

Building Energy Rating & Disclosure

An International View

Adam Hinge
Sustainable Energy Partnerships

A decorative graphic element in the bottom left corner, consisting of a blue triangle with a black diagonal line and a grid pattern.

ACEEE/CEE Market Transformation Symposium
April 11, 2011



We Seem Headed this Way...




Graphic courtesy CoStar Group



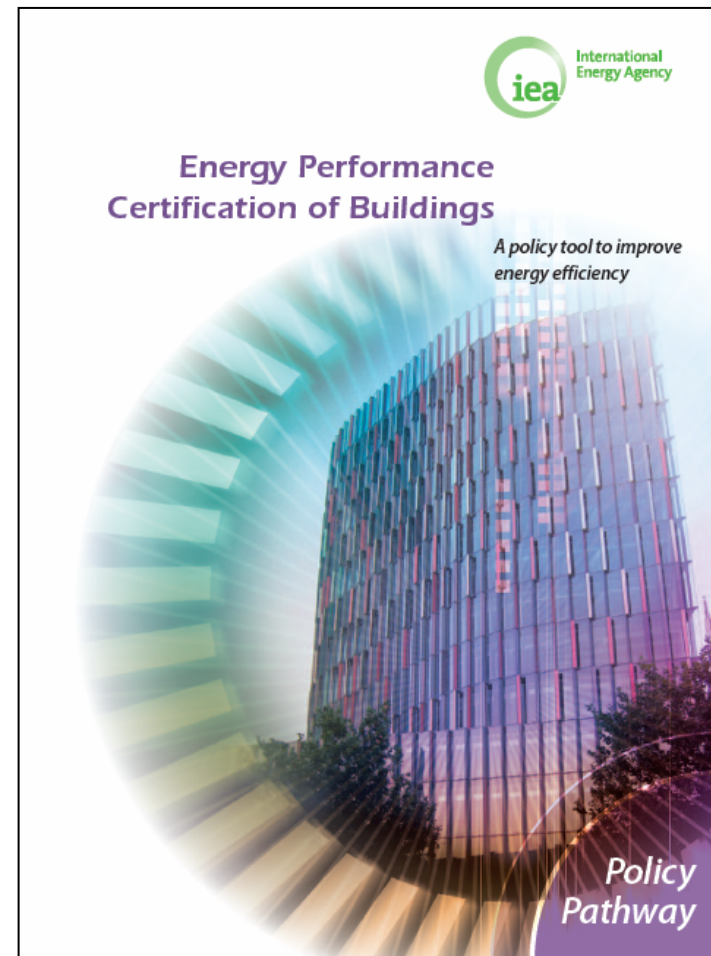
The European Energy Performance in Buildings Directive (EPBD)

Originally set in 2002; “recast” in 2010

What does the EPBD require?

- ▶ Energy Performance Certificates (EPCs) for all buildings over a size threshold; domestic and non-domestic; new and existing, when built, sold or rented out
 - ▶ Display Energy Certificates (DECs) for public buildings
 - ▶ Inspections of boilers & air conditioning systems
- 

Two Great Resources:



(report URLs on last slide)

Implementation Details Vary...

- ▶ The calculation method
- ▶ Setting energy performance requirements
- ▶ Requirements, training & accreditation of energy experts
- ▶ Communication & promotion
- ▶ Quality control
- ▶ Enforcement and sanctioning
- ▶ Policy goals (apart from meeting the EU Directive)
- ▶ Financial issues such as budget and cost of an individual EPC, administrative burdens

(BPIE "Energy Performance Certificates Across Europe" 2010)



UK EP Certificate

Energy Performance Certificate

Non-Domestic Building



Jubilee House
High Street
Anytown
A1 2CD

Certificate Reference Number:
1234-1234-1234-1234

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information on the Government's website www.communities.gov.uk/epbd.

Energy Performance Asset Rating

More energy efficient

A+

Net zero CO₂ emissions

A 0-25

B 26-50

C 51-75

D 76-100

92 This is how energy efficient the building is.

E 101-125

F 126-150

G Over 150

Less energy efficient

Technical information

Main heating fuel: Gas
Building environment: Air Conditioned
Total useful floor area (m²): 2927
Building complexity (NOS level): 4

Benchmarks

Buildings similar to this one could have ratings as follows:

68 If newly built
94 If typical of the existing stock

Administrative information

This is an Energy Performance Certificate as defined in SI2007:991 as amended

Assessment Software: SBEM 2.1a

Property Reference: 891123776612

Assessor Name: John Smith

Assessor Number: ABC12345

Accreditation Scheme: ABC Accreditation Ltd

Employer/Trading Name: EnergyWatch Ltd

Employer/Trading Address: Alpha House, New Way, Birmingham, B2 1AA

Issue Date: 08 Dec 2008

Valid Until: 07 Dec 2018 (unless superseded by a later certificate)

Related Party Disclosure: EnergyWatch are contracted as Facilities Managers

Recommendations for improving the property are contained in Report Reference Number 1234-1234-1234-1234

If you have a complaint or wish to confirm that the certificate is genuine

Details of the assessor and the relevant accreditation scheme are on the certificate. You can get contact details of the accreditation scheme from the Government's website at www.communities.gov.uk/epbd, together with details of the procedures for confirming authenticity of a certificate and for making a complaint.

UK Display Energy Certificate (Public Buildings)

Display Energy Certificate



How efficiently is this building being used?

A Government Dept
12th & 13th Floor
Jubilee House
High Street
Anytown
A1 2CD

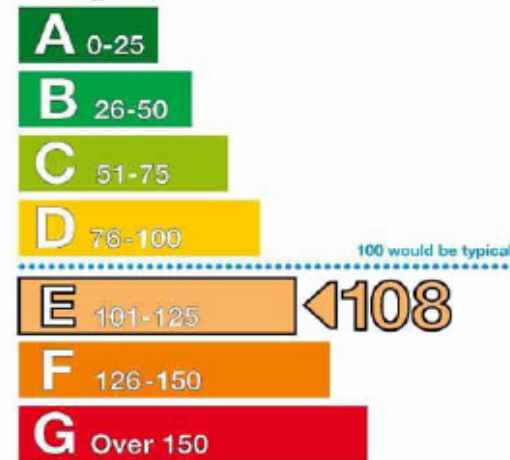
Certificate Reference Number:
1234-1234-1234-1234

This certificate indicates how much energy is being used to operate this building. The operational rating is based on meter readings of all the energy actually used in the building. It is compared to a benchmark that represents performance inclusive of all buildings of this type. There is more advice on how to interpret this information on the Government's website www.communities.gov.uk/dec.

Energy Performance Operational Rating

This tells you how efficiently energy has been used in the building. The numbers do not represent actual units of energy consumed; they represent comparative energy efficiency. 100 would be typical for this kind of building.

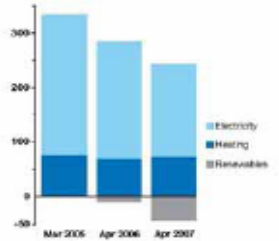
More energy efficient



Less energy efficient

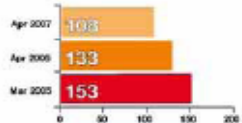
Total CO₂ Emissions

This tells you how much carbon dioxide the building emits. It shows tonnes per year of CO₂.



Previous Operational Ratings

This tells you how efficiently energy has been used in this building over the last three accounting periods.



Annual energy use, CO ₂ emissions and performance indicators	Fuel and heat	Electricity	Units for energy data	CO ₂ emissions	Units for CO ₂ data
Total energy use in the year concerned	473,401.56	1,412,025.77	kWh	668.09	tonnes CO ₂
Calculated performance indicators	68.49	204.40	kWh/m ² pa	125.71	kg CO ₂ /m ² pa
Reference performance benchmarks uncorrected	420.00	65.00	kWh/m ² pa	N/A	N/A
Reference performance benchmarks corrected	433.68	65.00	kWh/m ² pa	119.88	kg CO ₂ /m ² pa
Benchmark ratios and Operational Rating (lower is better)	15.79	314.46	Typical = 100	105	Typical = 100
Operational Rating grade (A is best)	N/A	N/A	N/A	E	A to G
Fossil fuel energy displaced	0.00	N/A	kWh	0.00	% of total
Grid electrical energy displaced	N/A	0.00	kWh	0.00	% of total

Building types	Area (m ²)
Hospital	6,912.00
Total useful floor area TUFA	6,912.00
Total accessible unconditioned area	0.00

Separable	Area (m ²)
Total area for DEC assessment TADA	6,912.00

(not displayed but available on request)

Technical information

This tells you technical information about how energy is used in this building. Consumption data based on actual readings.

Main heating fuel: Gas
Building Environment: Air Conditioned
Total useful floor area (m²): 92
Asset Rating: 92

	Heating	Electrical
Annual Energy Use (kWh/m ² /year)	126	129
Typical Energy Use (kWh/m ² /year)	120	95
Energy from renewables	0%	20%

Administrative information

This is a Display Energy Certificate as defined in S2007:901 as amended.

Assessment Software: OR v1
Property Reference: 801183776612
Assessor Name: John Smith
Assessor Number: ABC12345
Accreditation Scheme: ABC Accreditation Ltd
Employer/Trading Name: EnergyWatch Ltd
Employer/Trading Address: Alpha House, New Way, Birmingham, B2 1AA
Issue Date: 12 May 2007
Nominated Date: 01 Apr 2007
Valid Until: 31 Mar 2008
Related Party Disclosure: EnergyWatch Ltd contracted as energy managers
Recommendations for improving the energy efficiency of the building are contained in Report Reference Number 1234-1234-1234-1234

German Certificate

ENERGIEAUSWEIS für Nichtwohngebäude

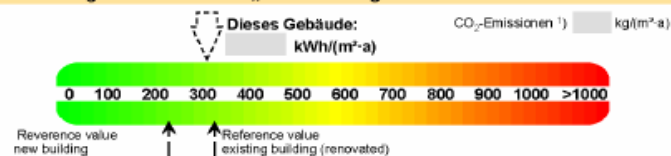
gemäß den §§ 16 ff. Energieeinsparverordnung (EnEV)

Calculated energy demand

2

Primärenergiebedarf

„Gesamtenergieeffizienz“



Nachweis der Einhaltung des § 4 oder § 9 Abs. 1 EnEV ²⁾

Primärenergiebedarf		Energetische Qualität der Gebäudehülle	
Gebäude Ist-Wert	<input type="text"/> kWh/(m ² ·a)	Gebäude Ist-Wert H _{tr}	<input type="text"/> W/(m ² ·K)
EnEV-Anforderungswert	<input type="text"/> kWh/(m ² ·a)	EnEV-Anforderungswert H _{tr}	<input type="text"/> W/(m ² ·K)

Endenergiebedarf

Energieträger	Jährlicher Endenergiebedarf in kWh/(m ² ·a) für					Gebäude insgesamt
	Heizung	Warmwasser	Eingebaute Beleuchtung	Lüftung	Kühlung einschli. Beleuchtung	

Distribution of end energy demand

[kWh/(m ² ·a)]	Heating	Hot water	Fixed lighting	Ventilation	Cooling incl. humidification	Total building
Useful energy						
End energy						
Primary energy						

Sonstige Angaben

Einsetzbarkeit alternativer Energieversorgungssysteme

- nach § 5 EnEV vor Baubeginn geprüft
- Alternative Energieversorgungssysteme werden genutzt für:
- Heizung Warmwasser Eingebaute Beleuchtung
- Lüftung Kühlung

Lüftungskonzept

- Die Lüftung erfolgt durch:
- Fensterlüftung Lüftungsanlage ohne Wärmerückgewinnung
- Schachtlüftung Lüftungsanlage mit Wärmerückgewinnung

Building zones

r.	Zone	area [m ²]	Anteil [%]
1			
2			
3			
4			
5			
6			
<input type="checkbox"/> weitere Zonen in Anlage			

Comments to the calculation methodology

Das verwendete Berechnungsverfahren ist durch die Energieeinsparverordnung vorgegeben. Insbesondere wegen standardisierter Randbedingungen erlauben die angegebenen Werte keine Rückschlüsse auf den tatsächlichen Energieverbrauch. Die ausgewiesenen Bedarfswerte sind spezifische Werte nach der EnEV pro Quadratmeter Nettogrundfläche. Die oben als EnEV-Anforderungswert bezeichneten Anforderungen der EnEV sind nur im Falle des Neubaus und der Modernisierung nach § 9 Abs. 1 EnEV bindend.

¹⁾ freiwillige Angabe

²⁾ nur in Fällen des Neubaus und der Modernisierung auszufüllen

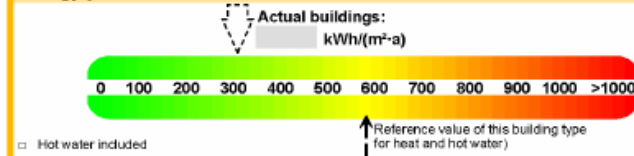
ENERGIEAUSWEIS für Nichtwohngebäude

gemäß den §§ 16 ff. Energieeinsparverordnung (EnEV)

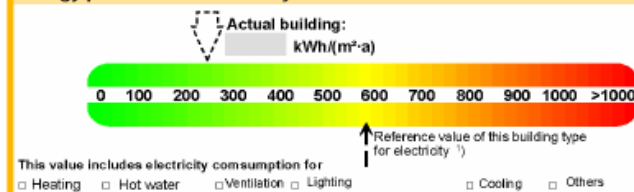
Metered energy consumption of the building

3

Energy performance heat



Energy performance electricity



Metering heat and hot water

Energieträger	Zeitraum		Energieverbrauch [kWh]	Anteil Warmwasser [kWh]	Klimafaktor	Energieverbrauchskennwert in kWh/(m ² ·a) (jährlich bereinigt, klimabereinigt)		
	von	bis				Heizung	Warmwasser	Kennwert
								Durchschnitt

Metering electricity

von	Zeitraum		Ablesewert [kWh]	Kennwert [kWh/(m ² ·a)]
	von	bis		

Building type

Building type	<input type="text"/>
Special uses	<input type="text"/>

Erläuterungen zum Verfahren

Das Verfahren zur Ermittlung von Energieverbrauchskennwerten ist durch die Energieeinsparverordnung vorgegeben. Die Werte sind spezifische Werte pro Quadratmeter Nettogrundfläche. Der tatsächliche Verbrauch eines Gebäudes weicht insbesondere wegen des Witterungseinflusses und sich ändernden Nutzerverhaltens von den angegebenen Kennwerten ab.

¹⁾ veröffentlicht im Bundesanzeiger / Internet durch das Bundesministerium für Verkehr, Bau und Stadtentwicklung und des Bundesministerium für Wirtschaft und Technologie

Not All EU Member States in Compliance with EPBD

- ▶ Last November European Commission opened “infringement proceedings” for Italy and Spain for:
 - Italian legislation ...does not comply with the requirements of the Directive. Furthermore, Italy has not adopted any measures regarding the requirement to carry out regular inspections of air-conditioning systems in order to evaluate their performance.
 - Spain has not yet adopted a methodology for calculating energy performance or a certification scheme that covers all existing buildings.

IP/10/1561

Brussels, 24 November 2010

Energy performance of buildings: the Commission asks Italy and Spain to ensure full compliance with European legislation

The European Commission today formally requested Italy and Spain to ensure full compliance with European rules on the energy performance of buildings. These rules should in particular enable European citizens to benefit from all relevant information about the buildings which they buy or rent. They also require each Member State to provide for a scheme for the regular inspection of boilers and air-conditioning systems. The Commission's decisions take the form of reasoned opinions. The Commission may decide to take these Member States to the Court of Justice

Australia Has Been At This a While...

- ▶ Originally Voluntary ABGR (Australian Building Greenhouse Rating), now NABERS* Energy
- ▶ One to Five Star rating scheme, with half star intervals
- ▶ In 2011, moves to mandatory “Commercial Building Disclosure”



*National Australian Built Environment Rating System

Australian Mandatory Disclosure

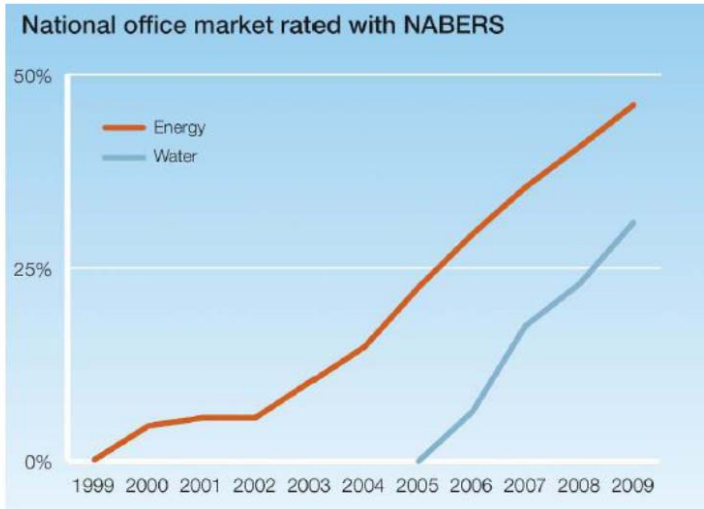


Figure 1: National office market rated with NABERS



NABERS Rating Summary

Building details

Building name:	Norwest Quay
Company:	Solent Circuit Pty Ltd
Address:	21 Solent Circuit Baulkham Hills NSW 2153
Rating Scope:	Base building
Rating Area:	10,132 m ²
Hours of Operation:	45 hrs/week
Rating expiry:	01 Dec 2011

NABERS energy rating

Star rating*:	3.5 stars
Total Emissions:	1,138,784 kgCO ₂ -e p.a.
Greenhouse Gas Intensity:	112 kgCO ₂ -e/m ² p.a.
Energy intensity:	451 MJ/m ² p.a.

* To comply with the requirements of the commercial buildings disclosure legislation, NABERS Energy ratings disclosed under the program do not include GreenPower.

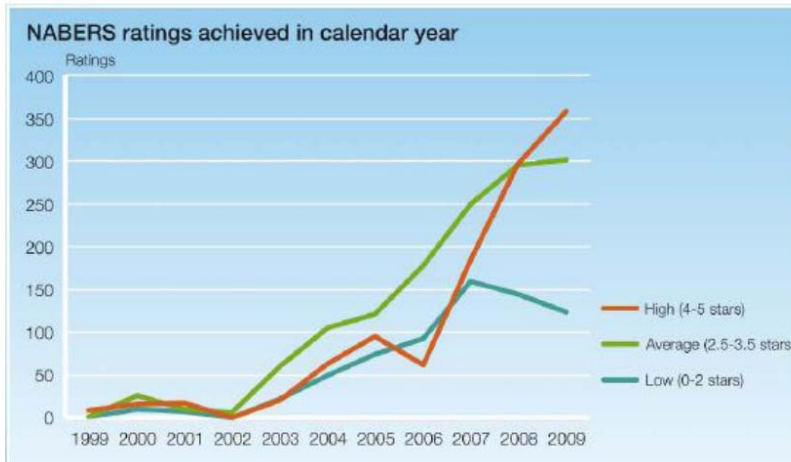
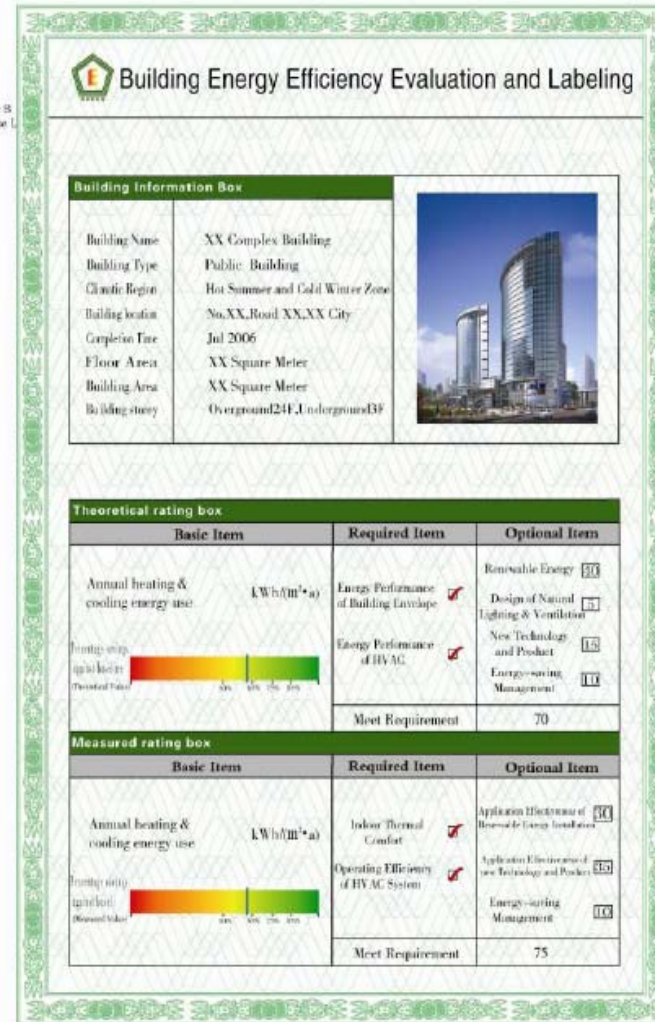
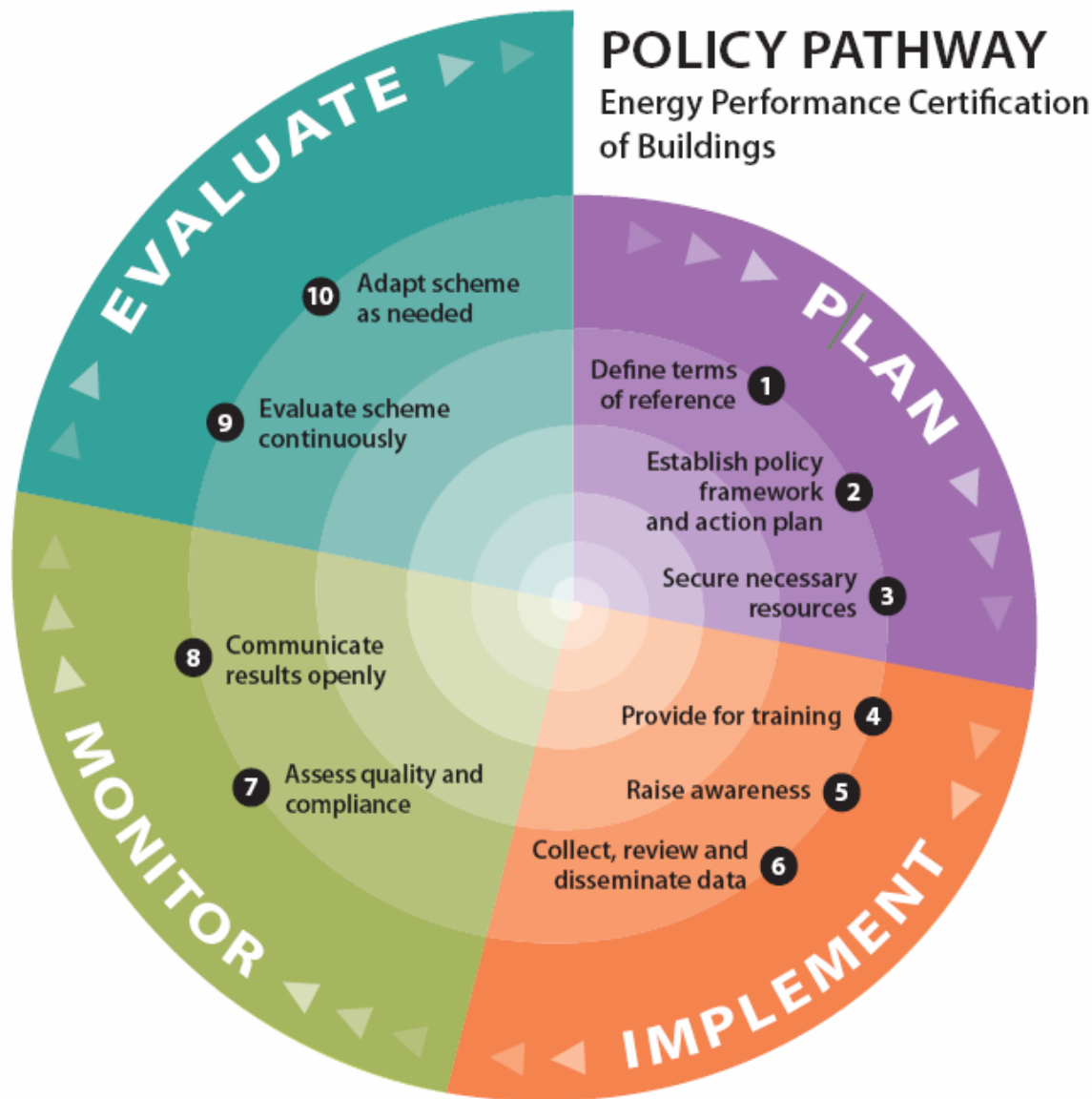


Figure 2: NABERS rating achieved in calendar year

China (World's Biggest Construction Market) Evolving to Labels...



IEA Identifies Four Stages:



Major Issue: Cost

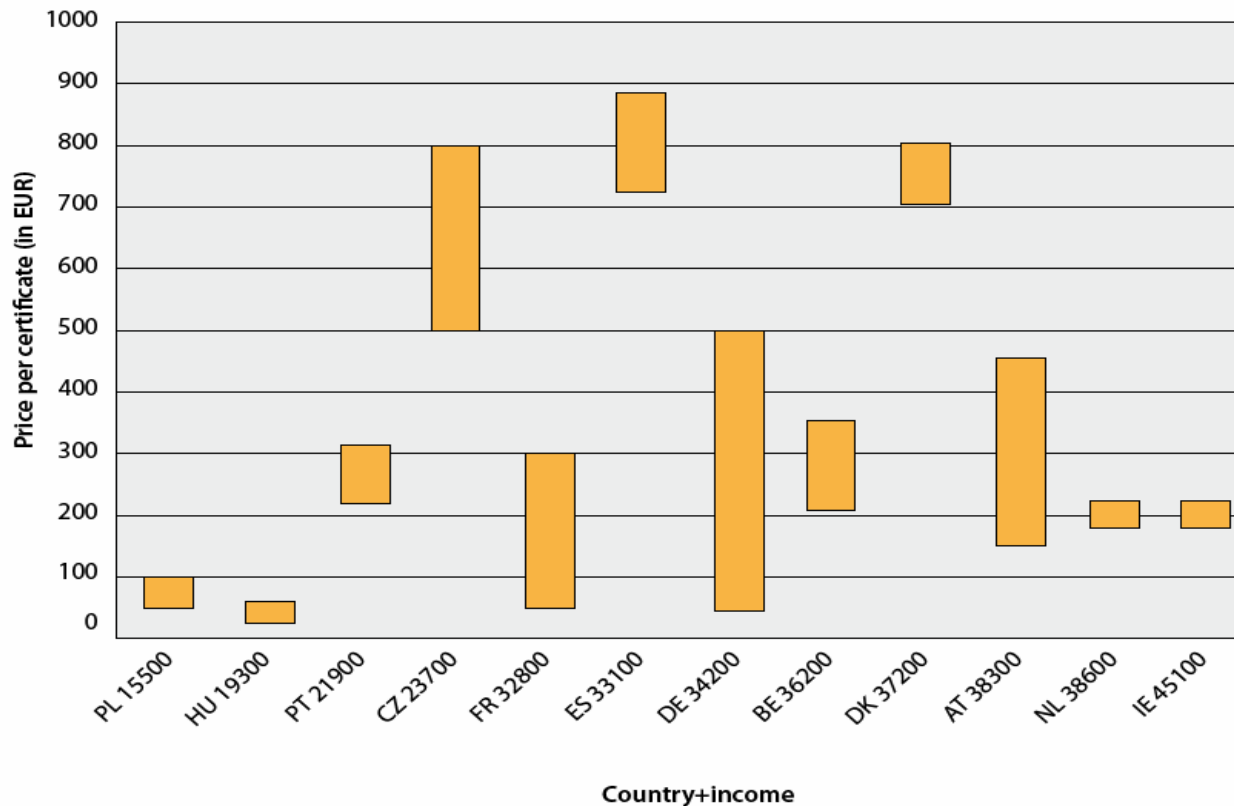


Figure 6 – Range of prices of certificates in the 12 Member States

(Figures from BPIE “Energy Performance Certificates Across Europe” 2010)

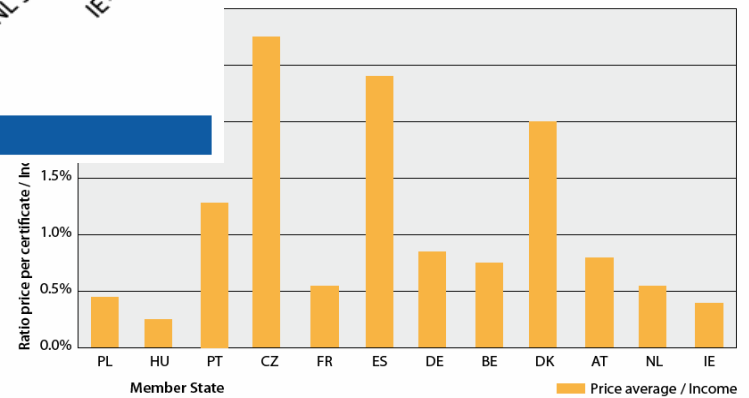


Figure 7 - Ratio of certificate price over income per capita for the 12 Member States

Major Issue: “Reproducibility”

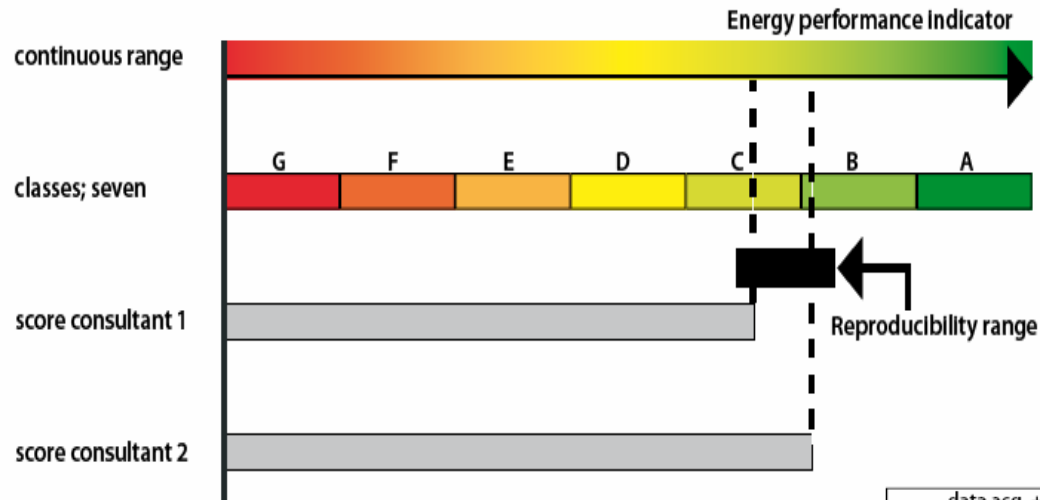


Figure 3 – Reproducibility mechanism

(Figures from BPIE “Energy Performance Certificates Across Europe” 2010)

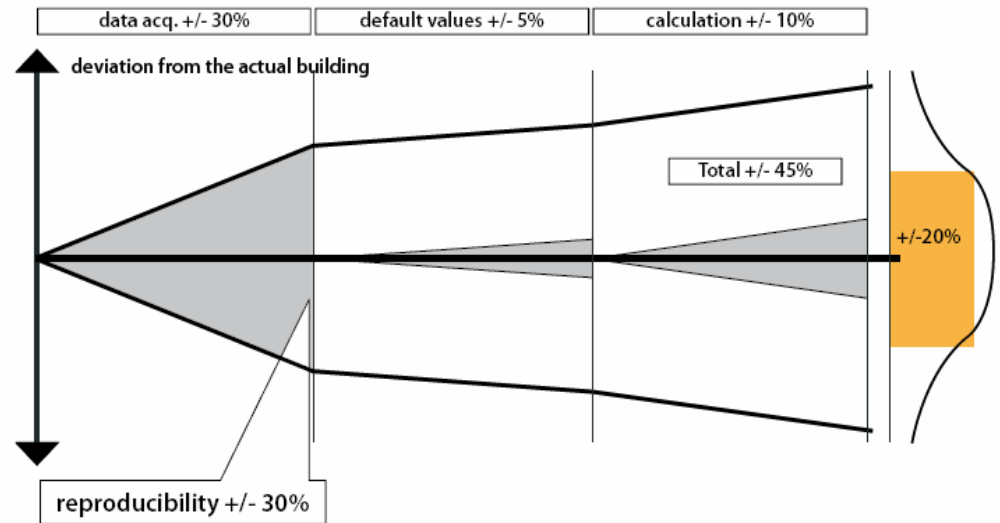


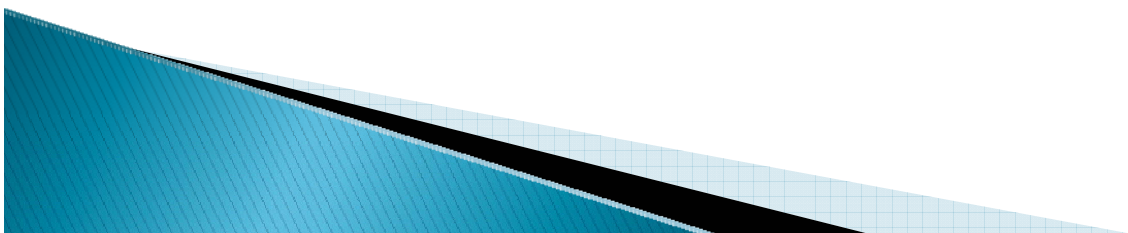
Fig. 4 – Deviation resulting from the accuracy level of the three-part assessment procedure

Energy Certificates for Berlaymont Building (European Commission HQ)



The collage displays six energy performance certificates for the Berlaymont building, each issued in a different European country:

- Germany (ENERGIEPASS):** Issued on 01 December 2014, showing a rating of A.
- France (DIAGNOSTIC DE PERFORMANCE ENERGETIQUE):** Shows a rating of B.
- Poland (Certyfikat energetyczny):** Shows a rating of B.
- Czech Republic (Energiepass):** Shows a rating of A.
- Romania (Sistem Național de Certificare Energetică a Saizabilității de Ar-Esterior sau Edificiilor):** Shows a rating of A.
- Spain (Energiesprestatie certificaat):** Shows a rating of A.



Voluntary Programs can Complement Mandatory Certification

www.display-campaign.org



Energiestadt label

Comprendre l'étiquette énergie

display Responsable du changement climatique

(0141) Hôtel de Ville

Ce bâtiment est-il performant ?

Pour le chauffage et l'électricité

	Energie Consommation	CO ₂ Emissions	Eau Consommation
Classification Display	A	C	E
Données 2007	364 kWh/m ² an	36 kg/m ² an	453 l/m ² an

Faire progresser ce bâtiment vers la classe A

Des gestes simples

Vous pouvez dès aujourd'hui aller à réduire de 10% et plus la consommation d'énergie et d'eau de ce bâtiment ! Utilisez l'énergie de façon rationnelle. Fermez les portes et fenêtres. Coupez l'éclairage, la climatisation, quittez une pièce. Faites le maintenance quand aux tubes de chaleur.

Energies utilisées

	Gaz naturel	Fioul	Pétrole
43%	50%	7%	
11.7	19022		

Gaz naturel, Fioul, Pétrole : non renouvelables

En France : Environ 80% de l'électricité est produite à partir des centrales nucléaires

Hydraulique, Éolien, Panneaux solaires thermiques, Panneaux solaires photovoltaïques

www.display-campaign.org

Our poster

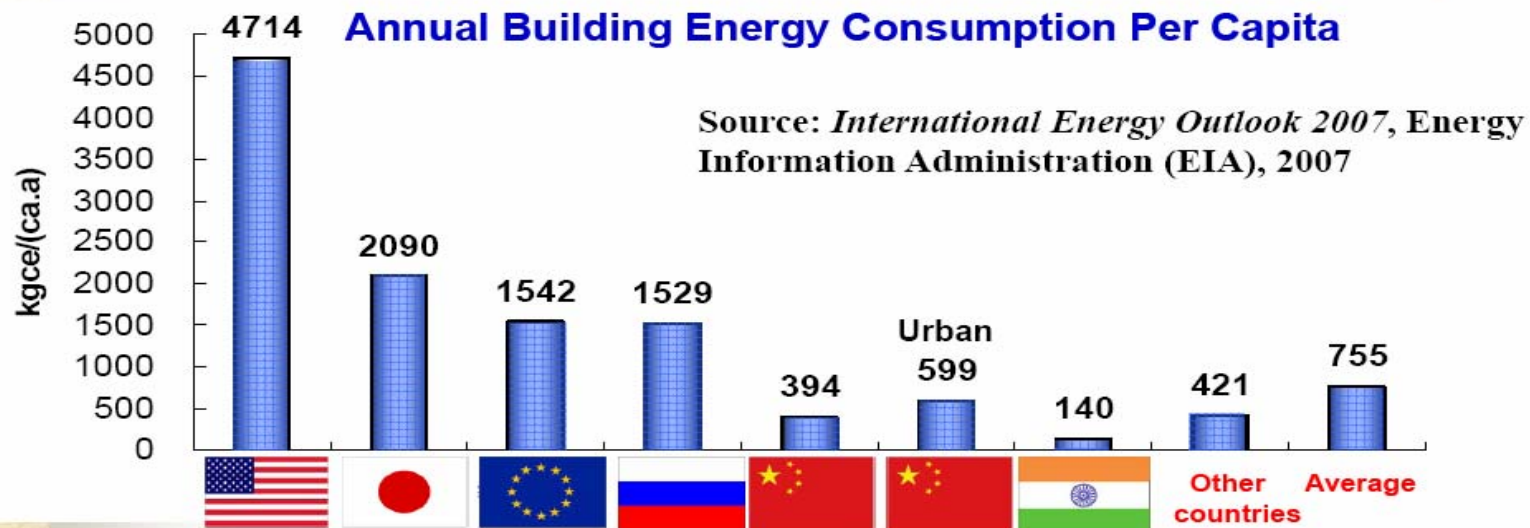
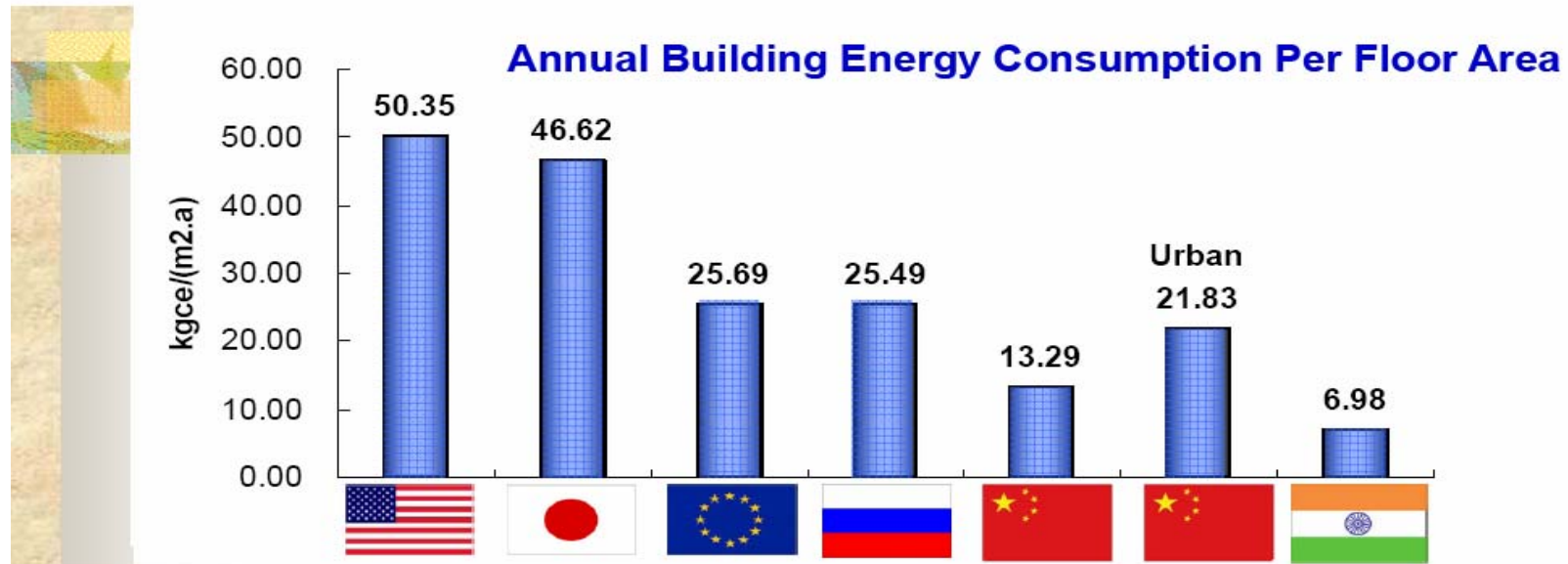
Building picture

Display label

Die Energieeffizienz dieses Gebäudes

Aarau, Aarau

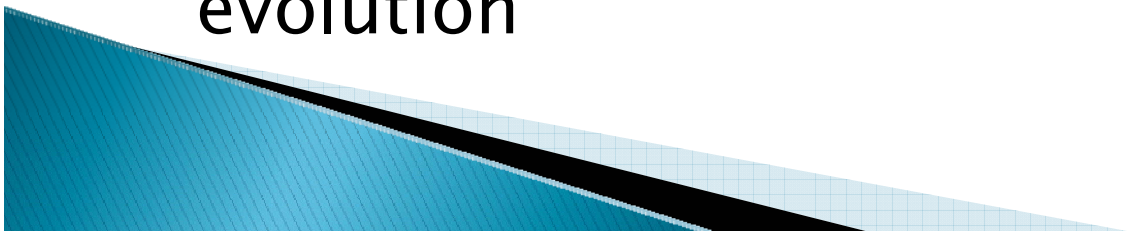
Another View of Building Performance



Source: Tsinghua University Dep't of Building

Summary

- ▶ Major effort in Europe through EPBD Implementation
 - Lots of lessons coming out; evaluations just beginning
- ▶ Australia, China & others moving quickly
- ▶ Some key issues raised in evaluations to date:
 - Cost; quality control; reproducibility
 - Adequate resources needed for administration and implementation
- ▶ Labeling/Disclosure can feed energy code evolution



Great New Resource: BuildingRating.org

The screenshot displays the BuildingRating.org website in an Internet Explorer browser window. The page features a navigation menu with links for Home, About Us, Search, Rating & Disclosure, Resources, Blog, News, Press, and Contact Us. A 'Policy Map' section is active, showing a world map with a focus on China. A pop-up window provides details for China, stating that the Ministry of Housing and Urban-Rural Development (MOHURD) developed the MOHURD energy rating program for commercial and residential buildings. The program is voluntary and includes both asset and operational ratings. Rating is mandatory for large office buildings, those undergoing publicly-funded retrofits, and "green" labeled buildings. A 'View documents in this area' link is also present.

BuildingRating.org
sharing transparency

Members: Username Password Log in
Lost Password? Create Free Account
What is a BuildingRating.org Member?

Home About Us Search Rating & Disclosure Resources Blog News Press Contact Us

Home >
Policy Map
tool by ammap.com

Back to Wo
Show Oceania
Show Asia
Show Europe
Show North America
Show South America

CHINA
China's Ministry of Housing and Urban-Rural Development (MOHURD) developed the MOHURD energy rating program for commercial and residential buildings. The program is voluntary and includes both asset and operational ratings. Rating is mandatory, however, for large office buildings, those undergoing publicly-funded retrofits, and "green" labeled buildings.
View documents in this area

Internet | Protected Mode: On 90%

Done
5 Micro... CTTC Benchma... ACEEE | 2... Policy Ma... http://ww... and what ... GoodURL... Microsoft... 2:22 PM

Questions????

Resources:

- ▶ Int'l Energy Agency – Policy Pathways: Energy Performance Certification of Buildings
 - http://www.iea.org/papers/pathways/buildings_certification.pdf
- ▶ Buildings Performance Institute Europe: Energy Performance Certificates Across Europe
 - <http://www.bpie.eu/publications.html>
- ▶ www.buildingrating.org

