



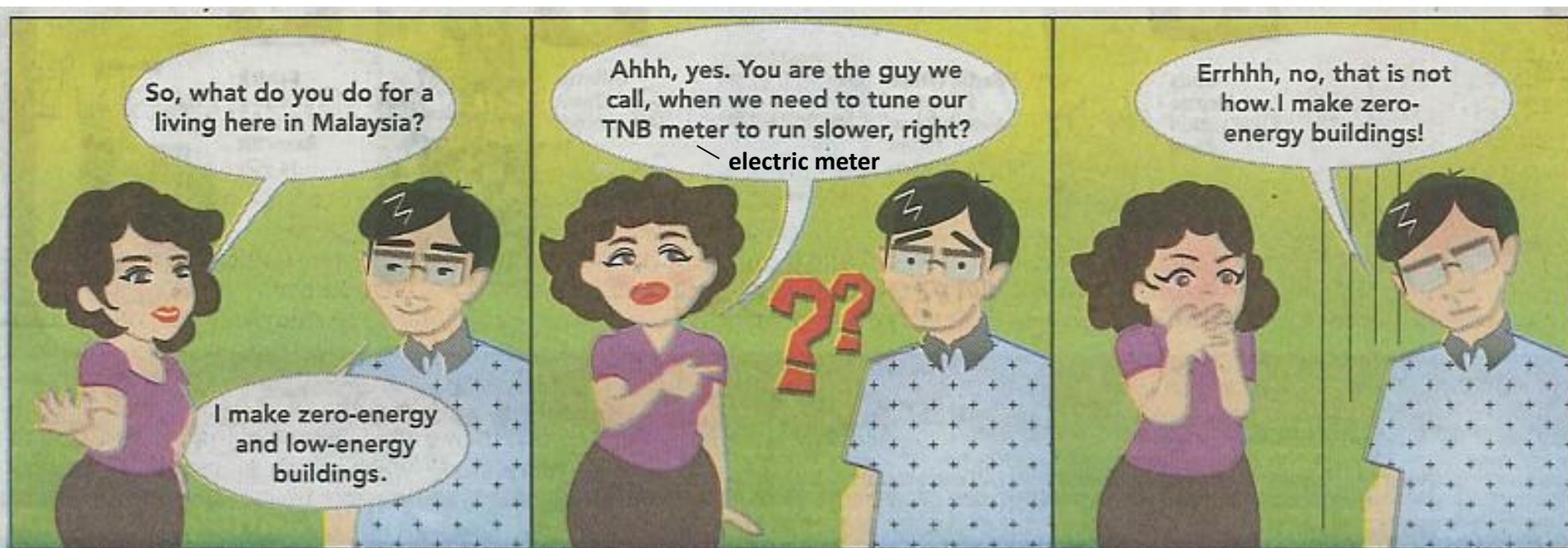
ZEB Renovation for existing buildings

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People want ZERO Energy Buildings but lack of awareness & misconceptions

Cartoon of a real conversation
I had when explaining my job as Energy Efficiency Consultant



Courtesy of Gregers Reimann/IEN Consultants Sdn Bhd / Illustration by Rachel Chen Ruiqi

The Star newspaper, Malaysia, 16 August 2013

Post Malaysia Stamp Series for Energy Efficient Buildings

We were the energy efficiency consultants for all three buildings
and call them our “stamps of approval”



.....but how do we make energy efficient buildings common place?

How to Accelerate Energy Efficiency?



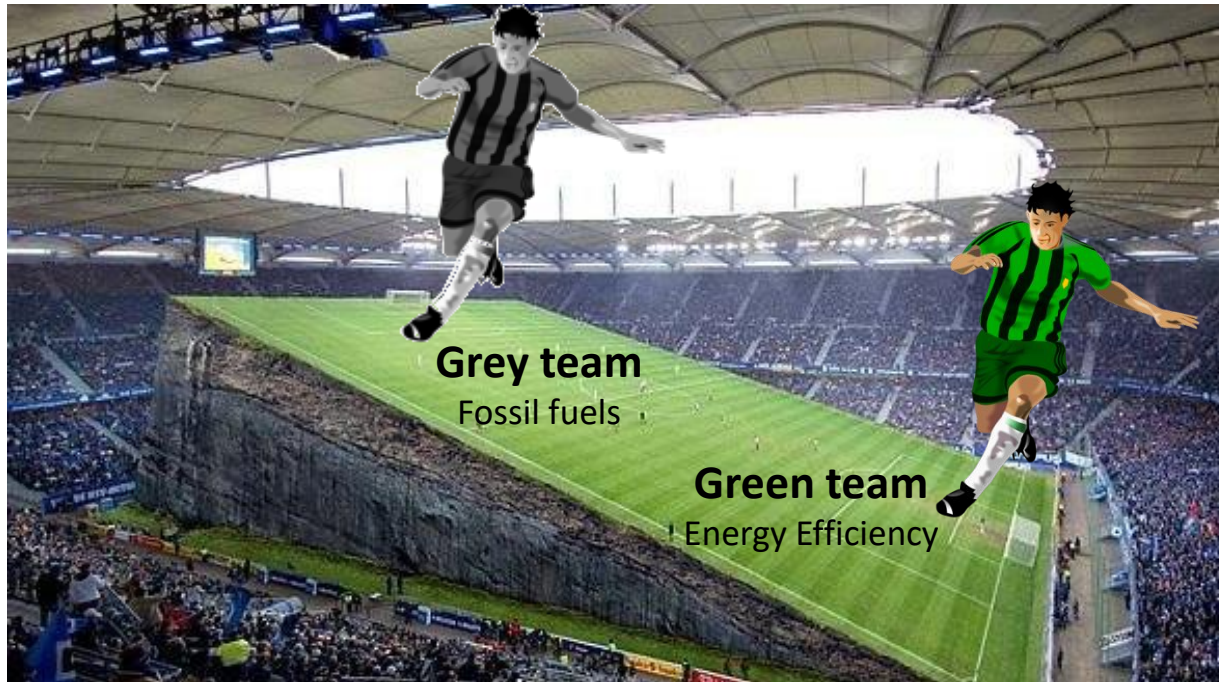
We need to talk about the Elephant in the Room: Energy Pricing

ENERGY EFFICIENCY

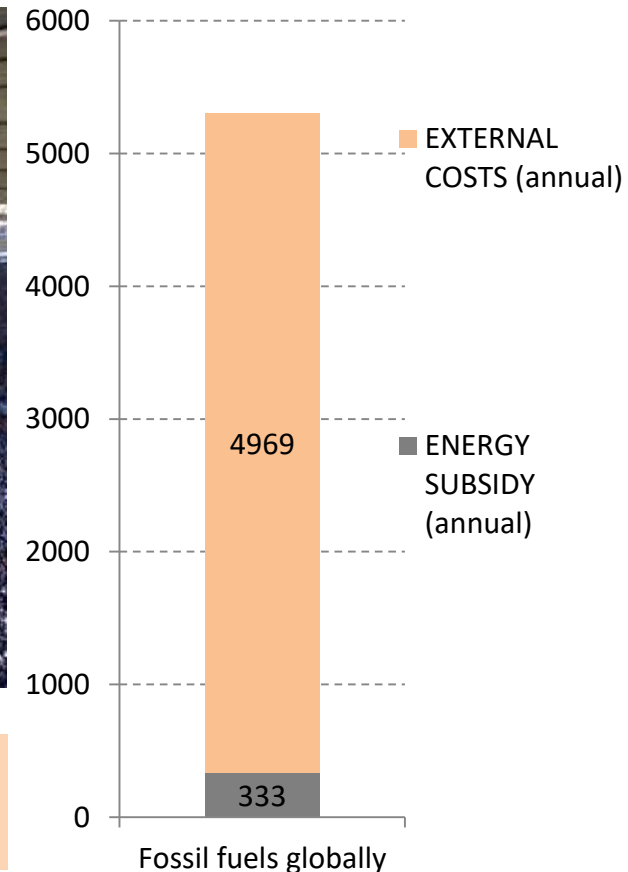
The playing field is NOT level

Fossil fuels are subsidized and underpriced. In fact, the annual cost of fossil is USD5.3 trillion – or 6.5% of the global GDP (Source: IMF, 2015)

LEVEL PLAYING FIELD?



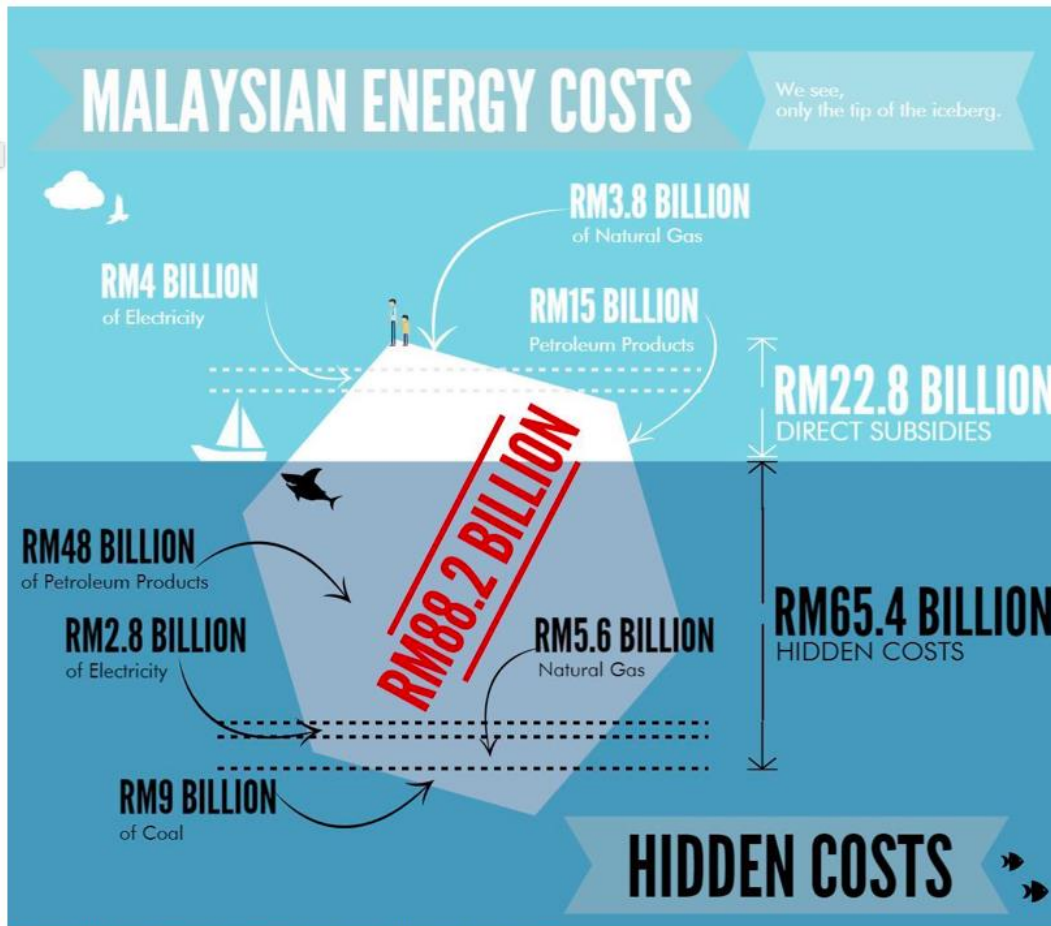
Billion USD/year



EXTERNAL COST break-down:

19% (Traffic congestion), 26% (Extreme weather) and 55% (Air Pollution Health Costs)

“Energy Subsidy Reform: Lessons and Implications”



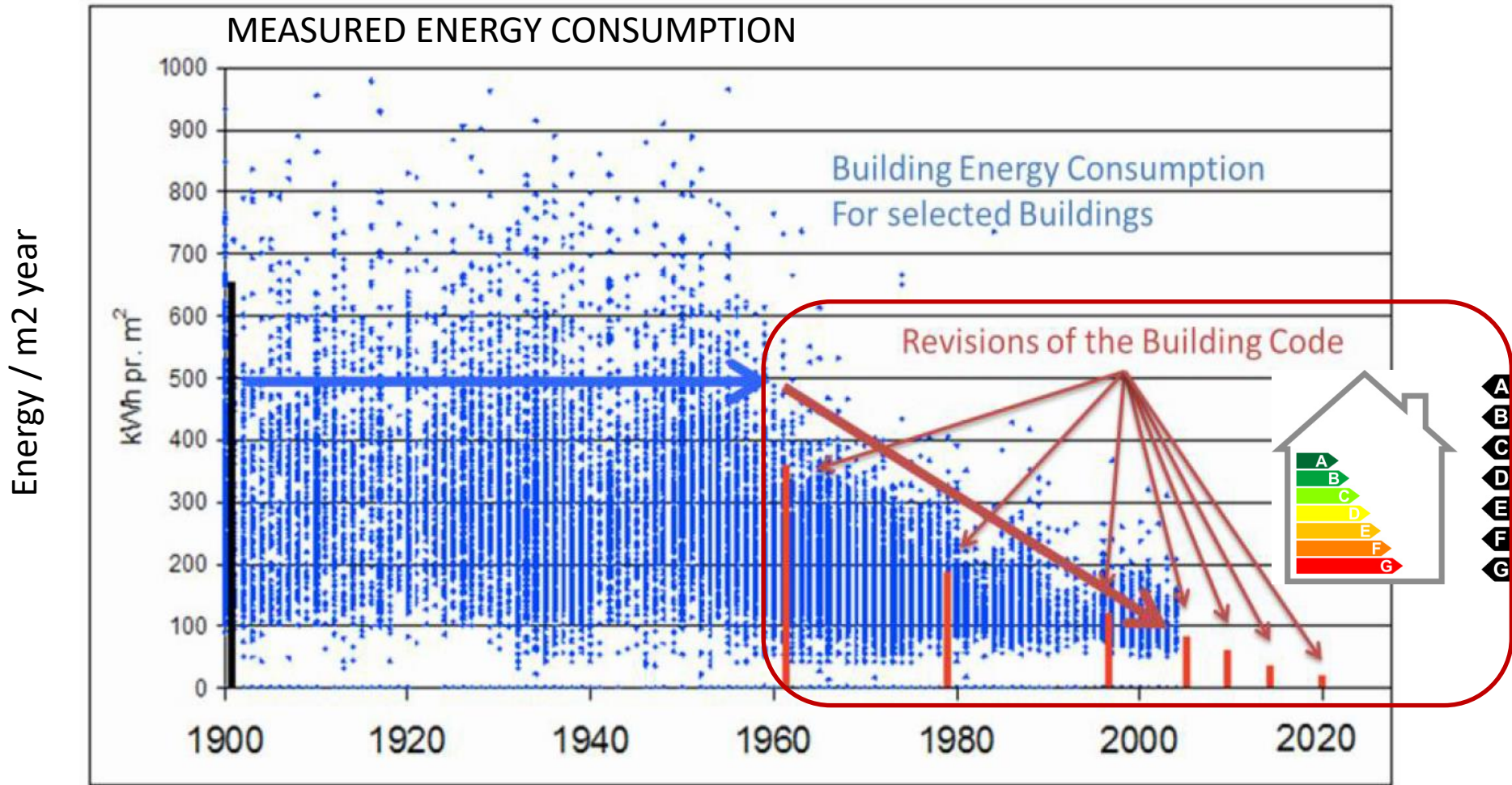
Source: IMF "Energy Subsidy Reform: Lessons and Implications", 2013



The Star newspaper, 5 Oct 2015

Energy Efficient Retrofit of Existing Building Stock in Denmark

50% Measured Energy Savings in Danish Buildings



50% reduction in heating per square meter for entire building stock

Let's strive for a similar improvement of the energy efficiency of the Malaysian building stock

Mandatory Energy Label for Buildings

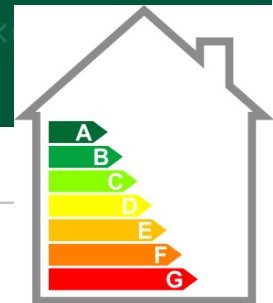
www.nybolig.dk/soegeresultat-boliger?locationFretext=københavn&postalDistrict=&roadName=&minPrice=-2147483648&maxPrice=2147483647&m

Property Size:	0 m2 - 300+ m2	Lot Size:	0 m2 - 2000+ m2
Number of rooms:	1 - 6+	Year:	Before 1900 - 2016
Level:	0 level - 5 plan	Floor:	Basement - 8+ floor
Energy:	A - G	length of stay:	0 - 1000+

All labels

Show homes: 2,081 homes

Real estate search for Copenhagen



Mandatory Energy Label for Buildings

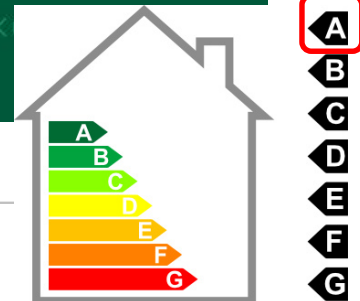
www.nybolig.dk/soegeresultat-boliger?locationFreetext=københavn&postalDistrict=&roadName=&minPrice=-2147483648&maxPrice=2147483647&m

Property Size:	0 m2 - 300+ m2	Lot Size:	0 m2 - 2000+ m2
Number of rooms:	1 - 6+	Year:	Before 1900 - 2016
Level:	0 level - 5 plan	Floor:	Basement - 8+ floor
Energy:	A - A	length of stay:	0 - 1000+

Label A only

Show homes: 412 homes

Real estate search for Copenhagen



412 Energy Efficient Buildings (Label A)

www.nybolig.dk/soegeresultat-boliger?locationFreestext=københavn&postalDistrict=&roadName=&minPrice=-2147483648&maxPrice=2147483647&m

Nybolig

We have found 412 properties that might be something for you.

Customize search



Sort by:

Select sort



Select



Kålagervej 24,
2300 Copenhagen S



177 m²



6



139 days



Save

Type: Villa

Cash price: 6,500,000

Nybolig



Strandlodsvej 18 C2
2300 Copenhagen S



127 m²



6



309 days



Save

Type: Townhouse

Cash: 4795000

Nybolig



Weidekampsgade 57 5 2
2300 Copenhagen S



79 m²



2



75 days



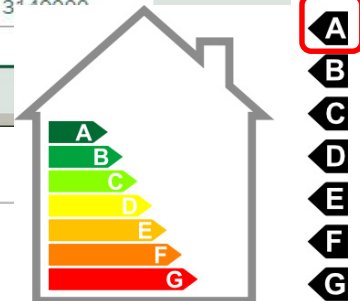
Save

Type: Condo

Cash: 3140000


Nybolig

Real estate search for Copenhagen



Energy Efficient Home (Label A)

www.nybolig.dk/ejerlejlighed/2300/weidekampsgade/260369/08tm0109



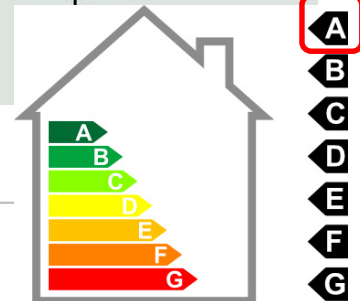
**Weidekampsgade 57, 5. 2.
2300 Copenhagen S**

type	Apartment
Size	79
cash price	3149000
Owner Per capita spending. md.	2,213

Monthly energy bill: kr 2213
Monthly energy bill: RM1307 monthly

- > Come out and see the property
- > Make an offer
- ↓ Get the documents
- ♥ Save

79 m² 2 5th floor 2006 **A** -3% SALG



Real estate search for Copenhagen

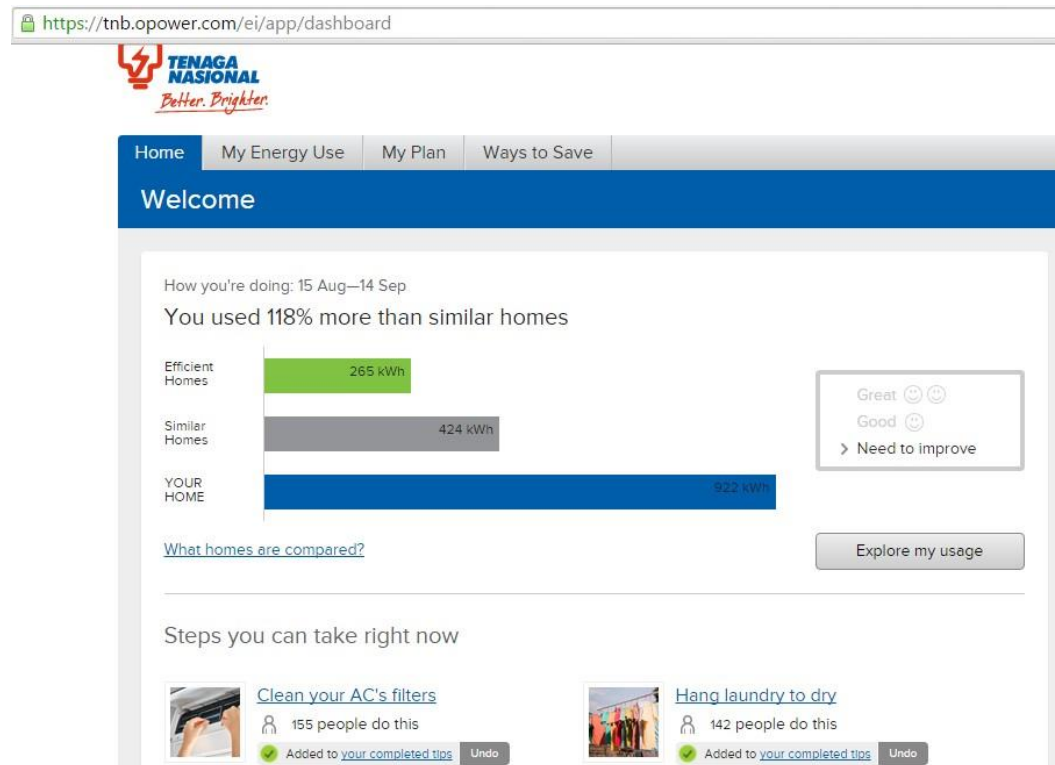
Energy Efficient Building Labelling in Malaysia

Energy Labelling of Buildings in Malaysia in progress

Mandatory energy label for government buildings
(launched 2019)



TNB's Home Energy Report gives comparison of your energy bill to that of your neighbours
(launched 2015)



Energy Efficient Retrofit of Residential Building

Night Ventilation: 2°C lower temperature

real measurements done on houses in Malaysia



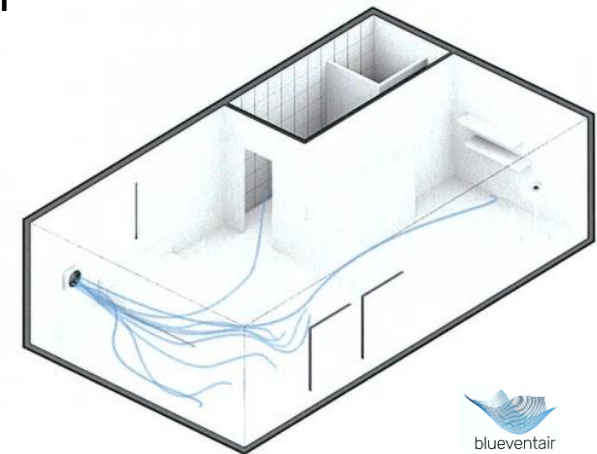
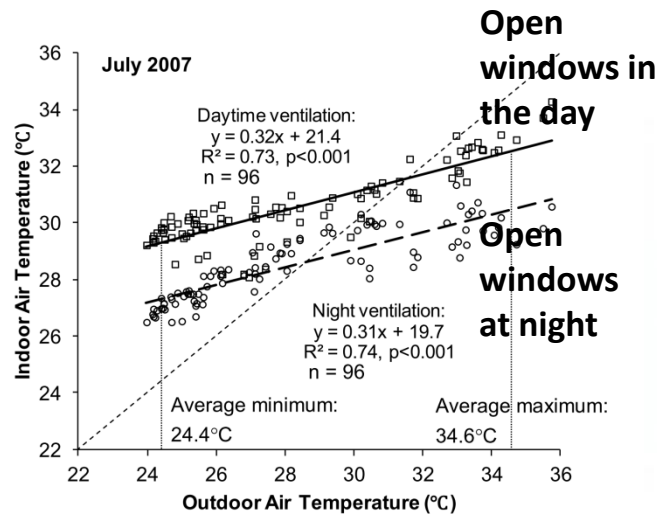
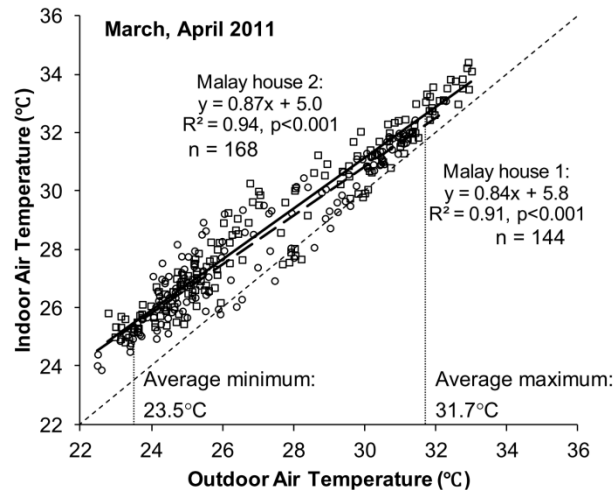
No air-con



No air-con



Mechanical night time ventilator with mosquito net and/or air filter for haze



blueventair

Energy Efficient Retrofit of Air-conditioned building by different approach to Thermal Comfort

New approach to Thermal Comfort: Hybrid Ventilation

Predicted Mean Vote (PMV)

6 Factors

- Garment Insulation
- Activity Metabolic Rate
- Air Speed
- Air Temperature
- Radiant Temperature
- Humidity

HYBRID VENTILATION:
Air-con with fans



*Air and Radiant Temperature can be represented by a single value called Operative Temperature.

Thermal Comfort Input Parameters For Hybrid Spaces

CLO Level

- Briefs + Socks + Long-sleeve Shirt + Trousers = 0.56 (Conservative)
- Briefs + Socks + Short-sleeve Shirt + Trousers = 0.50 (Realistic)

Activity Level

- Office: Typing = 1.1
- Studio: Standing = 1.4

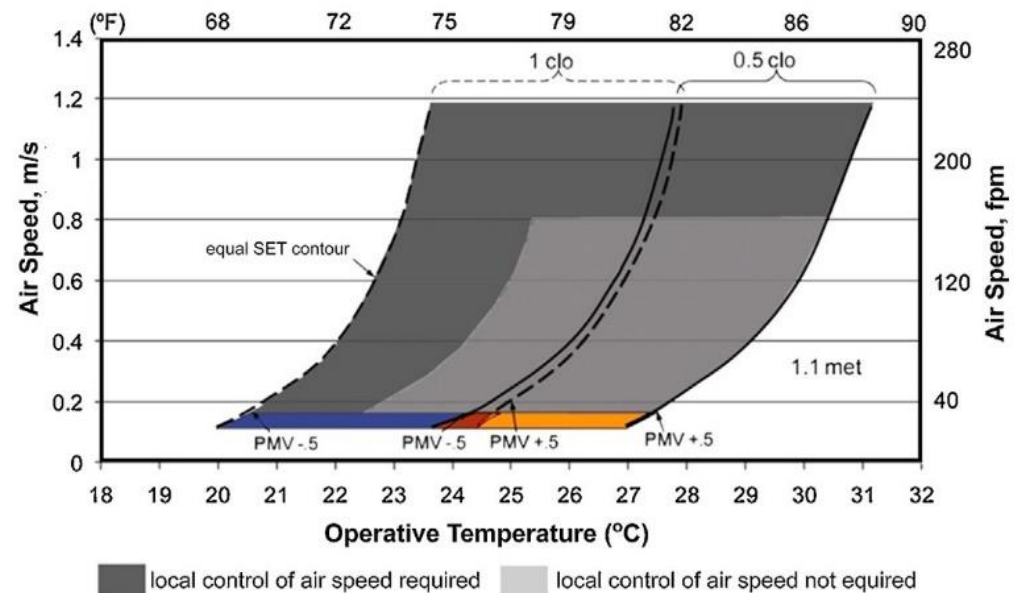


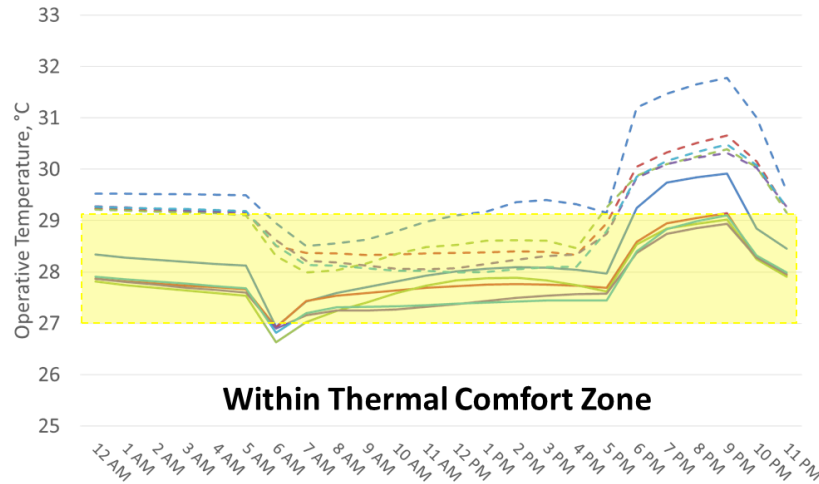
Fig. 5. Acceptable ranges of operative temperature and air speeds, reproduced from [24].

Thermal Comfort

(annual simulation for hybrid ventilation space)



L2 Knuckle Operative Temperature, °C vs Time



Design Air Temperature Rang



Thermal Comfort Zone Based on

MET: 1.2

CLO: 0.56

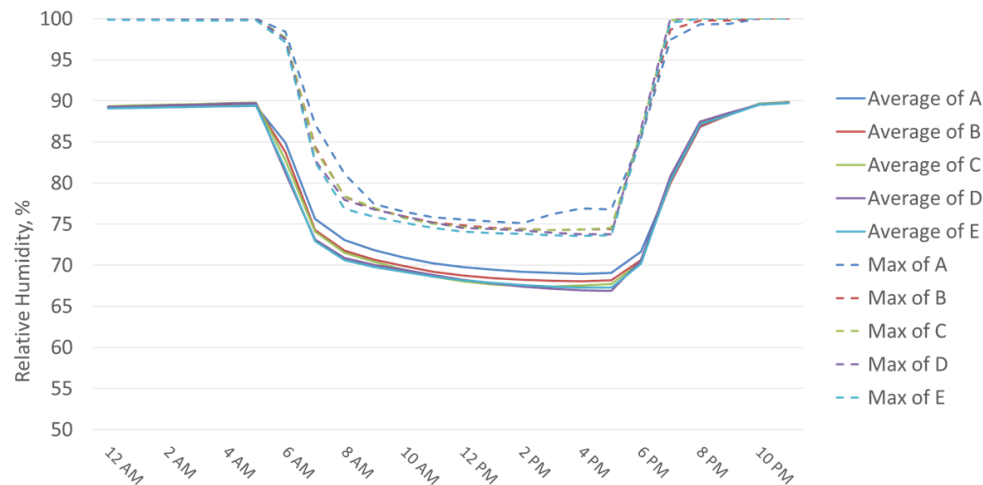


Operative Temperature: 28°C

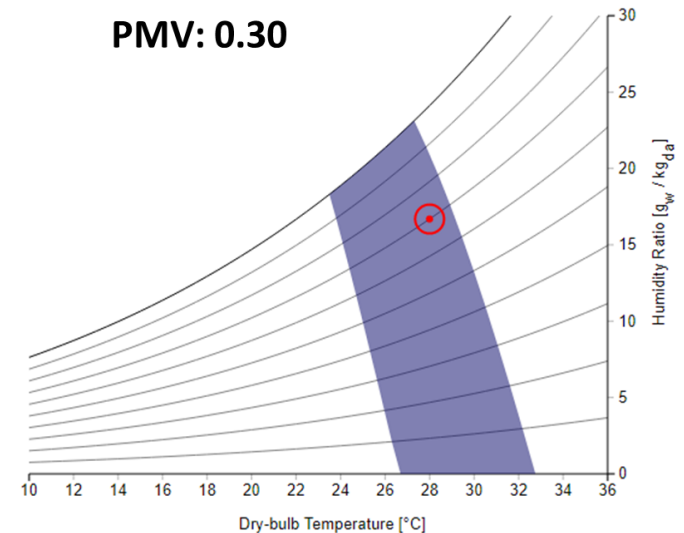
Relative Humidity 70%

Air Speed: 0.7 m/s

L2 Knuckle Relative Humidity, % vs Time



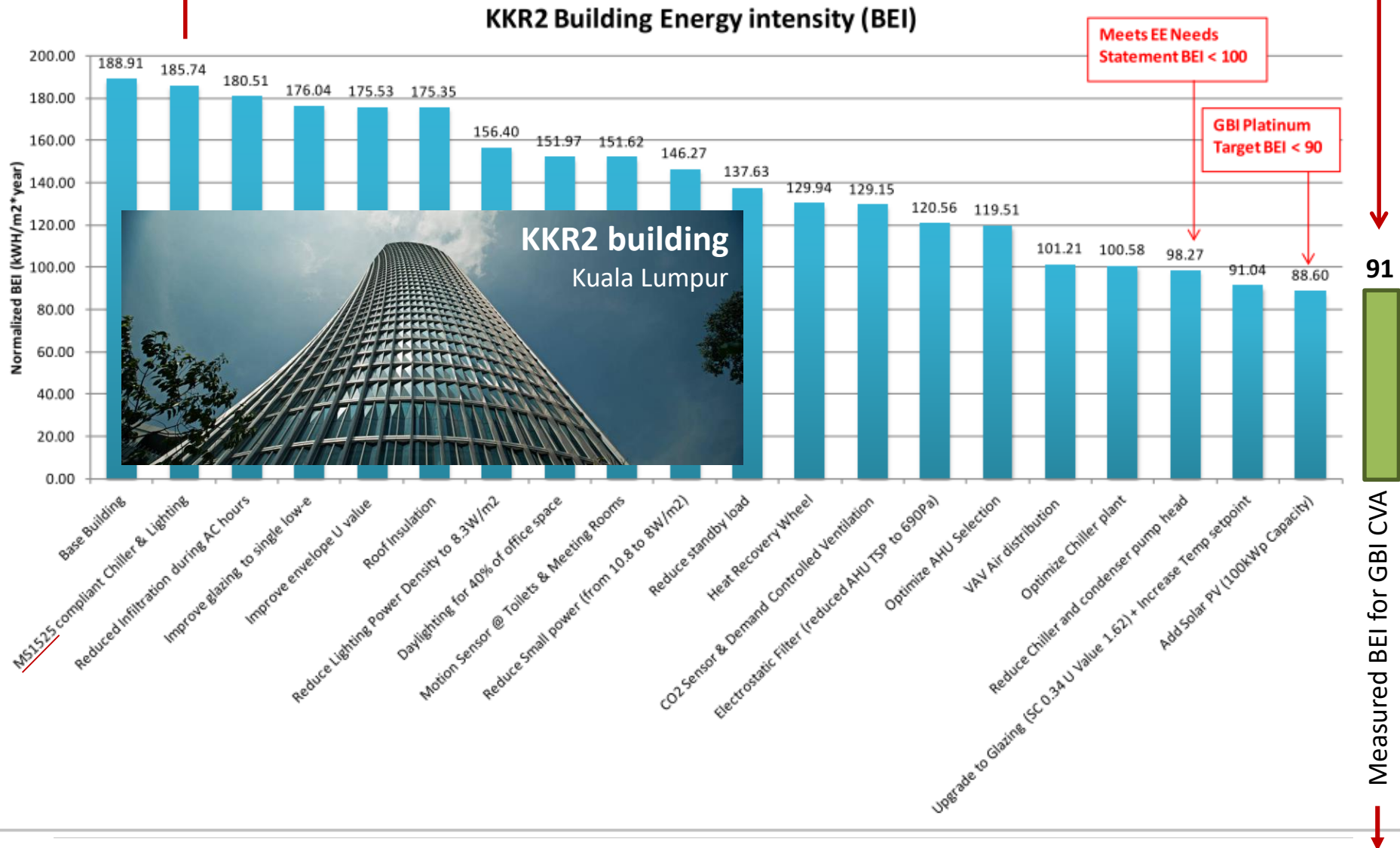
PMV: 0.30



Energy Efficient Office Building

51% more energy efficient
than the MS1525 standard

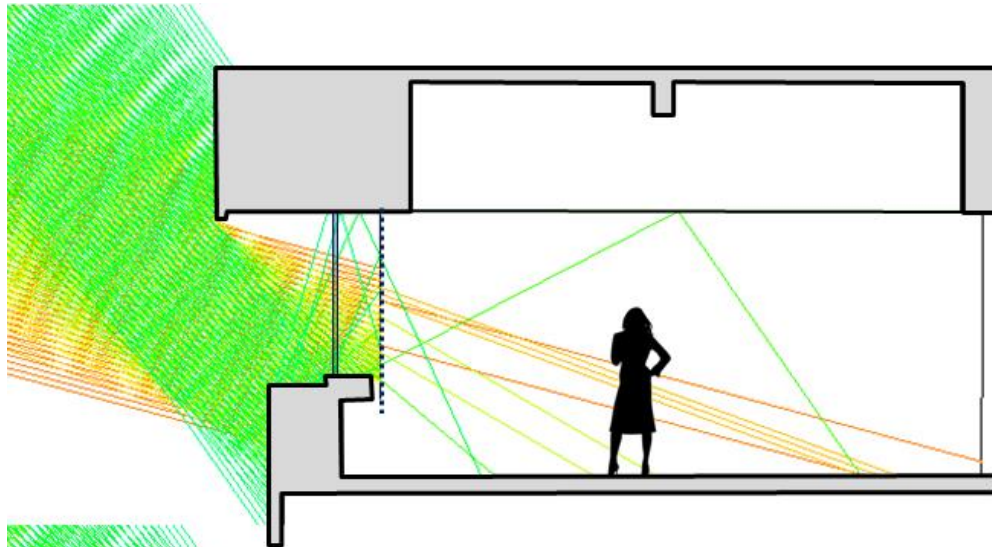
51% lower energy consumption than MS1525



Annual energy savings of RM2.4 million

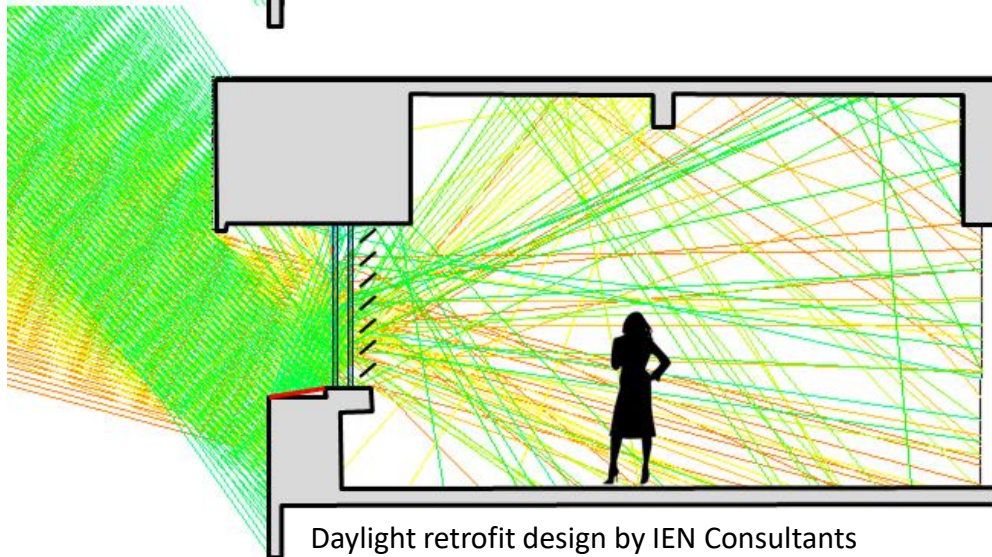
Energy Efficient Retrofit of office building (53% measured energy savings)

Retrofit & Improved Thermal Comfort



BEFORE RETROFIT

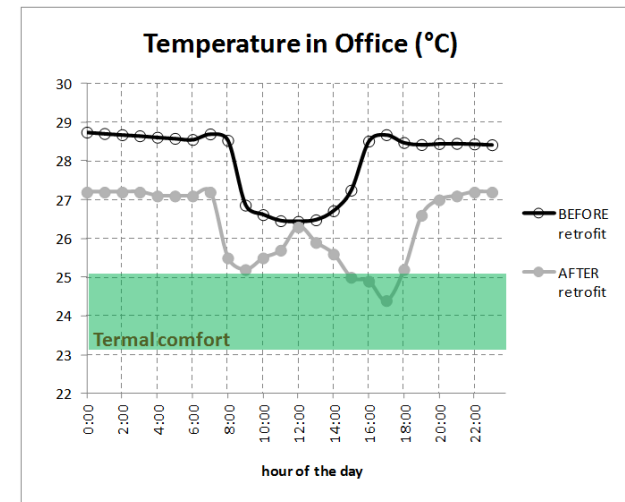
- Vertical blinds blocking most of the daylight
- Suspended ceiling



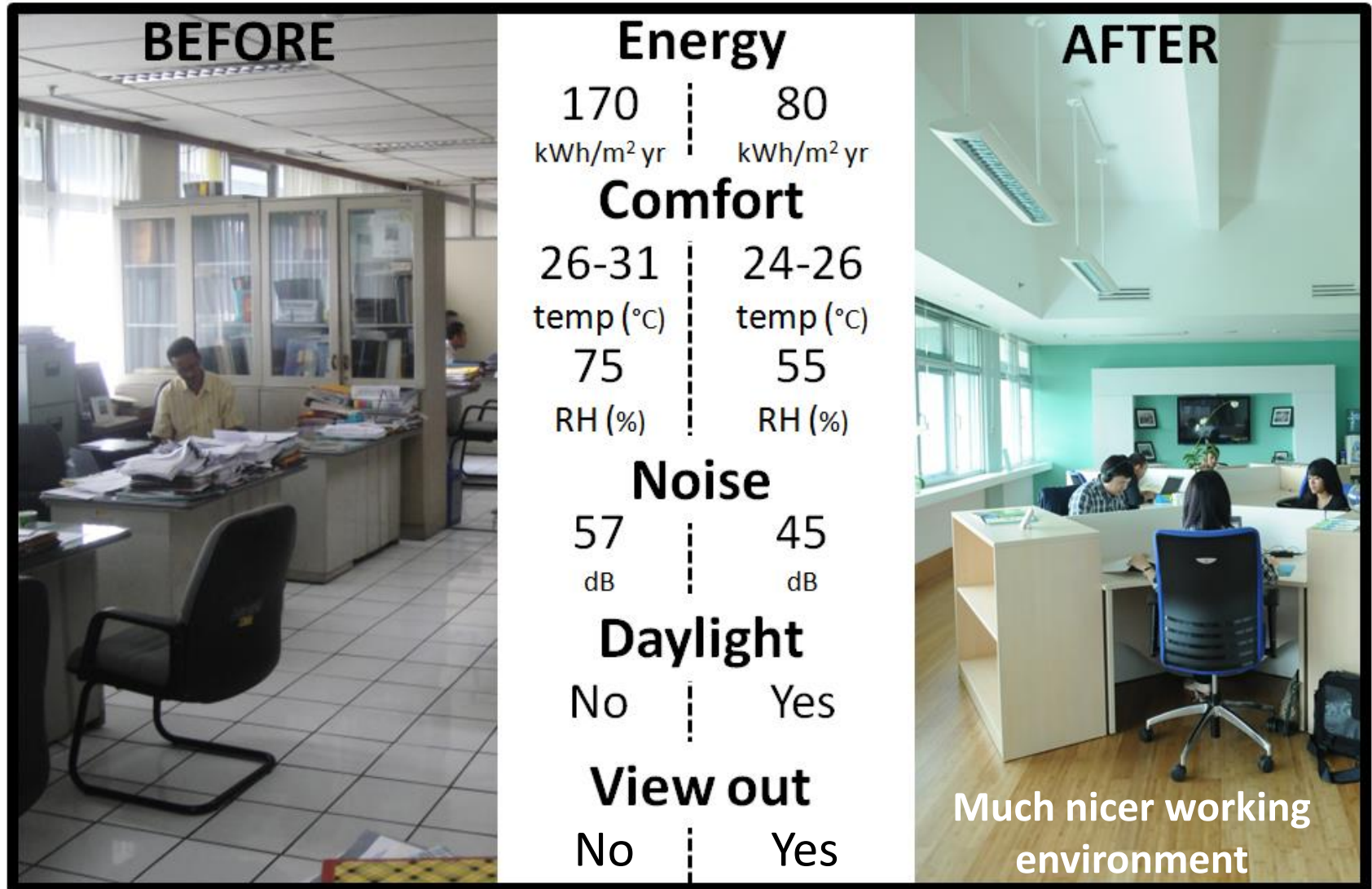
AFTER RETROFIT

- Mirror lightshelf on external ledge reflecting diffuse daylight onto the high ceiling (suspended ceiling removed)
- Perforate venetian blinds
- Extra window pane

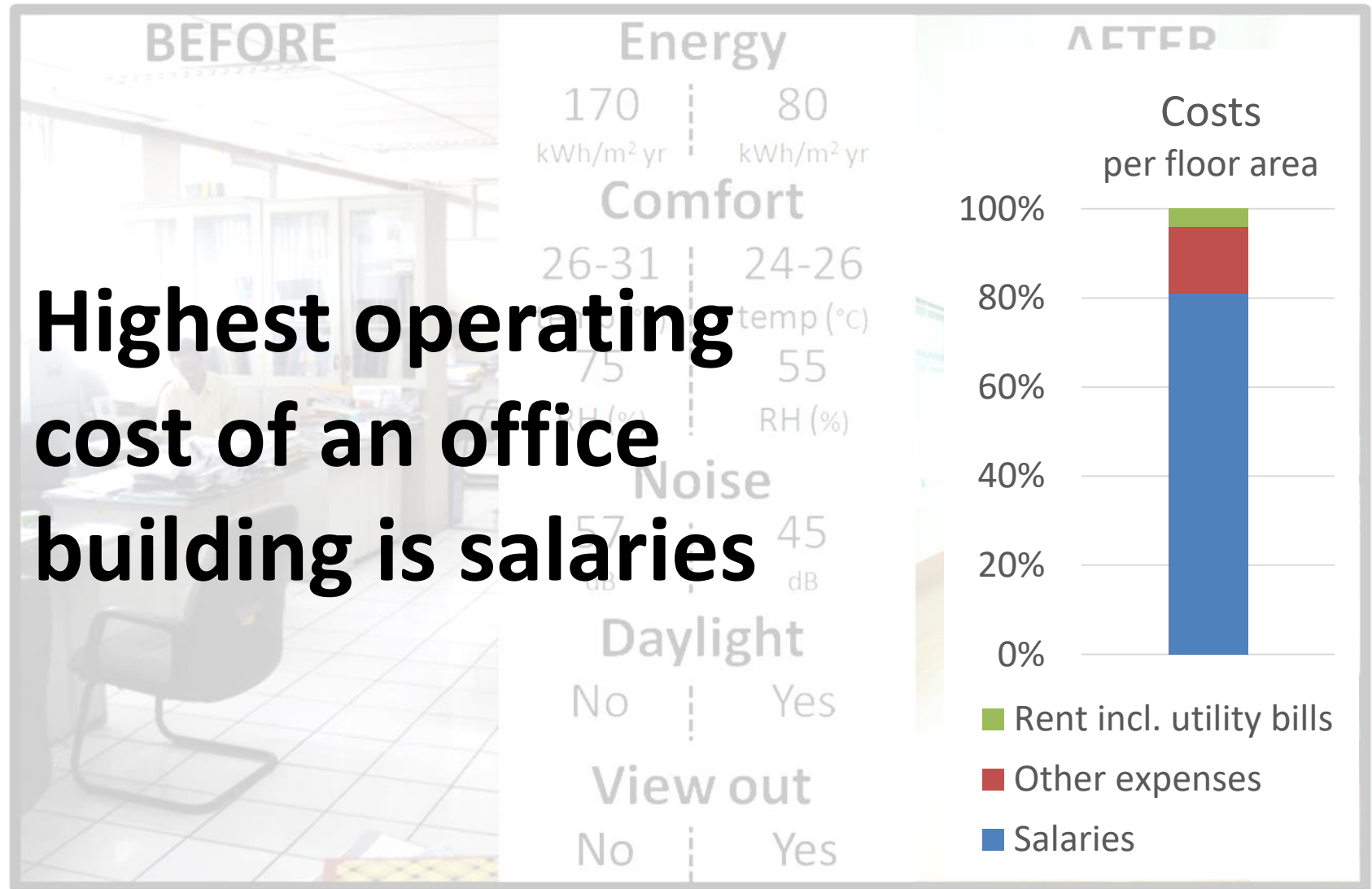
Daylight retrofit design by IEN Consultants



53% Measured Energy Savings



53% Measured Energy Savings



Malaysian Office Workers: Unproductive 66 days per year!

Amount of time that average Malaysian worker is either absent or suffering from presenteeism

NB. The UK figure is only 30 days per year

**MOST EMPLOYERS DO NOT REALISE THAT
HEALTH IS WEALTH...**



**EMPLOYEES UNDER-PERFORMING IN POOR WORKING ENVIRONMENT DESPITE
81% OF COST ARE GOING TO SALARIES**

In Conclusion:

Buildings are like a leaky bucket with lots of unnecessary wastages

ENERGY SUPPLY
(renewable) energy



ENERGY STORAGE
electric cars/batteries/thermal

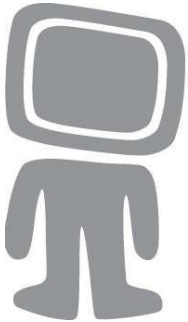
ENERGY DEMAND

Let's plug the holes!

And make buildings more healthy!



Thank you



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IEN Consultants Expert Staff



IEN Consultants

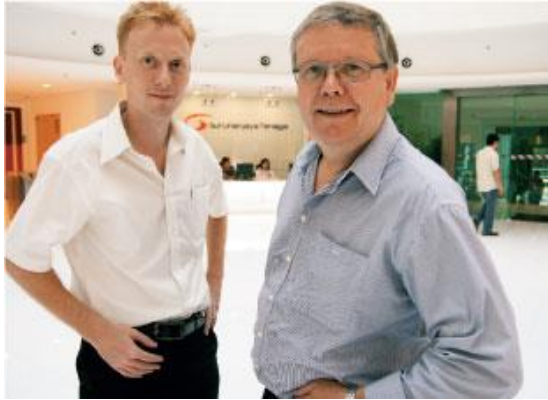
Hover the cursor over a person's head to see a short presentation and click to see a detailed personal description or click on a name in the list below.

We are a diverse group of
individuals

5 different degrees
6 different nationalities
4 LEED AP
8 GBI Facilitators

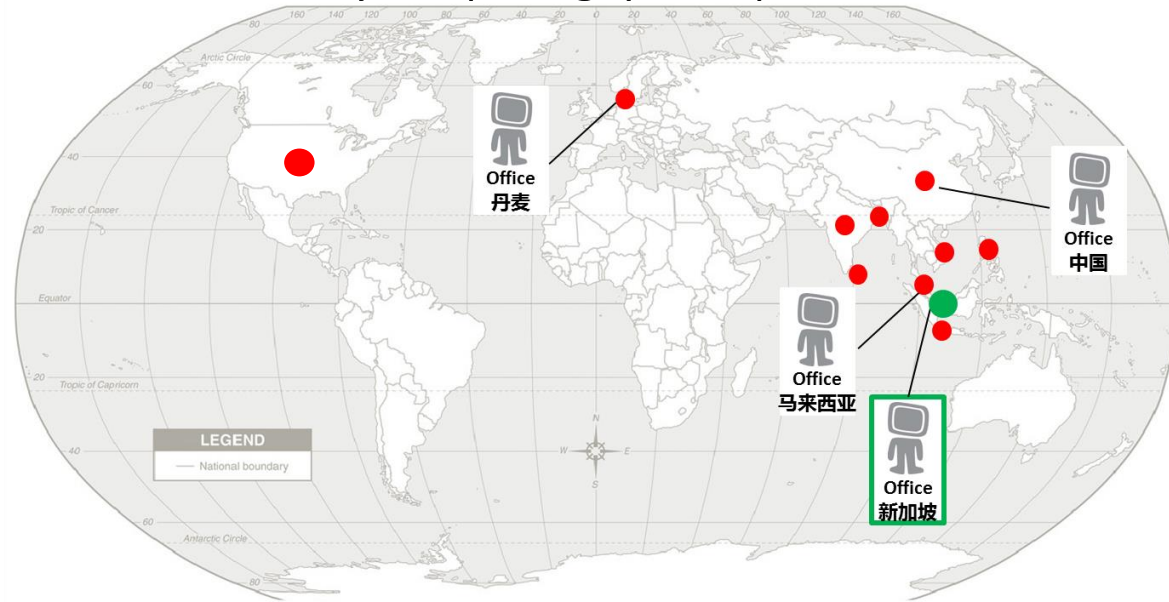
IEN Consultants

3.2 million square meters
of green building space



Gregers (MD) Poul (Founder)

Malaysia | Singapore | China



OFFICES

DEVELOPMENTS

RETAIL

EDUCATIONAL

FACTORIES & R&D

HOTELS

HEALTHCARE &
BIOTECH

OFFICE RETROFITS

AIRPORTS

RESIDENTIAL