Verco

Presenter's name:Robert CohenPresented to:Design for Performance WorkshopDate:01 December 2015

What should be the key ingredients of a successful UK scheme?



Pre-requisites for UK to follow approach in Australia









5 stars..... Excellent performance

4 stars..... Good performance

3 stars..... Average performance

2 stars..... Below average performance

1 star..... Poor performance



******** 6 stars...... Market leading performance

5 stars..... Excellent performance









- 4 stars..... Good performance
- 3 stars..... Average performance
- 2 stars..... Below average performance

1 star..... Poor performance

NABERS base building energy ratings: improving outcomes and penetration

NLA-Weighted Average NABERS Rating & Total Rated Area



Source: IPD, NABERS.

In 1998 the median base-building rating was aligned with 2.5 stars on a 0 to 5 star scale.

"Commitment Agreement" requirements on the developer

- Design and construct the premises to operate at the target energy performance level
- Provide data to allow the operational performance to be verified after 12 months of full occupation
- Provide all consultants and contractors involved in the design, construction, commissioning and management of the Premises with written notice of the Commitment Agreement
- Include in agreements to lease and leases with all tenants a clause that discloses the Commitment Agreement;
- Use best endeavours to achieve and maintain the Commitment Rating for the duration of the lease;
- Provide the tenants with annual updates of the Performance Rating for the Premises.

Mandatory

- Advanced simulation of the design, which can reliably predict actual operational energy use for individual sub-meters
- **Design reviews** by independent experts
- **Report the rating** to scheme administrator

Voluntary

- Extended commissioning and post occupancy fine tuning against expected performance.
- Integration with the **Soft Landings** Framework

Commitment Agreements registered with NABERS



Base building energy ratings for existing office buildings



TIMETABLE for a possible UK Commitment Agreement roll-out

	2015	2016					2017							2018							
Feasibility study																					
Pilot studies																					
Preparations for roll-out																					
Voluntary roll out																					

Base building energy use for new prime offices in London and Melbourne



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The Commitment Agreement

Background



Overview

- An overview of NABERS
- What drives NABERS improvement?
- The Commitment Agreement
 - Intent and Structure
- Summary

NABERS in overview

- NABERS ratings exist for:
 - Office buildings (base building/tenancy/whole building): Energy, water*, indoor environment and waste
 - Hotels: Energy, water
 - Shopping centres (base building): Energy/ water*
 - Data centres (infrastructure/IT equipment/whole facility): Energy
 - NZ Office Buildings: Energy/Water
- All ratings are based on measured performance not attributes or design

*Water ratings are whole building

NABERS Energy for Offices

- NABERS Energy for offices (base building) is the dominant rating and is the focus of today's seminar
- Data inputs:
 - Energy use of base building (lifts/HVAC/common area light and power)
 - Net lettable area
 - Area-weighted hours of operation
 - Climate zone (via postcode)
- Outputs:
 - Star rating

What delivers a high rated NABERS building?

- Must haves:
 - OK building façade
 - Good chillers
 - Reasonable air-handing design, most often VAV
 - Excellent control of HVAC plant, especially fan turndown
 - Good commissioning/maintenance
- Optional, and not always helpful:
 - "Innovative" HVAC such as displacement ventilation, chilled beams, etc
 - Broader environmental/sustainability initiatives
 - Cogeneration/trigeneration
 - On-site renewables

What delivers NABERS improvement?

- Step 1: Remove the stupidity
 - Simultaneous heating and cooling
 - VSD fans running at 100%
 - Other control and commissioning issues and blunders
- Step 2: Upgrade the dead and dying plant
 - Mainly chiller upgrades
 - Some AHU modification
- Costs:
 - Step 1: <3 year paybacks even with new control systems</p>
 - Step 2: Generally conducted as part of general refurbishments
- Benefits
 - Typically enough to get to 4-4.5 stars
 - Improved occupant comfort

Why do owners bother with NABERS improvement?

- Access to government and large corporate tenants
 - Many of whom require minimum NABERS ratings
- Measurable commercial benefits
 - Lower vacancies
 - Better rents
 - Higher building valuations
- CSR reporting and investor sentiment
 - High performance attracts investment
- General competitive pressure
 - Leading to a push towards 5.5 and 6 star buildings ahead of large scale tenant demand

Office market investment performance 2010-2013



Office market investment performance 2013



The genesis of the Commitment Agreement

- Developers concerned that they could not compete with existing NABERS-rated assets
 - Because NABERS requires 12 months of performance data
- Commitment Agreement process developed to enable a building to claim a NABERS rating during construction
- Process:
 - Sign NABERS Commitment Agreement
 - Undertake at least design review & simulation
 - NABERS Rate asset after 12-18months of occupancy to prove/disprove achievement

The requirements of the Commitment Agreement

- Simulation
 - Estimate of actual in-use performance
 - Covers all energy uses within base building
 - Reflecting known/expected hours of operation and loads
 - Calculation of NABERS rating
 - Risk analysis of potential failure scenarios
- Design review (by independent expert)
 - Review and interpretation of the simulation
 - Review of design covering
 - Performance risks
 - Design opportunities
 - Process/management enhancements
 - Controls improvements

The intent of the Commitment Agreement

- Important:
 - Design review is a menu of options only
 - Design team has to make their own response
 - This is risk management not compliance
- Performance tested (NABERS rating) 12-18 months after occupancy
 - Success design team got it right
 - Failure design team didn't get it right!

Light-handed, non-regulatory approach that lets design teams focus on delivering outcomes rather than ticking boxes

Summary

- NABERS has been highly successful in transforming the Australian office market
- Particular success with the office "base building" sector
- Commitment Agreement:
 - Enables new buildings to participate
 - Adopts a light-handed non-regulatory approach
 - Builds learning culture an industry transformation
- Commitment Agreement could be a model for driving design for performance in the UK



Questions?



Design for Performance Workshop L&G, 1 Coleman Street, London, 1 December 2015

Technical Challenges Introduction to panel discussion

Bill Bordass bilbordass@aol.com

the Usable Buildings Trust

www.usablebuildings.co.uk

Performance gaps were identified in the 1990s, but widely ignored until recently ...

"Missing feedback is a common cause of system malfunction" **DONELLA MEADOWS**

"designers seldom get feedback, and only notice problems when asked to investigate a failure." ALASTAIR BLYTH CRISP Commission 00/02

"I've seen many low-carbon designs, but hardly any low-carbon buildings" ANDY SHEPPARD, Arup, 2009



WE HAVE GOT MUCH BETTER AT IMPROVING PERFORMANCE IN THE VIRTUAL WORLD THAN IN THE REAL ONE

SOURCE: Hellman cartoon for W Bordass, Flying Blind, Association for the Conservation of Energy & OXEAS (2001)

... hence these conclusions from the recent TSB Building Performance Evaluation programme

- Significant problems with integrating new technologies, especially configuring and optimising BMSs. Insufficient thought given to how occupants need to use them.
- "Controls are ... a minefield." and they were usually too complicated.
- Maintenance, control and metering problems, especially with biomass boilers, PVs and solar heating.
- Multiple systems fighting each other: e.g. cooling vs heating, or different systems jockeying for control.





SOURCE: J Palmer & P Armitage, BPE Programme, Early finding from non-domestic projects, Innovate UK (Nov 2014)

If you wanted to improve building performance in use, what would you do ...

- A. Focus on performance in use? OR
- B. Do lots of other things & hope performance will improve ...?
- Why have we been barking up the wrong tree?



We need to move from Design for Compliance to Design for Performance.

When actual performance in use becomes the proper target, then everybody can pull together in striving to improve it.

CHALLENGES: 1

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Narrowing gaps during design and construction

- **Design energy estimates need to count everything** under likely scenarios, *not subsets under often unrealistic standard conditions.*
- **Modelling** needs to predict outcomes and test robustness, not just compare options and verify compliance (at least in theory).
- **Constant reality-checking** in design, construction: so the process converges onto outcomes, instead of diverging from design intent.
- Engineering systems must be efficient over a wide range, including part loads, at night, and clash avoidance.
- Controls must be better specified, more usable and manageable. These are often a blind spot.
- Effective sub-metering, to review outcomes against expectations.
- Greater attention to detail is necessary throughout: you can often make things simpler, if you do them better.

CHALLENGES: 2 Narrowing performance gaps in use

- **Designers need to understand occupiers and managers better**, and communicate design intent better to them.
- **Design and building teams must follow through after handover**, to help inform occupiers, review performance versus expectations, fine tune systems, troubleshoot, and oversee tenant fitout proposals.
- Further commissioning will be required once the building is in use, including fine-tuning, seasonal and "continuous" commissioning. Metering systems need commissioning too: often they haven't been.
- Buildings also need to be better managed to match supply and demand and minimise waste.
- Lessons learned must be captured, and fed back to as wide as possible an audience.

CHALLENGES: 3 Process-related lessons from **Soft Landings**

1. Inception and Briefing Need for Soft Landings Champions.

2. Design and construction

Client commitment may drift: **it mustn't**. Regular reviews required. An important role of the Champions is to trigger these.

3. Preparation for handover

However hard you try, there will always be loose ends, to be tied up after handover.

4. Initial aftercare

One needs to nip problems in the bud: this means a big change in attitude of most contractors in the Defects Liability Period.

5. Longer-term aftercare

Has usually required a budget outside the building contract – but Commitment Agreements might overcome this problem.



the SOFT LANDINGS FRAMEWORK

for better briefing, design, handover and building performance in-use



What might this mean in practice?



THE REWARDS: Benefits of Design for Performance

- Brings people together: Bridges the gaps between procurement and operations.
- Improves what really matters: the final outcomes.
- Identifies and rewards what is proven to work in practice: Helps to cut out the "green bling".
- Addresses more than energy performance: *well-tuned buildings have better occupant satisfaction outcomes too.*
- Allows industry to develop cost-effective solutions that work, helping to stop regulations becoming too onerous.

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www.usablebuildings.co.uk

Designing For

For Compliance

(or why buildings don't work properly)

Stephen Hill, Arup

VALUE



1 5 2000 Energy Costs Rental Costs People Costs

DESIGN







7 REASONS WHY BUILDINGS DON'T WORKAS THEY SHOULD



2. Carbon Calculations

O GOTTEND SCHUP

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10 40

....

3. Metering

H-TOTA AND

SYSTEM-10

BTU METER



ODEHEA

SCROLL RESET PROGRAM

POWER





SISTEM-10 man

1000

ONE HANOVER STREET - WEEKLY TARGETING AND MONITORING ELECTRICITY (HH) REPORT

Meter	Previous Week day kWh	Total Day kWh	Total Day Cost*	Variance %	Previous Week night kWh	Total Night kWh	Total Night Cost*	Variance %	Previous Week Total	Total kWh	Total Cost*	Total Variance %	Load Factor (%)	Maximum Demand (kWh)
Main Supply	106,951	109,156	10,385.10	2%	29,617	31,545	2,094.27	7%	136,568	140,701	£12,479.37	3%	68	1,226.00
2nd Floor T1	1,108	952	90.57	0%	262	259	17.20	0%	1,370	1,211	£107.77	0%	57	12.6
2nd Floor T1 - Additional	397	374	35.58	0%	47	45	2.99	0%	444	419	£38.57	0%	34	7.4
2nd Floor T2	1,613	1,355	128.91	n/a	336	369	24.50	n/a	1,949	1,724	£153.41	n/a	46	22.2
2nd Floor T2 - Additional	1,008	965	91.81	n/a	240	213	14.14	n/a	1,248	1,178	£105.95	n/a	44	16
2nd Floor T3	2,007	1,763	167.73	n/a	493	377	25.03	n/a	0	2,140	£192.76	n/a	49	26.2
2nd Floor T3 - Additional	564	485	46.14	-14%	119	110	7.30	-8%	683	595	£53.45	-13%	38	9.4
3rd Floor T1	530	519	49.38	-2%	148	128	8.50	-14%	678	647	£57.88	-5%	57	6.8
3rd Floor T2	1,244	1,012	96.28	n/a	210	219	14.54	n/a	1,454	1,231	£110.82	n/a	35	20.8
3rd Floor T3	1,269	1,095	104.18	-14%	196	200	13.28	2%	1,465	1,295	£117.46	-12%	42	18.4
3rd Floor Essential DB T1E 3	2,394	2,382	226.62	-1%	750	756	50.19	1%	3,144	3,138	£276.81	0%	72	26
3rd Floor Essential DB T2E 3	621	548	52.14	-12%	125	127	8.43	2%	746	675	£60.57	-10%	50	8
4th Floor T1	949	897	85.34	-5%	289	269	17.86	-7%	1,238	1,166	£103.20	-6%	65	10.6
4th Floor T2	857	812	77.25	-5%	241	219	14.54	-9%	1,098	1,031	£91.79	-6%	63	9.8
4th Floor T3	725	706	67.17	-3%	251	212	14.07	-16%	976	918	£81.24	-6%	64	8.6
4th Floor Essential DB T1E 4	0	0	0.00	n/a	0	0	0.00	n/a	0	0	£0.00	n/a	0	0
4th Floor Essential DB T2E 4	1,319	1,018	96.85	-23%	95	134	8.90	41%	1,414	1,152	£105.75	-19%	29	24
4th Floor MCC 11	0	0	0.00	n/a	0	0	0.00	n/a	0	0	£0.00	n/a	0	0
5th Floor T1	665	583	55.47	-12%	212	161	10.69	-24%	877	744	£66.16	-15%	43	10.4
5th Floor T2	0	0	0.00	n/a	0	0	0.00	n/a	0	0	£0.00	n/a	0	0
5th Floor T3	1,456	1,237	117.69	n/a	439	408	27.09	n/a	1,895	1,645	£144.78	n/a	58	16.8
5th Floor Essential DB T1C 5	0	0	0.00	n/a	0	0	0.00	n/a	0	0	£0.00	n/a	0	0
5th Floor Essential DB T1E 5	1,117	876	83.34	-22%	216	200	13.28	-7%	1,333	1,076	£96.62	-19%	46	14
5th Floor Essential DB T2E 5	1,169	955	90.86	-18%	233	212	14.07	-9%	1,402	1,167	£104.93	-17%	32	22
5th Floor Essential DB T4C 5	0	0	0.00	n/a	0	0	0.00	n/a	0	0	£0.00	n/a	0	0
6th Floor T1	668	588	55.94	-12%	286	236	15.67	-17%	954	824	£71.61	-14%	60	8.2
6th Floor T2	936	555	52.80	0%	342	231	15.34	0%	1,278	786	£68.14	0%	28	16.8
6th Floor T3	1,271	785	74.68	-38%	159	153	10.16	-4%	1,430	938	£84.84	-34%	25	22.8
6th Floor Essential DB Kitchen	110	71	6.75	0%	13	14	0.93	0%	123	85	£7.68	0%	6	8
6th Floor Essential DB T1E 6	360	355	33.77	-1%	108	108	7.17	0%	468	463	£40.94	-1%	46	6
6th Floor Essential DB T2E 6	437	440	41.86	1%	113	113	7.50	0%	550	553	£49.36	1%	41	8
6th Floor Essential DB T3AV 6	0	0	0.00	n/a	0	0	0.00	n/a	0	0	£0.00	n/a	0	0
6th Floor Essential DB T4 6	572	567	53.94	-1%	138	138	9.16	0%	710	705	£63.11	-1%	52	8
6th Floor Essential DB T5 6	187	221	21.03	0%	33	43	2.85	0%	220	264	£23.88	0%	39	4
6th Floor Essential DB T6 6	494	505	48.05	2%	74	81	5.38	9%	568	586	£53.42	3%	48	7.2
6th Floor MCC 10	7	2	0.19	-71%	0	11	0.73	n/a	7	13	£0.92	n/a	2	4
6th Floor MCC 9	342	338	32.16	-1%	136	134	8.90	-1%	478	472	£41.05	-1%	61	4.6
Basement Essential DB TE B	142	134	12.75	n/a	58	58	3.85	n/a	200	192	£16.60	n/a	57	2
Chiller 1	3,744	7,600	723.06	103%	431	1,729	114.79	301%	4,175	9,329	£837.85	123%	49	114
Chiller 2	5 008	/ 201	300 68	-16%	1 660	1 3/10	89 56	-19%	6 668	5 550	£180 21	-17%	3/1	96

Controls Integration

5. Practical (In)completion

ATTE

6. Knowledge Transfer



7. FM contracts



DEMAND



Happy People Performing Efficiently







Design for Performance

Occupier perspective

2 December 2015, London





What is your perspective on the UK situation?

Do you believe a Commitment Agreement would be valued by occupiers in their rental decisions?

What are the key factors which would prove their value to occupiers, i.e. create market demand?

Closing the performance gap





How much does energy cost matter to me?





My focus will be elsewhere



Impact on "typical CBD business" operating costs



Source: Adapted from World GBC, 2014

A 10% variation applied equally to each cost has a far from equal impact: +/-0.1% Energy costs +/-0.9% Rental costs +/-9.0% Staff costs

9% rental costs

90% staff costs in salaries and benefits



90% of employees admit that their attitude to work is adversely affected by the quality of their work environment

99% of employers will offer health improvement and wellness programmes within 3-5 years





ΗI

, Amsterdam 15

Deloitte

and a map

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Factors which would prove their value to occupiers...



- The energy cost factor isn't irrelevant... but it's not usually a deal breaker
- But I do want a building which is fit for purpose and/or 'high quality' where productivity can be maximised
- I will certainly demand better transparency in costs and other data which will enable me to be resilient, report and recruit
- Whatever I need, being accurately certified will help

Dare I ask for consensus on which is best?



Some of the Green Building rating tools in use in Europe





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The Commitment Agreement

Review and Next Steps



Overview

- Impacts of the Commitment Agreement
- How could the Commitment Agreement be improved?
- How might a Commitment Agreement work in the UK?
- Conclusions



The impact of the Commitment Agreement

- Design Reviews
 - Often limited impact on individual project design
 - Greater impact on control/commissioning
 - Significant impact on design over time so primarily an education mechanism
- Simulations
 - Improved quality of simulation work generally, both in terms of the simulation itself and the reporting
 - Flow-through to other simulation work
 - Buildings achieving at or close to simulated performance
- Building process
 - Incorporation of NABERS target in builder's contract
 - Final retentions not released until NABERS rating achieved


The impact of the Commitment Agreement

- Risk management, not compliance
 - Target outcomes rather than process
 - Leave industry to do its thing
- Education
 - Use expert advice to expose designers to new ideas
 - Close the loop from performance back to design
 - Improve simulation practice
- Industry
 - Change matrix of responsibility to create an engaged design and construction team



The strengths of the Commitment Agreement

- The Commitment Agreement:
 - Voluntary
 - Light-handed
 - Open to innovation
 - Non-prescriptive
 - Low to no cost impact on construction costs
 - Simple and low cost to administer
 - Drives learning culture and industry transformation
- Commitment Agreement is not readily adapted to regulation
 - Because it deals with things that are difficult to regulate
- A better starting point for performance measurement in the UK market than existing buildings



What could be done better?

- Issues:
 - Backlog of incomplete and overdue Commitment Agreements
 - Lack of monitoring/project contact
 - Process not updated since 2002
 - Communication of lessons learnt
- Advantages to incorporating known success factors into a revised Commitment Agreement program



Known features of successful projects

- Sign Commitment Agreement at the <u>beginning</u> of the project
- Performance targets in contracts
- Independent design review, simulation
- Independent Commissioning Agent/ enhanced commissioning
- Regular M&V & quarterly tuning in post-construction
- In UK: Soft Landings framework

Tracking these through the course of the project would improve project success rates AND reduce "lost" projects



Communication of lessons learnt

- Lessons learnt could be formalised and taught
 - Less pain!
- More forums for challenge/ advancement of design thinking
- Better simulation training, improvement and expansion of simulation guidelines
- Possibly: some work to improve consistency of design reviews, currently variable in content and emphasis



Can a Commitment Agreement work in the UK?

- Yes, with the following features:
 - Based on NABERS base building/LER like rating
 - Formalised and detailed
 - Benchmark achievement levels plus a set of rules
 - Using an enhanced Commitment Agreement process
 - Contractual requirements
 - Commissioning/ICA/soft landings
 - M&V and tuning
 - With support and training for high performance design/simulation



Conclusions

- Commitment Agreements have been an effective market transformation mechanism in Australia
 - Vector for change (performance measurement)
 - Identification of opportunities (design review)
 - Test of achievability (simulation)
 - Test of achievement (NABERS rating)
- Light-handed, non-regulatory approach
 - Encourages innovation, minimises cost
- The process could easily be adapted for the UK





Questions?



Verco

Presenter's name:Sarah RatcliffePresented to:Design for Performance WorkshopDate:01 December 2015

Workshop wrap up



Workshop conclusions

- Key comments from floor
- Timetable for feasibility study and pilots (next slide)
- Where we might go from here
 - Two more industry workshops during the pilots those attending will be invited
 - Keep stakeholders informed of progress those attending will receive updates
 - If you want to get more involved, please contact Robert Cohen or Sarah Ratcliffe

TIMETABLE for a possible UK Commitment Agreement roll-out

	2015	2016					2017							2018							
Feasibility study																					
Pilot studies																					
Preparations for roll-out																					
Voluntary roll out																					