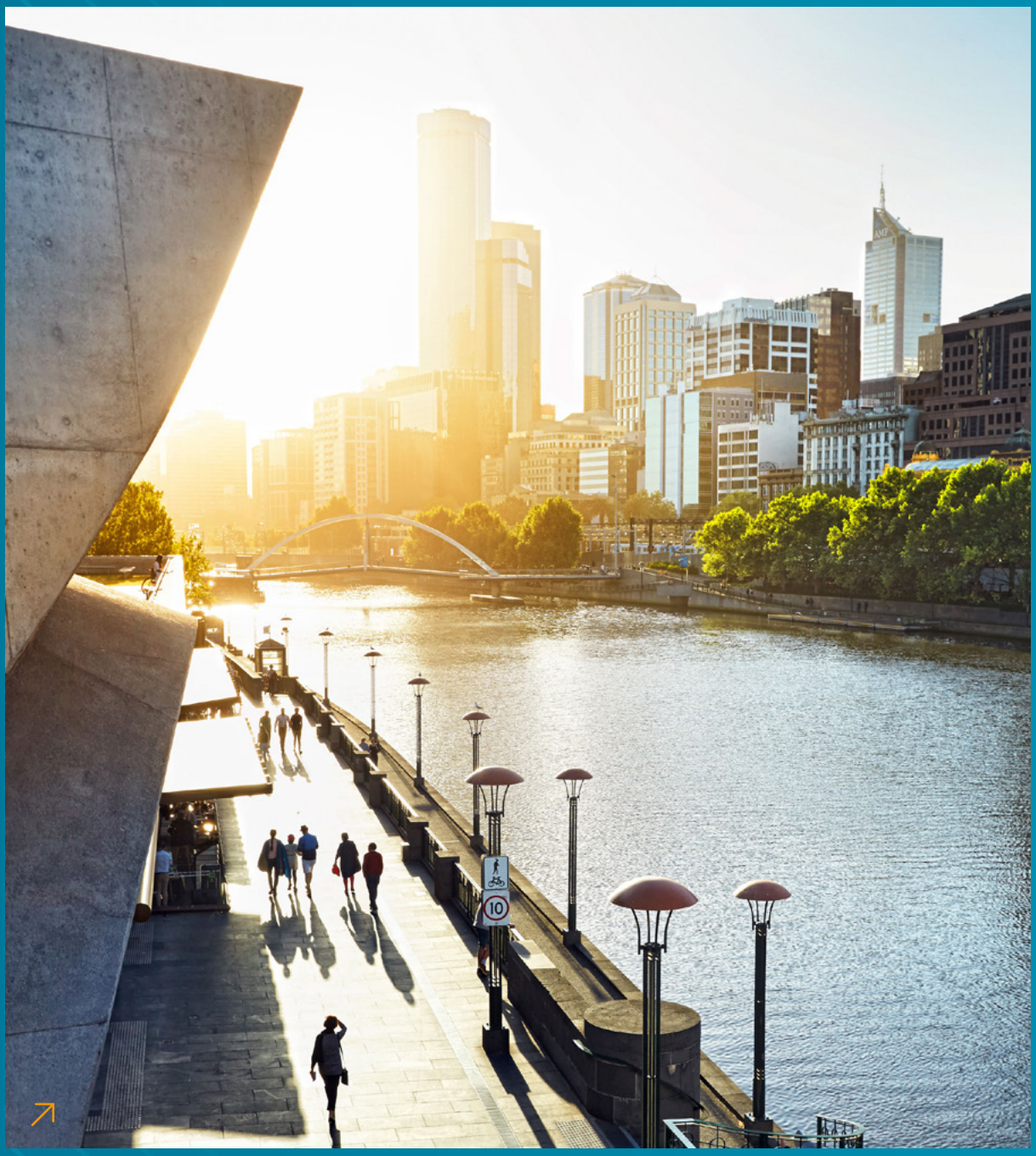
Energy efficiency in commercial buildings

How the National Australian Built Environment Rating System transformed the market

NABERS



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NABERS

Australia's approach to energy efficiency in commercial buildings can inspire action in other markets

Over the last 14 years, Australian offices rated using NABERS Energy have benefitted from average energy savings of 42% and have reduced greenhouse gas emissions intensity by 53%. This is one of the fastest widescale building transformations recorded anywhere in the world.

This guide to NABERS Energy in Australia can help anyone interested in driving energy efficiency gains in their country or region. Today, there is broad agreement that energy efficiency plays an essential role in our global transition to a decarbonised future. NABERS ratings are now offered in the United Kingdom and New Zealand, with growing interest from other markets. NABERS' transformational approach is adaptable, scalable and transferrable across markets and commercial property types.

NABERS provides a rating from 1 to 6 stars for energy efficiency.

3 stars shows average performance at the time a rating tool is launched. 6 stars demonstrates market leading performance.

Executive summary

With impressive impact over almost 25 years, NABERS, or the National Australian Built Environment Rating System, demonstrates how multi-faceted government and industry collaboration can drive genuine market transformation.

Those who use NABERS Energy ratings in Australia have saved an estimated AU$1 billion in energy costs and driven down greenhouse gas emissions in the commercial building sector by more than seven million tonnes since 1998.

This guide outlines the key success factors of NABERS Energy ratings in Australia. It explains why the NABERS suite of ratings for different building types has achieved significant market penetration and why NABERS is now recognised as a key pillar of the property industry's transition to net zero emissions.

There are valuable insights here for a range of professionals worldwide, from industry participants and policymakers to investors, from sustainability advocates to energy program managers. The guide is relevant for anyone interested in best practice and solutions which can powerfully enhance energy efficiency and reduce emissions.

The success of NABERS is underpinned by seven key principles

1. Measure **actual impact**, not intent
2. Assess **building operations**, not design
3. Deliver **meaningful ratings** that the market can understand
4. Support a **simple** and **easy-to-perform** rating process
5. Achieve **reliable ratings** that everyone can trust
6. Foster **strong governance** and **trustworthy management**
7. Encourage **collaborative** rating tool development.

NABERS is expanding from offices to many building types and is now available in the UK and New Zealand

NABERS Energy's genesis was the Australian Government's drive to better understand and measure the energy efficiency and greenhouse gas intensity of office buildings. Since then, NABERS has matured and evolved, with ratings now providing greater visibility of environmental impacts including water, waste and indoor air quality.

Current coverage by NABERS Energy ratings in Australia:

- 4,770-plus commercial buildings including 3,800 office buildings and tenancies
- 21 million m^2 of office space with a current rating (226 million sq ft)
- 9 million m^2 (97 million sq ft) of shopping centre space with a current rating
- 74% of Australia's commercial offices currently obtain NABERS Energy ratings on an annual basis.
- Rating tools available for building types from offices to data centres, hotels to public hospitals, residential apartments to aged care and retirement living.

A New Zealand NABERS program started in 2012 thanks to a partnership with the New Zealand Government. An office energy rating is now well established in the market with expansion to other building types underway. NABERS UK launched in 2020, and since then has grown rapidly with strong industry support.

In Australia, NABERS is a nationwide government program administered by the New South Wales government. It is overseen by a national steering committee comprising representatives from all state and territory governments, and the Australian Government.

Office buildings

Office tenancies

Data centres

Hotels

Shopping centres

Apartment buildings

Hospitals (public)

Retirement living

Aged care

Warehouses

Schools

Retail stores

Due for release in 2022-2023.

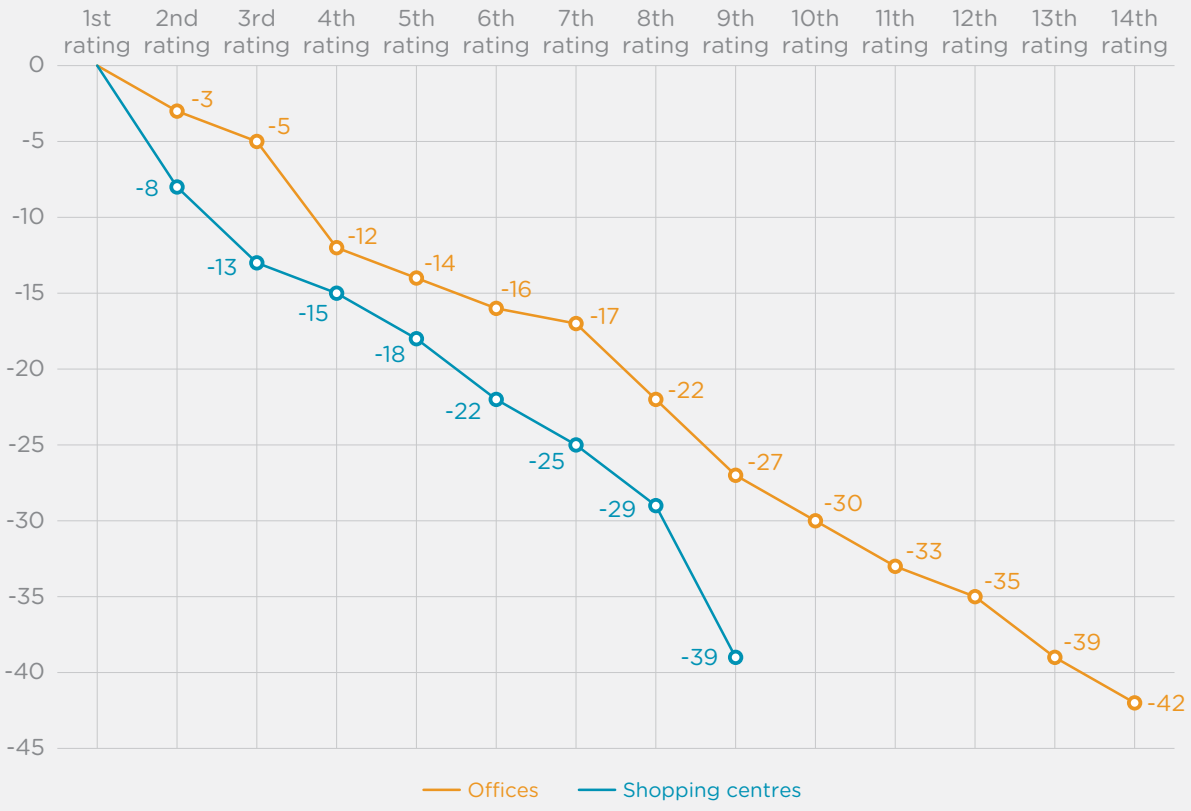
Public policy has helped transform the industry

The Australian Commercial Building Disclosure (CBD) Program requires energy efficiency information – notably a NABERS Energy rating – to be provided when large commercial office space is offered for sale or lease. This has been a powerful driver for industry participation. Established by the Building Energy Efficiency Disclosure Act 2010 and managed by the Australian Government, the CBD program initially covered commercial office space of more than 2,000 m^2 , but was expanded to include space of 1,000 m^2 or more.

Unmistakable impact

Offices that have been rated with NABERS Energy over 14 rating periods demonstrate average energy savings of 42% with greenhouse gas emissions intensity dropping by 53%. Evidence shows that this trend is repeated in other sectors such as shopping centres.

Average reduction in energy use after multiple NABERS ratings (%)



Source: NABERS 2021 Annual Report - Life of Program Statistics

NABERS rating scale

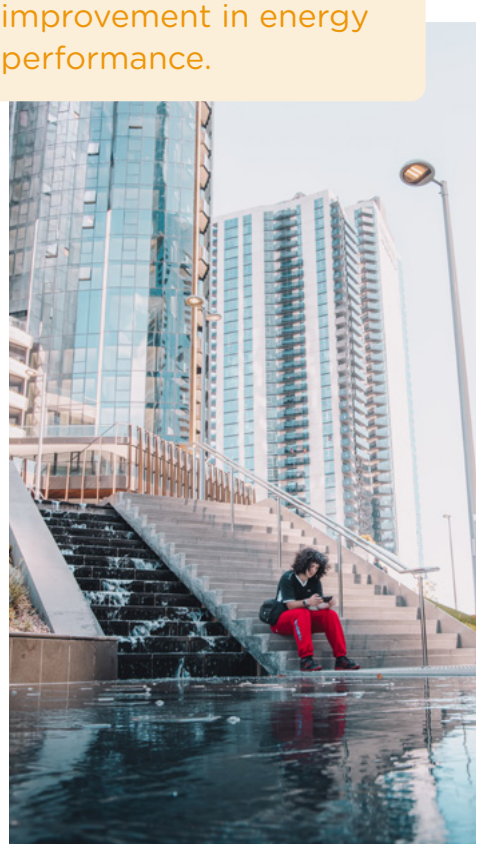
One of NABERS' key success factors is a technically robust benchmark that translates into an easily understandable star rating.

The rating scale from 1 to 6 stars in half star increments motivates owners and facility managers to work towards the next star on the scale.

Everyone from the CEO down can talk about the star scale, with more stars meaning better performance. 6 stars denotes best market practice.

Aiming for NABERS 4.5 stars is a much easier concept to communicate than aiming for a normalised energy intensity of 80 kgCO2e per m^2 per annum.

According to the Low Energy High Rise Research Report, the simple act of disclosing a NABERS Energy rating is linked to a 0.5 star improvement in energy performance.



Steps to a rating

1. Engage
A building owner engages a NABERS Accredited Assessor.

2. Assess
The assessor undertakes an onsite visit and examines actual energy bills.

3. Submit
The assessor lodges the rating, which is then checked and certified by NABERS. Assessment and certification fees are paid. **Ratings are valid for 12 months.**

4. Promote
Unless private, the rating is published on the NABERS website and is used by building owners in reporting and promotional material.

5. Disclose (where applicable)
Under the requirements of the Commercial Building Disclosure Program, an office energy rating must be disclosed at the time of sale or lease if the building is more than 1,000 m^2.

6. Audit
5% of assessments are audited post-certification to maintain the rigour of the system.

7. Improve
Building owners can use annual NABERS ratings to measure the impact of building improvements over time, including as a benchmark before and after embarking on capital upgrades.

Radical collaboration

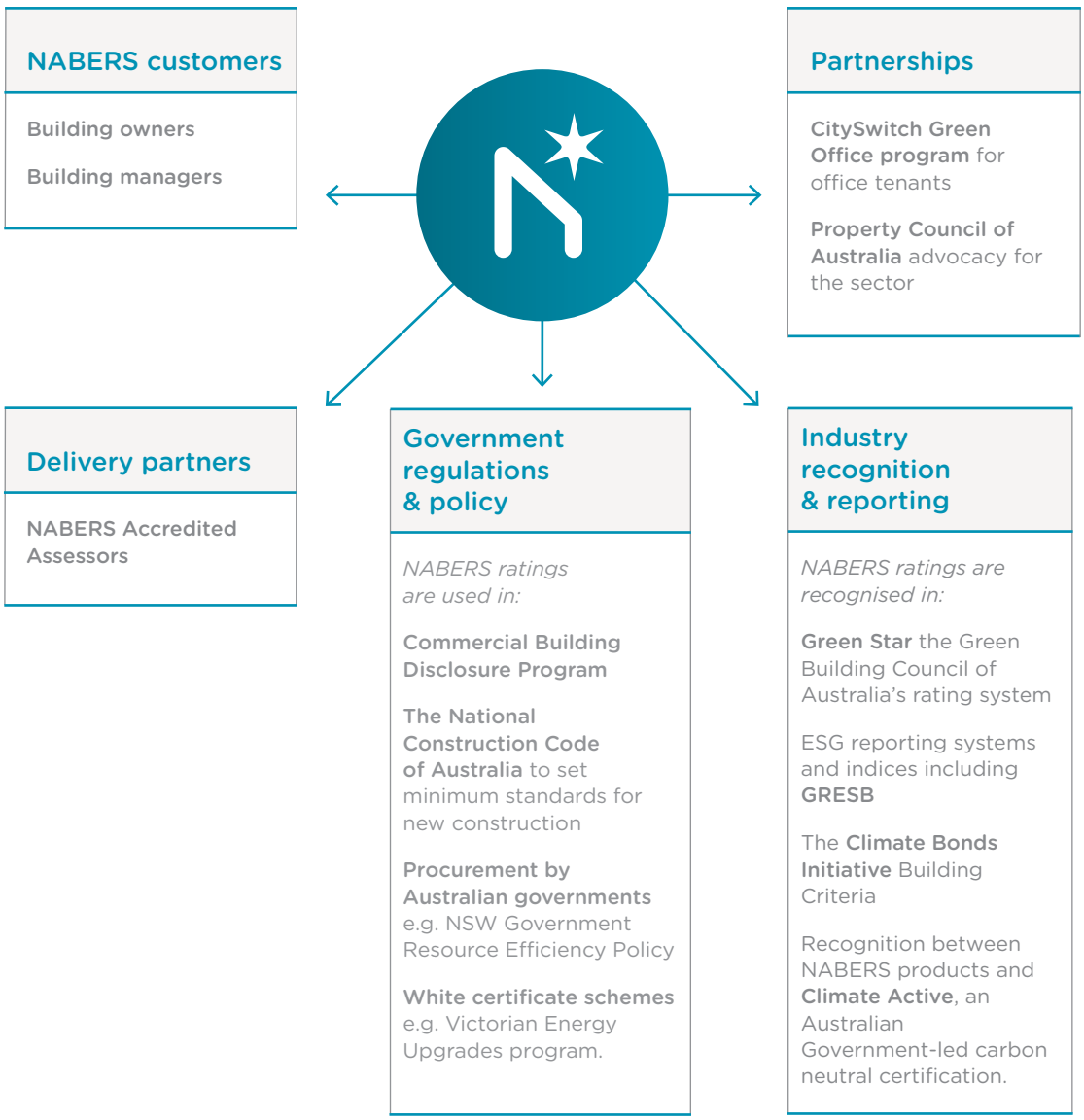
NABERS has helped create new jobs, valuable intellectual property and enabled sector-wide collaboration among a network of organisations committed to energy efficiency.

While energy and emission savings are the headline, NABERS has delivered many other benefits, from driving greater building value to supporting a collaborative and innovative network of organisations.

"The Property Council of Australia is a proud partner of the NABERS program. Our members understand the value of more efficient buildings to reduce costs and cut greenhouse pollution, and NABERS is instrumental in helping them do this."

Ken Morrison,
Chief Executive, Property Council of Australia

Key stakeholders

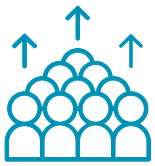


NABERS stakeholders cover a broad spectrum of people and groups from the property sector. This is reflected in the degree to which NABERS Energy is embedded into national disclosure legislation, the National Construction Code, leasing agreements, maintenance guidelines, design commitments, all the way through to key performance indicators in facility and operations managers' performance agreements.

The NABERS rating is used as a design target, as a commissioning target, and as an ongoing operational measure of building performance. It is a trusted, government-backed brand that gives all stakeholders confidence in the benchmark.

Characteristics of Australia's built environment:

More than **86%** of Australia's population lives in cities



Population growth is one of the fastest in the OECD and drives high rates of new builds

32.5% of Australia's electricity was powered by renewables in 2021

Energy is usually **electricity** with small amounts of gas or onsite fossil fuels, with no district heating systems

Australia's city centres feature **high-rise buildings** dominated by offices and shopping centres owned by large property corporations; tenants typically sign leases for 10-15 years

The nation spans **eight climate zones**, with the three largest cities of Sydney, Melbourne and Brisbane in mild-to-temperate climates.

Find out more

Increasing efficiency and slashing emissions from buildings is one of the fastest and most cost-effective ways to reduce global carbon emissions. But the window to transform to a sustainable world is narrowing and the pace of change demands collaboration on a global scale.

Australians have learnt much from leadership in other jurisdictions and are proud to share this illustration of excellence and play a part in the international conversation about energy efficiency.

Please contact the NABERS team if you'd like to find out more:
nabers@environment.nsw.gov.au

Reading this document

Australia Property and energy market in context	**History** Timeline and overview	**Features** System fundamentals and steps to a rating
Impact Energy and emissions savings by the numbers	**International** How NABERS operates in NZ and the UK and can be implemented in other countries	**Stakeholders** An energy efficient ecosystem in a cluster of excellence
In practice How different market actors respond to NABERS and use it every day	**Rating fundamentals** Technical information on benchmarking and how ratings are certified	**System elements** Presented all in one place, a list of all the parts of the system and how they interact

Glossary

ABGR	Australian Building Greenhouse Rating was launched in 2000, renamed NABERS in 2005
Accredited Assessor	A person who has completed a NABERS training course and assessment and demonstrated competence in inspecting buildings and applying the NABERS Rules
Base building	Assessment of the energy consumed in supplying building central services to office net lettable area (NLA) and common spaces
Benchmark	NABERS calculates an energy benchmark, based on measured performance and normalised on a range of factors, to allow comparability between buildings of similar type and use
CBD Program	Commercial Building Disclosure is an Australian Government program that makes the disclosure of a NABERS Energy rating mandatory when a building over 1000 m^2 goes on the market for sale, lease or sublease
Certified rating	A rating that has been calculated using information validated by an Accredited Assessor against the NABERS Rules and granted a certification, lasting 12 months, by the national administrator
NABERS	National Australian Built Environment Rating System
NABERS Steering Committee	NABERS is overseen by a national Steering Committee comprised of representatives from all state and territory governments, and the Australian Government. These government members have voting rights within the committee. The NABERS Steering Committee also includes non-voting stakeholder members from bodies representing the wide range of NABERS stakeholders
National administrator	The New South Wales Government manages the program on behalf of federal and state governments of Australia
Rating	The NABERS benchmark is converted to a star rating, 0 stars = worst practice, 6 stars = best market practice, in half star increments
Tenancy rating	Assessment of the energy consumed by the tenancy to be rated. A tenancy rating typically covers lighting and power within the tenancy, as well as any special tenancy requirements or supplementary air conditioning equipment. A tenancy rating does not cover base building central services
Whole building	Assessment of the energy used by office tenancies and by base building services to office lettable and common spaces

Contents

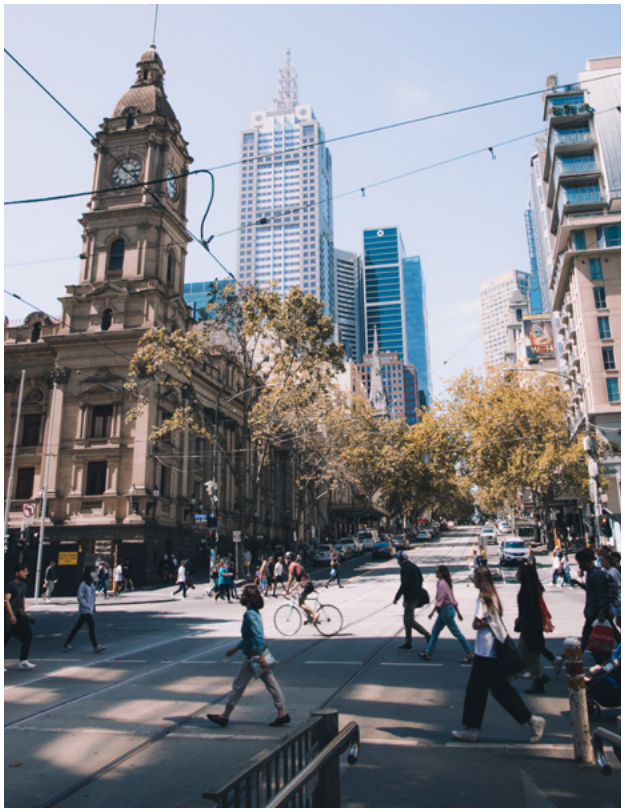
Property & energy market in context

Australia's commercial building stock

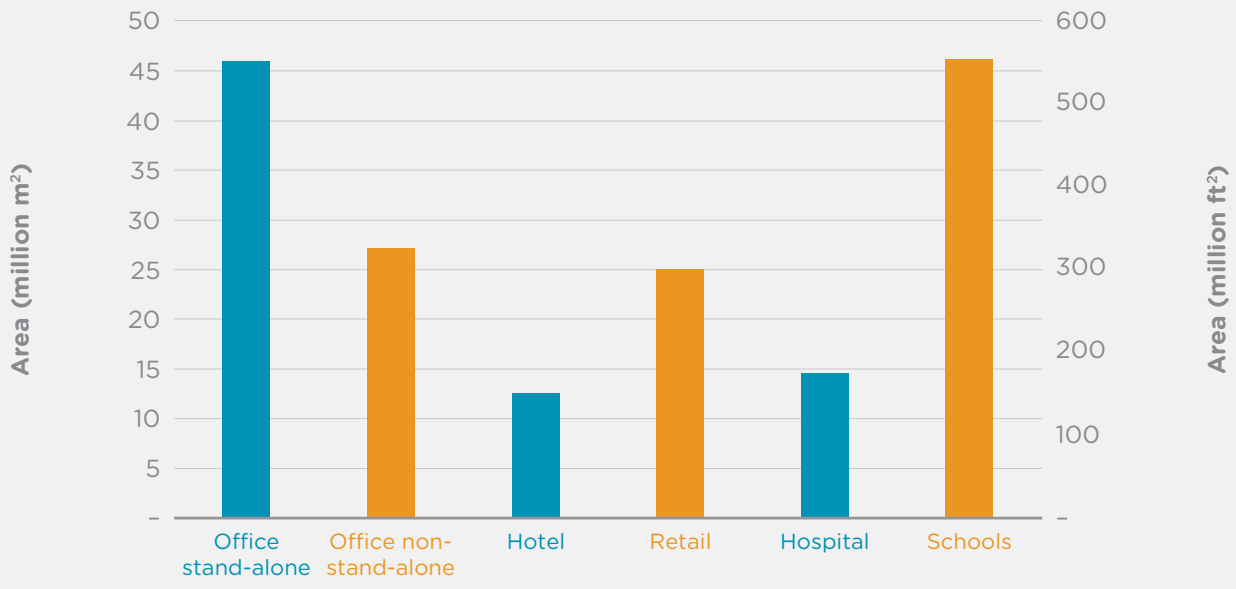
Despite the iconic images of red deserts, bush and beaches, Australia is a highly urbanised country with more than 86% of the population living in cities. Strong population growth, urbanisation and an economy increasingly focused on services has driven demand for commercial building stock.

According to the Property Council of Australia, the property industry is the nation's largest industry and the second largest employer, generating $182.5 billion in gross domestic product and employing more than 1.4 million people.

Australia's commercial property industry is dominated by large institutional investors. Over the last 50 years Australia's real estate investment trusts, or A-REITs, have grown into a AU$133 billion sector, according to the Australian Financial Review. Today, 49 A-REITs account for about 7% of the Australian Stock Exchange. Commercial buildings consume around a quarter of Australia's electricity and generate around 10% of total carbon emissions. But Australia's A-REITs, collectively, have a strong commitment to sustainability, demonstrated in Australia's world-leading status in the GRESB rankings for the 11 consecutive years.



Australia – Commercial building stock estimates 2020



Source: Baseline Energy Consumption and Greenhouse Gas Emissions In Commercial Buildings in Australia

Energy and emissions

Key characteristics of Australia's energy market

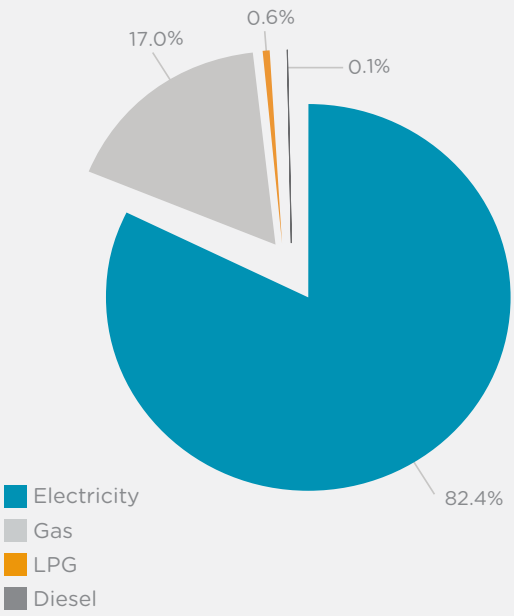
32.5% of Australia's electricity was powered by renewables in 2021, says the Clean Energy Council

40,000 Kilometres of transmission lines connect 9 million facilities in the National Electricity Market – making it one of the world's largest interconnected electricity networks

20% Renewable Energy Target, set by the Australian Government in 2010, and achieved in 2020.

Most commercial buildings rely on electricity as their primary energy source, with natural gas used in Australia's major cities for space heating, hot water and cooking.

Energy mix for commercial property in Australia



Source: Baseline Energy Consumption and Greenhouse Gas Emissions In Commercial Buildings in Australia

Electricity generation has historically been from high greenhouse intensity (approximately 1 kg of CO2 per kWh) black and brown coal. The amount of electricity supplied by renewables has increased rapidly over the last decade, according to the 2021 Clean Energy Australia Report. Around one in four standalone homes is fitted with solar photovoltaic (PV) generation and Australia has seen significant growth in grid scale renewables. In 2021, renewable generation supplied 32.5% of Australia's electricity needs.

The National Electricity Market (NEM) incorporates 40,000 kilometres of transmission lines and delivers 200 terrawatt hours of electricity to around nine million facilities each year. The NEM connects five regional markets – many of them the largest population centres along Australia's east and south-east coasts – and forms one of the largest interconnected electricity networks in the world.

A feature of the NEM is the Australian Government's 2001 legislation of a Renewable Energy Target that grew to be 20% new renewable energy by 2020. Large-scale generation certificates continue to regulate the trade of renewable electricity until at least 2030.

Renewable energy certificates also support a voluntary market that allows energy consumers to purchase renewable energy supply. Many of Australia's largest businesses have committed to renewable energy targets that rely on the renewable energy certificate system.

Consumers can choose to directly purchase renewable energy by establishing a power purchase agreement (PPA) with an independent power generator, such as a solar or wind farm. They can also purchase certificates through a secondary market or via their electricity retailer through a green power scheme. The most widely-recognised of these schemes is called GreenPower and is a government backed renewable electricity accreditation program available nationally.

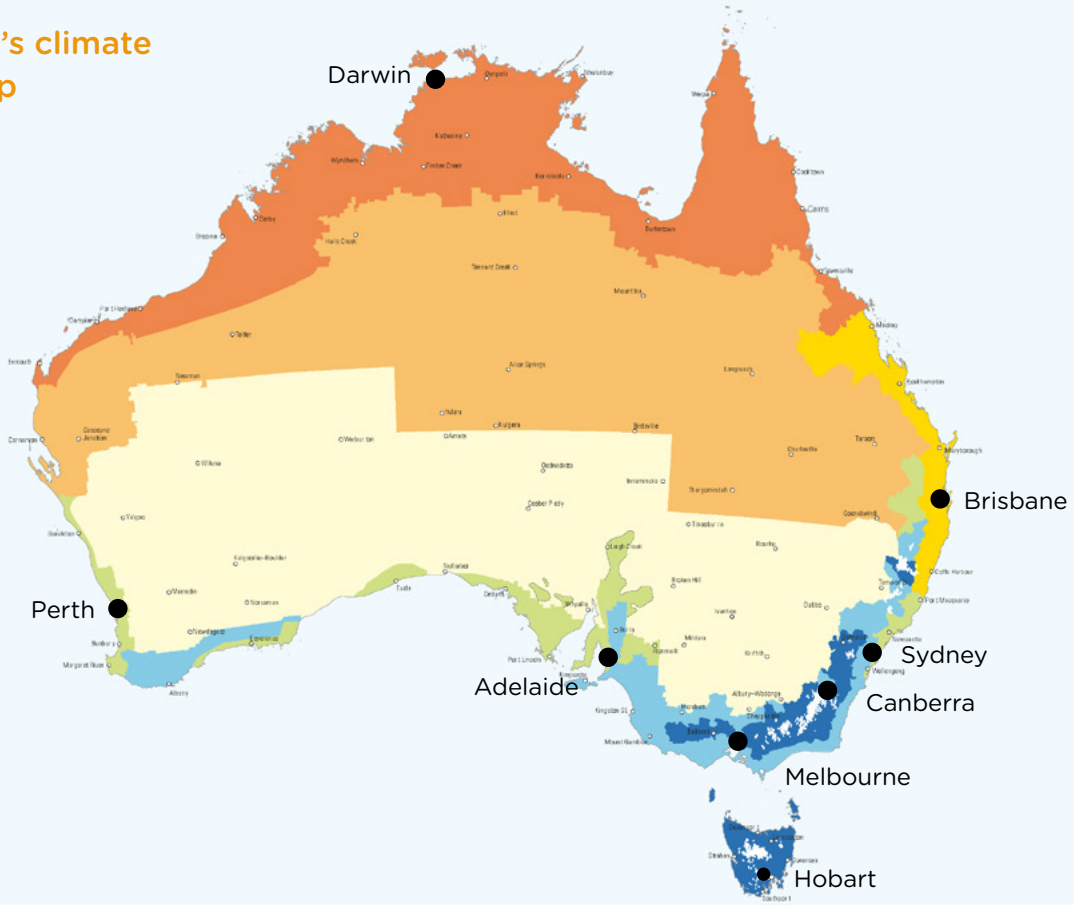
GreenPower®

Unlike many other jurisdictions, district thermal systems are rare and are limited to sharing cooling and heating plant between a small number of local buildings.

Climate zones

Australia's National Construction Code defines eight climate zones. The major population centres of Brisbane, Sydney and Melbourne are located in mild-to-temperate climate zones 2, 5 and 6.

Australia's climate zone map



Climate zones

1. high humidity summer, warm winter
2. warm humid summer, mild winter
3. hot dry summer, warm winter
4. hot dry summer, cool winter
5. warm temperate
6. mild temperate
7. cool temperate
8. alpine

Source: Australian Government, Climate Zone Map Australia

History

In 1997, as nations gathered to negotiate emissions reduction as part of the Kyoto agreement, forecast growth in Australia's commercial building market – coupled with some of the most carbon intensive electricity in the world – suggested that commercial building emissions could double in 20 years.

The response was to establish a new rating scheme to measure the energy intensity and emissions of office buildings.

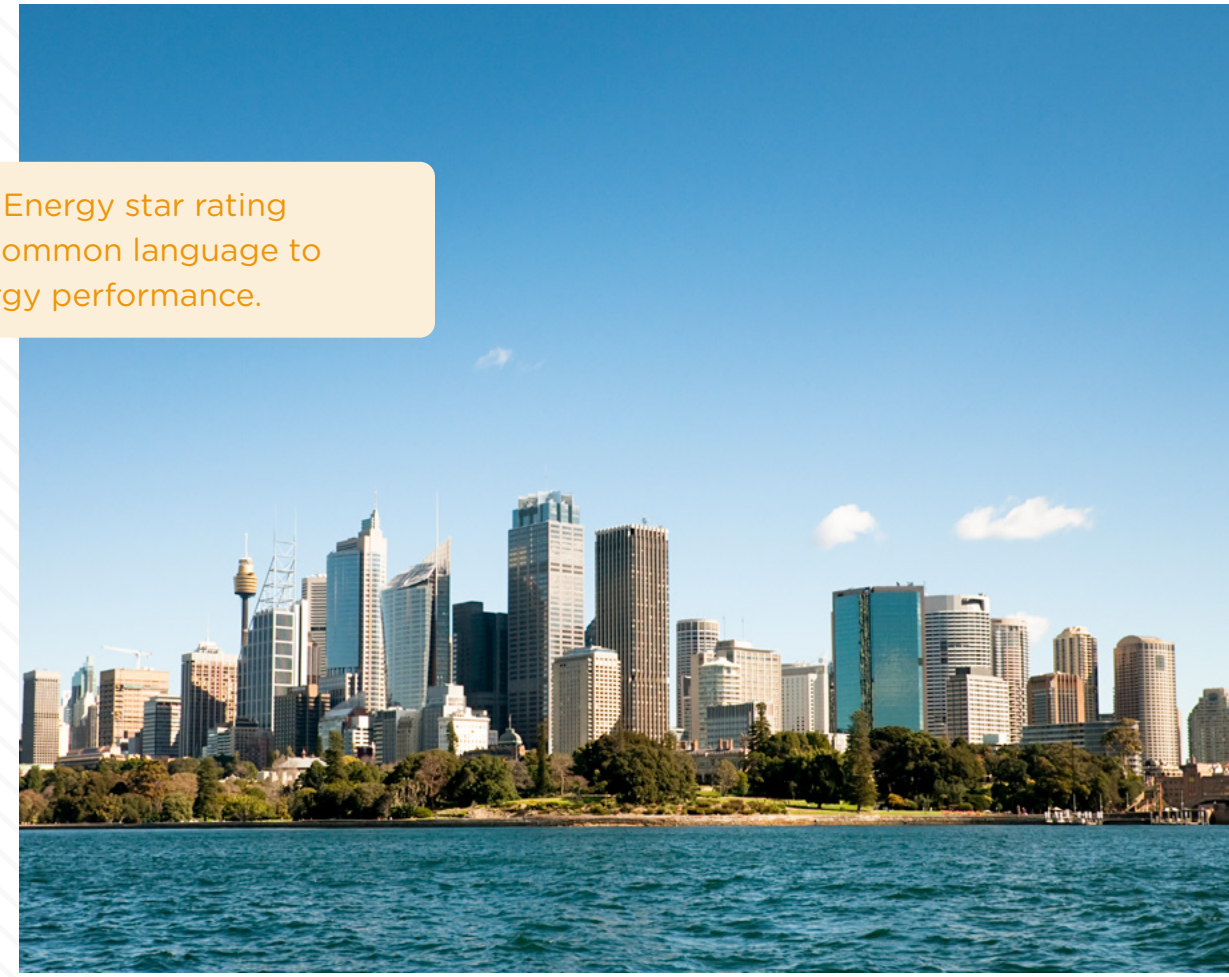
Timeline → NABERS Energy

1998	Launch of the Building Greenhouse Rating in the state of New South Wales
2000	The scheme becomes national and is renamed the Australian Building Greenhouse Rating (AGBR)
2005	The scheme is renamed National Australian Built Environment Rating System. NABERS offers Energy for Offices ratings and Commitment Agreements
2008	Launch of NABERS Energy for Hotels and Energy for Shopping Centres rating tools
2010	Legislation establishes the Commercial Building Disclosure (CBD) program and makes NABERS Energy for Offices ratings mandatory for buildings over 2000 m^2
2012	NABERS New Zealand scheme established, offering Energy for Offices
2013	Launch of NABERS Energy for Data Centres
2017	Launch of NABERS Energy for Public Hospitals The CBD threshold drops to 1000 m^2 for mandatory NABERS Energy for Offices ratings Launch of Carbon Neutral Buildings standards by the Australian Government with NABERS and the Green Building Council of Australia
2018	Launch of NABERS Energy for Apartment Buildings Launch of NABERS Co-Assess Launch of NABERS Carbon Neutral rating option
2019	Commitment Agreements expanded to most rating tools
2020	NABERS UK scheme established
2021	Launch of NABERS Energy for Retirement Living and Residential Aged Care NABERS UK launch of Commitment Agreements and Energy for Offices rating
2022	Planned launch of NABERS Warehouses and Cold Stores rating tool

Australian commercial property before NABERS

Energy underpins safe, comfortable and productive commercial buildings. Lighting, heating, cooling, lifts, ventilation, hot water and pumping are all essential services that require energy and contribute to annual energy bills. Commercial buildings consume around a quarter of Australia's electricity and generate around 10% of total carbon emissions.

The NABERS Energy star rating became the common language to describe energy performance.



The structure of the commercial property market compounds this challenge. In Australia, landlords pass on electricity costs to tenants through lease outgoings. This meant that, before NABERS was developed, landlords had little financial incentive to keep a cap on energy use and emissions.

In economic terms, Australia's commercial property sector was a case study of classic market failures: split incentives, lack of information and gaps in understanding, absence of common language, and information asymmetry. All these factors contributed to buildings that fulfilled a similar purpose and contained similar technologies, and yet displayed a wide variation in energy intensity.

Launching an energy efficiency benchmark

Five stars defined best-practice energy and emissions intensity.

The forerunner of NABERS, the Building Greenhouse Rating, was launched in 1998. It started as a collaboration between the New South Wales Government and industry organisations, including Australia's peak industry body for major commercial property owners, the Property Council of Australia. This voluntary benchmarking program for offices defined an annual measurement period for energy consumption. It also normalised energy by office area, operating hours, climate zone and occupancy, providing a zero-to-five star rating in half star increments.

By 2000, the NSW initiative went national and became the Australian Building Greenhouse Rating (ABGR). Five stars defined best-practice energy and emissions intensity. By making operational energy intensity transparent through a robust benchmark, this new rating made the benefits of energy efficiency investments visible to building owners and tenants, encouraging investments that improved energy performance.

In the first five years, clever marketing drove voluntary uptake by some of Australia's largest office portfolios and market penetration reached around 10% of all office space. The benchmark gave tenants information and was often used by large asset owners to compare buildings within a portfolio and identify those with the highest potential for improved energy performance. It wasn't long before tenants in the market for office space started using the benchmark as a filter for preferred properties.

Government creates demand

From 2005, all states and the Australian Government began including NABERS targets for their portfolios. By 2007, most had requirements in place for buildings they owned or rented to achieve a minimum 4.5 stars NABERS Energy rating. With more than two million square metres of office space around the country, the Australian Government is one of the nation's largest tenants. This requirement was one with real leverage. Not only did this directly drive growth in the number of rated buildings. It also required more property management specialists with an understanding of the ABGR system.

Suddenly, leasing and sales teams needed to understand if the buildings they represented would satisfy savvy tenants asking for an ABGR rating. Funds managers needed to know how their buildings rated and facility managers were required to explain to fund managers the actions they were taking to improve building performance. The star rating became the common language to describe energy performance.

A benchmark measured in stars

As awareness grew within the property sector, one of the key success factors was a technically robust benchmark that translated into an easily understandable star rating. Aiming for 4.5 stars is a much easier concept to communicate than aiming for a normalised energy intensity of 80 kgCO_2e per m² per annum. Everyone from the CEO down could talk the star scale, with more stars meaning better performance. Before ABGR, energy efficiency – if it was a topic of discussion at all – was left to the facilities teams and technicians. These people knew their megajoules from their kilowatt hours. But ABGR enabled discussions in the corporate boardroom or even with institutional investors from the other side of the world who wanted to improve the star rating of their portfolio of assets.

Tenants increasingly used the rating as a filter when they were shopping around for new space, and a method was designed to extend the benefits of the benchmark to new buildings.

In 2005, ABGR was relaunched as the National Australian Built Environment Rating System. It was embedded in national legislation, as well as in Australia's National Construction Code. NABERS is widely used and understood by the ecosystem of services and skills required to design, deliver and operate high efficiency buildings.

When the rating scheme was designed in 1998, the scale of the star rating was based on a set of "best available information" gathered from energy audits and existing information from portfolio owners. Average performance was set to 2.5 stars, with 5 stars reflecting exceptional performance. At the time, some stakeholders considered the benchmarks for 5 stars were set too high and owners of energy intensive high-rise towers would find it difficult, if not impossible, to achieve a high star rating without compromising service levels.

In 2009, analysis of the body of knowledge in the NABERS rating database determined the impact of commonly-used strategies to improve ratings. The Low Energy High Rise project identified a range of building and management attributes that correlated with improved NABERS ratings and higher energy efficiency. Importantly, the simple act of disclosing a NABERS Energy rating was linked with a 0.5 star improvement in energy performance. This was a powerful demonstration of the adage: what gets measured gets managed.

By 2011 Australia boasted enough buildings at the top end of the scale to justify adding 5.5 and 6 stars to the rating range. In 2020, 34 buildings in Australia were certified as 6 star – a considerable performance jump when a 6 star building uses around half the energy of a 5 star building.

NABERS rating scale

The NABERS rating scale from one to six stars in half star increments motivates owners and facility managers to work towards the next star increment. Six stars denotes best market practice.

The simple act of disclosing a NABERS Energy rating was linked with a 0.5 star improvement in energy performance.

A high NABERS rating is now a proxy for a well-managed building. Studies have found buildings with higher NABERS ratings have lower vacancy rates, increased capital value and lower costs of operation. For example, Knight Frank's 2021 Active Capital Report, found offices with NABERS Energy ratings of up to 4.5 stars are worth an average of 8% more than unrated buildings on a per square metre basis. Buildings rated between five and six stars attracted an 18% premium.

NABERS Energy benchmarks are also considered a mark of quality and are included in the Property Council of Australia's Guide to Office Quality, the reference guide for specifying office property in Australia.

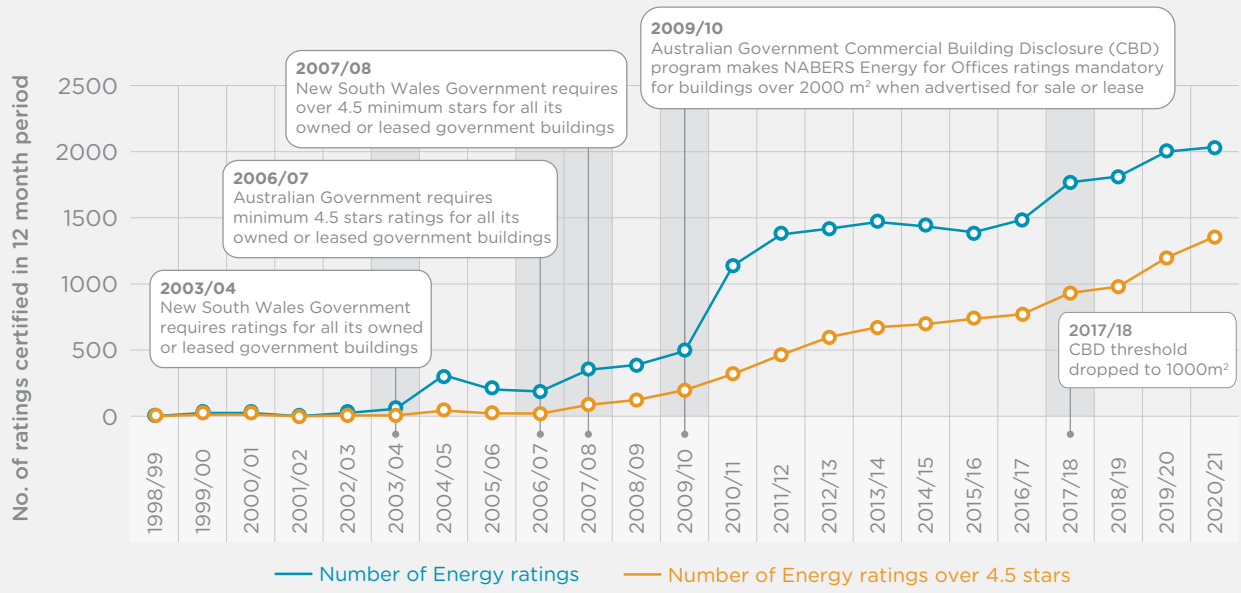
Mandatory NABERS Energy ratings

In 2010, the Australian Government established the Commercial Building Disclosure (CBD) program, through the Building Energy Efficiency Disclosure Act 2010. This required any office building with more than 2,000 m² of space being leased or sold to disclose a NABERS Energy rating. NABERS Energy ratings were soon prominent on advertising billboards, promotional material and stipulated in leases.

In 2017, the threshold for disclosure was reduced to 1,000 m². This captured a broader segment of the commercial office market.

The CBD Program undoubtedly drove the uptake of NABERS ratings. But the success of the CBD Program was bolstered by a robust system that had already gained widespread market acceptance. The success of NABERS and the CBD Program was symbiotic.

Government actions drive uptake of NABERS Energy



Note: Annual ratings of Office base building, whole building and tenancy ratings are included.

Features

NABERS is a case study of how government and the private sector can work in partnership to deliver a program that drives genuine market transformation, decreases operating costs, eliminates emissions, creates new jobs and valuable intellectual property, and supports better performing buildings.

NABERS Energy uses an energy intensity benchmark based on 12 months of energy consumption data. For example, in the case of offices, the benchmark is normalised for:

- Rated area (size of building, adjusted for vacant space)
- Hours of operation
- Climate zone
- Number of occupants (for whole building or tenancy ratings)
- Energy source greenhouse gas emissions intensity.

Different normalisation factors are used for other building types.

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Energy efficiency improvements are the key to improving NABERS Energy ratings.

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5% of assessments are audited post-certification to maintain the rigour of the system.

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Building owners can use annual NABERS ratings to measure the impact of building improvements over time, including as a benchmark before and after embarking on capital upgrades.

Energy and emissions rating?

From the outset, NABERS Energy was focused on lowering the emissions intensity of commercial buildings by encouraging energy efficiency and the use of low or zero emissions energy sources.

While NABERS Energy is, as the name implies, an energy rating, it is weighted to account for the relative emissions intensity of different fuel sources. There are emissions factors for different fuel sources used in Australia and these factors are being updated over time as the electricity grid becomes less emissions intensive.

NABERS and renewable energy

Energy efficiency improvements are the key to improving NABERS Energy ratings. However, from its earliest days NABERS Energy was also designed to incentivise the shift to renewable energy.

This demanded some decisions about the treatment of onsite versus offsite renewables.

Australia has the highest uptake of rooftop solar globally, and almost all onsite renewable energy is solar. While wind power is a major source of renewable energy in the national grid, the Australian Government says it is not as practical as solar PV for onsite generation.

NABERS does not count onsite renewable energy as part of the energy supply crossing the building boundary. Instead, onsite renewables are regarded as a feature of the building in much the same way that efficiency measures like shading are considered a feature of the building. This means that energy generated and consumed onsite is excluded from the energy rating.

To encourage the purchase of renewable energy from the electricity grid, NABERS introduced a separate rating – NABERS Energy with GreenPower. This enabled building owners to improve their NABERS ratings by purchasing renewable energy through the Australian Government-backed GreenPower program. This resulted in two ratings for the same building: NABERS Energy and NABERS Energy with GreenPower. The latter could be higher than the standard NABERS Energy rating.

While the ambition of this strategy was to incentivise investment in more renewable energy, it led to some confusion in the market. Ratings with, and without, GreenPower were quoted, sometimes in isolation, sometimes together. Indeed, NABERS with GreenPower was often described, especially among decision makers, as “cheating”, or “just using tenants’ money to buy stars”. Recognising this confusion, NABERS is acting to phase out NABERS Energy with GreenPower.

In 2022 NABERS will introduce a Renewable Energy Indicator to disclose the percentage of energy sourced from renewables for every Energy rating. This new metric aims to be a transparent way to reward those who use and purchase renewable energy.

In 2022 NABERS will introduce a Renewable Energy Indicator to disclose the percentage of energy sourced from renewables for every Energy rating.

NABERS and the CBD program

As mentioned previously, the Australian Government legislated the Building Energy Efficiency Disclosure Act in 2010. This required any office building with more than 2,000 m^2 of space being leased or sold to disclose a NABERS Energy rating. In 2017, the program was expanded to capture buildings 1,000 m^2 or more.

RIS uncovers benefits of NABERS Energy ratings.

In Australia, laws and regulations require a formal Regulatory Impact Statement (RIS) that assesses the costs and benefits and helps governments move towards best practice regulatory design and implementation. The RIS for the proposed CBD Program found several factors in the market for commercial office space in Australia that impede the take-up of economically feasible energy efficiency improvements:

- There are information asymmetries between building owners and prospective tenants or buyers, where tenants and buyers are placed at a disadvantage in understanding the energy efficiency performance of premises on the market
- Split incentives occur in the market, where those in the best position to effect change have little or no incentive to do so; and
- Organisational failures exist, where there are information asymmetries and split incentives within firms which mean that low or no cost opportunities are not taken up.

The RIS concluded that it was highly likely that the benefits far outweighed the cost of administering a mandatory program and the Building Energy Efficiency Disclosure Act was passed in 2010. As a result of the Act the Commercial Building Disclosure (CBD) program commenced in 2011.

Who must comply?

Most building owners who are selling or leasing office space with a net lettable area of 1,000 square metres or more

Most tenants who are subleasing part of their tenancy with a net lettable area of 1,000 square metres or more

Most real estate agents who are advertising office space with a net lettable area of 1,000 square metres or more.

The CBD program requires sellers and lessors to obtain a Building Energy Efficiency Certificate (BEEC) before the building goes on the market for sale, lease or sublease. BEECs are valid for up to 12 months and include:

The building's NABERS Energy star rating

A tenancy lighting assessment, and

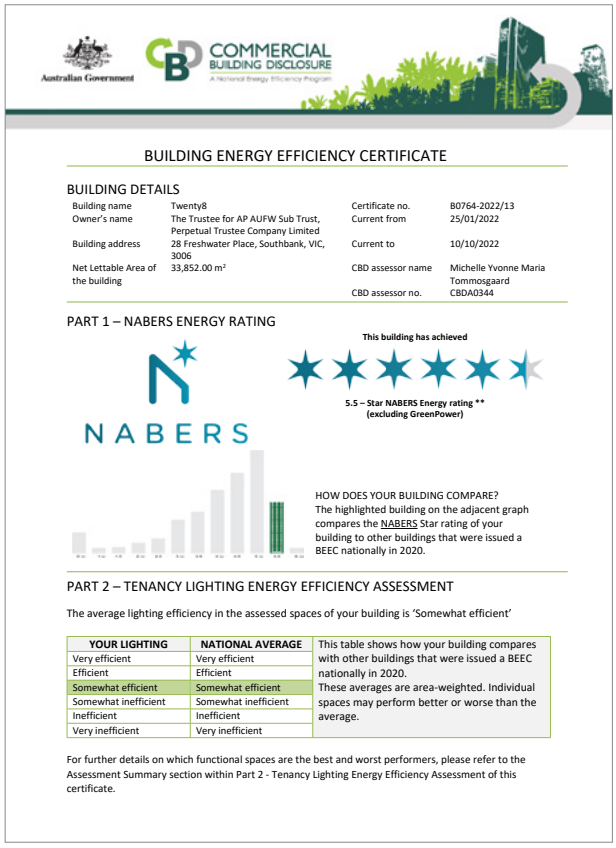
General energy efficiency guidance.

According to the administrators of the CBD Program, the average number of new program entrants was around 200 buildings per year between 2013 and 2017. The number of BEECs issued annually, grew from 896 in 2011-2012, to 1,383 in 2017-2018. The average NABERS Energy Rating on all BEECs issued improved from 2.9 stars when the program was introduced to 3.7 stars in 2017-18.

Once a NABERS assessor has completed an additional CBD training course, they can apply to become a CBD Accredited Assessor.
As at January 2022, there were 136 active accredited CBD assessors in the Australian Government's directory.

CBD Program Building Energy Efficiency Certificate

The CBD Building Energy Efficiency Certificate provides detailed information on the energy performance of the building.



Australian Government
COMMERCIAL BUILDING DISCLOSURE

BUILDING ENERGY EFFICIENCY CERTIFICATE

BUILDING DETAILS

Building name	Twenty8	Certificate no.	B0764-2022/13
Owner's name	The Trustee for AP AUFW Sub Trust, Perpetual Trustee Company Limited	Current from	25/01/2022
Building address	28 Freshwater Place, Southbank, VIC, 3006	Current to	10/10/2022
Net Lettable Area of the building	33,852.00 m²	CBD assessor name	Michelle Yvonne Maria Tommosgaard
		CBD assessor no.	CBDA0344

PART 1 – NABERS ENERGY RATING

This building has achieved

NABERS

5.5 – Star NABERS Energy rating **
(excluding GreenPower)

HOW DOES YOUR BUILDING COMPARE?
The highlighted building on the adjacent graph compares the NABERS Star rating of your building to other buildings that were issued a BEEC nationally in 2020.

PART 2 – TENANCY LIGHTING ENERGY EFFICIENCY ASSESSMENT

The average lighting efficiency in the assessed spaces of your building is 'Somewhat efficient'

YOUR LIGHTING	NATIONAL AVERAGE
Very efficient	Very efficient
Efficient	Efficient
Somewhat efficient	Somewhat efficient
Somewhat inefficient	Somewhat inefficient
Inefficient	Inefficient
Very inefficient	Very inefficient

This table shows how your building compares with other buildings that were issued a BEEC nationally in 2020.
These averages are area-weighted. Individual spaces may perform better or worse than the average.

For further details on which functional spaces are the best and worst performers, please refer to the Assessment Summary section within Part 2 - Tenancy Lighting Energy Efficiency Assessment of this certificate.

Learn more about the CBD BEEC

NABERS Energy Commitment Agreements

Within a few short years, NABERS Energy ratings proved such a valuable marketing tool that the property industry, especially developers, were keen to use the NABERS branding on promotional material for new buildings. But this enthusiasm brought new challenges. Statements varied from vague "targets" to bold claims without evidence. If practices were left unchecked and promises unfulfilled, NABERS' reputation could be at risk. Conversely, multi-million-dollar projects committed to NABERS Energy ratings were good for the environment and could demonstrate leadership.

The response was a "Commitment Agreement" – a contract struck between NABERS program administrators and the developer or owner, nominating a targeted star rating which could then be used in marketing material. The agreement outlines a range of requirements, chiefly that the property must be rated after 12 months of performance once at least 75% occupancy has been achieved. The rating must be disclosed.

As part of the NABERS Commitment Agreement, an independent design review is undertaken to assess the energy modelling of the development. The model is tested against a range of scenarios, including fault and poor calibration scenarios that are most likely to occur during normal operation of the building.

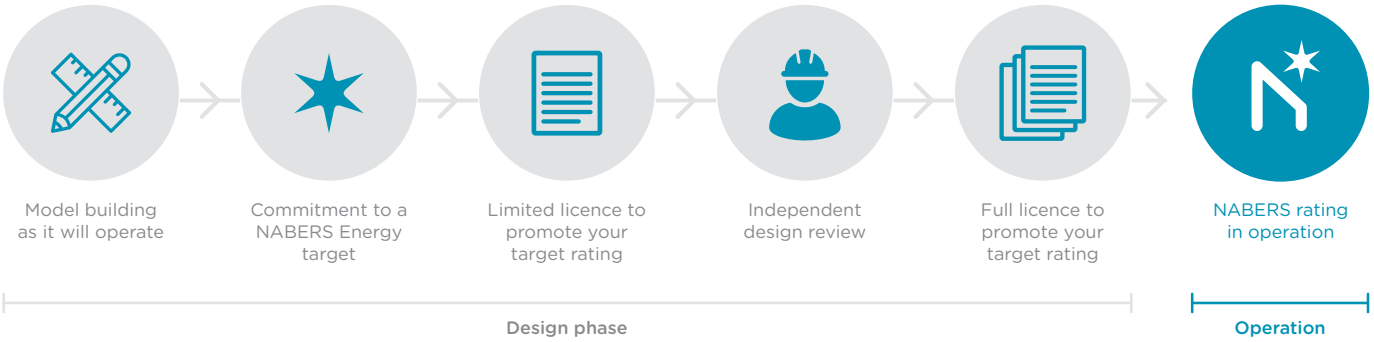
This design review process has enhanced the competency of the design fraternity. Australian designers now are likely to calibrate their models to whole-of-year performance, rather than design day conditions. While Commitment Agreements are not taken up on every new development, a contractual arrangement will frequently outline the builder's guarantee to achieve a specified NABERS Energy outcome. This binds the design team to measurement and monitoring of building performance throughout the first 12 months of operation.

More than 85% of buildings with a Commitment Agreement have achieved or exceeded the targeted performance, largely avoiding the significant "performance gap" reported in other jurisdictions.

NABERS Commitment Agreement target logo

Commitment Agreements were originally designed as a mechanism to allow property developers to promote the aspirations of new buildings. Today they are also used as a mechanism to satisfy energy efficiency requirements within the National Construction Code.

NABERS Commitment Agreement process



More than 250 Commitment Agreements had been signed by the end of 2021, with 42% still in progress. Of the 146 buildings completed, 86% of the planned ratings have been achieved. It is notable that the average period between striking a Commitment Agreement and confirming the performance rating is 4.4 years, underscoring the long cycle between project inception and validation of performance. Building designers often remain on the project team during the 12 month operation period so that performance intent is maintained and models can be calibrated.

The Commitment Agreement process crystallised the need for a "reverse calculator" so designers could nominate the building characteristics, energy split and targeted NABERS rating to determine the annual energy budget. The reverse calculator has proven incredibly useful, not only to the design process, but also for facility managers and others to determine energy savings required to achieve a targeted lift in NABERS Energy stars.

"Collaboration is key to driving the global adoption of green building practices and its many benefits, including emission reduction. NABERS provides robust pathways to high performing, efficient buildings. Green Building Council of Australia's partnership with NABERS ensures our rating systems are consistent, trusted and used by industry, enabling us to collectively work towards the decarbonisation of the built environment."

Davina Rooney,
Chief Executive Officer, Green Building Council of Australia

NABERS base building, whole building and tenancy ratings

NABERS Energy for Offices measures the efficiency of an office building and rates either the base building, tenancy or whole building.

This feature of NABERS, which splits the rating to reflect operational control, was initially a design requirement in response to Australia's energy market, in which every electricity consumer can choose their electricity retailer. The fortunate consequence of this policy is that every consumer has an individual electricity market meter.

In the 2021 financial year, NABERS Energy ratings for tenancies covered 2.3 million m^2 of office space, or 10% of total area of offices rated.

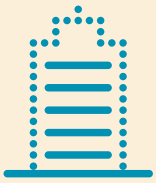
Recent work commissioned by the Australian Government to determine the benefits of energy efficiency improvements in tenancies recommended that mandatory disclosure of rating should be extended to tenant spaces if the rating process could be streamlined to avoid imposing too high a cost on the community.

An example of a streamlined process is the NABERS Co-Assess program. This enables businesses to get NABERS ratings, alongside the base building and/or whole building energy rating. The process was designed to help building managers, building owners and tenants better understand their energy use and work together to improve their performance.

CitySwitch is a voluntary leadership program that works with tenants to improve the sustainability of their office spaces. It is run by a coalition of Australian city councils and the NABERS team and encourages tenancy NABERS Energy ratings as an effective energy benchmark as part of energy management programs. Measures to encourage greater tenant uptake include capacity building, a collective impact approach, as well as recognition of individual successes via case studies and annual awards.

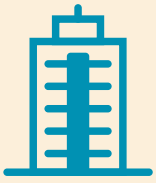
Base building NABERS Energy rating

Includes central services like heating and cooling systems. Lifts and lobby lighting are rated.



Tenancy NABERS Energy rating

When businesses choose to rate the space they occupy within a building.



Whole building NABERS Energy rating

Rates the base building and occupied space. This usually occurs when there is a single tenant occupying an entire building.

"NABERS Co-Assess is more than a simple way to get a whole-of-building energy efficiency rating. It's also a collaboration tool that brings building users, managers and owners together to start a meaningful conversation around whole building performance and value. We have taken a portfolio approach to NABERS Co-Assess ratings and have enjoyed greater customer engagement, as well as significant energy and cost savings across our portfolio."

Alicia Maynard,
General Manager, Sustainability & Technical Services, ISPT

Integrating NABERS Energy into green leasing

The industry-developed Better Buildings Partnership (BBP Sydney) Green Leasing Standard Template Clauses provides useful guidance on the inclusion of NABERS Energy ratings. The Green Lease aims to create an environment for collaboration between landlords and tenants using the NABERS rating as a key performance indicator.

Clause

1.1 Base building NABERS rating

a) Subject to clause 1.1(b), the Landlord [will/will use its reasonable endeavours] to ensure that the Current Base Building NABERS Rating is maintained for the Term

b) The Landlord [will/will use its reasonable endeavours to] ensure that the Target Base Building NABERS Rating is:

i) If not achieved at the Commencing Date, achieved by [insert date] and

ii) maintained for the Term

c) The Landlord [will/will use its best endeavours to] obtain a Base Building NABERS Rating on an annual basis and deliver to the Tenant a copy of an accredited Base Building NABERS Rating certificate no less than once per annum during the Term

d) The Tenant must:

i) Comply with the Landlord's reasonable requirements in relation to maintaining a Base Building NABERS Rating (including the Current Base Building NABERS Rating and the Target Base Building Rating, and;

a. [must not/must use reasonable endeavours] not to do anything to interfere with the Base Building NABERS Rating

NABERS expands beyond energy and offices

The success of NABERS Energy in the office market drove demand for additional ratings. NABERS has expanded in scope to include ratings for shopping centres, data centres, public hospitals, hotels and apartments. A rating for retirement living, and residential aged care was released in 2021 and ratings for warehouses and cold stores are due to be released soon. NABERS' goal is to release a rating tool for every major commercial building type by 2024.


Office buildings


Office tenancies


Data centres


Hotels


Shopping centres


Apartment buildings


Hospitals (public)


Retirement living


Aged care

Due for release in 2022-2023.


Warehouses


Schools

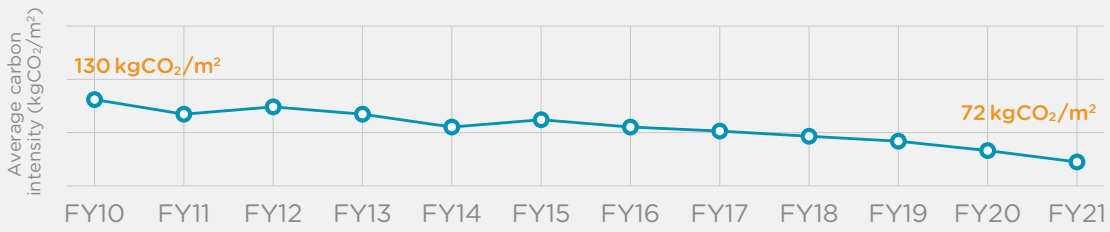

Retail stores

Shopping centres

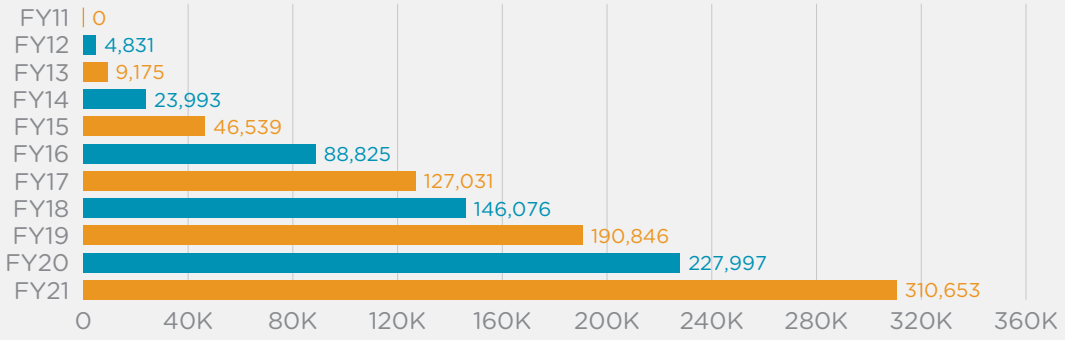
Many of Australia's large office landlords also own retail assets, making shopping centres an obvious target for NABERS Energy. Since the rating for shopping centres was released in 2010, the performance of these notoriously energy leaking assets has improved significantly, with buildings rated for nine years posting an average reduction of 39% on energy intensity and 45% on carbon emissions intensity. NABERS data confirms shopping centre owners save an average of $683,000 when they improve the NABERS Energy rating of their asset from 3 to 5 stars. By the conclusion of 2021, an impressive 283 shopping centres had achieved a NABERS Energy rating at least once.

Key performance indicators in FY21	FY20	FY21	% Difference
Total area (GLAR) of shopping centres certified (m^2)	8,347,294	9,571,301	14.7%
Number of shopping centres certified	168	172	2.38%
Average star rating	4.1	4.3	6.5%
Number of buildings achieving 5+ star ratings	34	73	114.7%
Average energy intensity (MJ/m^2)	350	318	-9.1%
Average carbon intensity – Scope 1, 2, 3 & 4 ($kgCO_2/m^2$)	82	72	-11.8%

Average carbon intensity for NABERS Energy shopping centres



Emissions saved with NABERS Energy for shopping centres since FY10

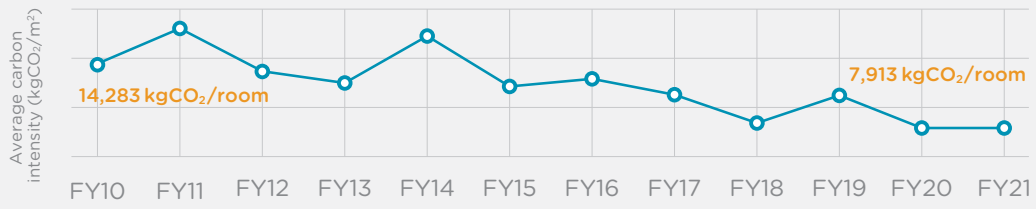


Hotels

Launched in 2008, NABERS Energy ratings for hotels can assess all standard, suite, boutique, conference, gaming and casino, ski and spa hotels. By the end of the 2021 financial year, 127 hotels had achieved a NABERS Energy rating at least once.

Key performance indicators in FY21	FY20	FY21	% Difference
Number of hotels certified	19	65	242.1%
Average star rating	4.1	4.0	-0.7%
Number of buildings achieving 5+ star ratings	2	15	650.0%
Average energy intensity (MJ/room)	45,162	44,516	-1.4%
Average carbon intensity – Scope 1, 2 and 3 ($kgCO_2$/room)	7,825	7,913	1.1%

Average carbon intensity for NABERS Energy hotels



Other building types

Fifty-one apartment buildings achieved ratings in the 2021 financial year. The vast majority of those were in New South Wales, where the City of Sydney's Smart Green Apartments program has driven interest and uptake in ratings, including a grants program funding ratings. The average star rating in the 2021 financial year was 3.1, an improvement from 2.9 in the previous year. The number of buildings with 5 star ratings or above increased by 350% – a good sign of the future trajectory of the rating tool.

Ten data centres have also achieved ratings, with the average NABERS Energy rating 4.4 stars in the 2021 financial year. More than 270 public hospitals have achieved NABERS Energy ratings since 2016.

Climate Active certification creates a new opportunity for tenants on the road to net zero emissions.

Certifying carbon neutral buildings – Climate Active

With increasing interest in buildings achieving net zero or carbon neutral performance, the Australian Government's Climate Active program has released the "Climate Active Carbon Neutral Standard for Buildings" which is carefully aligned with the NABERS Energy program.

Using the same certification boundaries as NABERS, the Carbon Neutral Standard defines the emissions sources to be included in an operational carbon neutral rating. If a building has a NABERS Energy rating, NABERS Water rating and a NABERS Waste rating almost all the information required for a Carbon Neutral rating is already collected and has been evaluated by the NABERS Assessor. With the addition of renewable energy purchases, records of refrigerant losses and the purchase/retirement of offsets, the NABERS team is able to provide Climate Active certification.

This exciting development creates a new opportunity for tenants to ask for Climate Active – Carbon Neutral next time they are in the market for office space.

Critical success factors

The runaway success of NABERS in Australia has been achieved with the help of many critical success factors

Progressive scale

A graduated scale includes all buildings and encourages building owners with low ratings to improve their assets over time.

Continuous improvement

Rating validity of 12 months encourages re-rating and continuous improvement.

Market driven

Empowered tenant businesses, including governments, exert their influence by asking for highly-rated buildings.

Commitment agreements

Contracts confirm NABERS targets for new buildings and emphasise the market value of ratings while encouraging better design techniques and metering systems that support continuous improvement.

Skilled administration

Dedicated resources protect the integrity of certifications, set the rules, foster training and ensure certification transactions are efficient and prompt.

Cost effective

Assessments and certifications are cost effective for owners but also support viable businesses for assessors.

Partnership approach

Government and private sector collaborate in equal partnership under a trusted governance structure that ensures balance.

Simple system

An easy-to-understand ‘star’ system presents a measure that resonates with the Australian market

Verified data

Efficiency is benchmarked using measured, third-party verified data that facility management teams understand, such as delivered energy on meters and invoices, net lettable area based on survey plans, vacancy levels and occupancy hours based on leases.

Clearly defined boundaries

By using “operational control” to define benchmark boundaries that split tenancy and base building, there is no room for argument that performance is someone else’s responsibility.

Training for everyone

The ecosystem of accredited assessors, designers, installers, maintainers, leasing agents, facility managers, asset managers and fund managers all have access to a free NABERS Essentials course and a wide range of high quality training options.

Inclusive governance

Stakeholders representing the full spectrum of the built environment guide the operation and development of the program.

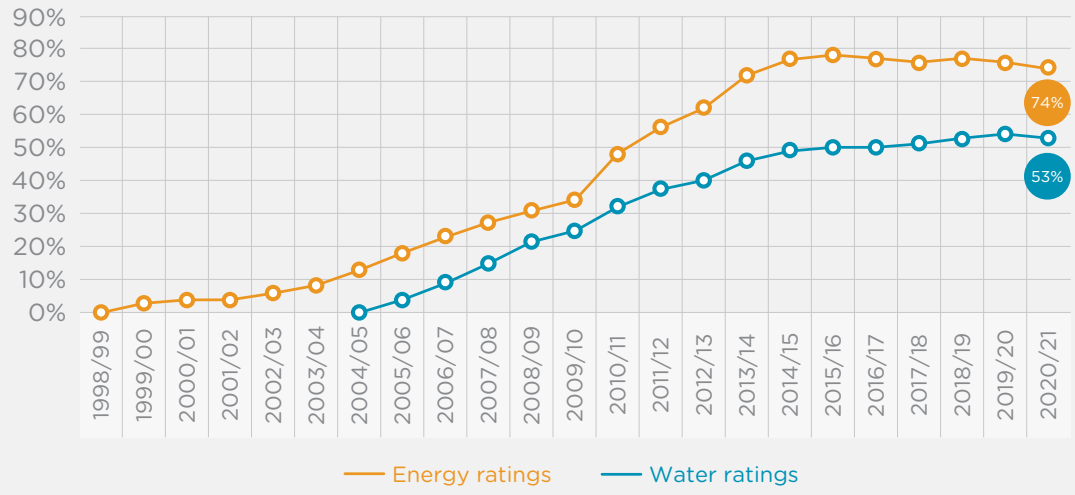
Impact

Because most buildings with a NABERS Energy rating are reassessed annually, Australia has a rich dataset of verified energy performance on hand to drive better decisions.

NABERS has saved an estimated AU$1 billion in energy costs and driven down greenhouse gas emissions in the commercial building sector by more than seven million tonnes since 1998.

The market penetration for NABERS Energy for Offices reached an estimated 74% in 2021.

NABERS penetration in the national office market



Note: Market penetration for NABERS Energy and NABERS Water in the office sector shows higher market penetration for the energy rating, which is mandatory for many buildings, compared to the voluntary uptake of the water rating.

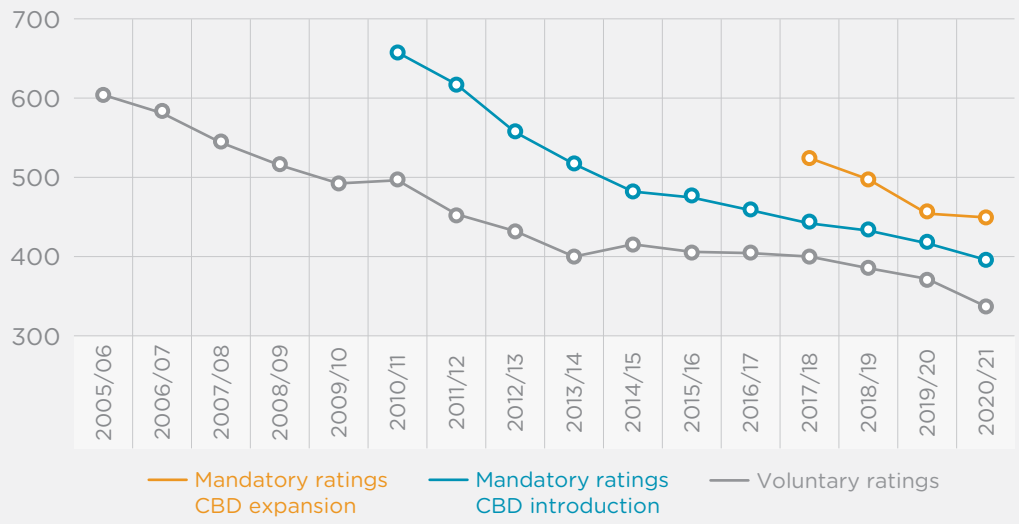
The purpose of NABERS Energy is to improve the energy efficiency of buildings, and as the illustration below demonstrates, the energy intensity of rated buildings has decreased over time.

The grey line tracks the trend of average energy intensity of the trailblazers – those building owners that rated their assets in NABERS' early days. These were typically large portfolio owners with premium buildings, and they have seen the energy intensity of their assets fall from around 600 MJ per m^2 to under 400 MJ per m^2 (base building).

The blue line tracks the performance of buildings that had not yet been rated when mandatory ratings were introduced nationally through the Commercial Building Disclosure Act in 2010. It is noteworthy how quickly energy intensity reduces, potentially demonstrating the rapid dissemination of key energy efficiency strategies through the industry.

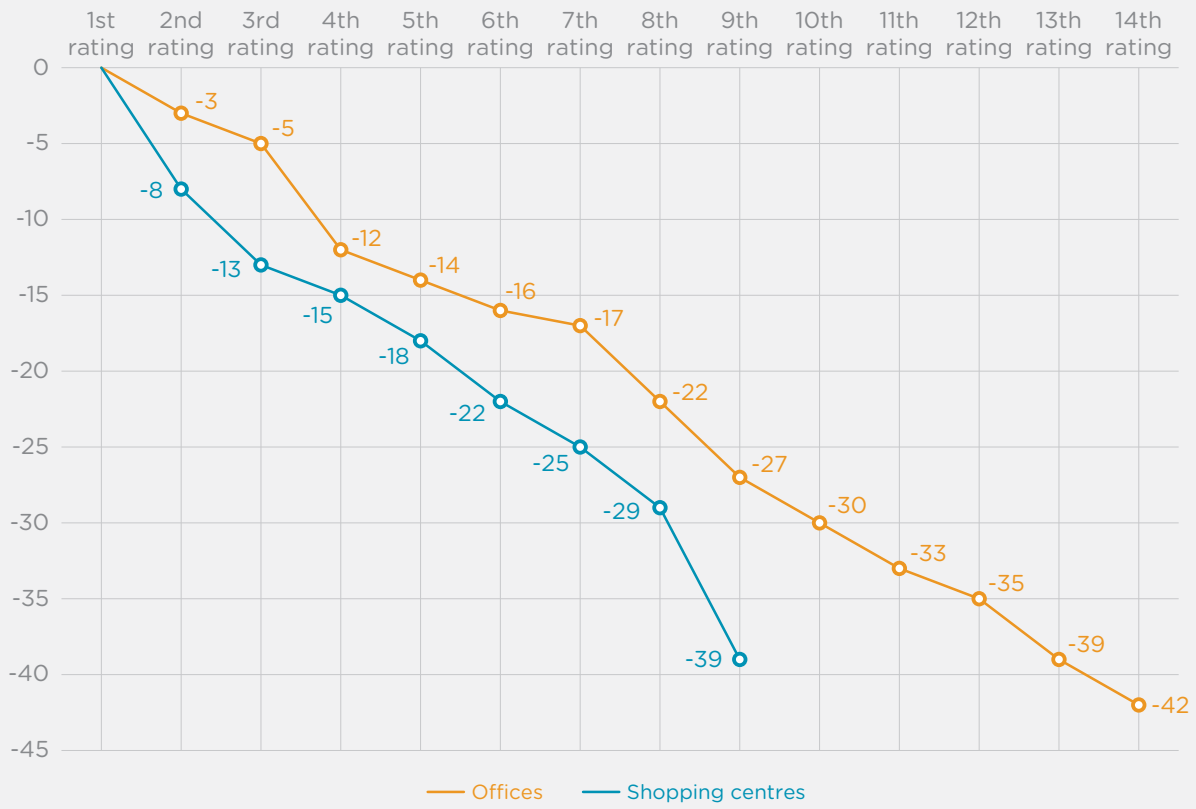
The orange line follows a new cohort of buildings that have been rated in response to the CBD Program's mandatory disclosure trigger dropping from 2,000 m^2 to 1,000 m^2. Again, this demonstrates that conducting and disclosing a NABERS Energy rating drives action to reduce energy consumption.

Improvements in average energy intensity (MJ/m^2) for voluntary and mandatory ratings



This shows average energy intensity based on MJ per m^2 for both voluntary and mandatory ratings. Buildings that are re-rated each year demonstrate a continuous improvement in energy efficiency.

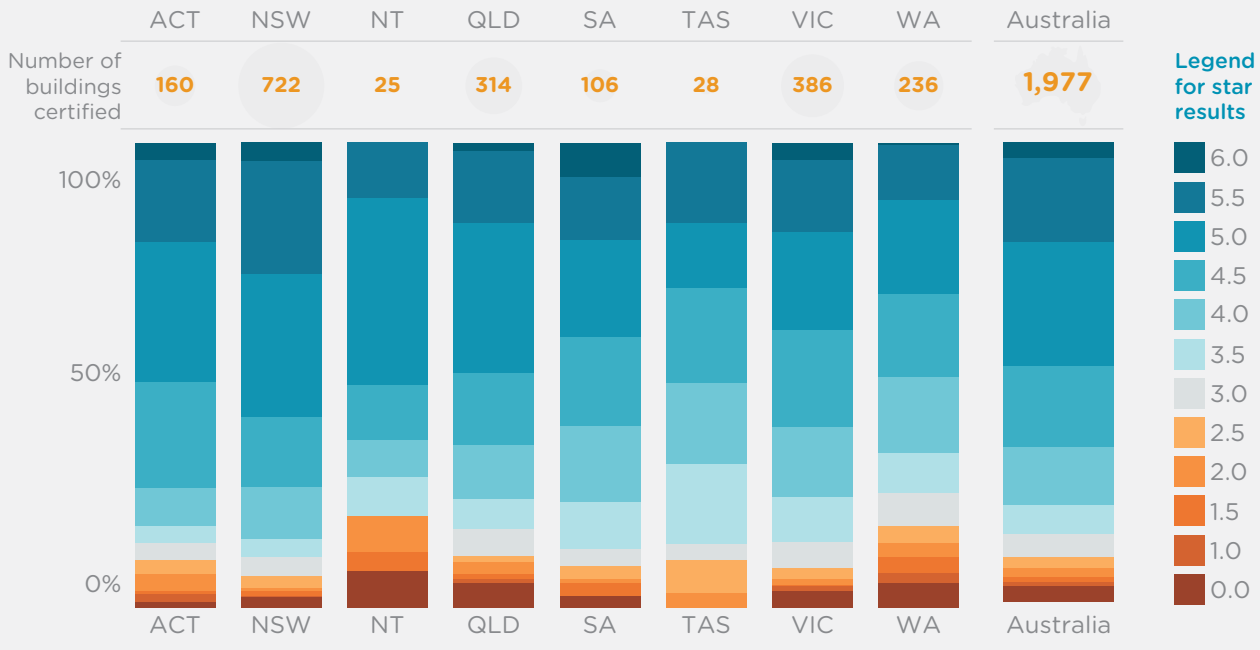
Average reduction in energy use after multiple NABERS rating (%)



Source: NABERS 2021 Annual Report - Life of Program Statistics

There is strong evidence that NABERS Energy is responsible for improved energy efficiency in office buildings with consistent results achieved in each of Australia's major cities. The chart below illustrates the distribution of ratings in each state of Australia in 2021, which has risen substantially since the average NABERS Energy rating of 2.5 stars at program's launch.

Geographic distribution of NABERS Energy for Offices in 2021



Note: Each state and territory in Australia participates in the NABERS program allowing comparison of building performance across subnational boundaries by star rating.

Buildings that have been rated over 14 rating periods demonstrate average energy savings of 42%, with greenhouse gas emissions intensity dropping by 53%.

"NABERS has provided the framework for the Australian property market to develop an understanding of the value of sustainability performance over sustainability features. This appetite is unique worldwide in its sophistication and maturity. Bueno is built off the foundation and the success of the NABERS program, which is reflected in the 1,500-plus buildings across 11 countries connected to our technology."

Leon Wurfel,
Chief Executive Officer & Founder, Bueno

Energy and emission savings are the headline. They are the purpose of the NABERS program. But it is the cascading effect of these savings that illustrate the market changes that make more efficient buildings the norm rather than the exception.

Some strategies to save energy are easy to implement and involve very little cost. These include optimising and recalibrating control systems to reduce hours of operation of air conditioning or modifying set points to align with the seasons.

Other strategies involve expenditure. This may include lighting upgrades to replace inefficient halogens with high efficiency LEDs. It may mean spending money on variable speed drives, which can halve the energy consumption of applications that use pumps and fans. Expenditure may be incremental and tied to regular maintenance spend. When asset owners transfer this expenditure from energy bills to investment in building systems, they gain inherently better buildings with lower maintenance costs.

As NABERS has gained a firm foothold in the market, knowledge of efficient buildings has expanded, and strategies are implemented every day by a wide variety of professionals and tradespeople tasked with improving the NABERS Energy rating. This sophisticated ecosystem of applied skills, comprehensive across the industry, is the arguably one of the most significant outcomes of the NABERS Energy program.

Industry training and certification delivered by the Property Council of Australia, Australian Institute of Refrigeration, Air conditioning and Heating, Green Building Council of Australia, the Energy Efficiency Council, as well as relevant university courses, commonly include background on NABERS and how buildings can be designed and operated to achieve higher ratings.

The impact of structured metering, allocation of responsibility, NABERS Energy and the GreenPower program mean buildings compete on energy efficiency and the proportion of renewable electricity purchased. As markets around the world struggle to identify buildings that could become stranded assets, Australian property owners are testing assets each day, via their NABERS Energy ratings, to understand their comparative performance.

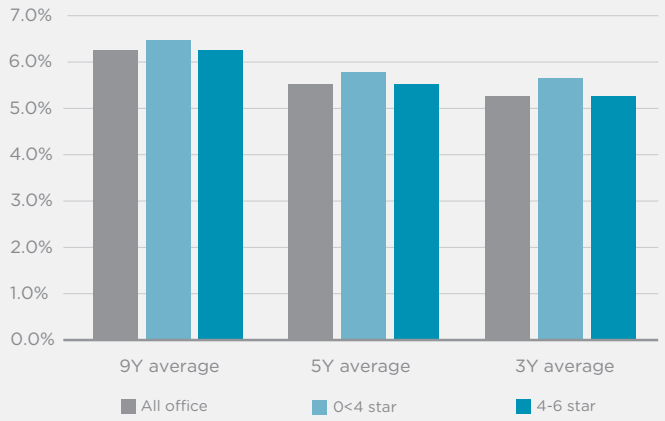
Investors' perspective

Real Investment Analytics (RIA) provides property investment analysis for a wide range of property stakeholders. RIA's measures of investment performance identify the superior financial performance of buildings with NABERS Energy ratings of 4 stars and above when compared with those below 4 stars.

NABERS Energy and office capitalisation rates

Capitalisation, or cap, rates, for higher NABERS Energy rated buildings are lower, and lower cap rates typically correspond to better valuation and prospect of returns and a lower level of financial risk. Whether there is a brown discount for lower rated buildings, or a green premium for higher rated buildings, the market prefers lower capitalisation rates.

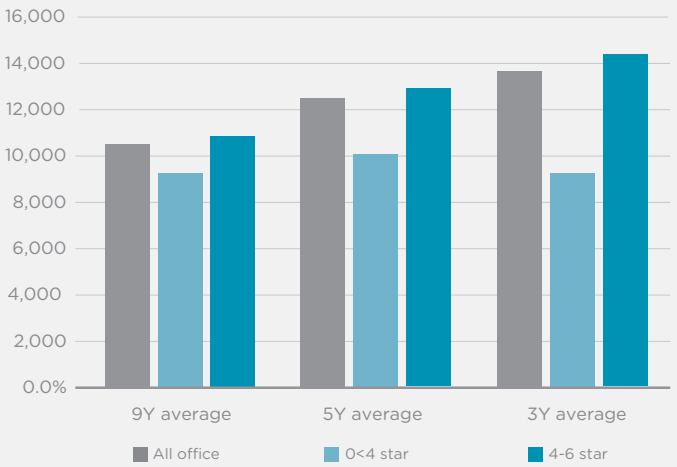
Source: RIA



NABERS Energy and office asset price

While there are many variables at play in property markets, higher NABERS Energy ratings correlate with higher market prices.

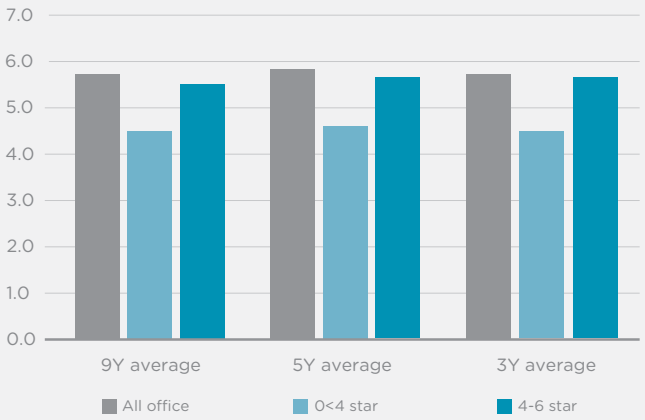
Source: RIA



NABERS Energy and office WALE

Weighted Average Lease Expiry (WALE) is a measure of the duration of leases and therefore an indicator of future income risk. The longer the WALE the more certainty in future income. Higher NABERS rated buildings are correlated with a longer WALE.

Source: RIA



Analysis of NABERS Commitment Agreements shows that 90% of targeted NABERS ratings are achieved

Eliminating the performance gap

It is very common for modelled energy use in the design phase to be much lower than the actual energy use in operation. One 2016 study from UK Innovate's Building Performance Evaluation Program found none of the buildings investigated achieved the energy use predicted at the design stage, and actually used on average 3.6 times more energy when in operation. This is known as the performance gap. However, analysis of NABERS Commitment Agreements shows that 90% of targeted NABERS ratings are achieved.

Furthermore, recent research from the Green Building Council of Australia has found 91% of new buildings certified under the Green Star rating tool met or exceeded their NABERS Energy target if the project team had signed a NABERS Commitment Agreement. As the GBCA's report says:

"This research confirms that a NABERS Commitment Agreement is much more than a piece of paper. This contract, signed by a developer or building owner at the design stage, is a critical success factor in translating design intentions into real-world outcomes."

International

The success and impact of NABERS Energy in Australia has caught the attention of property portfolios, owners and policymakers around the globe.

This section outlines key considerations for those interested in harnessing the benefits of NABERS Energy and describes how rating tools are created based on local building data.

Following close collaboration, NABERS schemes now operate in New Zealand and the United Kingdom. To achieve this, NABERS supported the development of local ratings tools and entered into licensing arrangements with delivery partners.

NABERS New Zealand

NABERSNZ is licensed to the New Zealand Government through the Energy Efficiency and Conservation Authority (EECA) and is administered by the New Zealand Green Building Council.

NABERSNZ offers Energy for Offices ratings, with a rating algorithm adjusted to suit the energy sources, emissions intensity and climate of New Zealand.

Following its launch in 2012, the program has grown steadily and now certifies more than 40 ratings each year. In 2020, the New Zealand Government announced that a 4 star NABERSNZ Energy for Office ratings would be required for government accommodation greater than 1,000 m^2. In 2022, product development started for a NABERSNZ Energy for Hospitals rating tool.

NABERS United Kingdom

NABERS UK launched in November 2020. The scheme, which is run by standards organisation BRE, is overseen by a steering committee comprising BRE, the UK's Better Buildings Partnership and NABERS, as well as the industry organisations including the British Council for Offices and the UK Green Building Council. The Better Buildings Partnership acts as scheme ambassador to support its uptake and success.

Two products are currently available in the UK for office buildings: Design for Performance (DfP, a local name for Commitment Agreements) to drive energy efficient new buildings, and Energy for Offices for existing buildings. All ratings are carried out by assessors trained in the UK. A local design review panel has been established for DfP.

Speaking at the launch of NABERS UK, Sarah Ratcliffe, CEO, Better Buildings Partnership celebrated the "huge leap forward for the industry in measuring and verifying the actual energy performance of UK offices".

While the UK tool is based on the Australian Energy rating, the rating algorithm has been adapted to the UK market.

Product Development

Before NABERS can be launched in a new country, various stages of product development are needed to create a rating tool plus supporting resources. Typically, funding for this work is sourced locally.

Data collection and initial industry engagement go hand in hand. Stakeholder consultation on the rating tool is important from the outset, and as part of this, building owners may be asked to support the initiative and share data.

Industry partners enable the creation of a dataset by providing information on building size and use patterns plus performance data. Climate and energy source information is also gathered to inform rating design.

As part of the benchmarking process, technical experts review the local dataset to test then define the settings for variables such as building size or hours of operation. Variables are then incorporated into a rating algorithm and thresholds are set for the performance range of each of the NABERS six star bands.

Careful analysis of building use patterns and configuration also enables the creation of locally tailored rules to guide the rating process and support assessors.

Draft versions of the rating calculator and rules may be used to carry out trial ratings on real buildings. This enables any final adjustments to be made before training and exams are created for the accreditation of local NABERS assessors.

Once a local administrator has set up systems and operations and a group of assessors have gained accreditation, the scheme can start to certify ratings and publish rating results.

Contact us

If you are interested in implementing NABERS in your region, please contact the NABERS team: nabers@environment.nsw.gov.au

Implementing NABERS in a new region

1. Collaborate

The support and involvement of a broad range of local stakeholders is crucial. Success is more likely when industry, government and advocacy bodies collaborate to design and build a scheme that meets local needs.

2. Build on existing principles

The principles and key elements of NABERS Energy are transferable. Principles such as the measurement of operational impact based on data and the use of a clear and simple rating scale are salient in all contexts.

3. Consider your unique geography

NABERS Energy ratings must be tailored to each region, and the NABERS team has extensive experience developing new ratings tools and can play a key advisory role. The collection of local building data is critical to the benchmarking process and ensures the rating tool is fair, relevant and reflects how buildings operate in the region.

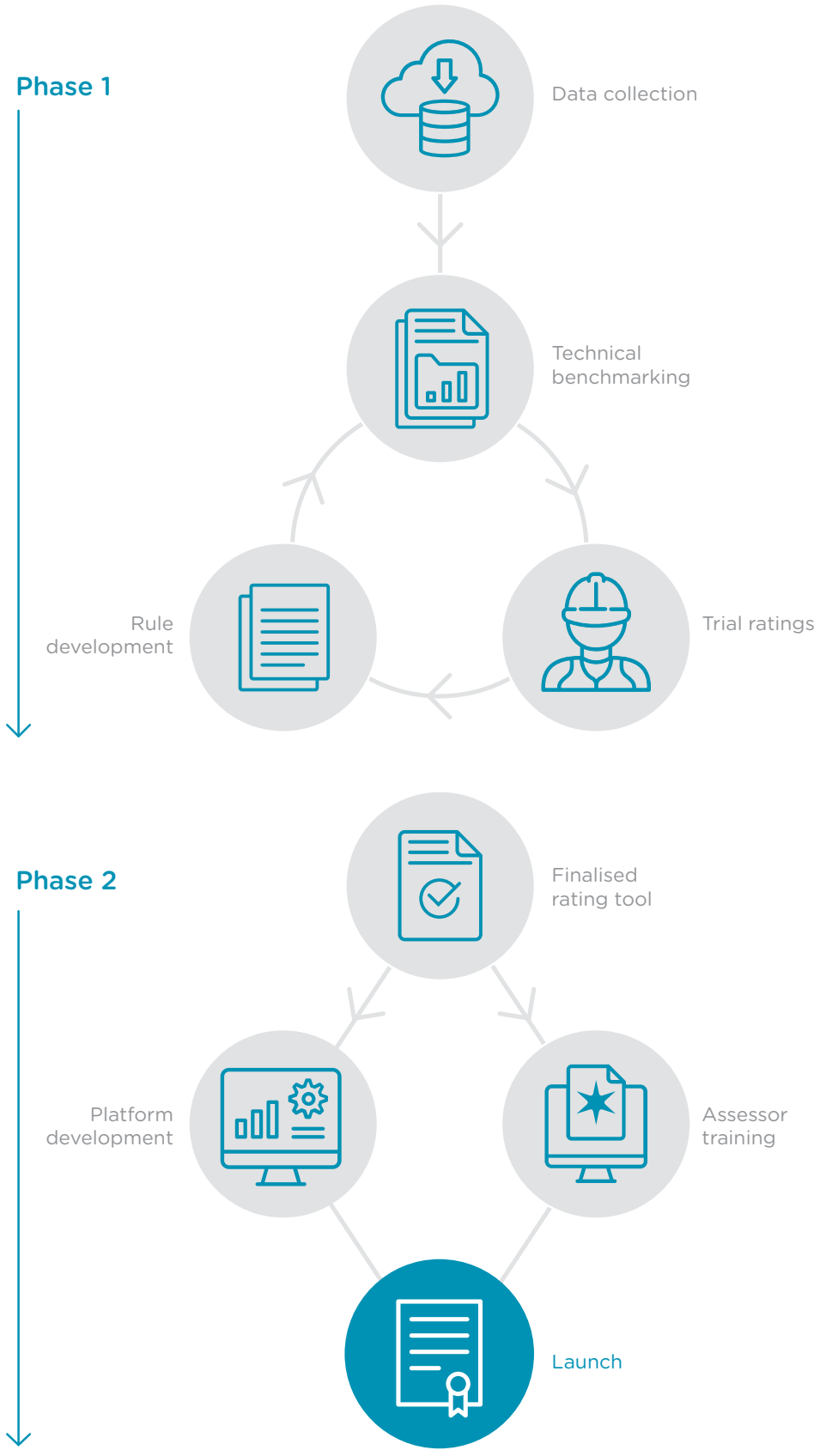
4. Create high quality governance

The local administrator could be a public sector, private sector or a not-for-profit organisation. While there are several ways to administer the scheme, high quality governance and transparent reporting are vital.

5. Scale over time

Once operational, a new scheme can expand based on government policy, industry participation and specialist expertise. Key milestones in the initial phase of operations include the training and accreditation of local NABERS assessors and the first wave of certified ratings. Once stakeholders have confidence in the scheme, NABERS ratings can support a variety of policy mechanisms, public and private procurement, ESG reporting and sustainable finance.

NABERS product development process



Stakeholder ecosystem

NABERS presents a range of co-benefits, but one of the biggest is the focal point it provides for discussion, collaboration and innovation in energy efficiency.

NABERS program stakeholders cover a broad spectrum of people and groups from the property sector, many of whom have a keen interest and often a sense of "ownership" over the program. This is reflected in the degree to which NABERS Energy is embedded into national disclosure legislation, the National Construction Code, leasing agreements, maintenance guidelines, design commitments, all the way through to key performance indicators in facility and operations managers' performance agreements.

The NABERS Steering Committee is the locus for this deep engagement, providing the NABERS team with the guidance and oversight necessary for ongoing development of new tools, expansion into different building types, and for the continuous improvement of existing tools.

As of 2021, NABERS includes representation from the following groups:

- Australian Government
- The majority of Australian state and territory governments
- Aged Care Industry Association
- Australian Institute of Architects
- Australian Property Institute
- Australian Institute of Refrigeration, Air conditioning and Heating (AIRAH)
- Australian Sustainable Built Environment Council
- Chartered Institution of Building Services Engineers (CISBE)
- Council of Capital City Lord Mayors
- Energy Efficiency Council
- Facilities Management Association of Australia
- Green Building Council of Australia
- Indoor Air Quality Association Australia
- International Building Performance Simulation Association Australasia
- Property Council of Australia
- Strata Community Association

The diversity of groups represented in the national Steering Committee highlights the wide-ranging ecosystem that uses NABERS Energy every day. From architects and services engineers designing new buildings, to fund managers marketing to investors, from facility managers to tenant representatives, NABERS is embedded in their business practice. This cluster of competitive collaboration is a product of the NABERS Energy market transformation.

Commercial property cluster of excellence

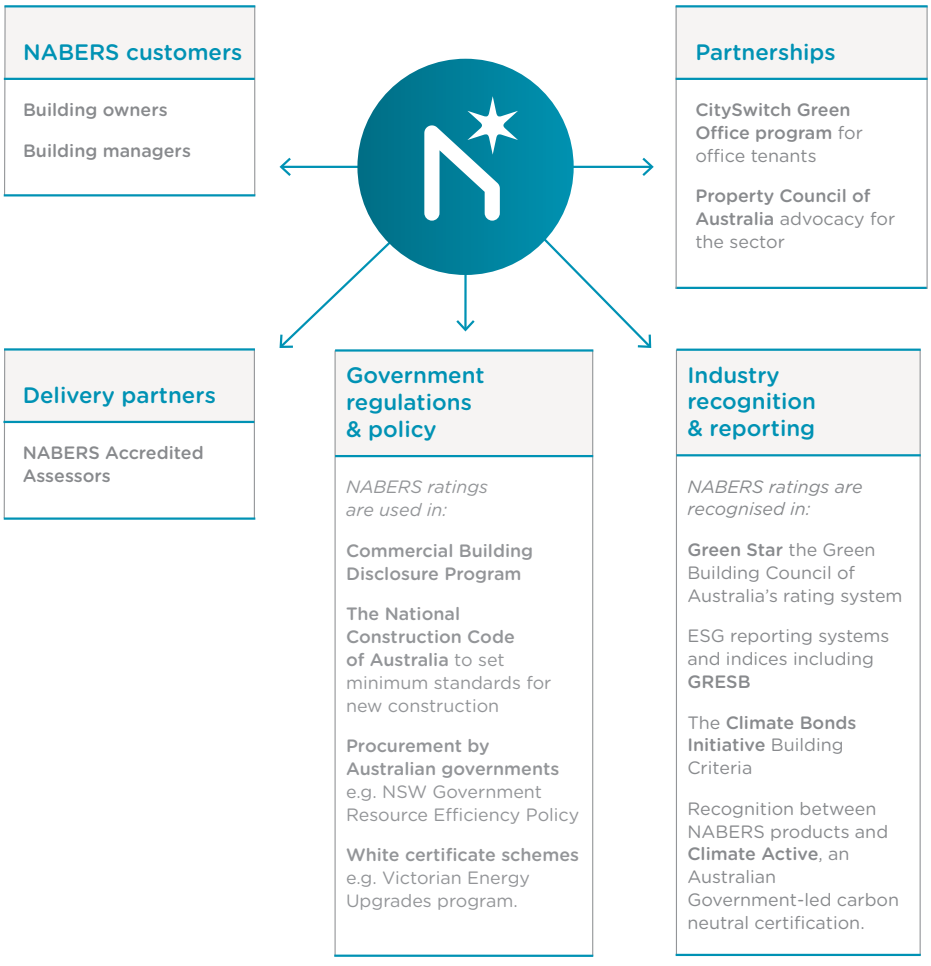
Global benchmarks of sustainability, notably GRESB and the Dow Jones Sustainability Index, have long acknowledged Australian real estate as leading the world in sustainability. In 2021, Oceania – comprising Australia and New Zealand – topped the GRESB league table for the most sustainable real estate for the eleventh consecutive year. There is a strong case that NABERS Energy plays a foundational role in establishing excellence in design, delivery and maintenance of high performing, sustainable buildings with a focus on measured, validated performance.

Clusters are geographic concentrations of interconnected companies and institutions in a particular field.

Harvard Professor Michael Porter, renowned expert in competition and markets, argues that "a cluster allows each member to benefit as if it had greater scale or as if it had joined with others without sacrificing its flexibility. At the intersection of clusters, insights and skills from various fields merge, sparking new businesses." This is exactly what NABERS does.

Working collectively is a critical element of successful clusters, and the NABERS Energy model provides an environment where private and public sectors work collaboratively in what otherwise could be seen as an area of competition. Each business is empowered to trial and experiment, to contribute to and to draw on the body of knowledge created within the cluster. In this way, NABERS is the "social glue" that binds the cluster of property excellence in the Australian market.

Key stakeholders



Innovation in energy services

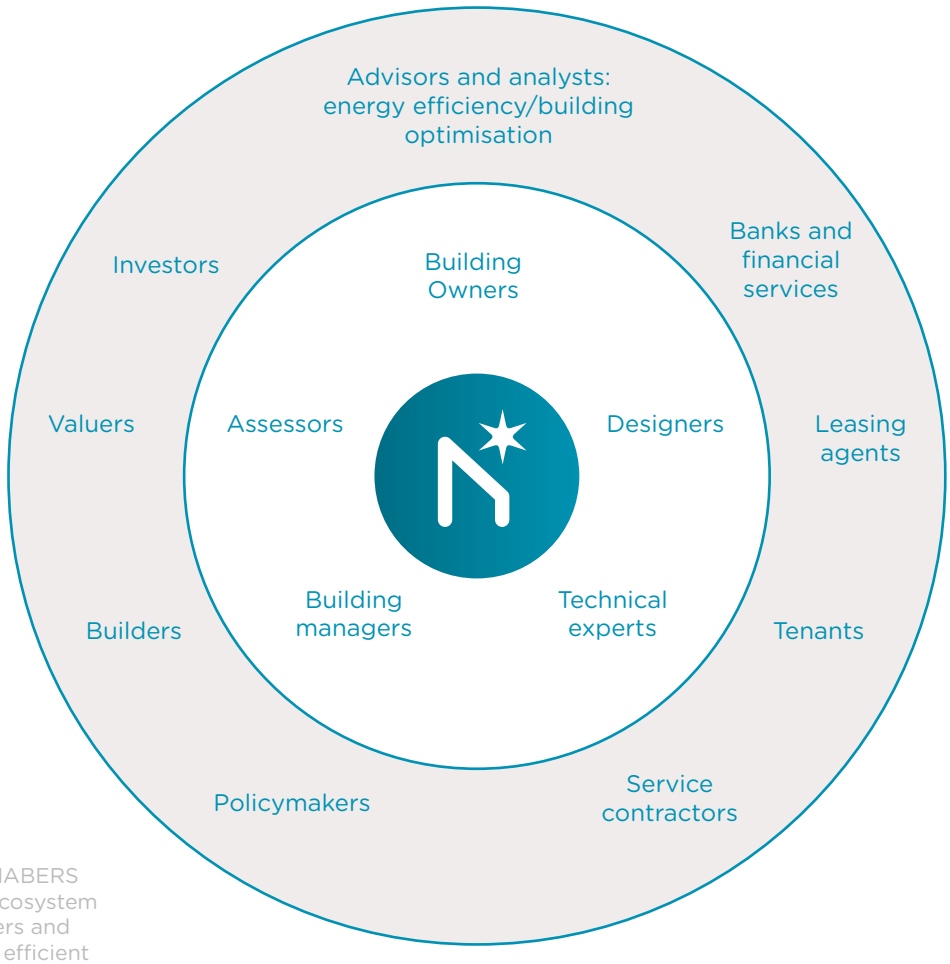
NABERS Energy has been an important catalyst for a range of new businesses. The most obvious of these are NABERS Assessors, but NABERS has also driven the development of new allied businesses.

Among the businesses that NABERS has encouraged are those that provide metering systems and energy data and analytics systems that combine weather and energy data to provide predictive insights. These are technology businesses that understand how to assimilate large datasets and make powerful recommendations to maintain and improve energy performance. These companies and their innovations have a global market, and many have grown rapidly after gaining experience across a variety of building types and geographic markets.

"We've developed a sophisticated ecosystem of energy efficiency products and services in Australia because NABERS makes the value that energy efficiency delivers tangible. Everyone knows that improving the NABERS Energy rating of your commercial building saves energy, lowers bills money and cuts carbon."

Luke Menzel, Chief Executive Officer, Energy Efficiency Council

The energy efficiency ecosystem



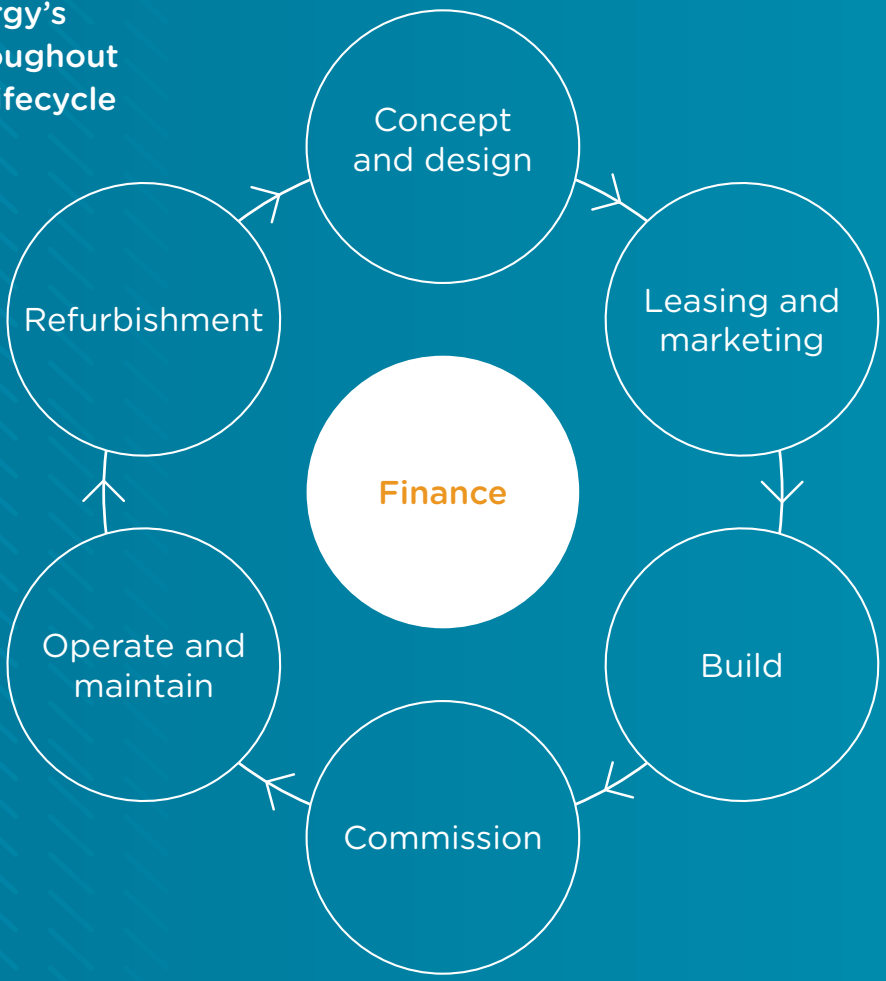
Typical users of NABERS Energy form an ecosystem that values, delivers and maintains energy efficient buildings.

In practice

NABERS Energy empowers each of the economic and technical actors involved to deliver and operate energy efficient buildings.

The NABERS rating is used as a design target, as a commissioning target, and as an ongoing operational measure of building performance. It's a trusted, government-backed brand that gives all these actors the confidence of a fair measure.

NABERS Energy's influence throughout the building lifecycle



Concept and design

At the earliest development stages of a new building, the developer and marketing teams will identify the preferred NABERS rating to meet the expectations of potential buyers and tenants. Architects and building services designers take up the NABERS Energy target as a design requirement using computer modelling to accurately predict the annual energy consumption of the design.

A NABERS Commitment Agreement may be formalised that allows the marketing team to promote the nominated NABERS rating to potential buyers and tenants. Financiers include the rating in their evaluation of project success and may include the rating as a condition of green bonds and other green finance mechanisms.

Leasing and marketing

Throughout the life of the building the NABERS Energy rating is used by the marketing and leasing teams whenever space is for lease or the building is on the market. In Australia, there is a mandatory obligation for offices under the Building Energy Efficiency Disclosure Act.

Tenants will also nominate a minimum NABERS Energy rating and the lessor and lessee can agree that maintenance of the NABERS Energy rating is a condition of green lease clauses.

NABERS disclosure at sale or lease

Note: When leasing office space of more than 1,000 m² it is a requirement to include the NABERS Energy rating on all advertising material.

Finance

Maintaining and improving the stars can also be a discussion point with bankers and financiers. NABERS is a convenient measure – or a common language – to be called up in green bonds or to support green financing. Take the example of the $100 million investment by the Australian Government's green bank, the Clean Energy Finance Corporation, in the AMP Wholesale Office Fund in 2017. This conditional investment included an obligation to improve the portfolio average NABERS Energy rating to 5 stars by 2020 and 5.5 stars by 2030. NABERS is piloting Sustainable Finance Criteria that provides two methods by which buildings can demonstrate eligibility for Green Loans. It aims to ensure adequate rigour and transparency whilst maintaining simplicity and ease of access.

NABERS publishes a Sustainable Portfolio Index annually which provides a portfolio-level view of NABERS ratings results. Participation by portfolios is voluntary and its popularity shows the importance of portfolio-level achievements for owners and investors.

"The NABERS rating tool has provided crucial insights into the actual energy performance of operating buildings. This has contributed to Australian property companies and fund managers having long been recognised as being leaders in sustainability when benchmarked against their global peers.

NABERS' track record of high-quality, environmental performance metrics continues to help institutional investors, landlords and tenants make decisions that lead to a more sustainable built environment."

↓

Ruben Langbroek,
Head of Asia Pacific, GRESB

Build

A NABERS target is often a performance outcome in a builder's contract, and the builder will pass this commitment to services design and delivery teams. This ensures the design integrity is maintained through the building phase. In these cases, the NABERS target is material to success and every design change is carefully checked to ensure it has no negative effects on the forecast energy efficiency.

Commission

In the past, the timeframes for building commissioning were often compressed and many compromises made along the way. With a NABERS rating to be delivered, commissioning teams are given the time to ensure systems are operating to the design intent and, through metering and submetering, that the energy performance is delivered.

Often the builder's obligations are not fully met until 12 months of performance information has been collected and a formal NABERS ratings achieved. This ensures that design and commissioning teams can monitor performance during the first 12 months.

Analysis of NABERS Commitment Agreements shows that 90% of targeted NABERS ratings are achieved, eliminating the "performance gap" that is a common reality in other jurisdictions.

Operate and maintain

Facility managers, operations teams and their services contractors target and monitor NABERS Energy ratings to ensure the building is "well tuned". National maintenance guidelines outlined by the Australian Institute of Refrigeration, Air conditioning and Heating (AIRAH) include NABERS Energy as a key performance indicator for service contractors responsible for heating, ventilation and air conditioning, and building management system controls. Benchmarking with NABERS motivates building management teams to investigate how to improve, or at least maintain, the energy rating through energy conservation measures that might include:

- **Building tuning:** Ongoing optimisation of start and stop schedules, set points, calibration of economy-cycle free cooling and equipment scheduling
- **Technology upgrades:** Business cases for equipment upgrades that improve NABERS ratings (and lower energy bills) are often given a high priority. When there's planned capital expenditure to replace equipment that has failed or reaching end of life there is incentive to specify higher efficiency equipment.

Analytic tools, submetering and energy information systems are used by facilities management teams to track performance to a sub-system level. Rules-based analytics use 'report by exception' functionality to highlight any operational deviations. Innovations in artificial intelligence offer even greater promise in extracting every last kilowatt hour without compromising comfort and other performance criteria.

Building management committees are often a feature of green leases that allow building management and tenant representatives to collaborate to optimise building performance and monitor the NABERS Energy rating.

Refurbish

Planned capital expenditure projects for building or system upgrades can often lead to significant improvements of a NABERS rating over time. Tasking design teams to target improved ratings in the selection of new equipment not only ensures building performance is maintained but energy efficiency continues to improve.

Capex managers, designers, installers, and service and maintenance teams can all be aligned to the expected outcomes of lifecycle upgrade projects.

NABERS Energy can also be used as the monitoring and verification pathway for energy efficiency incentive projects or energy certificate programs to enhance the business case for projects that deliver an efficiency benefit.

Incentivise

NABERS Energy can be used as a measurement method under government energy savings schemes. One example is the NSW Energy Savings Scheme reduces electricity consumption in the state by creating financial incentives for energy saving activities. Once created, energy savings certificates can be sold by the property owner back to electricity retailers that are obliged to retire a prescribed number of certificates each year.

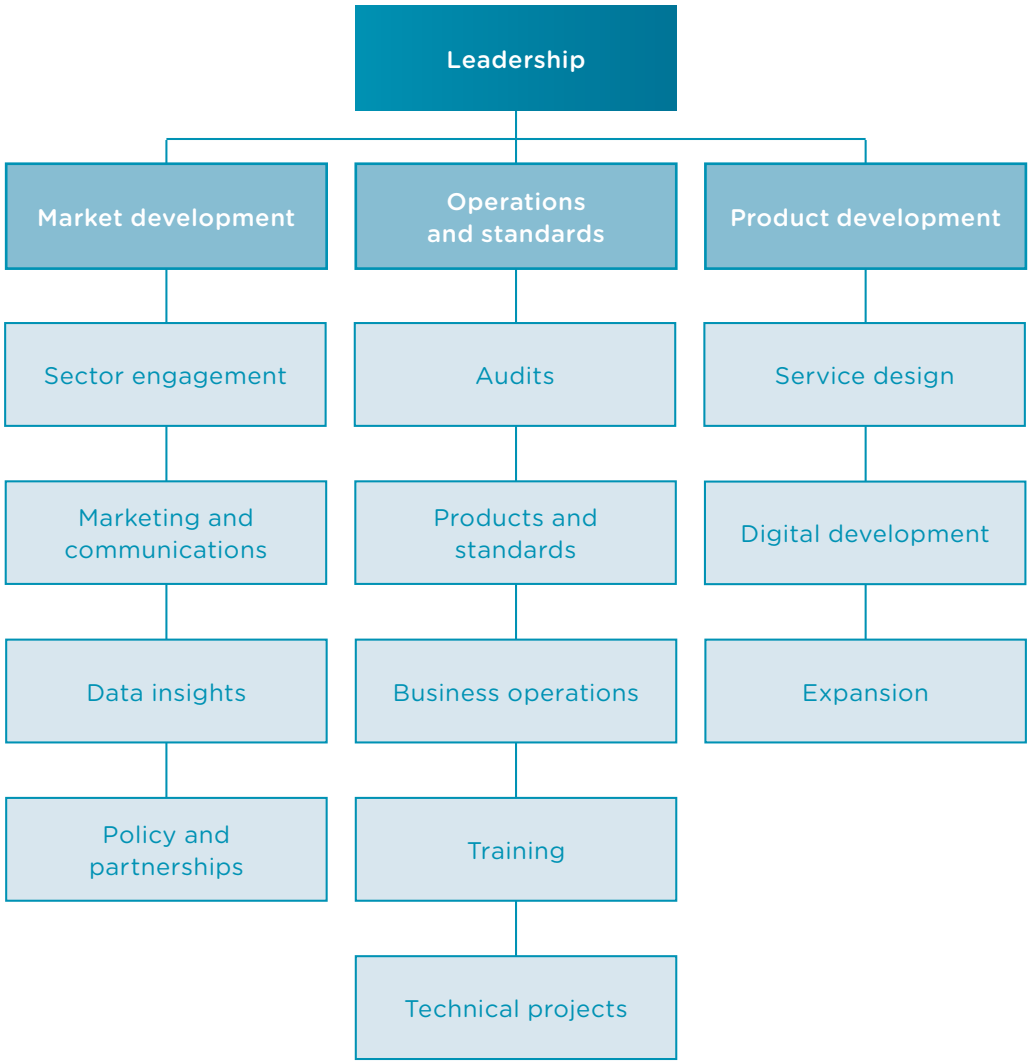
Energy savings certificates can enhance the business case for investment in energy efficiency. The projected increase in the NABERS rating also addresses, at least in part, the split incentive between landlord and tenant.

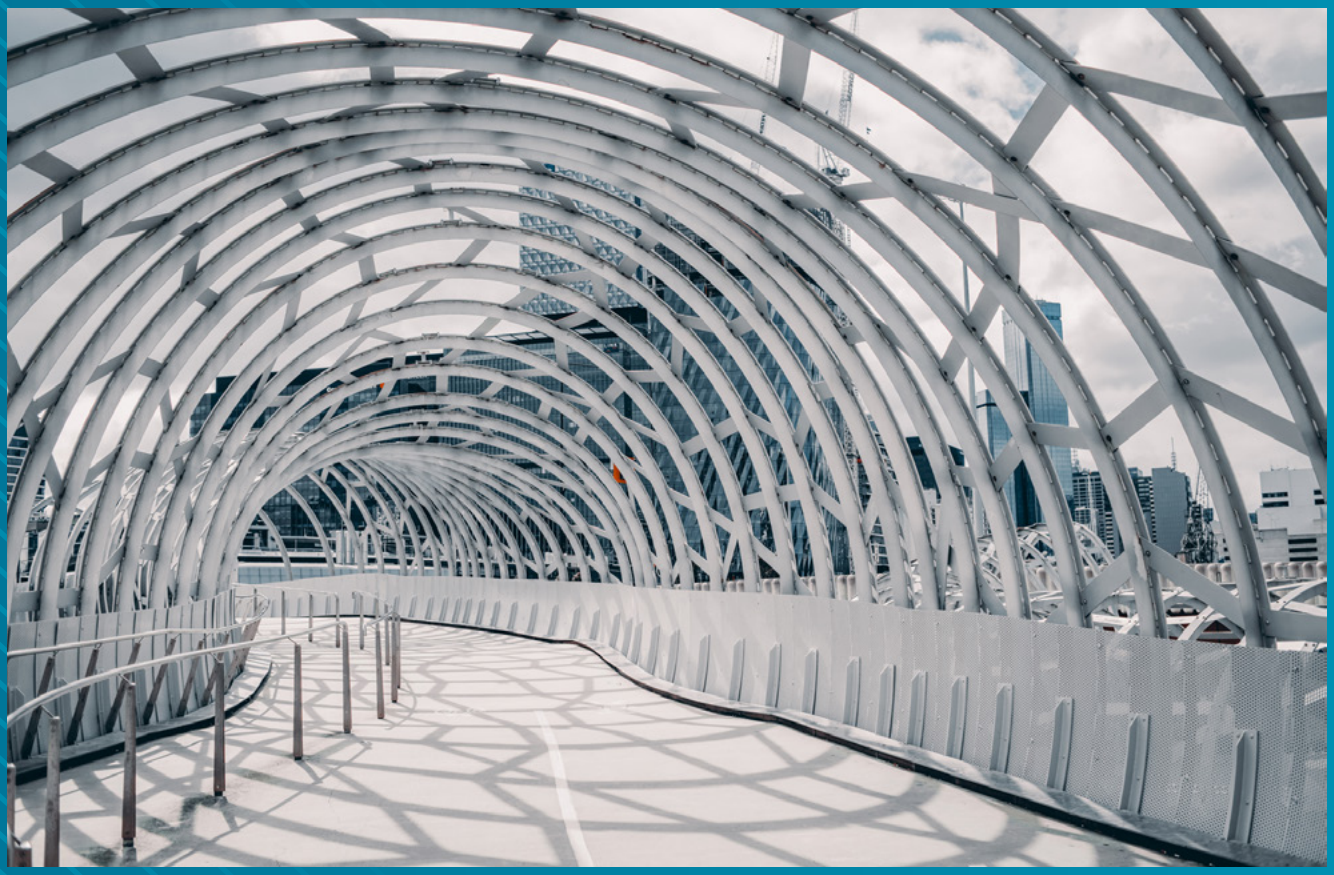
NABERS administration

The NABERS program is administered by the New South Wales Government on behalf of the other state jurisdictions and the Australian Government.

The team comprises approximately 40 people who support a sophisticated and growing program covering all rating types including energy, waste, water, indoor air quality and more.

NABERS organisational chart





Rating fundamentals

There are many interlocking parts of the NABERS Energy program that work together.

These interlocking parts vary depending on the building type, but work together to ensure ratings are comparable, reliable, efficient in administration, and enable a path of continuous improvement. NABERS Energy for Offices is used in this section as an illustration to unpack the rating fundamentals.

NABERS Energy algorithm

Normalisation allows buildings of different sizes, operating hours and climate zones across a country to be fairly compared. To set the various coefficients in the normalisation algorithm, the offices rating tool relied on best available building data and used regression analysis, a statistical method that estimates relationships and impacts between one or more independent variables.

After testing these variables, using building modelling in some cases for sense checking, the algorithm was trialled on buildings to prove and perfect the relationships.

NABERS Energy for Offices normalises for:

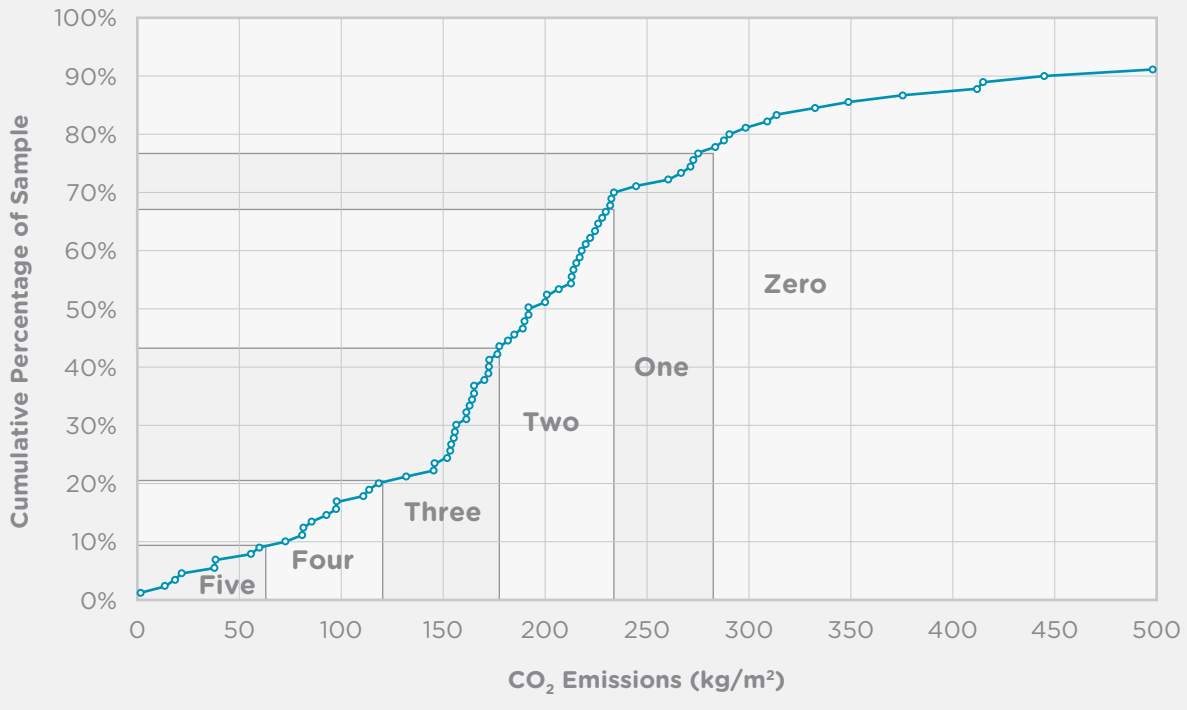
- Size of building by net lettable area (NLA)
- Hours per week in operation
- Climate zone based on postcode
- Occupancy density (for whole building and tenancy ratings only).

NABERS Energy is also adjusted for energy source based on greenhouse gas intensity to encourage the transition to low emission and zero emission sources. As renewable electricity is growing rapidly in Australia, periodic adjustments are planned to energy source factors to ensure fossil fuels aren't given preference over renewable energy.

The chart below illustrates how the original star rating bands were determined. Using the best available energy consumption data from energy audits and government records of office buildings this cumulative percentage distribution could be drawn and the rating thresholds chosen. A period of consultation followed, allowing engaged stakeholders the opportunity to refine the available information, to be certain it was consistent, and to consider the impact of the rating bands.

This chart was an important step in demonstrating to a broad audience that the ratings were based on current measured performance as demonstrated through the best available information set.

Original NABERS 5 star thresholds



This simplified diagram shows the original 5 star rating thresholds.

Certifying a rating

NABERS' customers can access certified ratings by engaging a NABERS Accredited Assessor. Assessors may work in-house or independently. Assessors are free to market themselves and their services to the customers and are required to sign conflict of interest forms where needed. Independent assessors deal directly with their customers, setting their own prices and conditions of engagement. The overall principle is to allow the market to drive itself, while providing guidance to ensure consistency and integrity within the scheme.

Assessors are trained and rigorously tested as part of the NABERS accreditation and quality assurance arrangements. They agree to abide by a code of conduct before being accredited. Only individuals, not companies, are accredited and are held accountable for the ratings they perform.

Accredited assessors must conduct ratings in strict accordance with the NABERS Rules to maintain quality and ensure consistency of results. All ratings are subject to a desktop audit, while a further 5% of ratings receive a full audit to ensure accuracy and assessor competency. NABERS selects a group of experts to act as independent supervisors and auditors. Assessors must undertake supervised ratings or liaise with auditors as required.

Assessors collect evidence of each of the NABERS Energy rating inputs while visiting the building to familiarise themselves with the configuration of spaces and the levels of service provided.

A simplified checklist for the office sector includes:

Area

- Survey plans
- Tenancy stacking plans
- Survey plans of areas to be excluded (non-office parts of the building, for example, training rooms, healthcare facilities that have very different energy intensities and are therefore not comparable to office spaces)

Hours

- Lease extracts
- Building management system records
- After hours air conditioning requests

Energy

- Electricity bills
- Gas bills
- Diesel bills
- On site generation meters (solar)
- Single line diagrams and meter identification
- Non-utility meter calibration
- Energy exclusions from non-utility meters
- Renewable energy purchases

The Assessor loads the collected information into a NABERS digital tool to generate a NABERS rating that is validated with a certificate issued by the NABERS administrator.

Assessors are encouraged to engage with building management teams to help identify how energy can be used more efficiently to improve future NABERS ratings. For independent assessors, this advisory role may increase business activity and encourage repeat customers.

"NABERS communicates complex and technical measures in a simple message of 6 stars – and this has been an incredibly powerful tool.... For building owners, this means greater ability to access finance, the ability to track and report on progress with ESG obligations to stakeholders and to differentiate your portfolio's standing from your peers."

↓

Grace Foo, Principal Consultant, DeltaQ and NABERS Accredited Assessor and Supervisor

System elements

NABERS Energy is a proven system to measure, benchmark, rate, certify, promote and improve energy efficiency and reduce associated greenhouse gas emissions from commercial buildings.

NABERS resources are adaptable, scalable and transferable to many commercial property types and markets. The following tables describe the components of the NABERS system.

System element	Element description	Why it's important
NABERS Energy rating tool	Online calculator that allows for input of building specific annual energy consumption information, base building, tenancy or whole building (as relevant), to generate a rating normalising annual energy consumption by the building relevant variables.	The benchmarking algorithm is designed for each market and each building type, using best available data sets to determine the relationships between each of the variables and energy performance. The normalisation algorithm compares buildings and is critical to the integrity of the system.
NABERS Renewable Energy Indicator (implementation in 2022)	Using the energy source information from the energy rating, the percentage of renewable energy is calculated and disclosed.	Future cities will comprise efficient buildings running on renewable energy. NABERS Energy benchmarks efficiency while the Renewable Energy Indicator further informs customers and provides another metric for them to compare when assessing properties.
NABERS rating assessment platform	An online platform allows Accredited Assessors to log in and submit all required ratings data and documentation and then request rating certification. The platform also enables NABERS team members or external experts to conduct audits and address non-compliance.	Enables streamlined data collection, document sharing and maintains data quality and rating quality. Allows assessors and NABERS auditors to communicate effectively.
NABERS Energy calculators	A range of simple or reverse calculators available on the NABERS website. allowing casual users to conduct a test rating using their own building data.	Increases familiarity with ratings tools and allows everyone to test different energy scenarios.
Searchable NABERS ratings listings	An online searchable database of all current public NABERS ratings.	Disclosable ratings are included in the database, searchable by name, address or via maps. This allows sharing and promotion of rating results and provides transparency for participants and the market.
NABERS Energy standards, rules and guides	The suite of standards including: • NABERS Energy Rules • Thermal Energy Systems Rules • Onsite Renewable Electricity Generation System Rules • Commitment Agreement guides • Metering and Consumption Rules	Key to ensuring the integrity of the system and providing a basis for training of assessors and auditors, the rules and guides are co-created with industry to provide practical guidance.
Audit and quality control	Auditing policy, program, templates and workflow. Implemented within the rating assessment platform.	A program of routine and unscheduled audits is maintained to ensure the highest integrity of ratings.

System element	Element description	Why it's important
Assessor training	A range of online training courses and assessments. Includes mandatory courses that trainee assessors must pass before accreditation.	Having suitably trained and accredited assessors applying the NABERS rules is an inherent component of NABERS ratings' quality and credibility.
NABERS brand guidelines	Guidance that defines the allowable use of NABERS certified ratings and other NABERS branded material.	The toolkit encourages the use of the NABERS brand for relevant marketing purposes while preventing inaccurate claims or use.
Marketing and communications to: • Assessors • Property owners/managers across market segments • Energy efficiency suppliers • Developers/designers/builders	A full range of communication campaigns, events, guidance and incentives tailored to each market segment or stakeholder group.	Ongoing communication and engagement are critical elements to establish and grow the rating program.
NABERS Sustainable Portfolios Index	An annual published leaderboard showing the weighted average rating results for participating property portfolios. The online index includes a range of features and covers energy plus other ratings types.	Promotes competition among portfolio owners to demonstrate leadership and broad commitment across a portfolio.
Commitment Agreements	• Commitment Agreement guidance, templates and supporting documentation • Independent Design Review Panel Guides • Reverse calculators	Commitment Agreements allow a developer to nominate a targeted NABERS outcome and to use the associated logo in marketing material. Commitment Agreements have been a key part of eliminating the "performance gap" in new builds. The Design Review Panel is made up of independent peer reviewers that test HVAC designs for best practices in modelling and simulation of performance. As above, reverse calculators allow the energy budget to be calculated for a given development, working backwards from a target star rating and predicted hours of use.
Governance • NABERS Steering Committee • Technical Working Groups	Governance operations ensure quarterly NSC meetings and a range of supporting engagement activities. Resources include a Program Management Agreement, Terms of Reference Guides and templates for the establishment and operation of governance groups.	A critical success factor for NABERS has been the national Steering Committee comprising representatives from all the major government and private sector stakeholder groups. Technical Working Groups with representatives from building ownership and design fraternities underpin collaborative design, leading to high levels of acceptance and understanding of the rating requirements and rating integrity.

Building on the success of NABERS Energy, a suite of other performance-based certifications has been developed to help drive market transformation in water, waste, indoor environment quality and other sustainability aspects. Meanwhile the range of building types available for certification continues to grow.

System element	Element description	Why it's important
NABERS Indoor Environment	Rating system for the air quality attributes of office buildings including: • Ventilation effectiveness • Pollutants • Thermal services • Acoustic comfort • Lighting • Office layout	An unintended outcome from pursuit of high energy efficiency can be compromising indoor air quality. NABERS IE provides a consistent method to measure and report.
NABERS Water	Using similar building characteristics as for NABERS Energy, based on water consumption, a building rating algorithm generates a normalised water efficiency rating.	In many markets and cities, water scarcity is a material sustainability concern. NABERS Water provides a reliable benchmark to compare performance between similar building types.
NABERS Waste	As above, this time substituting measures of waste generated and recycled. The normalisation algorithm provides a comparable benchmark waste rating.	Waste is an increasing focus across all markets and the benchmarking tool allows comparison of waste collection and destination across comparable building types.
NABERS Climate Active Carbon Neutral Building	In Australia, NABERS provides a streamlined approach to generating an operational emissions footprint, combining the data from NABERS Energy, NABERS Water and NABERS Waste with refrigerant information to create an operational emissions footprint.	Certifying buildings as carbon neutral in operation supports a market in net zero emission buildings. It's a certification that tenant businesses can ask for, in conjunction with other NABERS ratings, as a simple strategy for dealing with related Scope 3 supply chain emissions.
NABERS for other building types: • Shopping centres • Data centres • Apartment buildings (common areas) • Hotels • Public hospitals • Retirement living and residential aged care • Warehouses and cold stores (for release in 2022)	Building on the proven model of NABERS Energy for Offices, other building types can follow the same transformation path.	Stakeholders engaged with other property types welcome the opportunity to adopt the NABERS processes, targeting better performance, designing, building, commissioning and maintaining higher energy efficiency.

Towards a net zero future

Future focus for NABERS Energy

NABERS Energy has an ongoing role to play as Australia works towards its whole-of-economy emissions reduction plan and net zero target by 2050. The supply side of the energy market in Australia and around the globe is undergoing a rapid transition to renewable energy but this doesn't diminish the importance of energy efficiency. Economies that achieve an effective balance between energy supply and demand will enjoy economic benefits.

In 2022, NABERS will introduce a Renewable Energy Indicator to be included on NABERS Energy certificates underneath the main star rating result. The indicator will show the proportion of renewable energy used in the building. Developed in close consultation with industry, this metric further informs stakeholders and investors and provides another means for them to compare different properties.

NABERS is also developing a method to compare the embodied emissions of new commercial buildings. The tool is due for completion in 2023 and envisaged as a voluntary rating that could enable mandatory planning policy in the future.

Even in a post-fossil fuel world, the efficient use of renewable energy will be a prime requirement of sustainable communities and there remains a considerable gap between average and best practice. In the office sector, average performance is 4.5 stars and best practice is 6 stars. Across the approximately 20 million m^2 of rated office space in Australia alone, this suggests annual savings of more than AUD$500 million is obtainable.

NABERS Energy has transformed how commercial buildings are managed and ultimately how they perform. This transformation has uncovered new value for investors, owners, managers, occupants and the industry of supporting services. NABERS is a proven, flexible model with application in any market where the energy efficiency of commercial property is valued as a positive contribution to society. If it gets measured, it gets managed.

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The NABERS team pays respect to Traditional Custodians and First Peoples across Australia and acknowledges their continued connection to country and culture.

The team especially acknowledges the people of the Dharug nation as the Traditional Owners of Parramatta, the land on which the NABERS office is located.

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