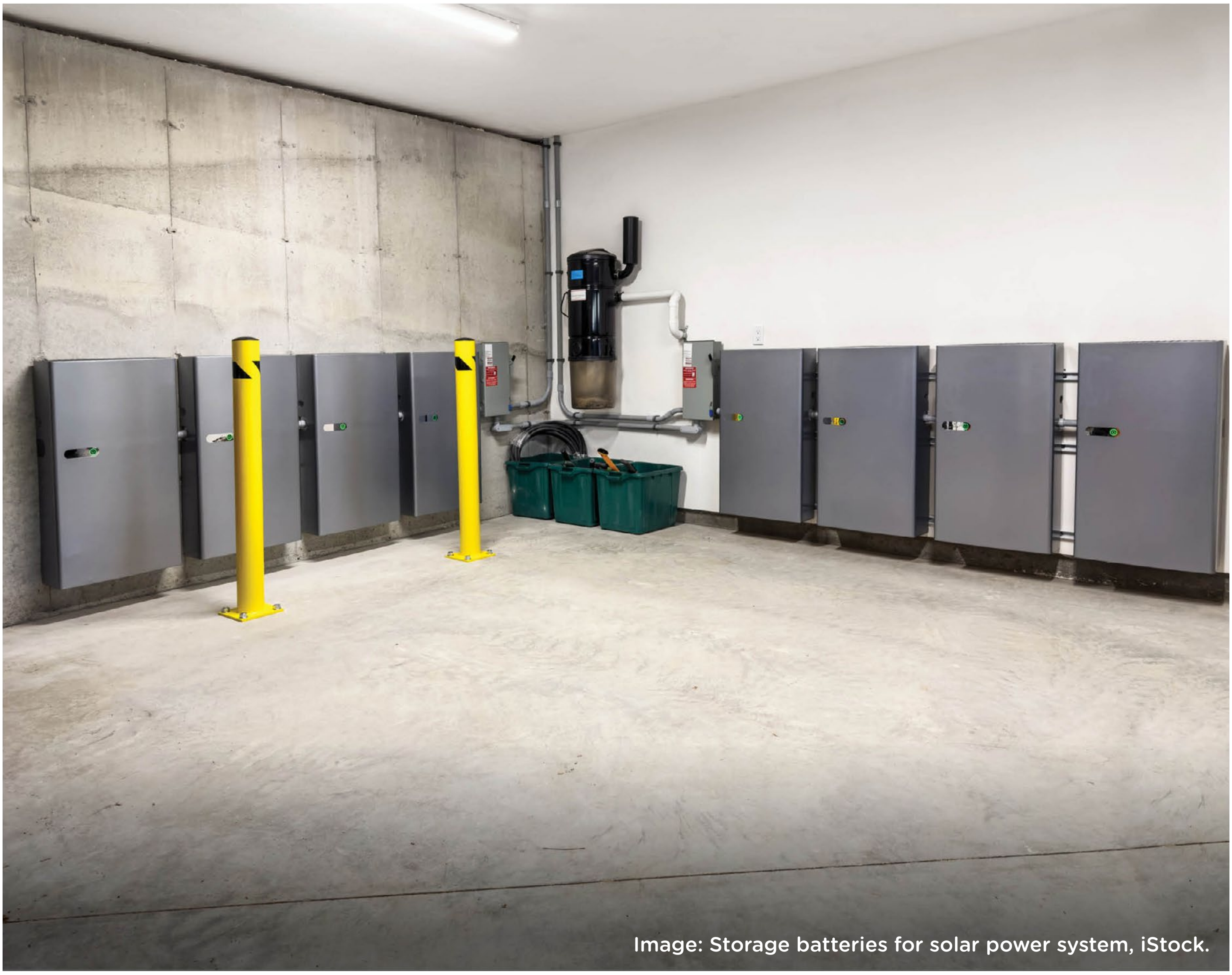


Image: Storage batteries for solar power system, iStock.

The role of energy efficiency

Energy efficiency is the foundation of electricity system stability and lower emissions. Buildings that operate on less energy also use less energy during peak demand events.

> *"Energy efficiency should come first, reducing overall energy demand through high-performing building envelopes."*
> **– International Energy Agency, 2024.**[12]

Energy efficiency is especially important during multi-day winter peaks, when heating demand is high, solar generation is limited and batteries may be unable to provide sustained support to the grid.

NABERS has helped building owners and managers to improve energy efficiency since 1999. Measurement leads to better management, and over the last two decades NABERS customers have saved:

- $2.2 billion on energy bills
- 15.5 million tonnes of CO_2 emissions.

The steps to energy efficiency are well defined. Industry knowledge is sophisticated and it is easy to get started. Strategies include using timers, sensors and smart control, improving the building's thermal shell, upgrading equipment, installing solar and batteries and – perhaps most importantly of all – engaging people to embrace energy saving behaviours.

Ready, set, rate

Commercial building owners that do not already rate the energy performance of their buildings with NABERS can check their eligibility to rate on our website and find a NABERS Assessor to guide them through the process.

www.nabers.gov.au

Image: Solar and wind farm, iStock.

12. International Energy Agency, April 2024.

Load shaping and shifting

Another way buildings can flex is by moving electricity consumption away from peak demand periods to times when renewable energy is abundant.

Taxonomy of flexible demand[13] is a concept that refers to these behaviours as load shaping and shifting:

- **Load shaping** is a long-term, consistent approach that changes electricity use over months and years and permanently alters demand patterns to better align with grid needs and renewable generation.
- **Load shifting** is moving electricity use forwards or backwards in time over hours and days to avoid peaks or make use of periods when renewables are plentiful and emissions are at their lowest.

Both load shaping and shifting help flatten demand curves and reduce emissions. When buildings are exposed to the wholesale electricity market, time-of-use tariffs or Power Purchasing Agreements (PPAs) they can take advantage of cheaper electricity prices.

Load shaping and shifting are often seen as a natural next step after energy efficiency, because they can take advantage of existing building systems, delivering financial and environmental benefits without major infrastructure upgrades.

Building owners can get started through manual intervention and then streamline their strategy by using systems that allow them to schedule or automate electricity use. This can be done through a Building Management System (BMS) or signals from energy providers. Some building owners already work with energy providers to optimise battery charging and discharging.

There are many ways a building can move loads, including:

- Staggering appliance use to flatten loads
- Heating domestic hot water during periods of high renewable generation
- Charging batteries, electric vehicles and chilled water storage when renewables are plentiful and emissions are at their lowest
- Changing temperature setpoints, pre-heating or pre-cooling spaces, or adjusting refrigeration set-points while maintaining tenant comfort, food safety and lease requirements
- Discharging chilled water storage instead of running chillers during peak periods
- Optimising strategies seasonally to align with renewable generation patterns and peak demand windows.

During our research, stakeholders most frequently referred to battery optimisation, pre-heating and cooling, and refrigeration strategies as those they are most aware of or engage with.

13. Brinsmead, T.S., et al., 2021.

Supporting the grid during times of instability

Buildings can flex by rapidly reducing the amount of electricity they draw from the grid or by sharing electricity (e.g. stored in batteries). The *taxonomy of flexible demand* refers to this as load shedding and shimmying:

* **Load shedding** is temporarily reducing or switching off electricity use, for minutes or hours, to help manage peak demand or respond to electricity grid and contingency events.
* **Load shimmying** is very fast adjustment of electricity demand over seconds (or faster) in response to external signals, typically to support real-time system balancing such as frequency control ancillary services (FCAS).

Buildings can support grid stability in several ways, including drawing power from onsite batteries, shifting loads to different times of day, temporarily reducing electricity consumption, adjusting heating, ventilation and air conditioning (HVAC) systems for short periods and participation in VPPs, FCAS and other grid support mechanisms.

> *"We are putting solar in to manage peak demand and the battery in to optimise demand response. That pays for itself."*
> **– Building owner and operator**

To participate, buildings must respond to signals, typically from energy retailers, electricity service providers and DNSPs who call on facility managers, offering a financial reward for flexing.

Most flexibility events involve planned, time-bound actions that occur over minutes or hours. More information on these strategies is found in ADP Consulting's white paper, *Orchestrated energy*.[14]

Image: Cityscape, iStock.

14. ADP Consulting, June 2026.

Who is involved in flexing?

Energy flexibility involves multiple stakeholders across the electricity and building sectors.

Building owners and managers decide whether to invest in flexibility-enabling technologies and strategies.

Financial decision makers evaluate costs, savings and revenue opportunities of high performing assets.

Tenants play a role by occupying low-emissions buildings, transparently reporting on their energy consumption and sharing their progress towards corporate sustainability goals with the market.

Facility managers, engineering and technical teams operate building systems, implement controls and maintain building operations, including comfort and safety.

Energy retailers, energy services providers, DNSPs and building services consultants (including NABERS Assessors) can help identify, design and deliver financially rewarding flexing strategies.

AEMO operates the electricity system and markets, coordinating supply and demand in real-time and procuring demand-side flexibility to maintain system security and reliability.

Which buildings have greatest capacity to flex?

Not all commercial buildings can participate in energy flexibility to the same extent.

Our research suggests that buildings are generally better placed to flex when they are highly electrified, have modern controls and automation systems, operate beyond standard business hours, or can adjust energy use without disrupting critical services.

Several building types stood out:

Electric buildings

Buildings that rely on electricity for heating, cooling and hot water are generally better able to shift their loads and participate in demand response programs. Electric systems can be controlled more precisely and respond quickly to signals from building management systems, energy retailers or connected devices.

Newer buildings

Modern buildings are more likely to incorporate electrification and energy-efficient equipment, including sensors, smart energy management systems or batteries. These features make electricity demand more visible, controllable and responsive.

Retrofitted buildings

Many existing buildings can improve their energy flexibility through upgrades of smart controls, electrified heating and cooling systems, solar panels, batteries and heat pumps. However, retrofit opportunities are often constrained by space, building design and capital costs.

Buildings with extended operating hours

Buildings that operate into the evenings, like shopping centres, hotels, airports and data centres, are often well positioned to respond to peak demand events. In contrast, standard office buildings typically have fewer opportunities to flex outside normal business hours.

Buildings with some flexibility in their operations

Buildings that can temporarily adjust heating, cooling, refrigeration or other non-critical loads without disrupting essential services are generally better placed to participate in flexibility programs. This flexibility usually comes from adjusting heating, cooling or refrigeration settings for short periods, or from using the building's thermal buffer (for example, pre-cooling earlier in the day so systems can run less later).

Shopping centres, followed by supermarkets, warehouses and some industrial facilities, were most frequently mentioned as having this capability. Some stakeholders noted office buildings can provide flexibility while maintaining indoor temperature ranges set out in leases or workplace agreements.

While some stakeholders see merit in these strategies, building owners and operators note the complexity of achieving this in practice without breaching comfort expectations or contractual requirements.

Data centres

Hyperscale data centres can support the electricity system through measures such as deferring non-critical loads, shifting workloads geographically, operating on backup power during emergencies, and co-locating large-scale batteries.

In contrast, we heard that co-located data centres are already highly efficient and cannot flex because energy is needed to support critical infrastructure (such as air traffic control and border control) 24 hours a day, 7 days a week.

Similarly, we heard that cloud service providers (who provide services for banks, hospitals, governments and sole traders) can't shift workloads because they cannot directly influence the way their clients run their workloads, and their development applications rule out the use of their diesel generators to support peak demand events due to noise and emission concerns (unless directed by AEMO). While this is the case, they can incentivise their clients to shift their electricity use through favourable pricing arrangements.

The Australian Government's Expectations of data centres and AI infrastructure developers[15] state that new data centres and AI infrastructure should not place upward pressure on energy prices and should make a positive contribution to Australia's energy transition. *Expectation 2: Supporting Australia's energy transition* specifies that data centres should "minimise their energy demand and emissions by adopting industry-leading efficiency measures and technologies" and "improve the overall security and stability of the energy grid, including by enhancing demand flexibility and opportunities for peak-load management and appropriate sharing of consumption data."

15. Department of Industry, Science and Resources, March 2026.

Energy flexibility challenges, drivers and enablers in commercial buildings

This part of the report summarises what we learnt about:

- **Market acceptance**
- **Financial considerations**
- **Operational considerations**
- **Technology considerations**
- **Sustainability frameworks, reporting requirements, regulation and procurement policies**

Together, these insights offer a snapshot of where the market is today and where it may be heading next.

Image: City street, iStock.

Market acceptance

Uptake of energy flexibility is limited as financial returns, practical risks and implementation pathways evolve.

What's happening today

Awareness is limited

Few building owners and operators understand energy flexibility, its benefits, or how to get started. Uptake is largely confined to a small group of well-resourced large portfolio owners, with dedicated teams and strong support from energy retailers and service providers. Most are in the experimentation phase, testing what is operationally and financially viable.

Even with their resources and sustainability commitments, many building owners report that flexibility remains challenging and may be difficult for B- and C-grade building owners to adopt.

Grid stability is not a priority

Many building owners and operators do not yet see energy flexibility as a business priority.

Commercial building owners recognise that electricity system instability could affect business continuity, but many question whether grid stability is a commercial building problem to solve. Some argue that peak demand is largely driven by households and occurs outside office operating hours. Others acknowledge that shopping centres, warehouses and data centres, which operate into the evening, may be better placed to support flexibility outcomes.

> *"We seem to be taking on an awful lot of the requirement that the grid should be doing. I still think the distribution level is where you'll get the best outcome."*
>
> **– Building owner and operator**

Future developments

Concerns raised reflect the realities of an early market, where financial returns, practical risks and implementation pathways are still evolving. Adoption is expected to increase over time as technical and operational barriers are addressed, case studies and guidance emerge, capability grows, incentives become more compelling, and sustainability frameworks, regulation and procurement policies align.

Financial considerations

While some buildings are generating significant financial returns, the business case for energy flexibility can be difficult to identify, quantify and predict.

What's happening today

Flexing can be lucrative

While few case studies are publicly available, NABERS has identified examples where flexing strategies can be lucrative.

ADP Consulting's *Orchestrated energy* report suggests buildings that can shift loads or draw on stored energy during wholesale electricity price spikes – which occur just 20-50 times a year – may reduce energy costs by a third and pay back battery investments in under 4 years, with retail centres and other large, energy-intensive assets best placed to benefit.[16]

Financial signals are fragmented

Revenue opportunities can come from multiple sources, including from Wholesale Demand Response Mechanism (WDRM) payments, time-of-use tariffs, PPAs, equipment incentives, grants and government incentives. There is no way for building owners to aggregate this information to understand which incentives are available, how they interact, and whether the combined benefits justify flexing.

Incentives target residential versus commercial buildings

Most flexibility programs, incentives and media coverage focus on households rather than businesses. The *Cheaper Home Batteries Program* and *Solar Sharer Offer*, for example, target households.

> *"When we've looked at the numbers, it seems to be very much residential driven, and the timings are not when commercial buildings are going to be using a lot of energy."*
>
> **– Building owner and operator**

Financial returns are unpredictable

Financial returns can be difficult to forecast. Market conditions, demand response events and electricity prices vary over time, creating uncertainty around payback periods and long-term value.

> *"We are very aware that things could change on the grid and that would change the payback periods quite significantly underneath us."*
>
> **– Building owner and operator**

Some building owners and operators told us they prefer the predictability of fixed or hedged retail contracts and are cautious about flexibility arrangements that increase exposure to wholesale market volatility, even where potential revenues or savings are available.

16. ADP Consulting, June 2026.

Further, without a clear and transparent link between system-wide avoided costs and impacts on network charges on electricity bills, it is difficult for owners to factor these potential savings into decisions.

Contracts can limit flexibility

Some commercial building owners and operators are locked into long-term agreements that prevent load shaping and shifting for the duration of the contract.

> *"Electricity contracts are shaped to our portfolio load profile for the NMIs [national metering identifiers] we have. So, if our demand profile changes, we potentially breach our energy contract."*
>
> **– Building owner and operator**

Upfront investment costs can be reduced

While upfront costs remain a barrier, many commercial buildings are flexing without major capital investment. Adjusting HVAC operation, optimising controls or using thermal storage strategies can often be implemented without installing new equipment.

> *"Changing set-points, ramping down equipment and shedding loads can be implemented by the BMS controls already installed in most large buildings. This doesn't require a capex spend or new equipment."*
>
> **– Sustainability engineering consultant**

Several stakeholders also described emerging commercial arrangements where energy retailers own and operate onsite batteries. This allows building owners to participate in flexibility programs and share financial returns without purchasing, installing or maintaining the assets themselves.

Image: Storage batteries for solar power system, iStock.

Future developments

Tariffs reward flexibility

New financial drivers for commercial buildings are beginning to emerge.

For commercial building owners, time-of-use tariffs could create a financial incentive to shape and shift loads, capturing value without direct exposure to wholesale market volatility.

As part of the National Electricity Market (NEM) review, retail tariffs are expected to increasingly reward customers who use electricity when renewable generation is abundant, particularly in the middle of the day.[17] Further, some energy retailers are offering periods of free daytime electricity, and this is likely to increase consumer familiarity with time-of-use pricing and demand-shifting behaviour.

Monetising flexibility through VPPs

Retailers and energy service providers are increasingly offering lucrative VPP incentives to customers with batteries, allowing them to earn revenue while supporting electricity system stability during peak demand events. While most offers currently target residential customers, similar models for commercial buildings are emerging.

> *"In one incident we made $26,000 in an hour – so it's pretty lucrative at times."*
>
> **– Building owner and operator**

Reducing upfront costs through equipment incentives

Rebates and co-funding for batteries, building controls, heat pump hot water systems and electric vehicle charging infrastructure are expanding. While many of these programs are not explicitly designed for energy flexibility, they can materially reduce upfront costs and improve the business case for investment in flexibility-enabling equipment.

Image: Cityscape, iStock.

17. Nelson, T., Conboy, P., Hancock, A., and Hirschhorn, P., 2025.

Operational considerations

Many flexibility strategies are technically possible, but building owners and operators are unlikely to pursue them if they compromise tenant comfort, critical services or day-to-day operations.

What's happening today

Comfort comes first

Maintaining tenant comfort is the top priority for commercial building operators, and most leases include strict temperature requirements. Flexibility strategies like pre-heating or pre-cooling could put those conditions at risk, potentially triggering large penalties.

> *"We have to deliver comfort conditions first and foremost without question."*
> **– Building owner and operator**

> *"If building owners don't deliver lease temperature conditions within a certain band we are in breach of our lease, and that can mean huge financial penalties for us."*
> **– Building owner and operator**

> *"The rent abatement risk is far greater than the $20,000 demand response saving. It could be $88,000 a day!"*
> **– Building owner and operator**

Commercial building owners are unlikely to use their HVAC systems as part of an energy flexibility strategy unless they have strong confidence in control measures that guarantee tenant comfort.

Control matters

Building owners and operators can be reluctant to hand control of their systems to third parties, like energy retailers or virtual power plant operators. This concern is strongest among building owners with strict lease requirements or hosting sensitive activities, and can be compounded by staff on the ground with limited understanding of how flexibility initiatives may operate in practice.

> *"There definitely needs to be a human control intervention. We don't want a robot taking control of it."*
> **– Building owner and operator**

> *"Our market differentiation is the redundancy and certainty that we will always keep running."*
> **- Data centre operator**

Where third parties operate on-site batteries, building operators told us they establish clear protocols with service providers to ensure critical processes and conditions, such as tenant comfort and food safety, are unaffected. We also heard that, when technology is orchestrated by a third-party, those on the ground can override settings.

> *"The customer always has the right to not participate at a point in time."*
> **– Energy services provider**

Decision making can be complex

In some buildings, the electricity loads that could provide flexibility are controlled by tenants. This can make participation more difficult. One example cited was data centres operated by cloud service providers, which host servers for customers who decide when and how intensively to run their workloads.

> *"Cloud providers can't shift workloads because it's not our data."*
> **– Data centre operator**

Some data centres allow customers to schedule workloads during off-peak periods, and some pricing plans can encourage load shaping and shifting through time-of-use electricity tariffs. Both only work if customers choose to use them.

> *"Cloud providers give customers tools for how they want to run their workload. Time shifting is one of these. Customers who want to run at off peak can schedule this."*
> **– Data centre operator**

Many data centres operate on embedded networks and are well placed to host large-scale batteries to reduce peak demand charges, capture value from wholesale price fluctuations and support grid stability services. As battery economics improve, co-location with data centres may become more attractive.

Capacity is limited

Responsibility for energy flexibility is often spread across sustainability, operations and engineering teams, with no clear owner. This can lead to inertia.

Facilities managers already manage competing priorities and may not have the time or expertise to implement and manage flexibility strategies.

> *"Demand management is perhaps one of hundreds of things that [building and facilities managers] need to look at."*
>
> **– Building owner and operator**

Many building owners and operators expressed feeling overwhelmed by existing compliance obligations and were unwilling to take on voluntary tasks like tracking time-of-use emissions or working with time-matched REGO certificates.

This hesitancy reflects a broader concern that reporting frameworks for energy flexibility may impose administrative burdens without clear, immediate benefits.

> *"We spend way too much of our time already just reporting for reporting's sake, and going to that extent is, I suppose, beyond our capacity. And beyond the capacity of most of the market."*
>
> **– Building owner and operator**

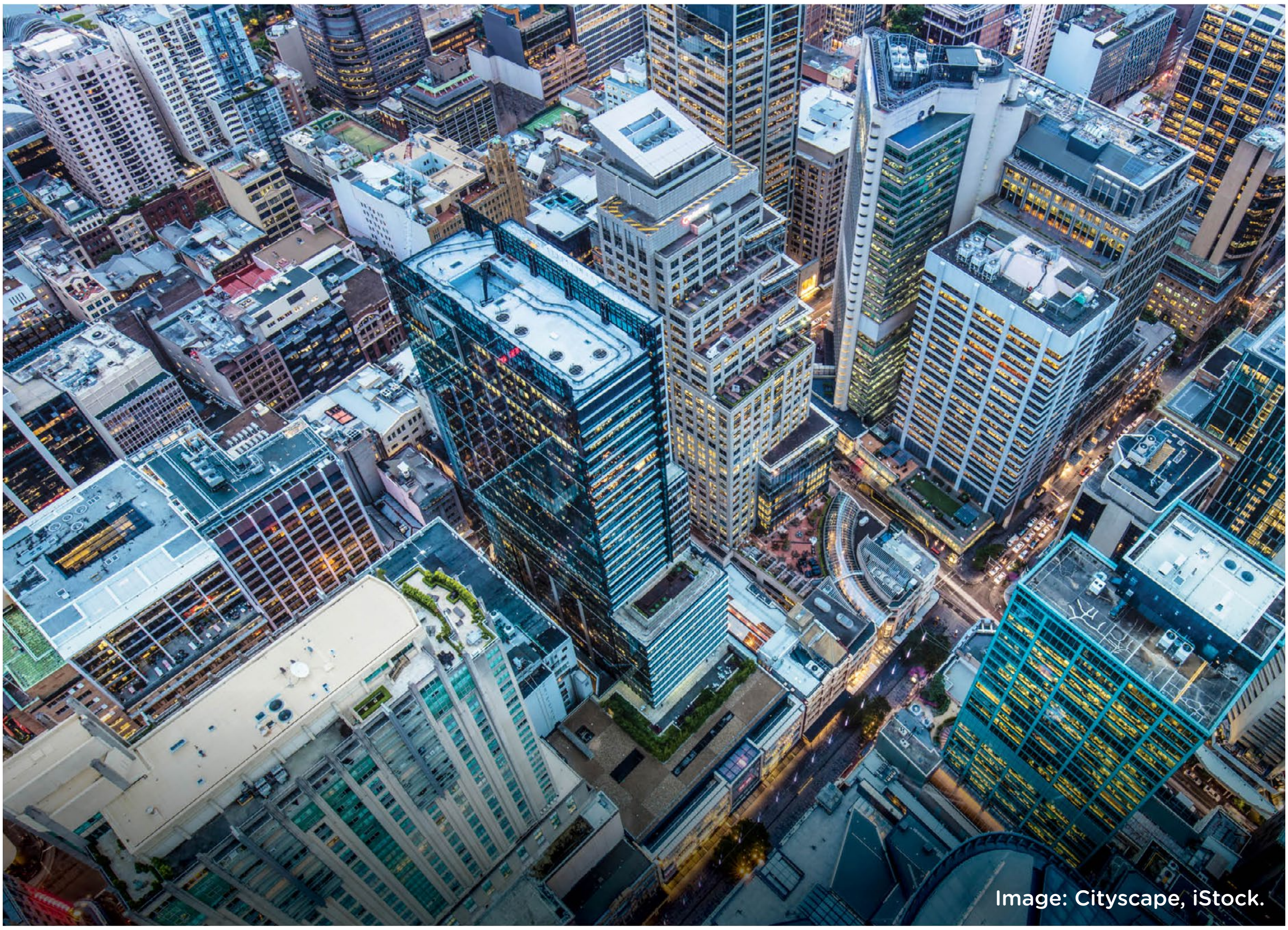


Image: Cityscape, iStock.

Future developments

Confidence in HVAC flexibility is growing

Research and case studies show HVAC adjustments can be made within acceptable limits to comply with tenant comfort and lease conditions.

Buildings Alive demonstrated how carefully managed HVAC flexibility strategies, using pre-cooling, staged load shedding and automated controls, can reduce peak demand without breaching temperature requirements.[18]

A University of Wollongong case study found that temporary HVAC set-point changes delivered measurable cost savings and emissions reductions, with tenant surveys indicating no significant impact on occupant thermal comfort.[19]

Over time, the growing body of evidence and broader awareness could increase confidence in HVAC-based flexibility approaches.

Governance and controls will build trust

Energy service providers are increasingly adopting arrangements that preserve building owner and operator authority, including clear override rights, opt-out provisions and pre-approved operating parameters.

Future flexibility strategies are expected to be defined, tested and authorised in advance. Clearer accountability and escalation protocols are also likely to improve trust between building owners, operators and third-party providers.


Image: Cityscape, iStock.

18. Buildings Alive, December 2023.
19. Sustainable Building Research Centre, n.d., *UOW Demand Flexibility Case Study*, University of Wollongong.

Technology considerations

Many commercial buildings operate ageing equipment, disconnected systems and space-constrained infrastructure – and technology can be both a barrier and a constraint.

What's happening today

Systems are fragmented

Many commercial buildings operate a mix of legacy plant, building management systems and metering platforms that were not designed to communicate with each other or with external energy markets. Proprietary software, inconsistent data standards and bespoke system configurations increase complexity and risk. These limitations discourage building owners and operators from engaging in energy flexibility beyond pilot projects.

Older and smaller buildings face big challenges

Older, smaller or lower-grade buildings that fall into B- and C-grade categories often lack the infrastructure needed to support energy flexibility, and retrofitting can be costly and technically complex. Outdated HVAC systems, limited automation, poor thermal envelopes and small plant rooms are problematic. Many buildings simply do not have the physical room to accommodate additional equipment like batteries, advanced control systems or upgraded switchboards.

Batteries and EVs raise safety concerns

Batteries can support a range of flexibility strategies, but concerns about fire safety, insurance and liability are barriers to adoption.

> *"You've got the fire risk to think about, which your insurer is probably going to have a really good chat to you about."*
>
> **– Building owner and operator**

Battery installations can be challenging. Plant rooms are often space-constrained and may require additional cooling and electrical upgrades, while using car parking areas can reduce revenue and tenant amenity.

> *"Customer-facing businesses don't want to give up car parks."*
>
> **– Energy retailer**

V2G technology, which is expected to grow over the next four years, could provide valuable support to the electricity system if carefully managed.[20] However, some building owners noted their concerns about fire risks, particularly when they have limited oversight of vehicle maintenance and battery condition.

> *"The risk is fire and liability, if someone doesn't maintain their [EV] battery."*
> **– Building owner and operator**

> *"I feel much safer about having a very large battery in a shipping container at one of our assets than I feel about having EV charging in a basement of an office building."*
> **– Building owner and operator**

Image: Electric vehicles, iStock.

20. Endgame Economics, February 2025.

Future developments

Integration is getting easier

Interoperability issues are starting to ease as new software platforms and integration tools emerge. As fragmentation and bespoke configurations are a significant barrier, these solutions can sit over existing building systems to schedule load shifting, automate responses and participate in flexibility programs without replacing core infrastructure.

More options for older and smaller buildings

Technology developments are expanding flexibility options for buildings with limited space and capital. Trials funded by the Australian Renewable Energy Agency (ARENA), have demonstrated how refrigeration, cooling and other controllable loads can be optimised through software and operating changes alone, reducing the need for new plant in space-constrained buildings.[21]

Fire safety standards are improving

Standards for battery enclosures and controls, and for EV charging continue to mature. Currently insurer acceptance, fire authority requirements and liability settings are varied. These variations occur by jurisdiction, building type and insurer. However, stakeholders expect greater clarity and confidence as technologies become more widely deployed.

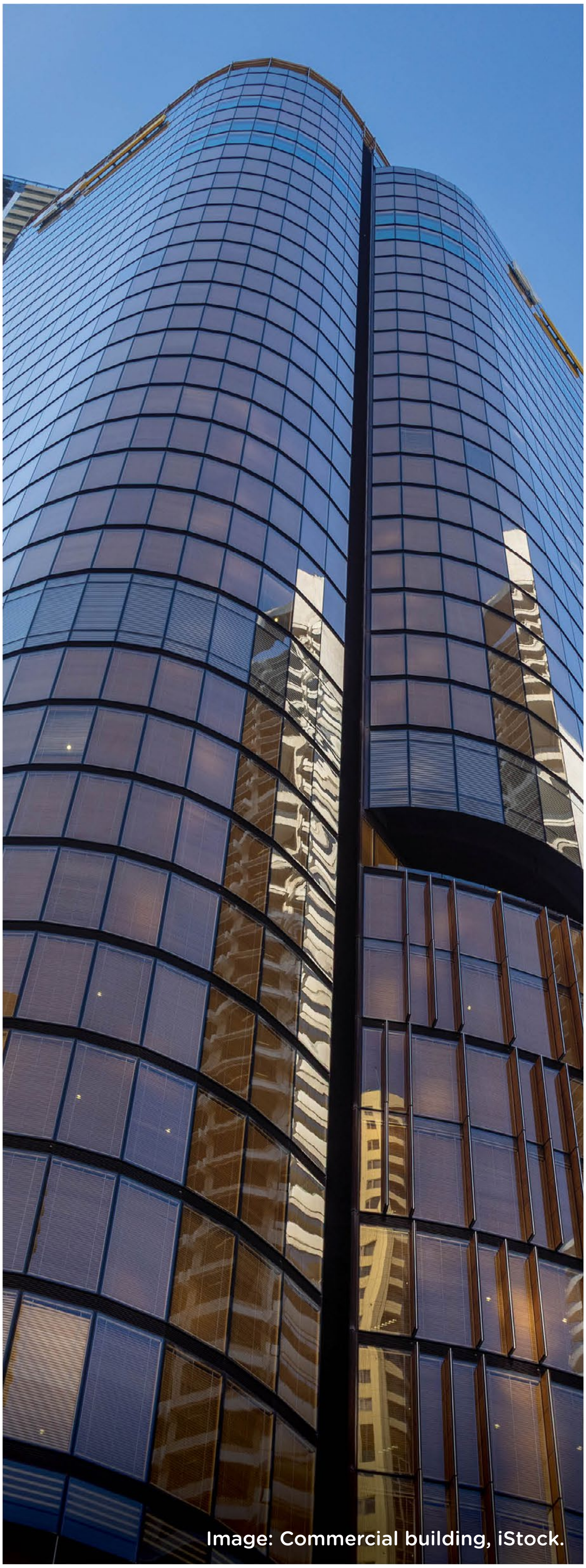


Image: Commercial building, iStock.

21. Renew Economy, 19 July 2023.

Sustainability frameworks, reporting requirements, regulation and procurement policies

Sustainability frameworks, reporting requirements, regulation and procurement policies have collectively shaped how commercial buildings are designed, developed and operated. This sets a solid foundation for energy flexibility.

What's happening today

Measurement drives performance

NABERS, Green Star, GRESB, the Carbon Risk Real Estate Monitor (CRREM) and other sustainability frameworks provide comparability and shared definitions of performance, creating a common language for market-based decisions and informing policy design.

Related regulations, disclosure requirements and minimum standards, including the National Construction Code (NCC), state planning instruments, the National Greenhouse and Energy Reporting (NGER) scheme, CBD Program and Climate-Related Financial Disclosure (CRFD) requirements, also set expectations and drive positive sustainability outcomes.

Real estate investment trusts (REITs) operate in highly competitive markets and have strong incentives to demonstrate sustainability leadership to attract and retain tenants, capital and partners, and to maintain long-term asset value. Their response to energy efficiency sustainability frameworks, regulation and procurement policies shows how consistent measurement, disclosure and sustainable finance decisions can drive sustainability improvement across large portfolios. The same dynamic could apply to energy flexibility as similar signals emerge.

Green Star incentivises energy flex

The Green Building Council of Australia is encouraging energy flexibility through Green Star Buildings v1.1 credits and the Green Star Performance Time of Energy Use Leadership Challenge.

Grid resilience credit

Credit 21 specifies that buildings must either have a demand response strategy or reduce their reliance on grid electricity through passive design.

Demand response strategies include having an energy management and information system that can receive external control signals, implement pre-programmed load shedding responses, and display a demand management dashboard and a load shedding strategy that outlines contributing building systems and occupant communication.

Alternatively, buildings may meet the credit requirements through passive design solutions that demonstrably reduce reliance on grid electricity during periods of grid stress.

Energy source credit

Credit 22 supports energy flexibility by encouraging buildings to be designed to maximise renewable grid interaction. It does this by recognising renewable electricity sourcing and design choices that make it easier for buildings to use electricity when renewable energy is most readily available, such as electrified services, energy management and information systems and having a load shifting strategy.

While the credit does not require buildings to actively change when electricity is used, it helps create the conditions that enable flexing over time, particularly for electricity under the building owner's control.

GBCA's Time of Energy Use leadership challenge

Please refer to page 23.

Future developments

Several emerging developments have the potential to strengthen the case for energy flexibility over the coming decade.

New building requirements

Updates to the National Construction Code (NCC 2025) introduce additional energy monitoring requirements under *Section J9* that aim to improve energy visibility of large new commercial buildings.[22] The requirements include granular submetering of major electrical loads and systems so building owners can better understand when and where electricity is being used. When onsite renewables are installed, this can also help identify how electricity generation aligns with demand.

While the NCC provisions do not require buildings to actively flex, they remove many of the practical barriers by improving data and visibility needed for load shifting and grid support programs.

More rigorous emissions reporting requirements

The GHG Protocol, which sets the global standard for greenhouse gas emissions measurement, released a public consultation in October 2025 which would significantly strengthen time-of-use accounting. This includes hourly time-matching and deliverability requirements for renewable energy certificates and more granular emissions data reporting.

As the GHG Protocol underpins many global disclosure frameworks, these changes would signal a major shift towards time-of-use emissions reporting globally and is likely to influence the Australian market over time. While an exact timeline for implementation is yet to be confirmed, broader market impacts are likely to emerge towards 2030.

Stronger renewable energy claims

Growing interest in the concept of "true zero" is drawing attention to the limitations of annual renewable energy matching. A building may source sufficient renewable electricity to cover its yearly consumption yet still rely on fossil fuel generation during winter mornings or summer evenings when renewable supply is low. Shifting electricity use to times when renewable generation is abundant helps narrow this gap between reported claims and real-world electricity system impacts.

22. Australian Building Codes Board, 2022, *Volume One Building Code of Australia*.

Time-matched REGO certificates

REGO certificates are set to replace Large-scale Generation Certificates (LGCs) in 2030. A key feature of REGOs is time-stamping, which could allow organisations to match renewable electricity use to specific hours rather than relying on annual averages.

Hourly time-stamped REGOs create the potential for more accurate time-of-use reporting and may influence how "net zero" and "true zero" are understood and scrutinised.

The practical impact of time-stamped REGOs will depend on how sustainability teams adopt them and whether renewable energy generators feel there is a market for certificates matched to specific hours, rather than annual volumes alone.

Data centre expectations are evolving

Please refer to page 34.

AEMO's Demand-side Statement of Opportunities

AEMO will publish its first *Demand-side Statement of Opportunities* (DSOO) alongside the 2028 Integrated System Plan. This statement is intended to identify where flexible demand, energy efficiency and Consumer Energy Resources could help meet system needs and reduce the need for costly network and generation investment.

The DSOO has the potential to influence market behaviour by explicitly identifying the value of demand flexibility. In doing so it would strengthen incentives for networks, retailers and aggregators to develop programs that reward energy flexibility. This could translate into clearer market signals and greater confidence for commercial building owners.

Image: Data centre, iStock.

04.

Glossary

Image: Industrial warehouses, iStock.

Australian Energy Market Operator (AEMO): The organisation responsible for operating Australia's electricity and gas markets, managing the power system, forecasting and coordinating demand response programs.

Building management system (BMS): A computer-based control system that monitors and manages a building's mechanical and electrical equipment, such as heating, ventilation and air conditioning (HVAC), lighting and power.

Commercial buildings: Large buildings such as offices, shopping centres, data centres, industrial facilities and warehouses. While large residential buildings are treated a separate asset class, they are included within the scope of this paper due to their growing role in energy management and flexibility programs.

Commercial Building Disclosure (CBD) Program: An Australian Government program that requires sellers and lessors of large office spaces to disclose a current NABERS Energy rating when marketing a property, helping improve transparency and energy performance in the commercial office market.

Consumer Energy Resources: Assets that can support grid stability such as rooftop solar, batteries, HVAC systems and electric vehicle chargers. Also referred to as Distributed Energy Resources.

Curtailment: Reducing or stopping electricity generation from a power source, even though it could produce more.

Decarbonisation: The process of reducing greenhouse gas emissions associated with an activity, building, organisation or economy, typically through energy efficiency, electrification, renewable energy and other emissions reduction measures.

Demand response: The capability to vary demand in response to generation, network or market signals.

Demand response payments: Financial payments made to customers who reduce or move electricity use when requested, helping support the electricity system during peak demand or high-price periods.

Distributed Energy Resources: Assets that can support grid stability such as rooftop solar, batteries, HVAC systems and electric vehicle chargers. Also referred to as Consumer Energy Resources.

Distribution Network Service Provider (DNSP): An organisation that owns, operates and maintains the electricity distribution network, including poles, wires and substations, and delivers electricity from the transmission network to homes and businesses within a defined geographic area.

Duck curve: A visual description of a daily demand profile characterised by a morning peak, a deep midday drop and a steep evening peak, emulating the profile of a duck.

Electrification: Replacing equipment and processes powered by fossil fuels with technologies powered by electricity. Examples include replacing gas boilers with heat pumps or internal combustion vehicles with electric vehicles.

Energy flexibility: Behaviours undertaken by households and businesses to alter when they use, store and share electricity to support the transition to a reliable energy system powered by renewables. Terms such as flexing, flexible demand, load flexibility, time-of-use and grid-interactive efficient buildings are often used to describe these behaviours.

Energy retailer: A company that sells electricity or gas to customers. They bill customers, set tariffs and may offer demand response or energy flexibility programs.

Energy service provider: A company that manages and coordinates flexible electricity use or storage across one or more sites so it can be used to support the electricity system and participate in energy markets.

Equipment incentives: Rebates or financial incentives that help cover the cost of installing energy-efficient, flexible or grid-interactive equipment such as batteries, heat pumps or smart controls.

Flexing: The action of energy flexibility.

Frequency Control Ancillary Services (FCAS): A market where fast-responding loads and batteries help maintain grid frequency.

GHG Protocol: A global standard for measuring and reporting greenhouse gas emissions. It defines Scope 1, Scope 2 and Scope 3 emissions and guides organisations on carbon accounting.

The grid: The network of poles, wires, substations, generators and control systems that deliver electricity from producers to consumers.

Large-scale Generation Certificates (LGCs): Tradeable certificates created for every megawatt-hour of renewable electricity generated by accredited large-scale power stations in Australia. They are part of the Renewable Energy Target (RET) scheme and can be sold to businesses or electricity retailers. These are set to be replaced by Renewable Energy Guarantee of Origin (REGO) certificates in 2030.

Load shaping: Long-term, consistent changes to electricity use over months to years that permanently alter demand patterns to better align with electricity system needs and renewable generation.

Load shedding: Temporarily reducing or switching off electricity use for minutes to hours to help manage peak demand or respond to grid stress and contingency events.

Load shifting: Moving electricity use forwards or backwards in time over hours to days, typically within a day, to avoid peaks or make use of periods when renewables are plentiful and emissions are at their lowest.

Load shimmying: Very fast adjustment of electricity demand over seconds (or faster) in response to external signals, typically to support real-time system balancing such as FCAS.

Market incentives: Incentives such as the Australian Government incentives for solar and batteries, the South Australian Retailer Energy Productivity Scheme, the Victorian Energy Upgrades (VEU), the NSW Peak Demand Reduction Scheme.

Minimum demand events: Periods when electricity demand is unusually low, usually in the middle of the day when rooftop solar output is strongest and can exceed local consumption.

National Electricity Market (NEM): The system that connects electricity generators, retailers and consumers across Australia's eastern and southern states. It operates as a wholesale market and manages the physical flow of power to keep supply and demand balanced in real time.

Net zero: Balancing the amount of greenhouse gases emitted with the amount removed from the atmosphere by reducing emissions as much as possible and offsetting any remaining emissions. The goal is that overall emissions equal zero.

Peak demand events: Periods when electricity demand is extremely high while solar generation is low or declining and wind output may not be sufficient.

Peak demand charges: Electricity charges based on a site's highest level of power demand during a billing cycle. They aim to reduce strain on the electricity system during peak times and can comprise up to 40% of a consumer's bill.

Power Purchasing Agreement (PPA): A long-term contract between an electricity generator and a buyer. The buyer agrees to purchase electricity at a fixed price for a set period. PPAs help secure stable energy costs and often support renewable energy projects.

Pre-cooling or pre-heating: Running HVAC earlier than usual to move cooling or heating loads to periods of lower cost or lower emissions.

Real Estate Investment Trusts (REITs): Companies that own and manage income-producing properties, often premium commercial buildings such as office towers and shopping centres.

Renewable Electricity Guarantee of Origin (REGO) certificates: Official records that show electricity was generated from renewable sources. These allow businesses and consumers to prove the origin of their electricity for reporting, compliance or sustainability claims.

Renewable Energy Indicator (REI): A NABERS Energy indicator that measures the proportion of a building's electricity consumption matched with renewable electricity over a 12-month period, providing a consistent way to assess and compare renewable electricity procurement.

Scope 1, Scope 2 and Scope 3 emissions: Categories used under the GHG Protocol to classify greenhouse gas emissions. Scope 1 emissions are generated directly from sources owned or controlled by an organisation. Scope 2 emissions arise from purchased electricity, heating or cooling. Scope 3 emissions are indirect emissions that occur across an organisation's value chain, including purchased goods and services, transport and waste.

Thermal storage: Using a building's structure or dedicated systems, such as chilled water tanks, to store cooling or heating for later use.

Time-of-use: The practice of using more granular consumption or emissions data, such as 5-minute to hourly intervals, rather than annual data.

Time-of-use emissions: Greenhouse gas emissions associated with electricity consumption at specific times, reflecting changes in the grid's fuel mix and emissions intensity over the day.

Time-of-use tariff: An electricity pricing structure where the cost per kilowatt-hour changes depending on the time of day, encouraging consumption in cheaper periods.

True zero: Eliminating greenhouse gas emissions entirely without relying on offsets or removals by stopping emissions at the source.

Vehicle-to-Grid (V2G): Technology that allows electric vehicles to discharge stored energy back into the electricity grid.

Virtual Power Plant (VPP): A digital platform that aggregates distributed assets such as buildings, batteries, EV chargers, solar and flexible loads to operate as a coordinated energy resource.

Wholesale Demand Response Mechanism (WDRM): An Australian market mechanism that allows large energy users to reduce load during high-price periods and be paid directly through the wholesale electricity market.

Wholesale electricity market: A market where generators bid to supply electricity in 5-minute intervals, with prices set based on real-time supply and demand.

05.
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NABERS is administered by NSW Government.

4 Parramatta Square
12 Darcy Street,
Parramatta NSW 2150
T (02) 9995 5000
E nabers@environment.nsw.gov.au

nabers.gov.au