



DESIGN FOR PERFORMANCE: QUIZ THE EXPERTS

19TH JUNE 2019

Jasper Gilbey

*Head of Business Space, TIAA General Account,
Real Estate, Europe*

nuveen

A TIAA Company





Agenda

1. An introduction to Design for Performance
Sarah Ratcliffe, CEO, Better Buildings Partnership
2. NABERS and it's impact on the Australian Office Market
Carlos Flores, Director, NABERS
3. Design for Performance in action
Nils Range, Landsec
4. Quiz the experts
Sarah Ratcliffe, BBP
Jen Elias, Cundall
Paul Bannister, Delta Q
Carlos Flores, Director, NABERS
Nils Rage, Landsec
5. What next?



AN INTRODUCTION TO DESIGN FOR PERFORMANCE

SARAH RATCLIFFE, CEO, BBP

Thank you!

Funders



Project lead

Project team



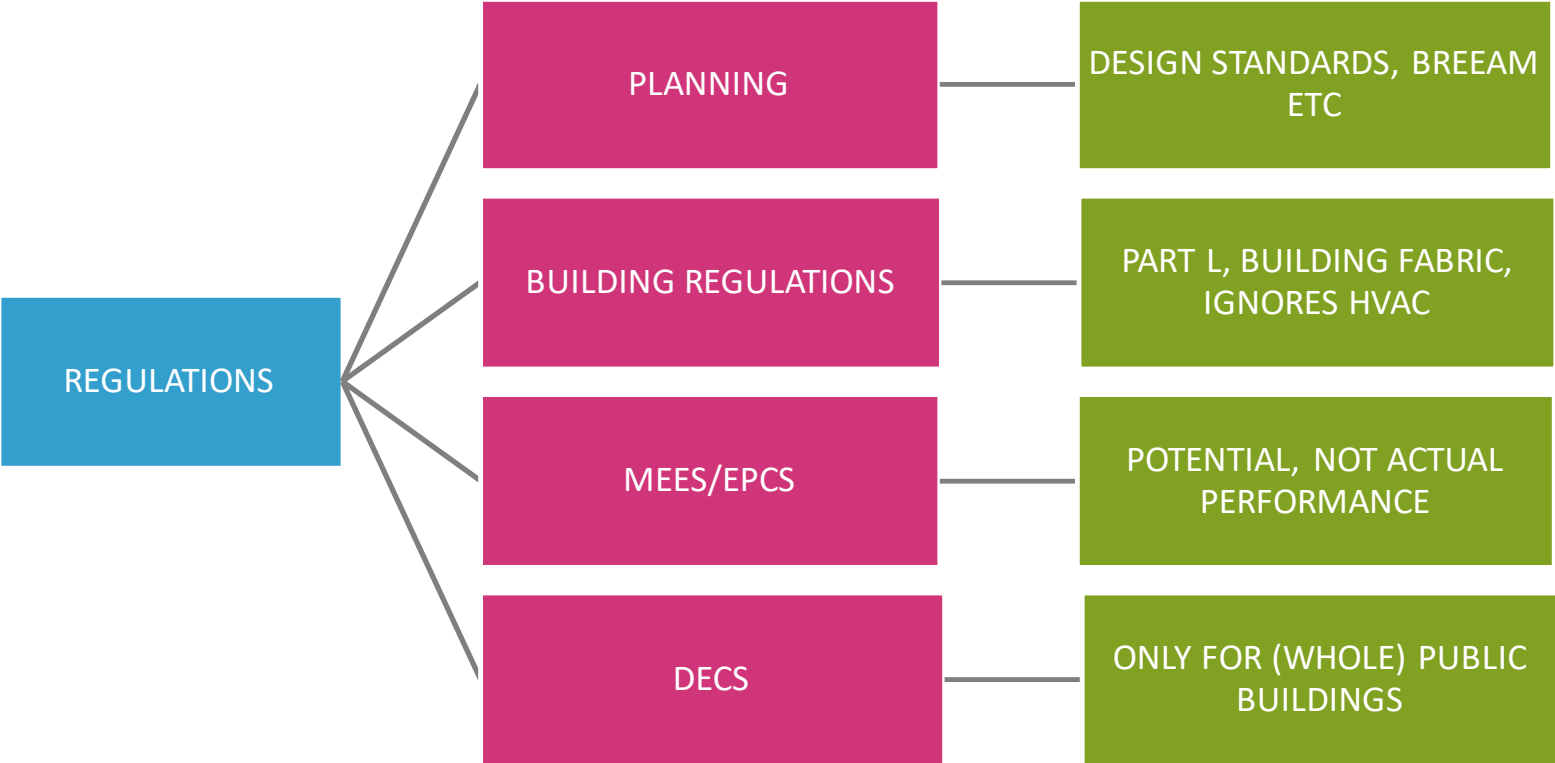
Additional thanks for support provided in the Pilot Programme



Supporters

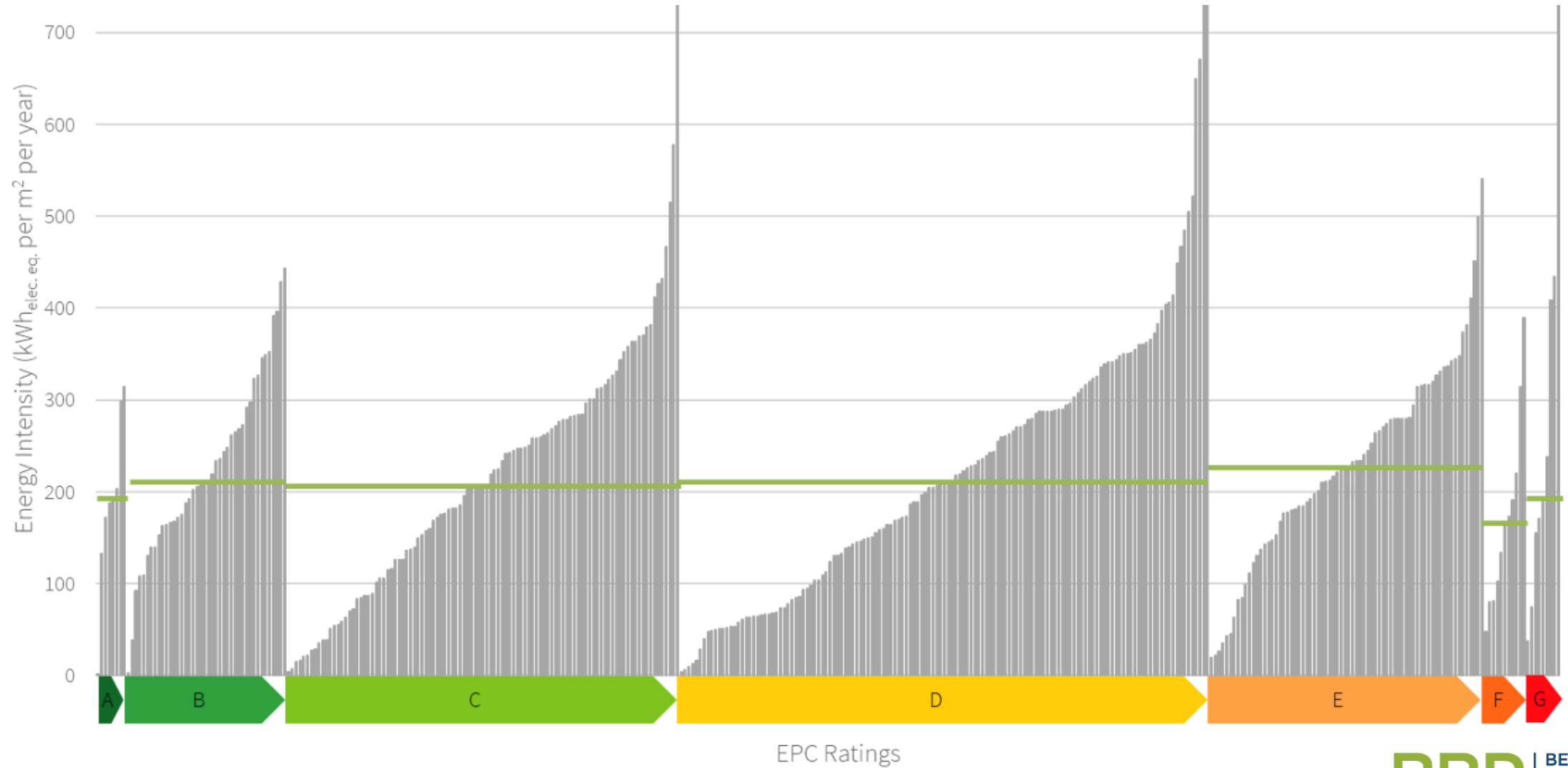


The Challenge: UK's approach to energy efficiency in buildings



= *Design for Compliance*
not performance

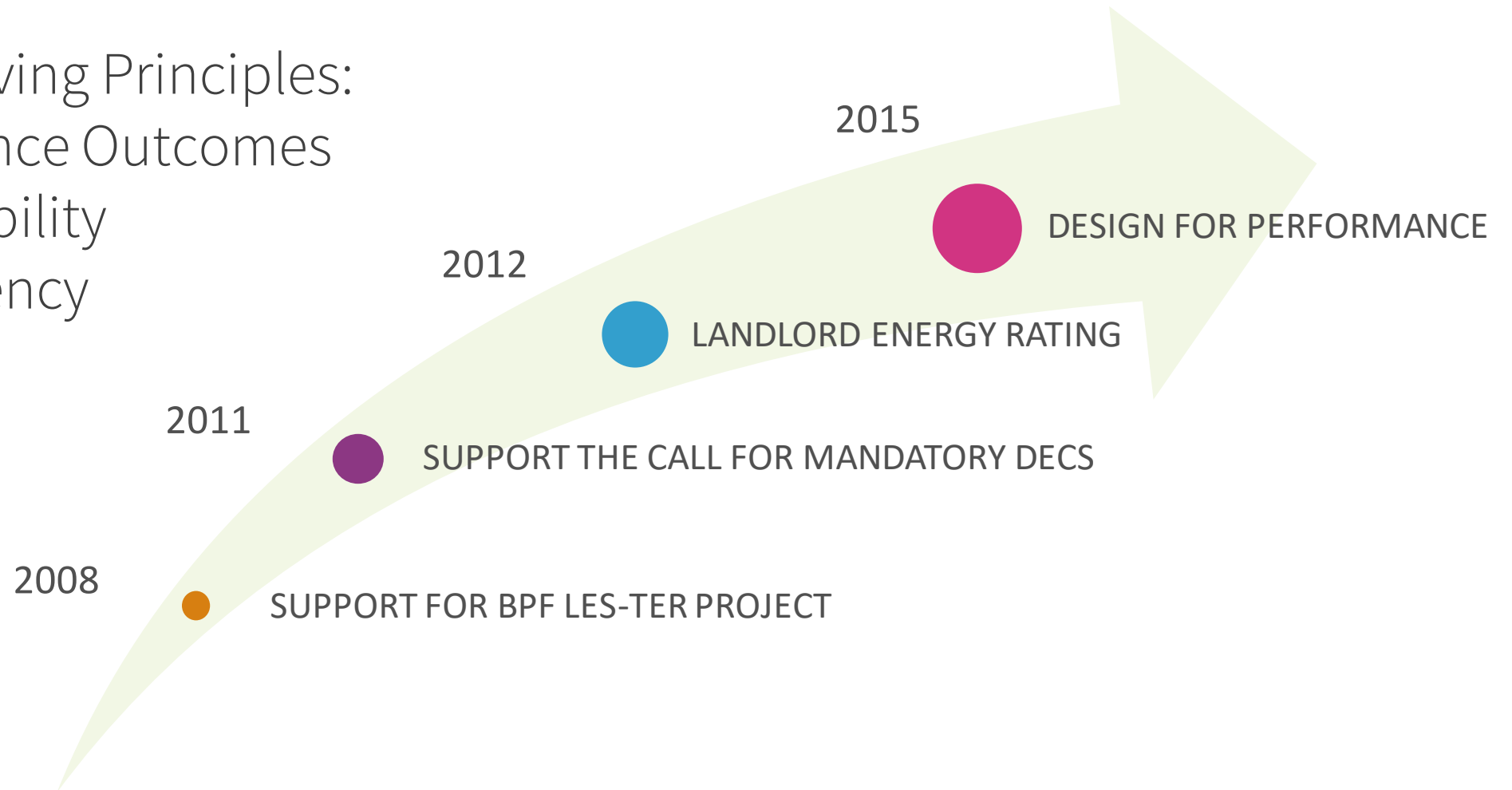
A Dysfunctional Market



BBP's journey to Design for Performance

Three Key Driving Principles:

1. Performance Outcomes
2. Accountability
3. Transparency



Aims & Programme of Work

An industry backed research programme to learn from Australia's market transforming NABERS scheme with the aim to:

- Ascertain whether it is possible to replicate the Australian process for securing the performance of new office buildings in the UK.
- Provide a sound evidence base from which to consider whether it is feasible and desirable to introduce such a scheme in the UK.

2015 - 16

Design for Performance Feasibility Study

Reviewed Australian & UK Markets to compare:

- Base building boundaries & performance
- Estimating energy use & setting targets
- Procurement processes
- Advanced simulation modelling approach & skills
- Drivers & tools for improving performance

2016 - 18

Design for Performance Pilot Projects:

- 6 New Office Developments
- Different stages of the construction cycle
- Applying relevant Design for Performance approaches
- Reviewing outcomes

Launch today...



BBP BETTER BUILDINGS PARTNERSHIP

DESIGN FOR PERFORMANCE

A new approach to delivering energy efficient offices in the UK

JUNE 2019

The UK's Australia's Design Culture

The design of new office buildings in the UK is driven by a wide range of factors, including the need to comply with Building Regulations. These regulations are based on a 'compliance model' (a rather than attempting to deliver a building that will actually perform better than the original specification).

The consequence has been that design teams focus on 'compliance' (a rather than attempting to deliver a building that will actually perform better than the original specification).

The UK's design-for-compliance approach has been transformational, leading to a 'performance gap' between the original specification and the actual performance of the building.

What is a Design-for-Performance Approach?

If the UK is to mirror the NABERS (National Australian Built Environment Rating System) approach, the design and delivery of office buildings must be based on a design-for-compliance approach.

Figure 3 A comparison of the key elements of the design-for-compliance and design-for-performance approaches.

RIBA PLAN OF WORK	DESIGN-FOR-COMPLIANCE APPROACH	DESIGN-FOR-PERFORMANCE APPROACH
1 PREPARATION & BRIEF	SET COMPLIANCE BASED DESIGN TARGET	SET OPERATIONAL PERFORMANCE TARGET
2 CONCEPT DESIGN	Developer sets a target based on Building Regs. Part L compliance that is written into tender documentation as a procurement requirement.	Developer sets a target based on Building Regs. Part L compliance that is written into tender documentation as a procurement requirement.

Key Elements

A Feasibility Study was a key part of the DfP initiative. The key elements of the NABERS Rating and Commitment framework that have contributed most to its success. This is summarised below.

- AN OPERATIONAL PERFORMANCE TARGET RATING SYSTEM**
- A CLEAR BASE BUILDING DEFINITION**

The ability for developers to set operational performance targets for new office buildings has transformed the approach and led to HVAC design in Australia. The simple, measurable outcome has increased scrutiny given to HVAC design through the delivery supply chain. This has, in turn, improved the design skills within the industry.

It is now common place for base building performance targets to be included in procurement arrangements for new office developments. The industry to routinely deliver against Energy 4.5 Star target or higher. This has provided a clear metric for property owners and occupiers to know what will be delivered to them.

What is Needed to Implement a Design-for-Performance Approach?

The Feasibility Study and Pilot Programme have demonstrated that not only is a design-for-performance approach possible, but also desperately needed. For such an approach to become reality, a scheme would need to be developed, supported by the appropriate governance structures, market demand and industry skills to deliver it.

Figure 5. A diagram highlighting the key elements that would need to be established to deliver a design-for-performance approach in the UK.

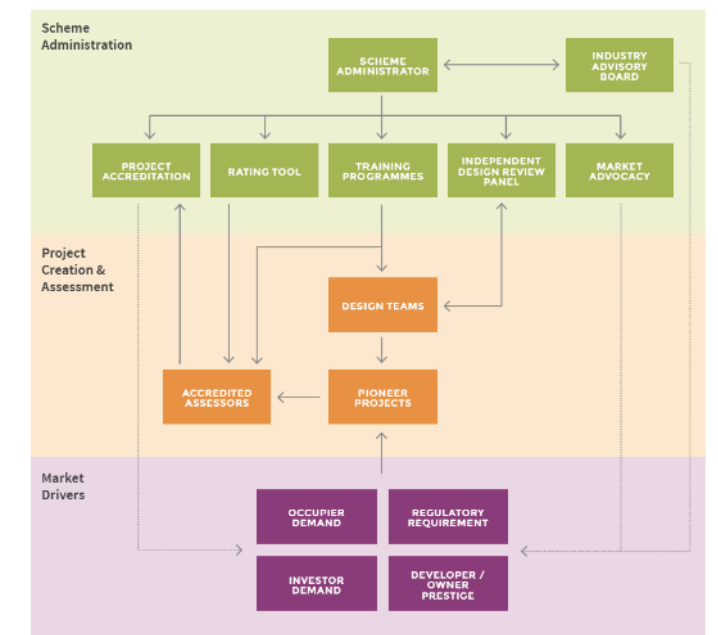


Figure 5. A diagram highlighting the key elements that would need to be established to deliver a design-for-performance approach in the UK.

A ground-breaking new partnership





N A B E R S

Two decades of NABERS in Australia

Carlos Flores

Director, NABERS



The principles of NABERS

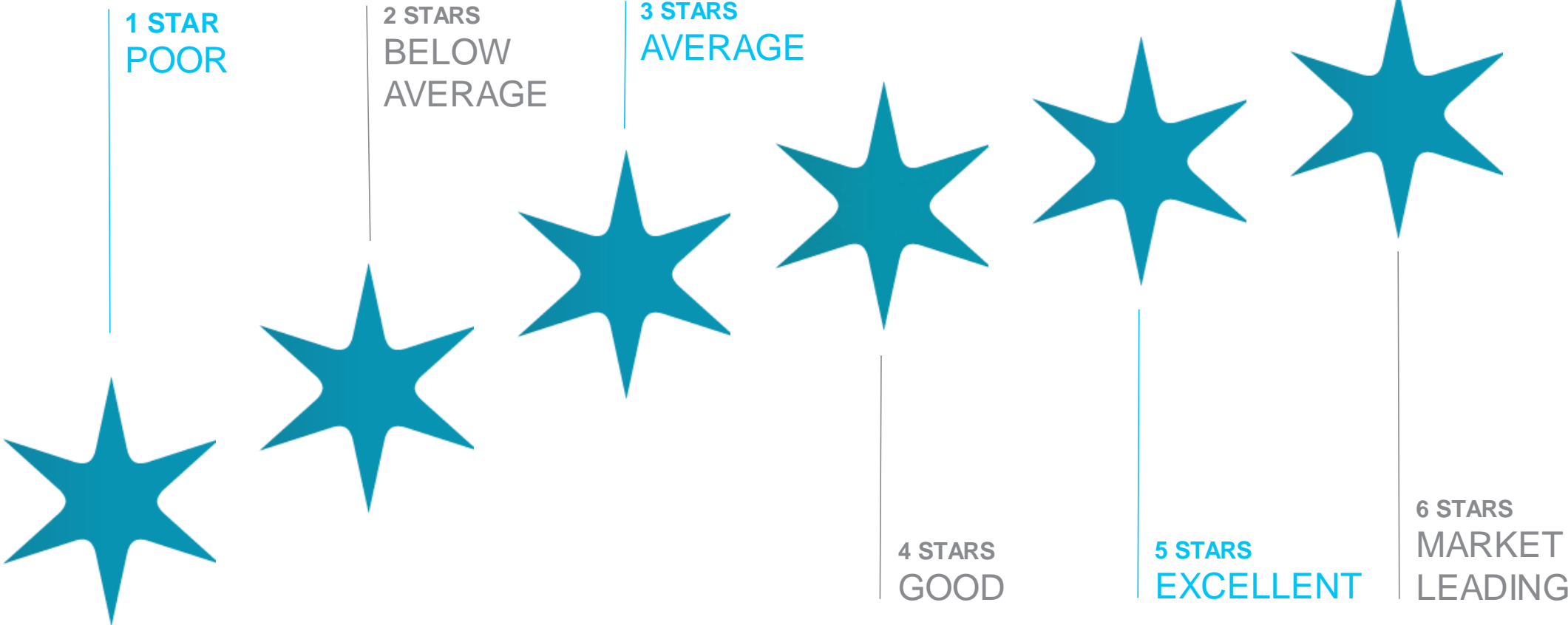


Metered performance



Fair comparison

A language for sustainability



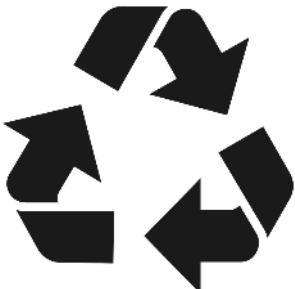
What we certify buildings on



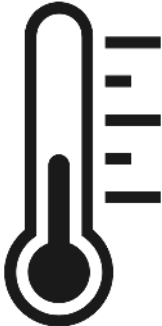
Energy



Water

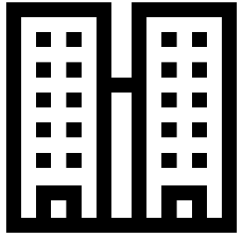


Waste

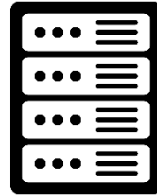


Indoor Environment
Quality

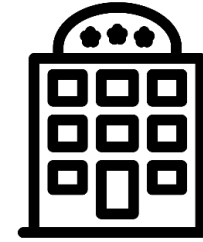
Sectors currently covered by NABERS Energy



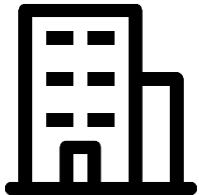
Apartment Buildings



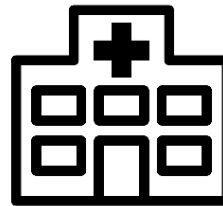
Data centres



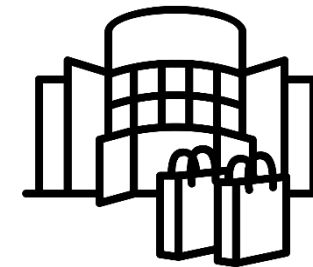
Hotels



Offices



Public Hospitals



Shopping centres

We certify three users in office buildings

Base Building Rating



N A B E R S

ENERGY

A vertical dark blue bar containing three white icons: a person in a box with up/down arrows, a snowflake, and a fan.

Tenancy ratings



Who is using NABERS in Australia?





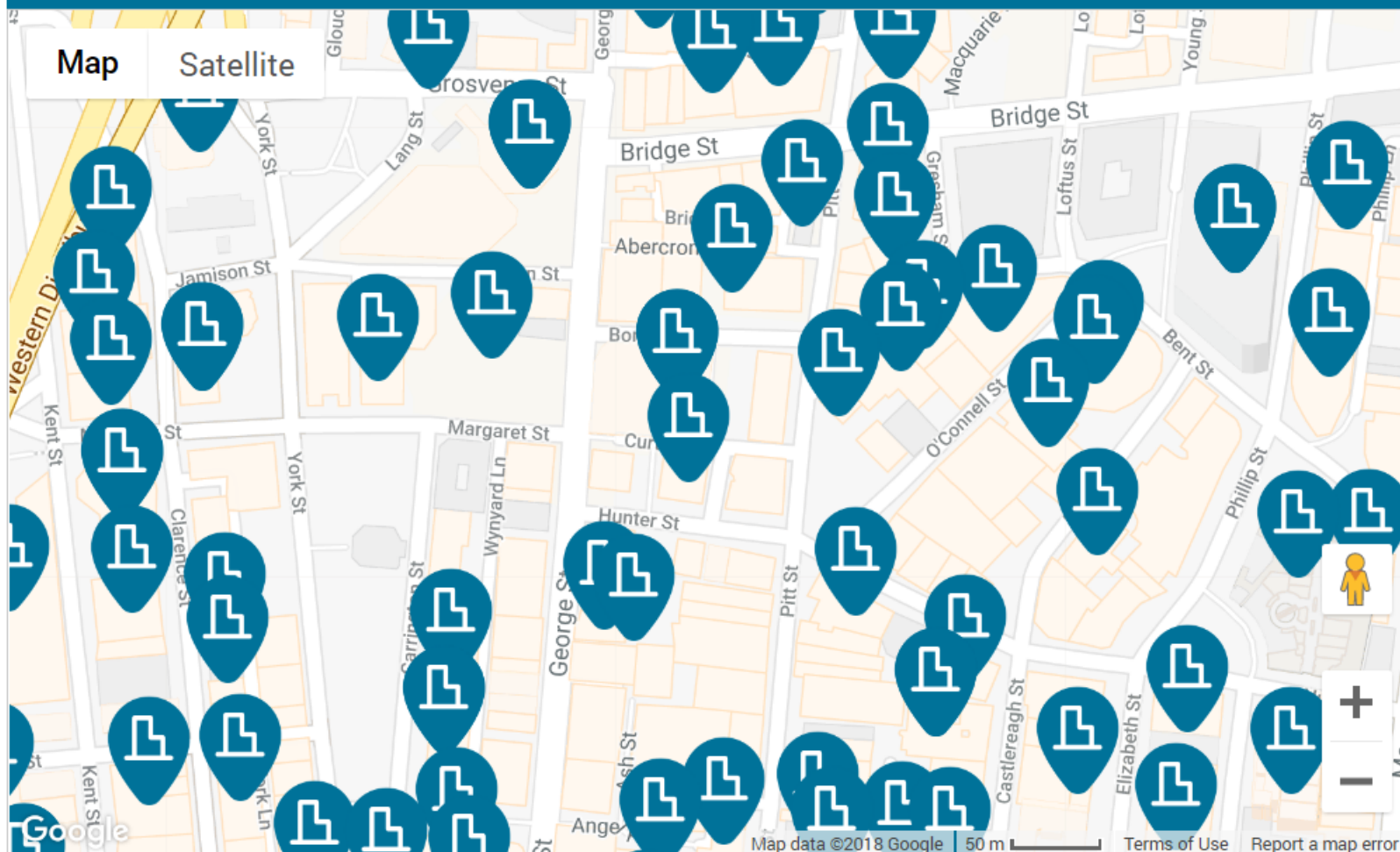
✕ Postcode: 2000

Building type ▾

Rating scope ▾

Rating type ▾

Star rating ▾



◀ [Search results](#)

🔗 [Share results](#)

**201-217 Kent Street, SYDNEY
NSW 2000**

TSA Project Management
Office

[Tenancy](#) ⓘ

TSA Project Management

⚡ [NABERS Energy](#)

6 star with GreenPower

6.0 star without GreenPower

For CBD: use rating without GreenPower



25 Oct 2018 Rating expiry

[View all rating details for this building](#)

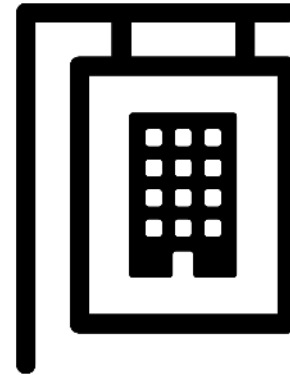
**NABERS is at the centre of many
government sustainability policies**



Two policies that changed Australian building sustainability

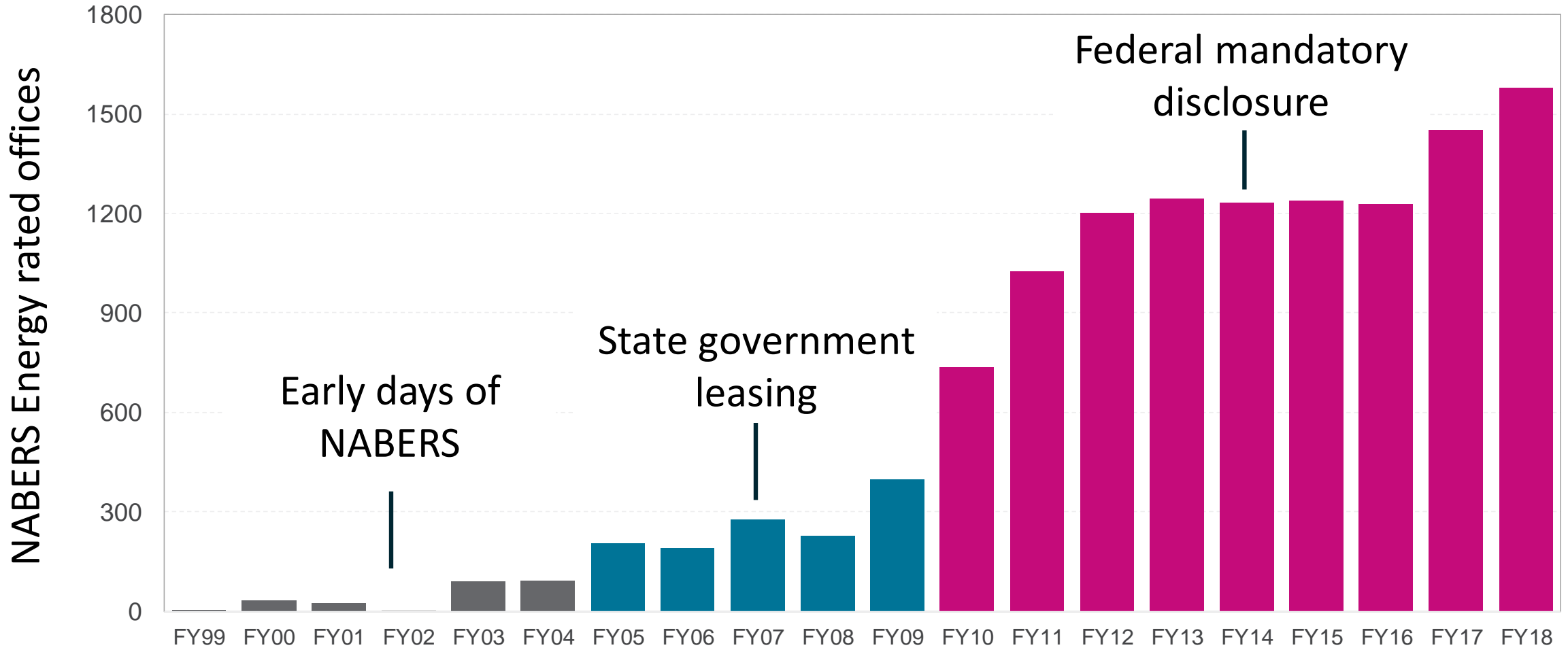


Government procurement
using NABERS
(e.g. 5 stars)

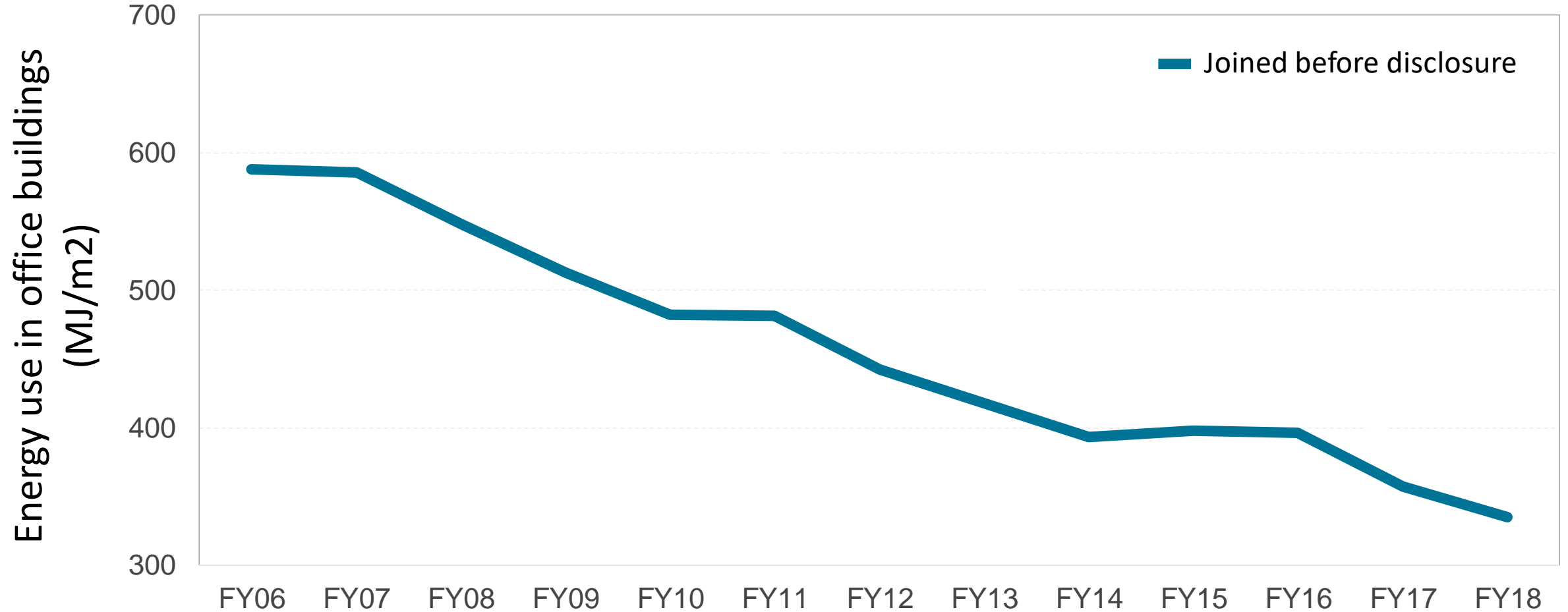


Mandatory disclosure of
NABERS ratings

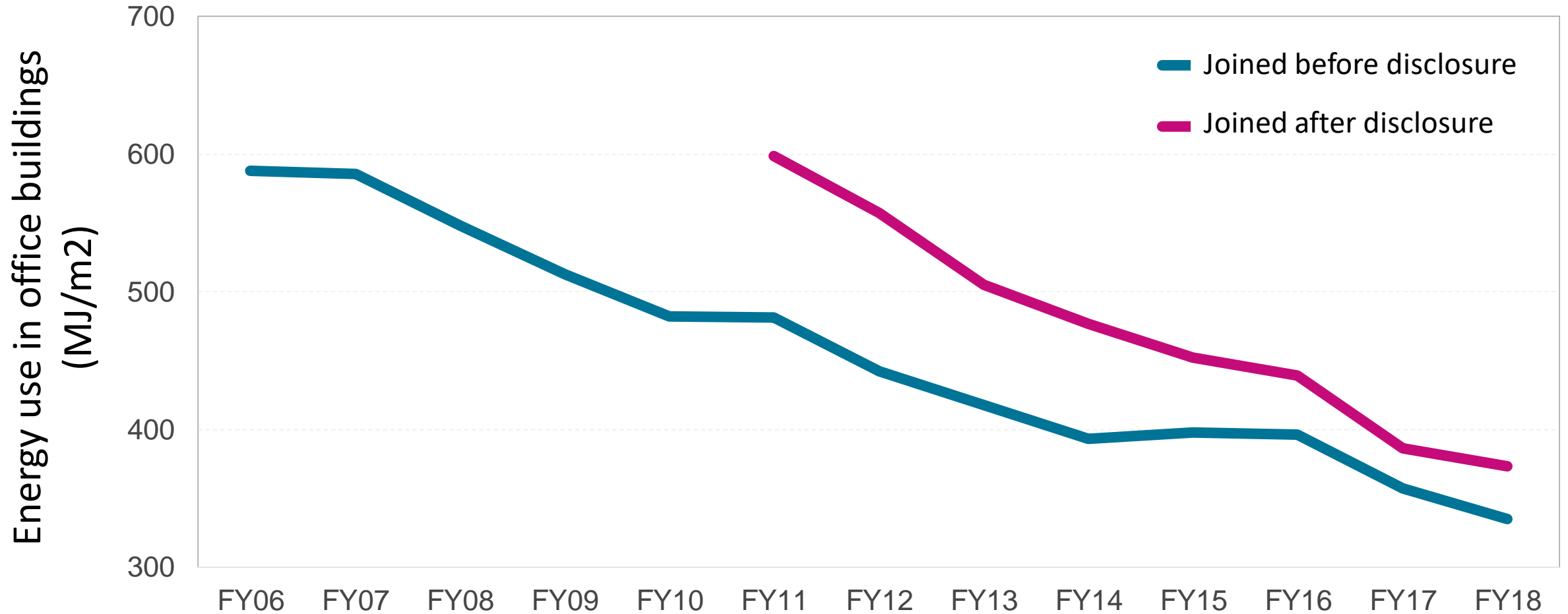
Policy has been key in building energy efficiency demand



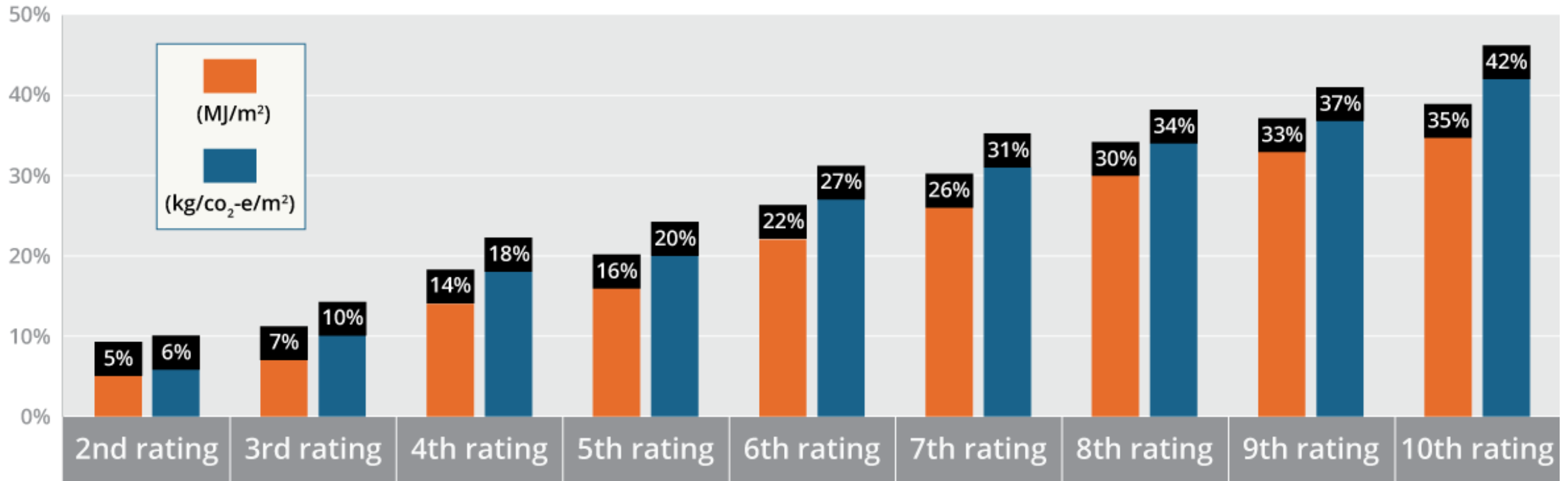
The power of NABERS and policy



The power of NABERS and policy



NABERS-certified buildings in Australia have one of the world's fastest rates of improvement



Australian buildings lead the world in the most important property sustainability indices



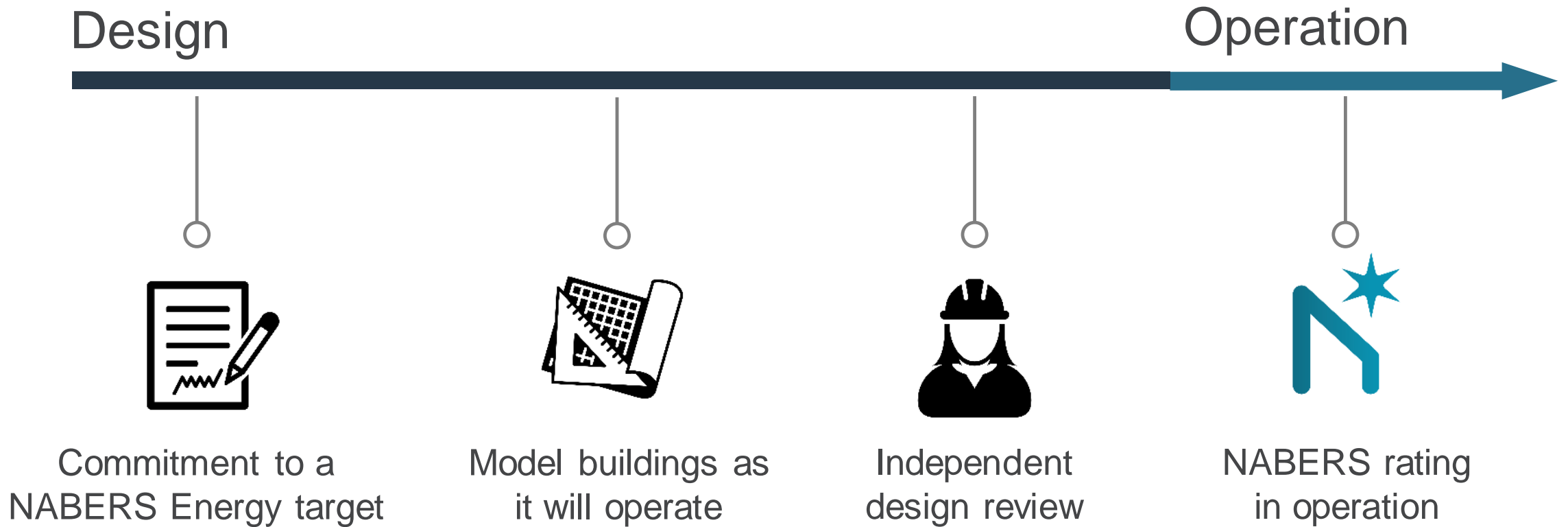
NABERS Commitment Agreements



NABERS

NABERS Commitment Agreements

Bridging the gap between design and performance



Why do building owners use NABERS Commitment Agreements?



Promotion

To communicate sustainability targets



Confidence

Over 90% achieve their NABERS targets in operation

**NABERS Commitment Agreements are now in the
2019 Australian Building Code**



N A B E R S



NABERS

Thank you

Carlos Flores

Carlos.Flores@environment.nsw.gov.au

nabers.gov.au

19th June 2019

BBP Design for Performance briefing

Nils Rage



Landsec

We're Landsec



Setting the right targets to tackle climate change

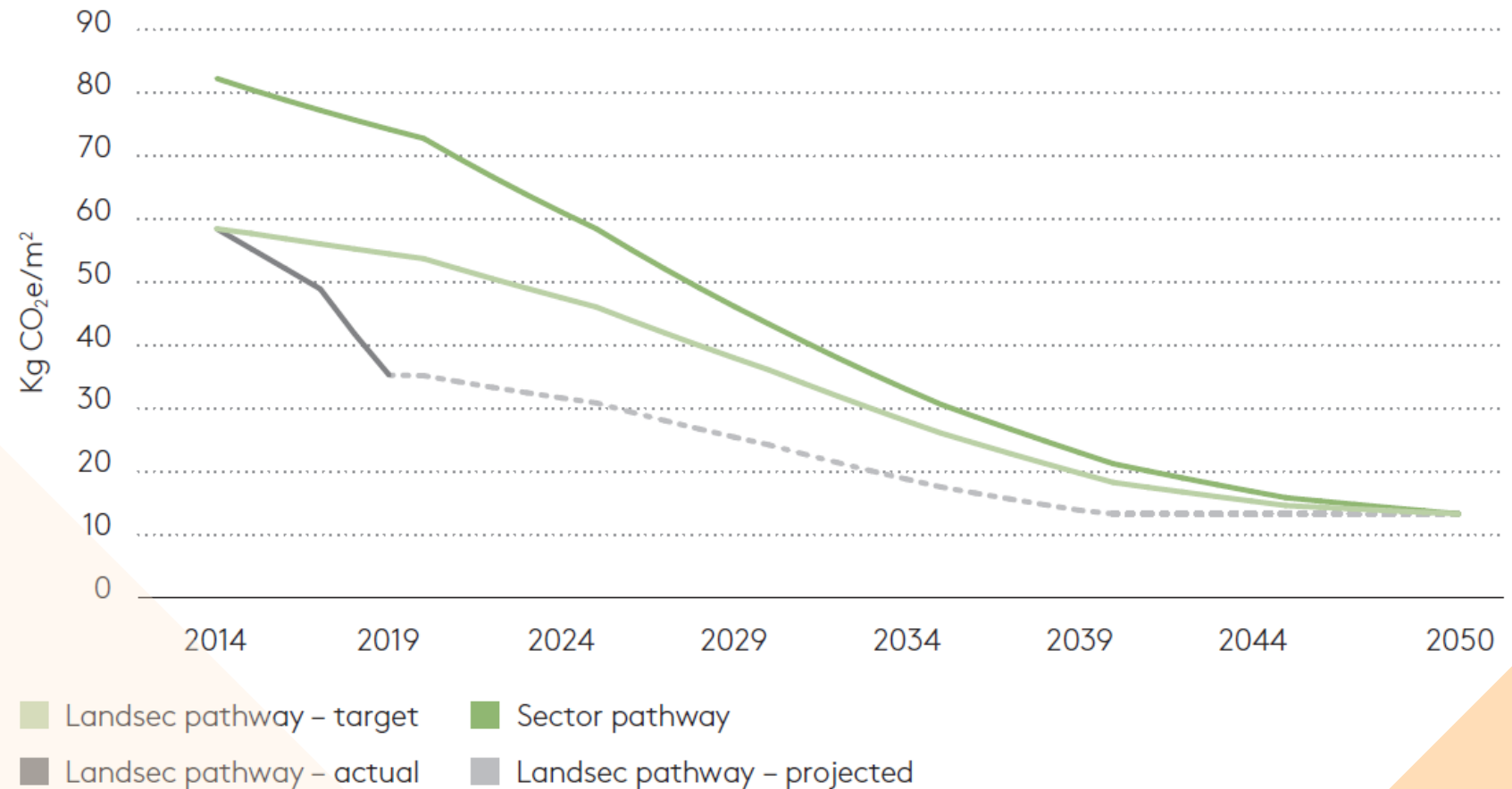
Addressing carbon emissions and energy intensity

- **40%** by 2030

- **80%** by 2050

Against 2013-14 baseline

Landsec carbon emissions intensity pathway



SCIENCE
BASED
TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

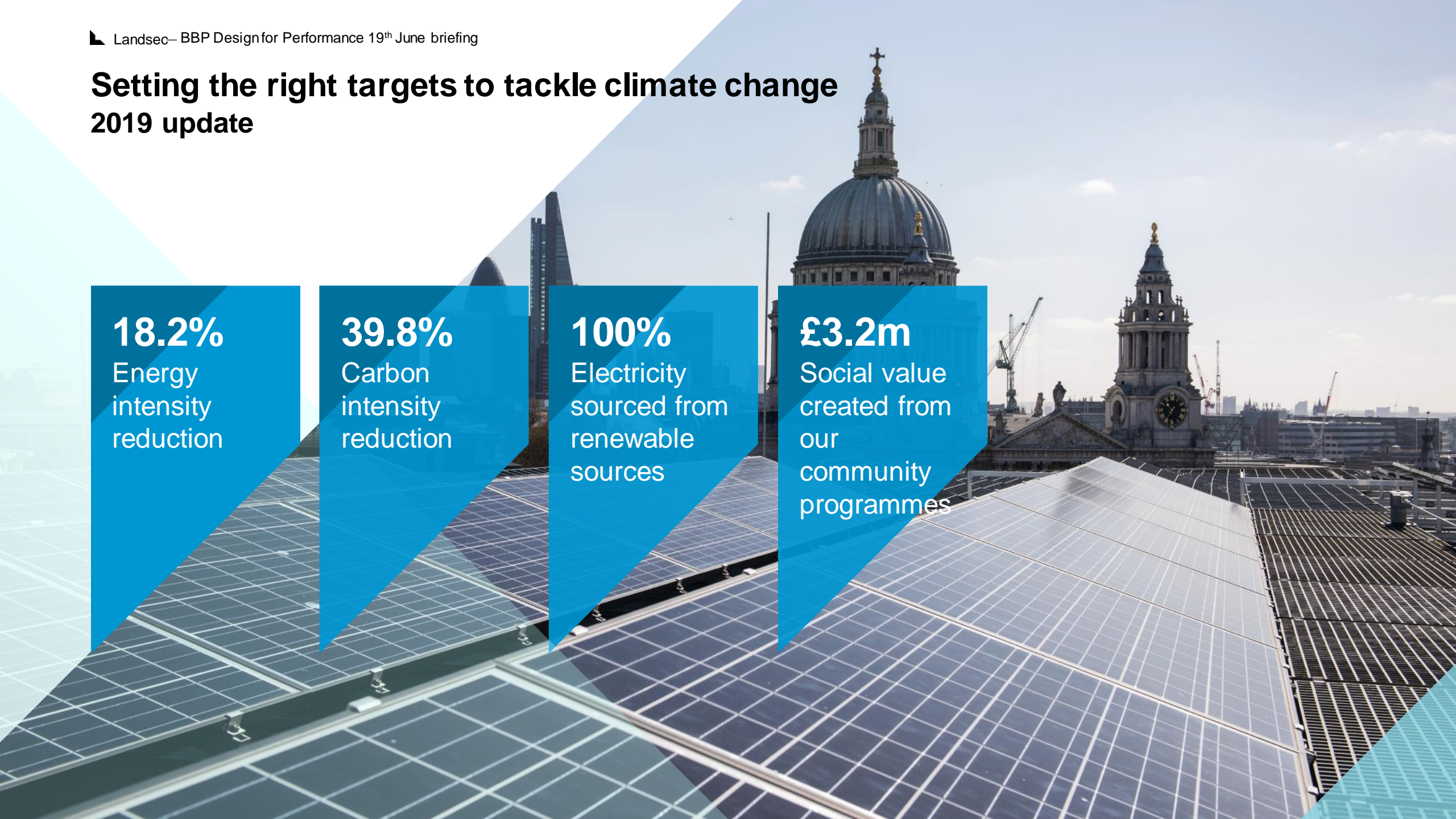
Setting the right targets to tackle climate change 2019 update

18.2%
Energy
intensity
reduction

39.8%
Carbon
intensity
reduction

100%
Electricity
sourced from
renewable
sources

£3.2m
Social value
created from
our
community
programmes



21 Moorfields

Our Design for Performance pioneer project



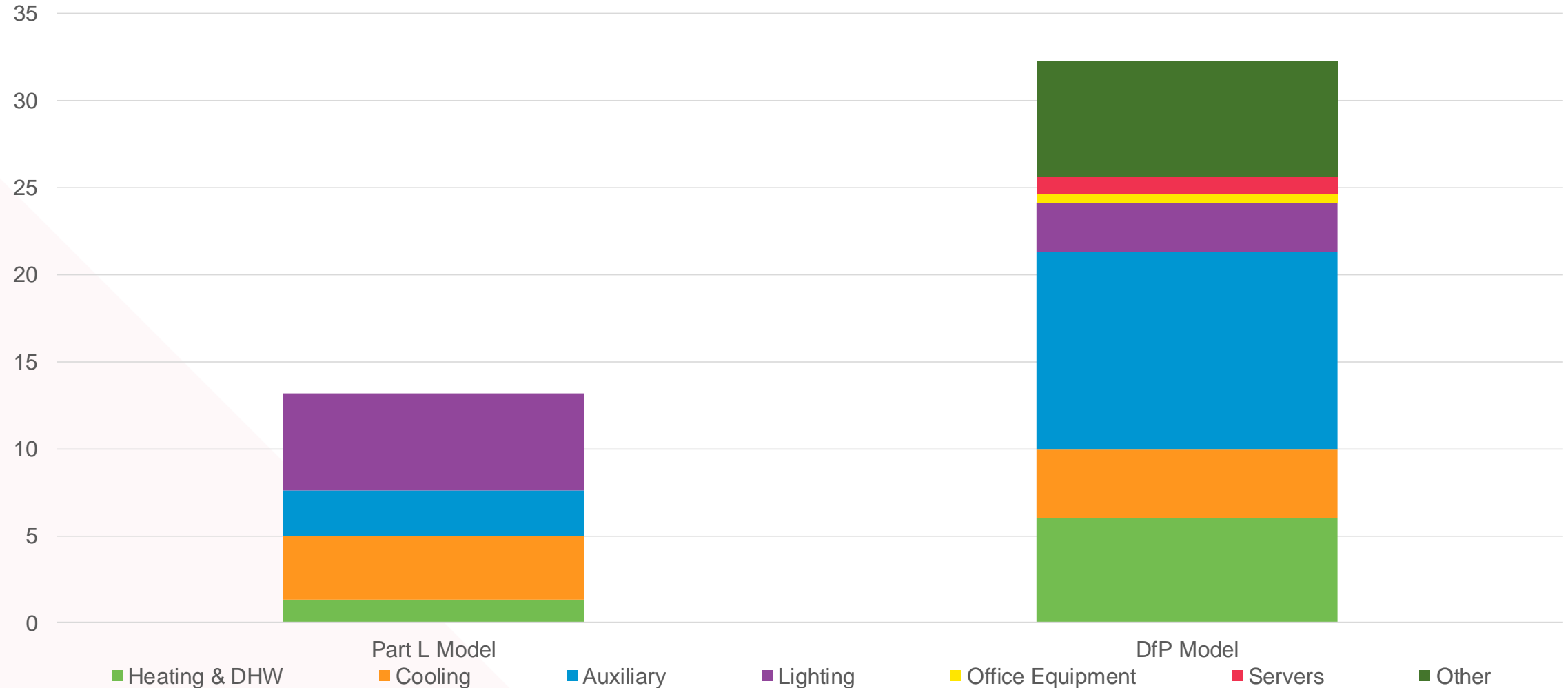
21 Moorfields



Design for Performance

Measure what matters

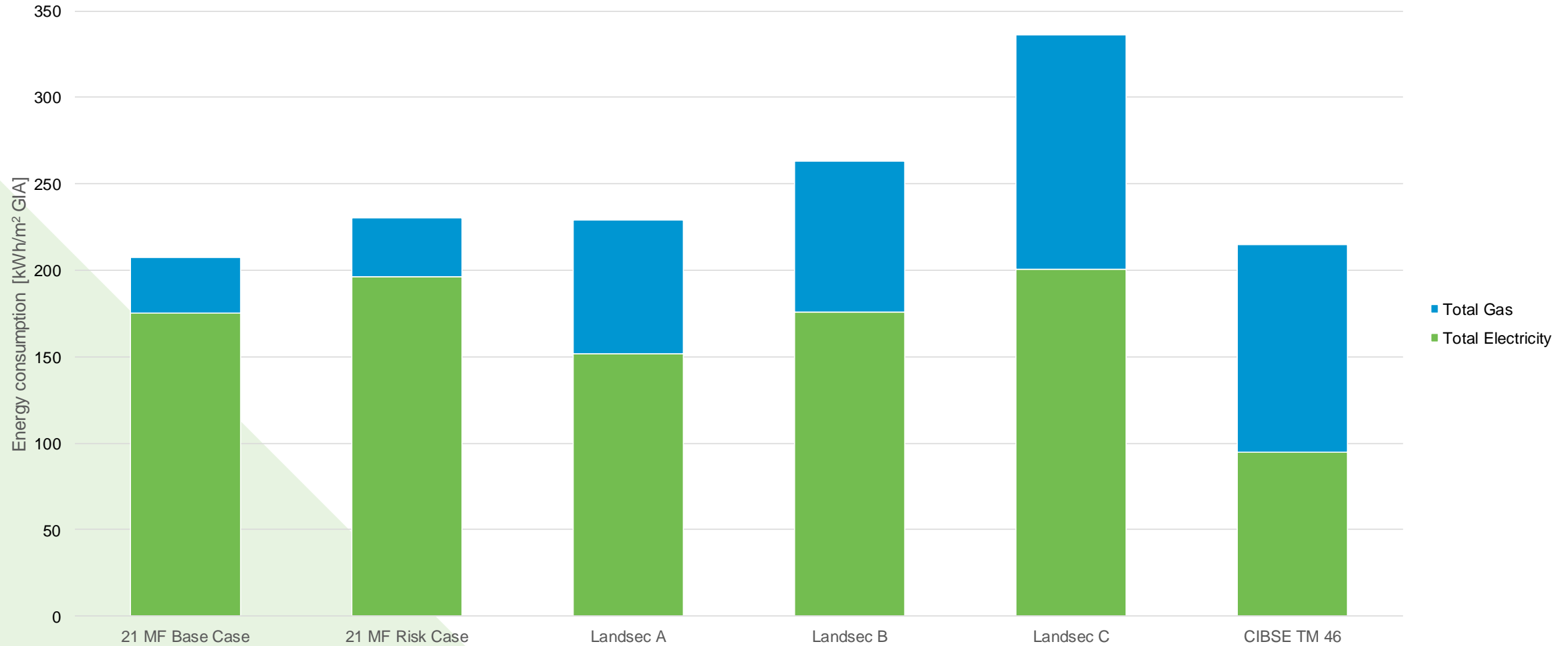
21 Moorfields Landlord Carbon Emissions [kg CO₂/m²]



Design for Performance

Learnings from advanced energy modelling

Comparison of energy consumption - Whole Building



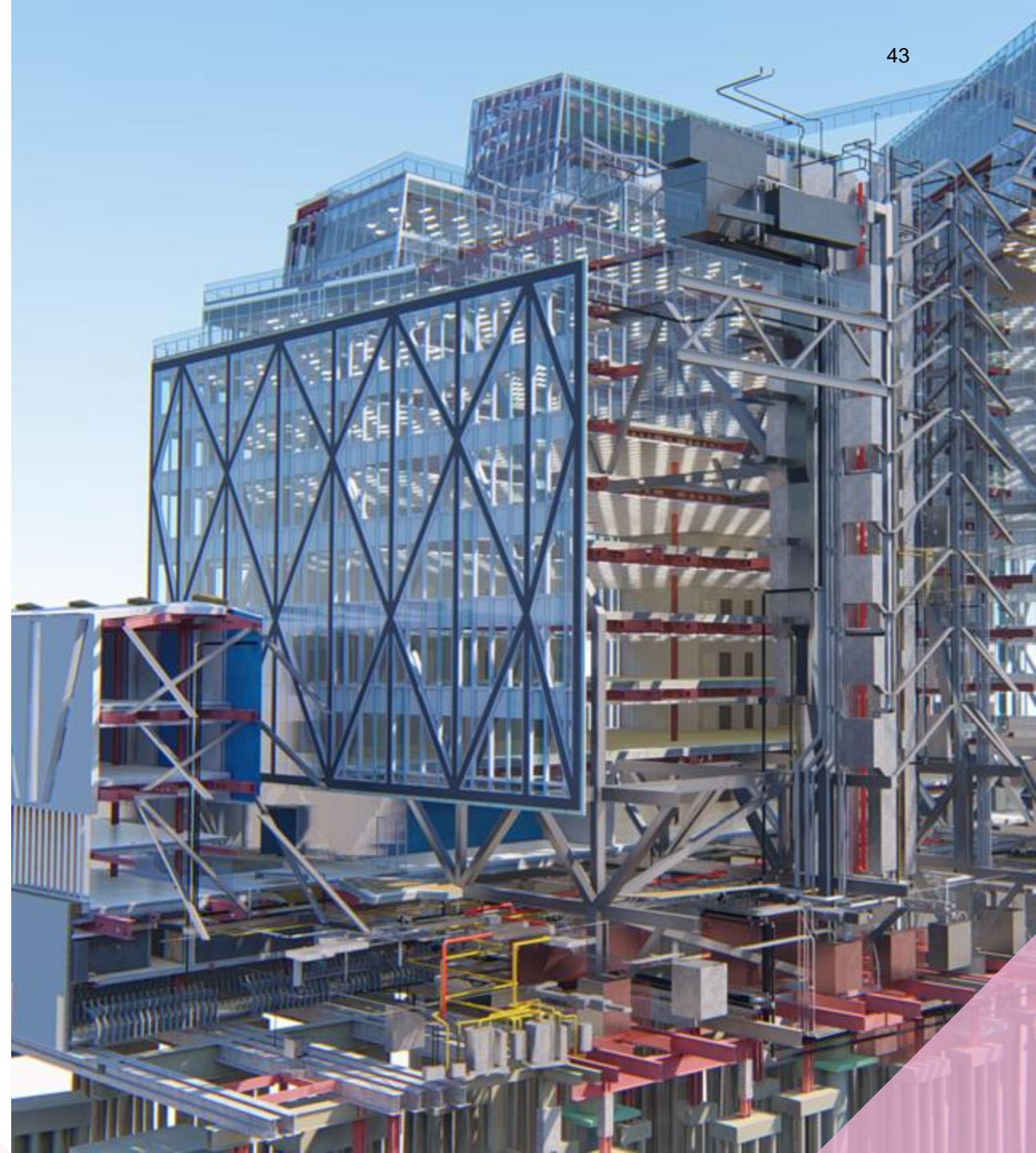
Next steps

- Independent Design Review
- Engagement with final occupier
- Test impact of proposed changes on rating and operational performance
- Intensive commissioning
- Monitor performance
- Apply methodology to the rest of our development pipeline

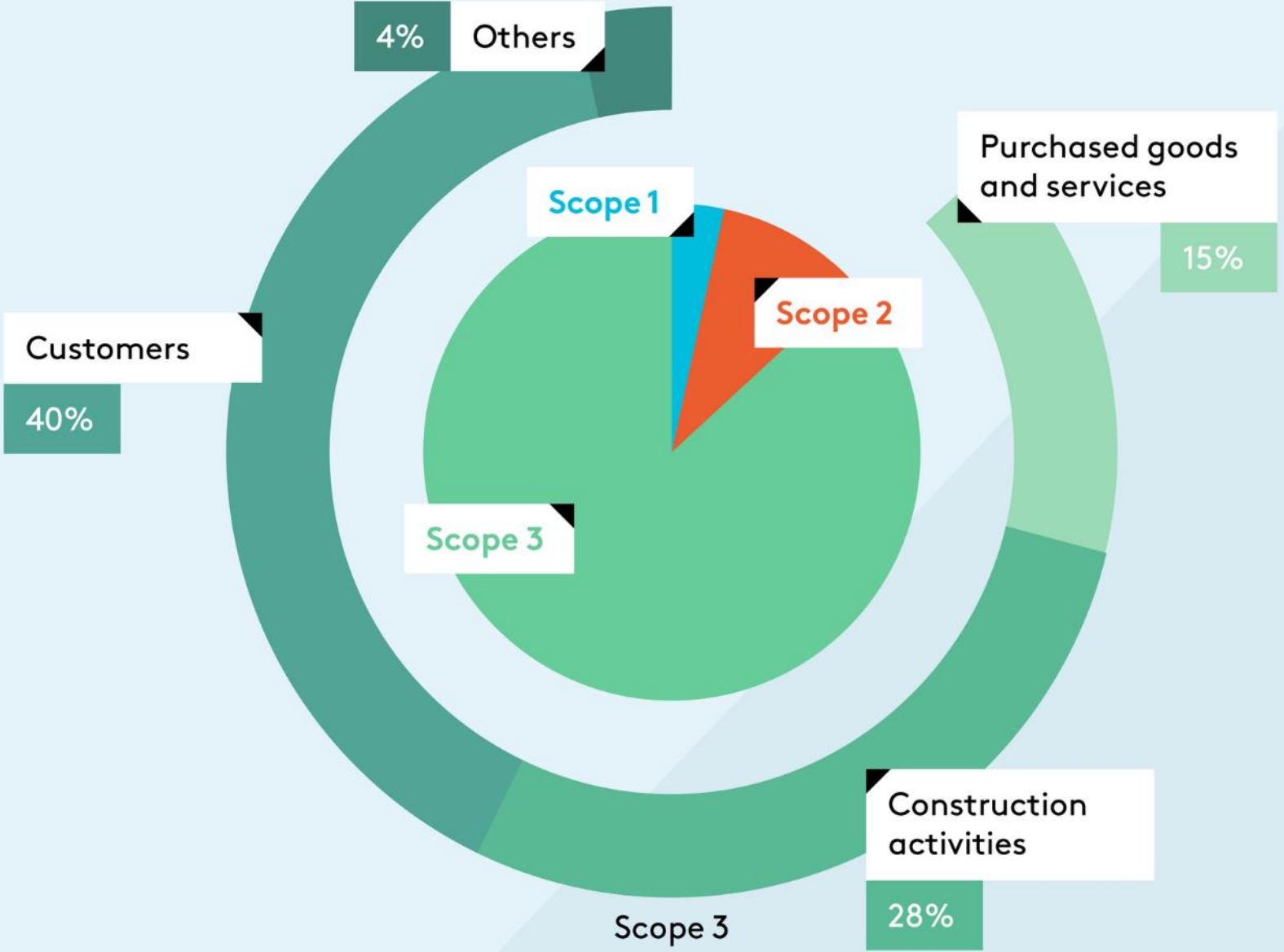


Delivering value

- Use of outcome-based metric
- Track meaningful performance
- Devise better control strategies
- Align with existing methodologies
- Reduce risk in operation
- Deliver a better customer experience
- Potential to reduce CAPEX by reviewing appropriate plant sizing
- Engage over tenant consumption



Our carbon emissions
Scopes 1, 2 & 3



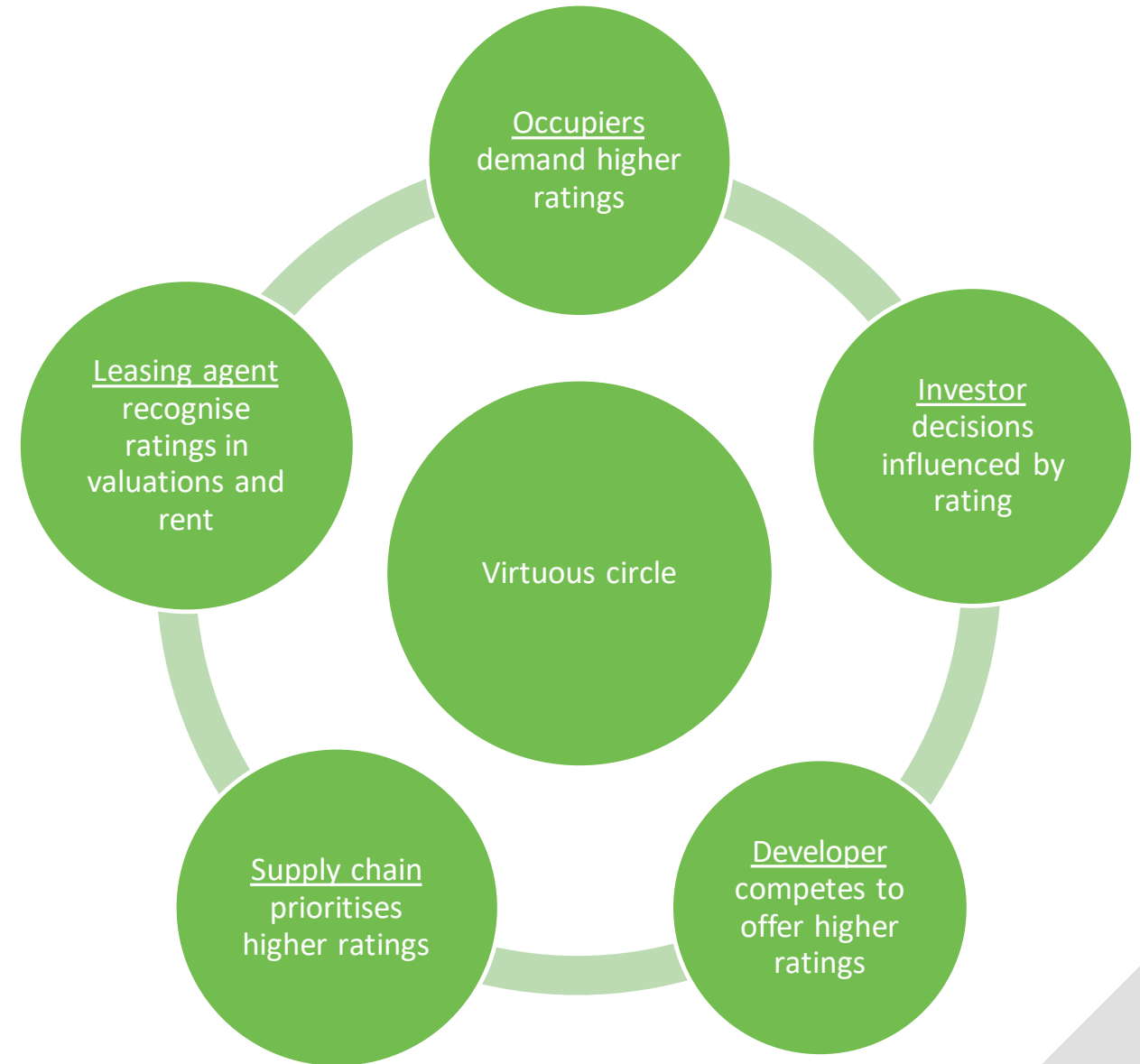
Scope 1 emissions
3.6%
Direct emissions from activities controlled by us

Scope 2 emissions
9.7%
Indirect emissions associated with our consumption of purchased energy

Scope 3 emissions
86.7%
Indirect emissions which are caused by our activities but not controlled by us

Helping create a virtuous circle leading to market transformation

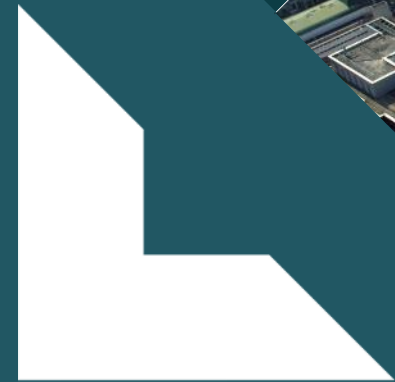
- Design for Performance has the potential to transform the UK market's approach to energy use in buildings
- Performance in-use recognised by the market as proxy for asset quality
- Simple, non-technical measure of success understood by all



Thank you

Nils Rage

nils.rage@landsec.com



Landsec





Sarah Ratcliffe
Better Building
Partnership



Jen Elias
Cundall



Paul Bannister
DeltaQ



Carlos Flores
NABERS



Nils Rage
Landsec



WHAT'S NEXT?

Developing a scheme for the UK...

SCHEME ADMINISTRATION

- PROJECT ACCREDITATION
- ASSESSOR TRAINING & SKILLS
- RATING TOOL
- INDEPENDENT DESIGN REVIEW PANEL
- MARKET ADVOCACY

PIONEER PROJECTS

- PROJECT AGREEMENTS
- SUPPLY CHAIN DEMAND
- ROAD TESTING
- EVIDENCE BASE

INDUSTRY UPSKILLING

- ACCREDITED ASSESSORS
- SIMULATION MODELLING
- DESIGNERS / ENGINEERS
- FM / PROPERTY MANAGEMENT

MARKET DRIVERS

- OCCUPIER DEMAND
- INVESTOR DEMAND
- CORPORATE LEADERSHIP
- REGULATORY REQUIREMENTS

DfP Pioneers



DERWENT
LONDON



STANHOPE



DfP Delivery Partners

AECOM Imagine it.
Delivered.

ATKINS

ARUP

 Built Physics Limited

BURO HAPPOLD
ENGINEERING

CUNDALL

HOARE LEA 

KJ TAIT
ENGINEERS

 **TFT**

RAMBOLL

 **watkins payne**
designed | engineered | focused

Pioneering Activities 2019 - 2021

- Rating Scheme Development
 - Rules and benchmarks
 - Submission, assessments and QA processes & documentation
- Pioneering Projects
 - Project Agreement development
 - Road testing
 - Consolidating business case
- Market Development
 - Brand development
 - Industry engagement
- Administration
 - Manage project applications & accreditation
 - Oversight of rating tool & project agreements
 - Procure UK Scheme Administrator
- Capacity Building
 - Establish Independent Design Review Panel
 - Develop professional competency frameworks
 - Training & skills development programmes

TECHNICAL LEAD

verco

“DATA PROVIDER” SUPPORTERS

BBP | BETTER BUILDINGS PARTNERSHIP

 **CarbonCredentials**


CIBSE

 EVORA

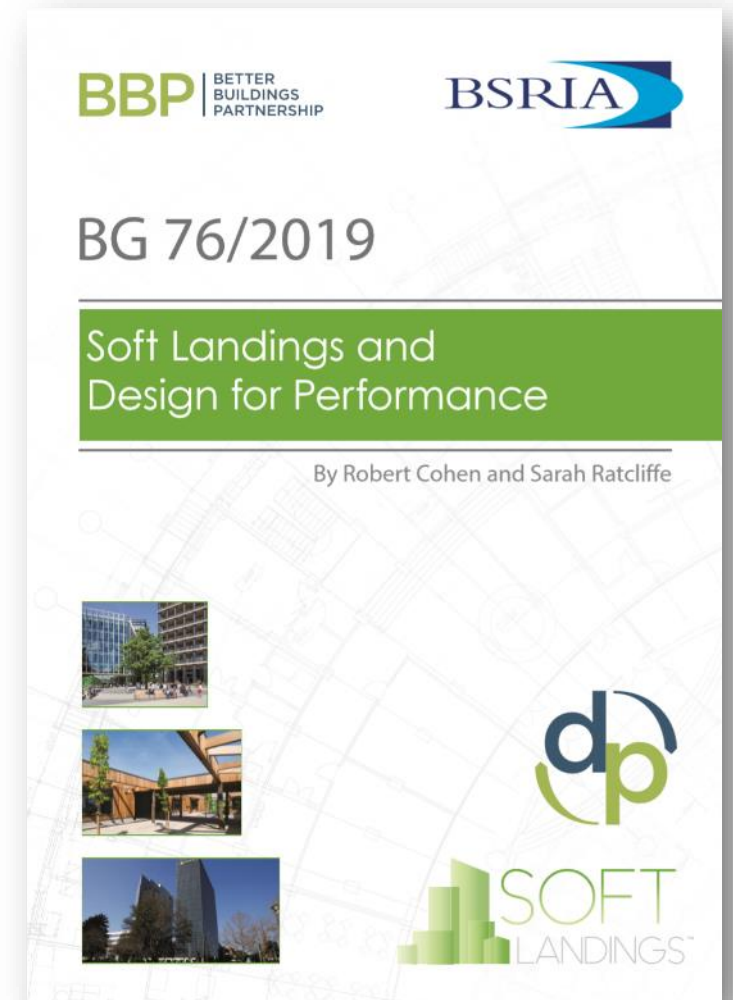

UCL

verco

BBP | BETTER BUILDINGS PARTNERSHIP

Embedding the DfP approach

- ❑ BSRIA Soft Landings and Design for Performance.
- ❑ BREEAM New Construction 2018 includes a Verification Stage launched by BRE.
- ❑ CIBSE TM39 (Energy metering) 2019: defines metering required for base building ratings.



BCO Guide to Specification

Screen

5



The success of NABERS has been built on the establishment of protocols for energy modelling, metering and detailed review of the systems post commissioning to ensure the controls are operating correctly and there are no faults. It has ensured that buildings are delivered to a high standard and are functioning as designed.

Innovate UK: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/497765/Non-domestic-Building_performance_full_report_2016.pdf

UKGBC Work on Performance Gap: www.ukgbc.org/ukgbc-work/delivering-building-performance/

National Trust HQ, Swindon: www.cbse.org/knowledge/items/detail

Committee on Climate Change Progress Report to Parliament 2018: www.thccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf

Aldersgate Group Energy Efficiency in the UK: Key Priorities for the government: www.aldersgategroup.org.uk/asset/896

BEIS: Helping Business to Improve Energy Efficiency: Call for Evidence: www.gov.uk/government/consultations/helping-businesses-to-improve-the-way-they-use-energy-call-for-evidence

CBSE TMS4: Evaluating Operational Energy Performance of Buildings at the Design Stage: www.cbse.org/knowledge/items/detail

2.0 Specification Guidance / Sustainability

5.10 / Designing for Operational Performance

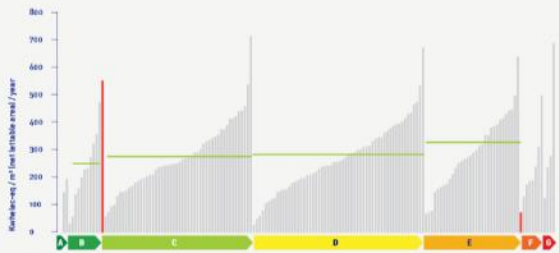
5.10.1 Mind the Gap
In the UK there is a gap between the design intent – or theoretical energy performance rating of buildings – and the actual performance of buildings.

This has been extensively evidenced through programmes such as the Innovate UK funded Building Performance Evaluation programme and work on the performance gap.

Regulations and design principles [see Sections 5.3 and 5.4 respectively] can help to inform an energy efficient building design, but do not guarantee the delivery of energy efficient buildings in operation. Data from the Better Building Partnership (BBP) in Figure 5.15 shows the divergence between the energy use predicted from EPCs and actual energy consumption in use something often referred to as the performance gap.

This disconnect between metrics used by the market and performance outcomes has been acknowledged by a wide range of organisations including the Committee on Climate Change, the Aldersgate Group and BEIS.

Figure 5.15 Comparing actual whole building energy intensity for existing buildings with the same EPC



Note: the green lines indicate that the average performance in each grade does not reflect the calculated EPC and red bars indicate that the best 1% rated building performs significantly better than the worst A-rated building

There are two main reasons for this performance gap. The first is that the method of calculating energy use for the purposes of compliance does not consider all the energy uses in a building. It does not address energy used by lifts and escalators, for catering facilities or for server rooms. This energy use can be substantial. At the National Trust HQ, Swindon, it was found that the server room and the catering used over 60% energy in just 3% of the floor area and more than doubled the operational energy use over the design estimates.

The second reason for the performance gap is related to site practice. To deliver a building that uses as much energy as expected requires that the design is built as intended, the engineering systems are commissioned effectively, and the operators and occupiers of the building understand how to operate and maintain the building so that it delivers the expected performance.

There are several building energy performance measures aimed at addressing the performance gap. The most relevant to driving actual operational performance are the Display Energy Certificate (DEC) mandatory on public buildings [see Section 5.4.5] but which can be voluntarily adopted on other buildings [see CIBSE TMS4: Evaluating Operational Performance of Buildings at the Design Stage].

Source: Real Estate Environmental Benchmark Update, BBP, 2016

British Council for Offices Guide to specification 2019

5.10.2 International Comparisons
Evidence shows that despite a regulatory framework in the UK designed to drive energy efficiency, offices in some other markets perform much better. For example, research shows the base building services of office buildings in Melbourne consume an average of around half of the energy of those in London and that the best operate at 16% of the average London consumption [see Figure 5.16].

This illustrates the potential of a focussed approach to actual performance. In Australia, this has been driven by the National Australian Built Environment Rating System (NABERS) rating tool [see Appendix A5] and through the verification and disclosure of base building performance data.

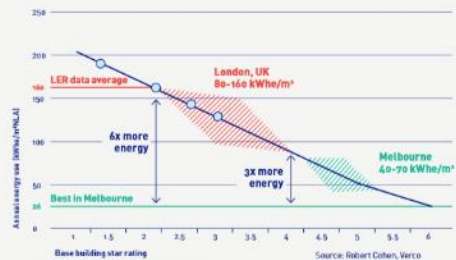
However, it should be recognised that the NABERS methodology was developed for the Australian climate and needs further development to meet UK requirements [CIBSE Technical Symposium Paper: Understanding the numbers behind the NABERS energy rating systems, Lim and Wilson, 2019].

The NABERS energy rating scheme covers 86% of commercial office space and an almost complete penetration into the market for commercial buildings with tenancies more than 2,000 m². Over the ten-year period from 2006–16, the average base rating of existing buildings has improved from 2.7 to 4.2 stars (NABERS is based on a 1–6-star rating scale), representing a 40% reduction in energy intensity.

The market penetration and improvement in performance is the result of a long-term trajectory from voluntary to mandatory disclosure. This has enabled many investors, occupiers and local authorities to set their own targets. For example, in May 2018, the City of Sydney announced that new office developments and retrofits will have to achieve a base building rating of 5.5 stars.

As well as energy performance improvements, over the past 20 years in the Australian market, the theory that better designed, constructed and operated buildings produce better investment returns has been tested, with evidence demonstrating a positive correlation between investment performance and higher rated NABERS buildings.

Figure 5.16 Energy intensity of office buildings in Melbourne and London compared



Landlord Energy Rating (LER) case studies

Figure 5.17 Growth in rated commercial office floor area and improvement in the existing stock average base building energy rating from 2006 to 2016



Total Rated Area x1,000,000sqm (lha)

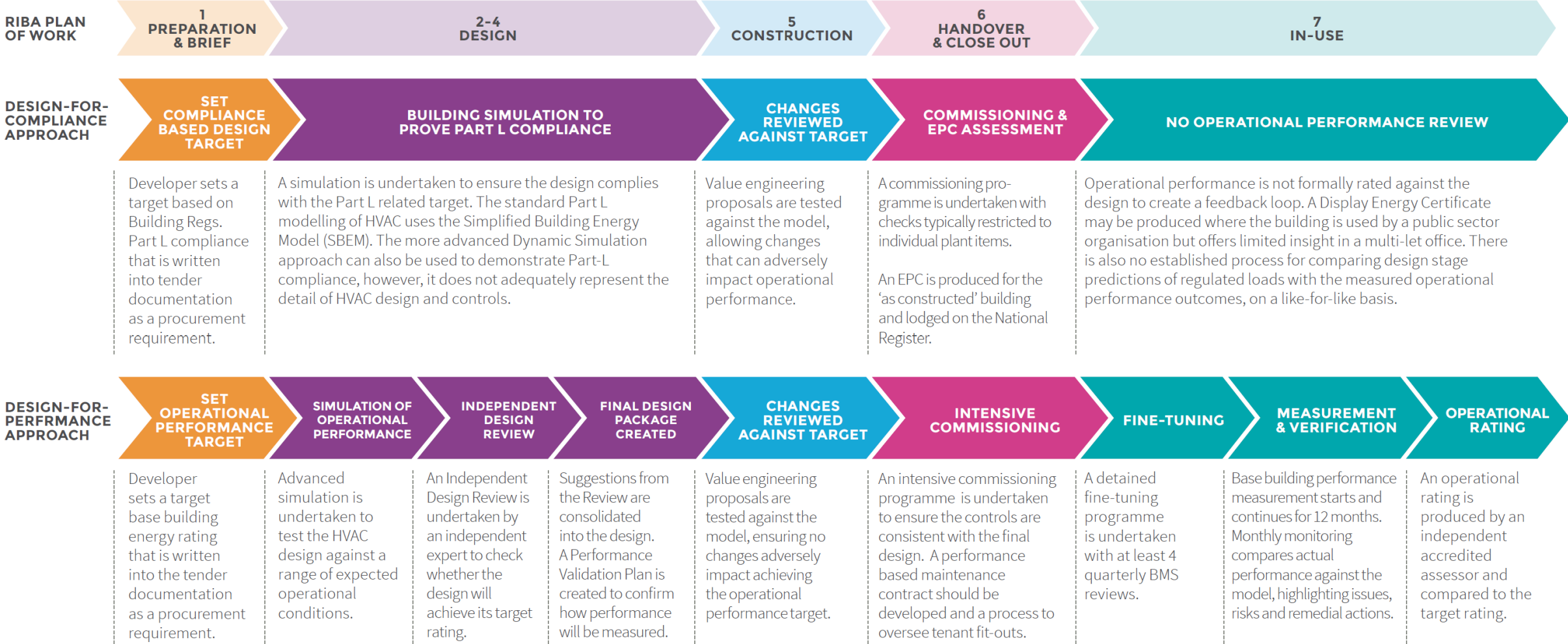
Area weighted average NABERS Rating (hrs)

Source: NABERS, DEH

CIBSE Technical Symposium Paper: Understanding the numbers behind the NABERS energy rating Lim and Wilson 2019: www.cbse.org

Better Investment Returns: <http://bitd.gov.au/sites/default/files/NABERS-energy-office-market-analysis-june-2013.pdf>

RIBA Plan of Work alignment



Policy & Advocacy

- [BEIS Call for Evidence](#) on Business Energy Efficiency references BBP, NABERS & DfP initiative
- [GLA's London Plan](#) to mandate performance reporting for all major new development.
- [Committee on Climate Change](#) called for Government to support further work in this area (referencing DfP).
- [Aldersgate Group](#) advocates Commitment Agreements and performance-based labelling.
- [London Energy Transformation Initiative](#) Declaration for offices embodies DfP principles
- [UK-GBC "Advancing Net Zero"](#) synergies

DfP – matching the zero-carbon rhetoric with action...

A design-for-performance approach:

- Delivers on energy efficiency promises.
- Delineates accountability for energy consumption, enabling action to improve efficiency.
- Is transparent, enabling stakeholders to drive better performance in use.
- Reduces energy demand.



THANK YOU