

Do you speak Sustainable Construction?

20 May 2010

Renaissance Hotel, Brussels



ARCHITECTS' COUNCIL OF EUROPE
CONSEIL DES ARCHITECTES D'EUROPE

PLATFORM
EUROPEAN
CONCRETE

Energy Efficiency & Nearly Zero Energy Buildings

Solutions: Industry Response

Arup or Skanska (tbc)

Energy Efficiency & Nearly Zero Energy Buildings

Solutions: Industry Response

Sure, but at what cost ?

Our challenge, and ambitions....



Our challenge, and ambitions....



Our ambitions are clear: the 20-20-20 target

http://ec.europa.eu/environment/climat/climate_action.htm

The EU climate and energy package

In March 2007 the EU's leaders endorsed an integrated approach to climate and energy policy that aims to combat climate change and increase the EU's energy security while strengthening its competitiveness. They committed Europe to transforming itself into a highly energy-efficient, low carbon economy.

To kick-start this process, the EU Heads of State and Government set a series of demanding climate and energy targets to be met by 2020.

These are:

- * **A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels**
- * 20% of EU energy consumption to come from renewable resources
- * **A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.**

Our ambitions are clear: the SET Plan

http://ec.europa.eu/energy/technology/set_plan/set_plan_en.htm

Energy efficiency – Smart Cities Initiative

Energy efficiency is the simplest and cheapest way to secure CO2 reductions. In transport, buildings and industry, available technology opportunities must be turned into business opportunities. This new European initiative – Smart Cities – has the objective to create the conditions to trigger the mass market take-up of energy efficiency technologies. The initiative will support ambitious and pioneer cities (e.g. from the Covenant of Mayors) that would transform their buildings, energy networks and transport systems into those of the future, demonstrating transition concepts and strategies to a low carbon economy. **Participating cities and regions will be expected to test and demonstrate the feasibility of going beyond the current EU energy and climate objectives – i.e. towards a 40% reduction of greenhouse gas emissions through sustainable production, distribution and use of energy by 2020.** The total public and private investment needed in Europe over the next 10 years is estimated as €11 bn. By 2020, the Smart Cities initiative should put 25 to 30 European cities at the forefront of the transition to a low carbon future. These cities will be the nuclei from which smart networks, a new generation of buildings and low carbon transport solutions will develop..

Belgium as an example....

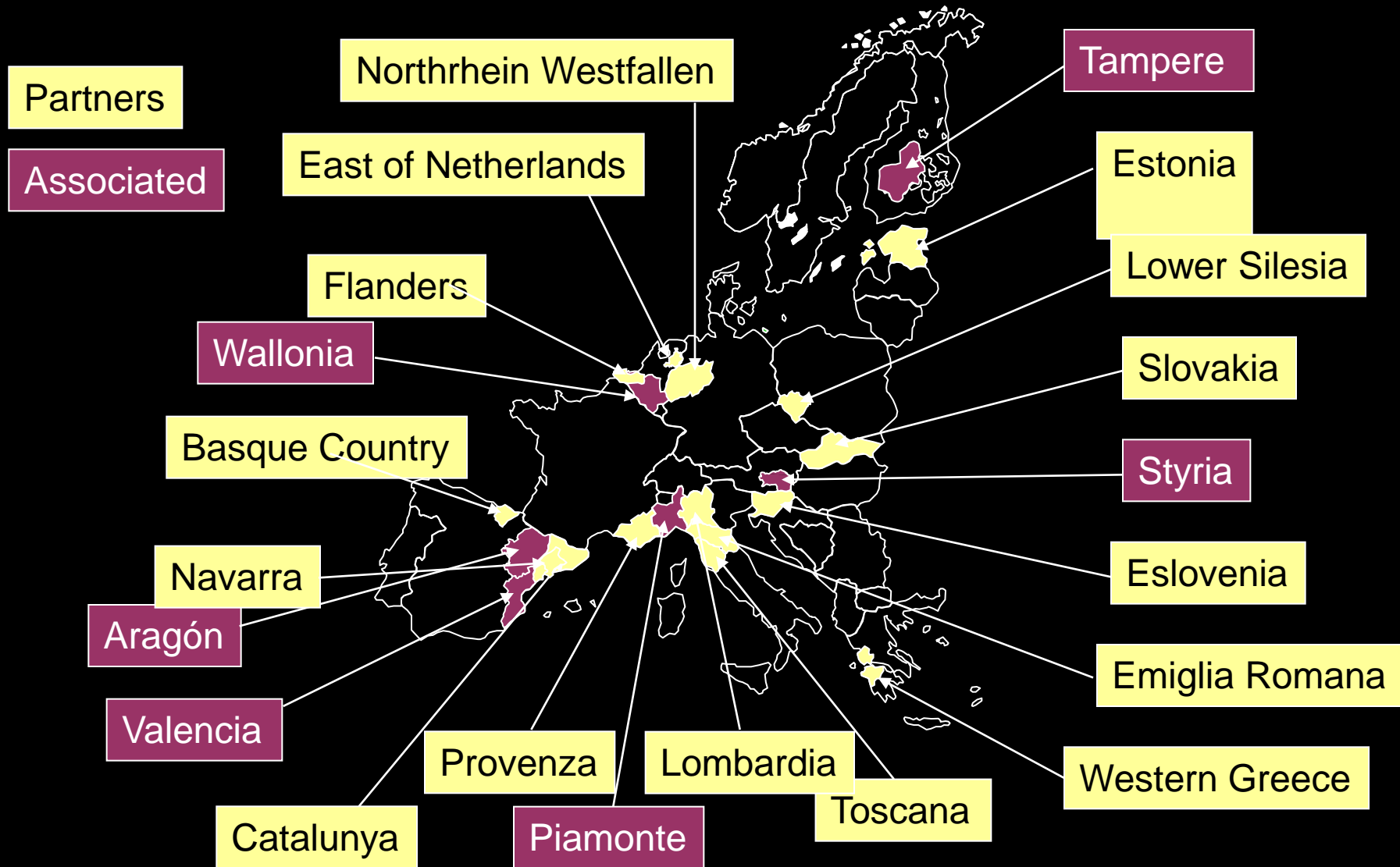
Belgium is a résumé of Europe, of which Brussels, its radiant capital, is the common ground.



<http://nl.wikipedia.org/wiki/Belgie>

Belgium: 7 parliaments and 6 gouvernements

MANUNET - PARTICIPATING ACTORS





Pathways to World-Class Energy Efficiency in Belgium



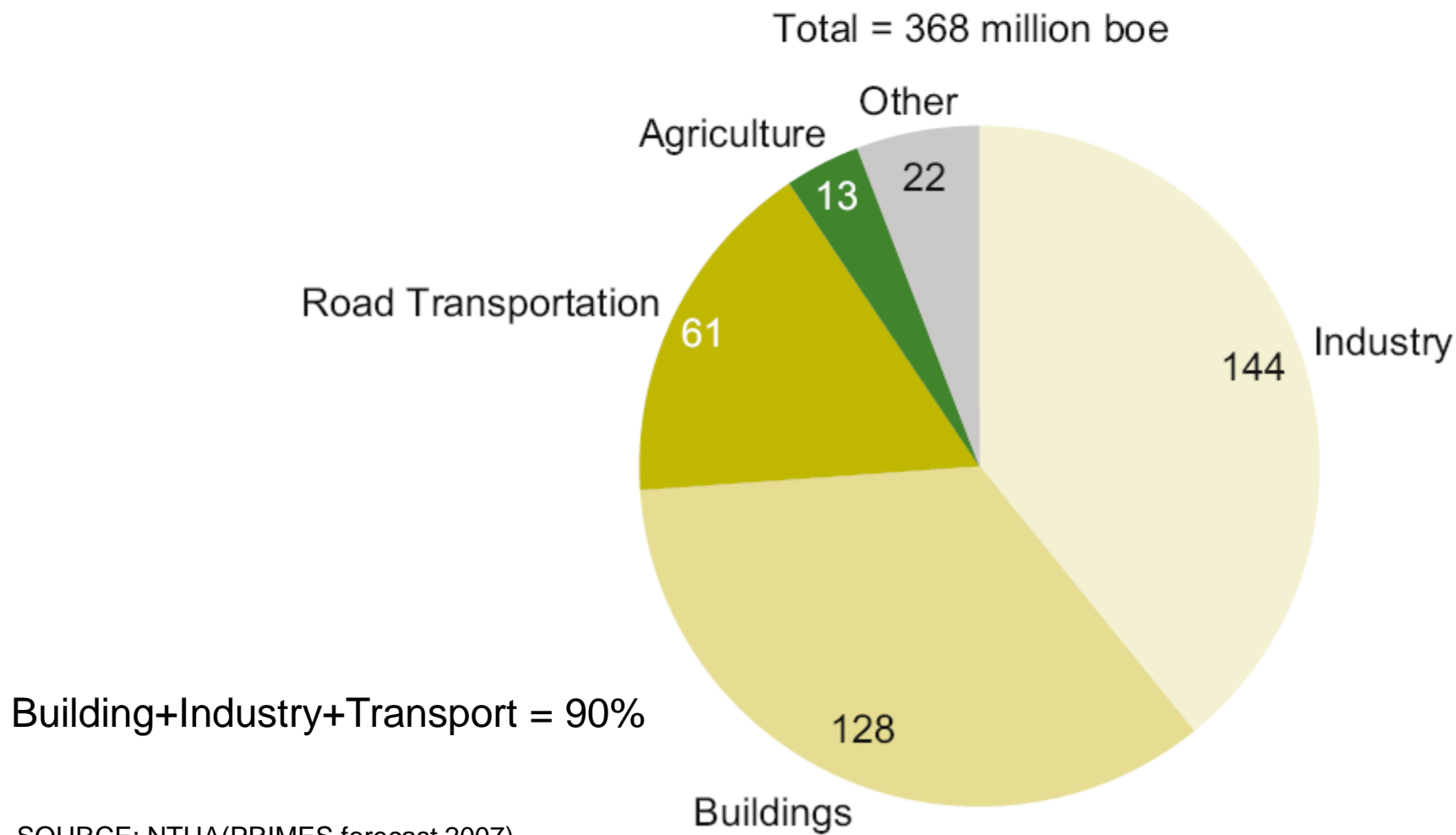
To provide a basis for discussions on energy efficiency, **McKinsey & Company** collaborated with the **Federation of Enterprises in Belgium**, representing 33,000 businesses in Belgium from **33 sector federations**. . . . McKinsey has developed a perspective on **pathways leading to world-class energy efficiency in Belgium**. . . . The report includes a comprehensive review of potential measures and illustrations of international best practices.

Elements making the case for improving energy efficiency in BE:

- 1) ... research on the potential to decrease greenhouse gas (GHG) emissions worldwide shows that **energy efficiency measures account for about 38 percent of the global GHG emission savings potential**. Failing to initiate energy efficiency improvements now may make it hard for Belgium to meet GHG targets without taking more drastic measures later.
- 2) ... beyond the environmental burden, **high energy consumption represents an important cost to society** in an export dependent economy such as Belgium.
- 3) ... **energy inefficiency makes BE more vulnerable to fluctuating commodity prices** and geopolitical risks.
- 4) ... improving energy efficiency **could improve our competitive position and create a significant number of local jobs**.

Breakdown of primary energy consumption in Belgium

Boe Millions, 2005

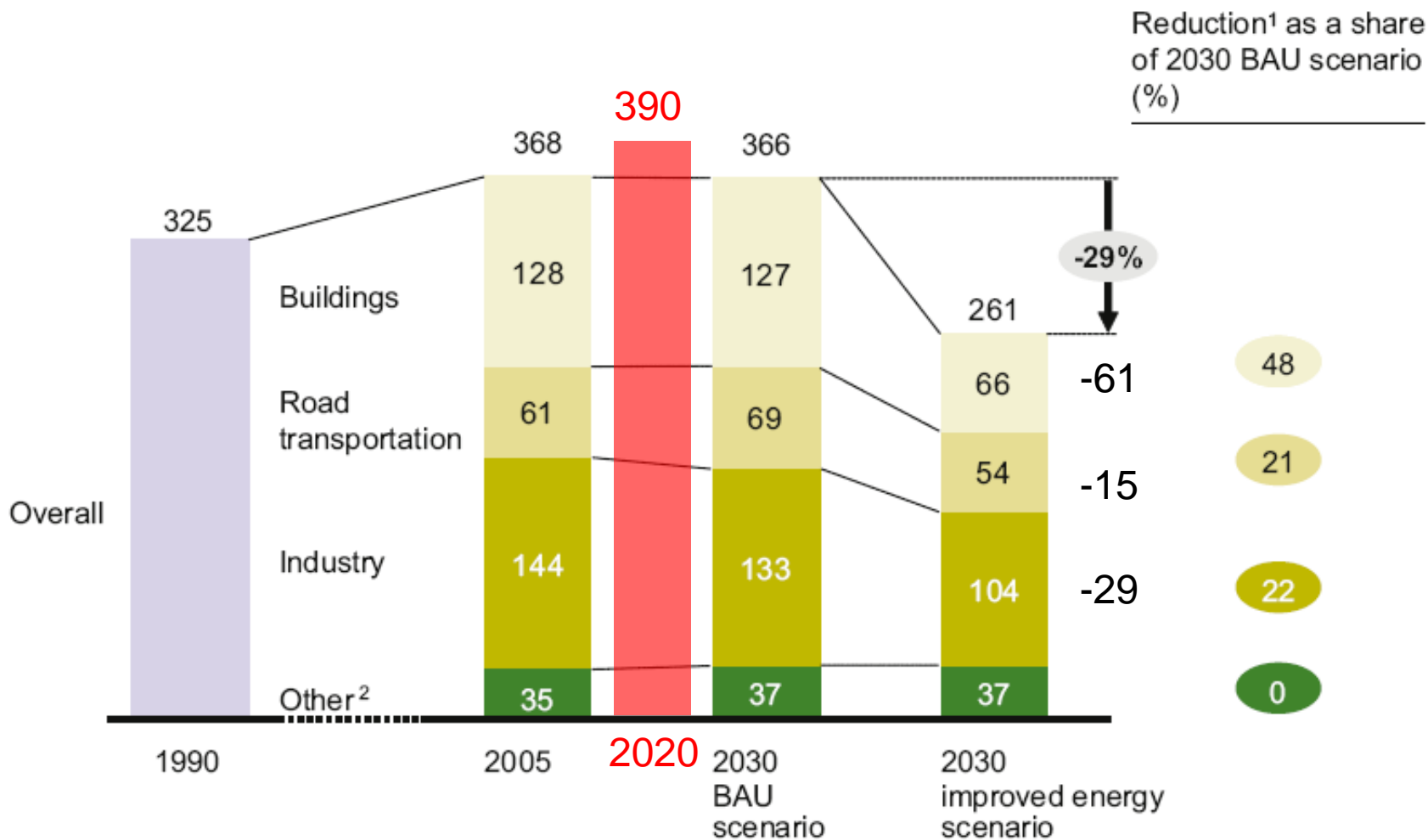


SOURCE: NTUA(PRIMES forecast 2007)

WHERE BELGIUM COULD BE IN 2030

Scenarios for primary demand evolution in Belgium

Boe Millions



1 Expressed as primary energy; consumption slightly decreases between 2005 and 2030 due to changes in energy fuel mix and efficiency gains in conversion

2 Not considered in the analysis

SOURCE: NTUA (PRIMES forecast 2007); McKinsey analysis

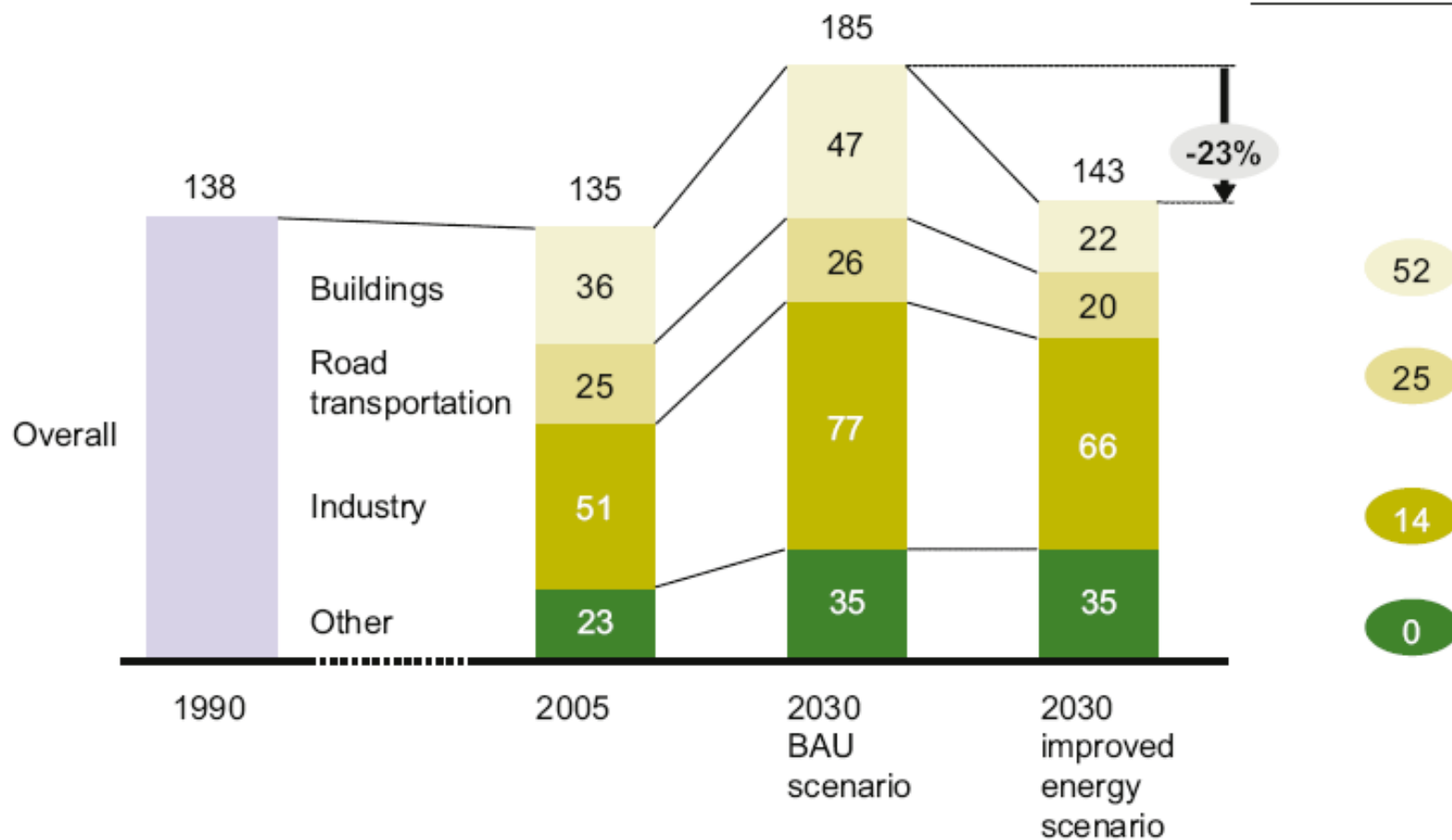
BAU = Business as Usual

WHERE BELGIUM COULD BE IN 2030

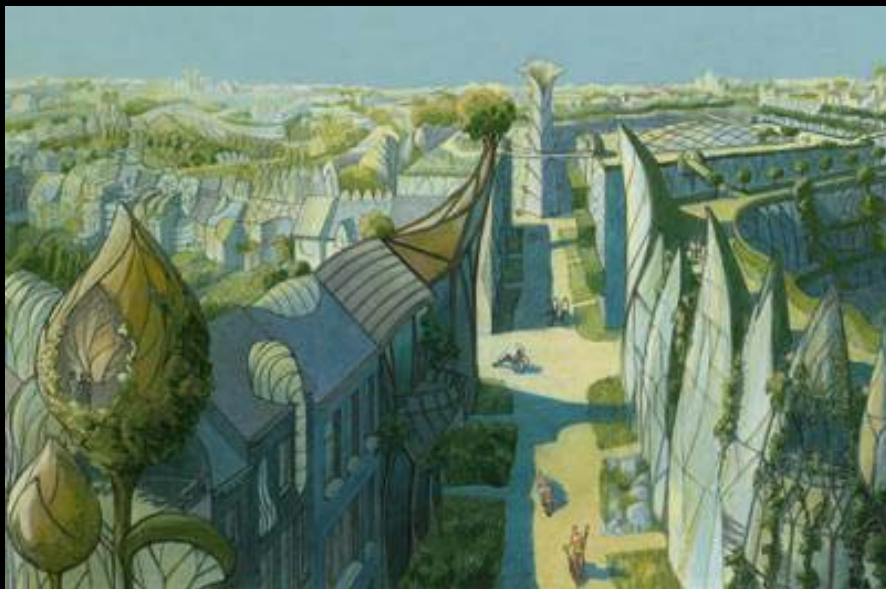
Scenarios for greenhouse gas emissions evolution in Belgium

MtCO₂e

Reduction as a share
of 2030 BAU scenario
(%)



With an improvement potential of 61 million boe, **residential and commercial buildings represent the largest share of the total energy efficiency improvement potential in Belgium.**



In 2005, Belgium's residential and commercial buildings were responsible for 35 percent of primary energy demand (128 million boe). Residential buildings accounted for 73 percent of Buildings' primary energy demand, with the commercial sector accounting for the remainder. Within commercial buildings, primary energy demand mainly comes from schools (30 percent), hospitals (30 percent) and public administration offices (30 percent). Energy in buildings is consumed chiefly in heating, cooling and lighting.

Commercial 27%

Offices (1/3)

Hospitals (1/3)

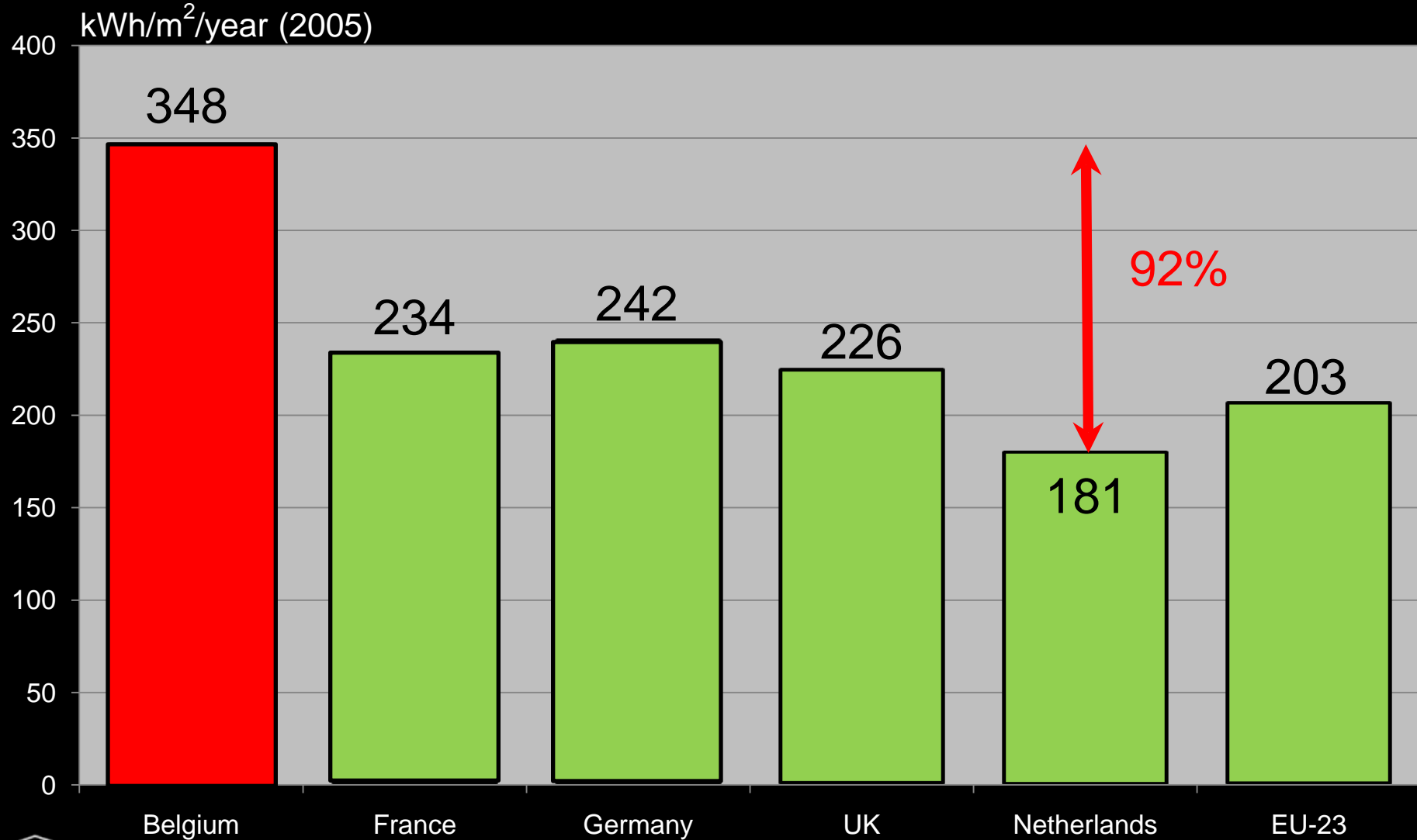
Schools (1/3)

Residential 73 %

Construction 128 M boe (35%)

McKinsey's Global Greenhouse Gas Abatement study

Pathways to World-Class Energy Efficiency



WTCB - CSTC

Average Residential Energy Consumption in kWh/m²/year (2005)

Context – Megatrends

“Local” warming (BE)



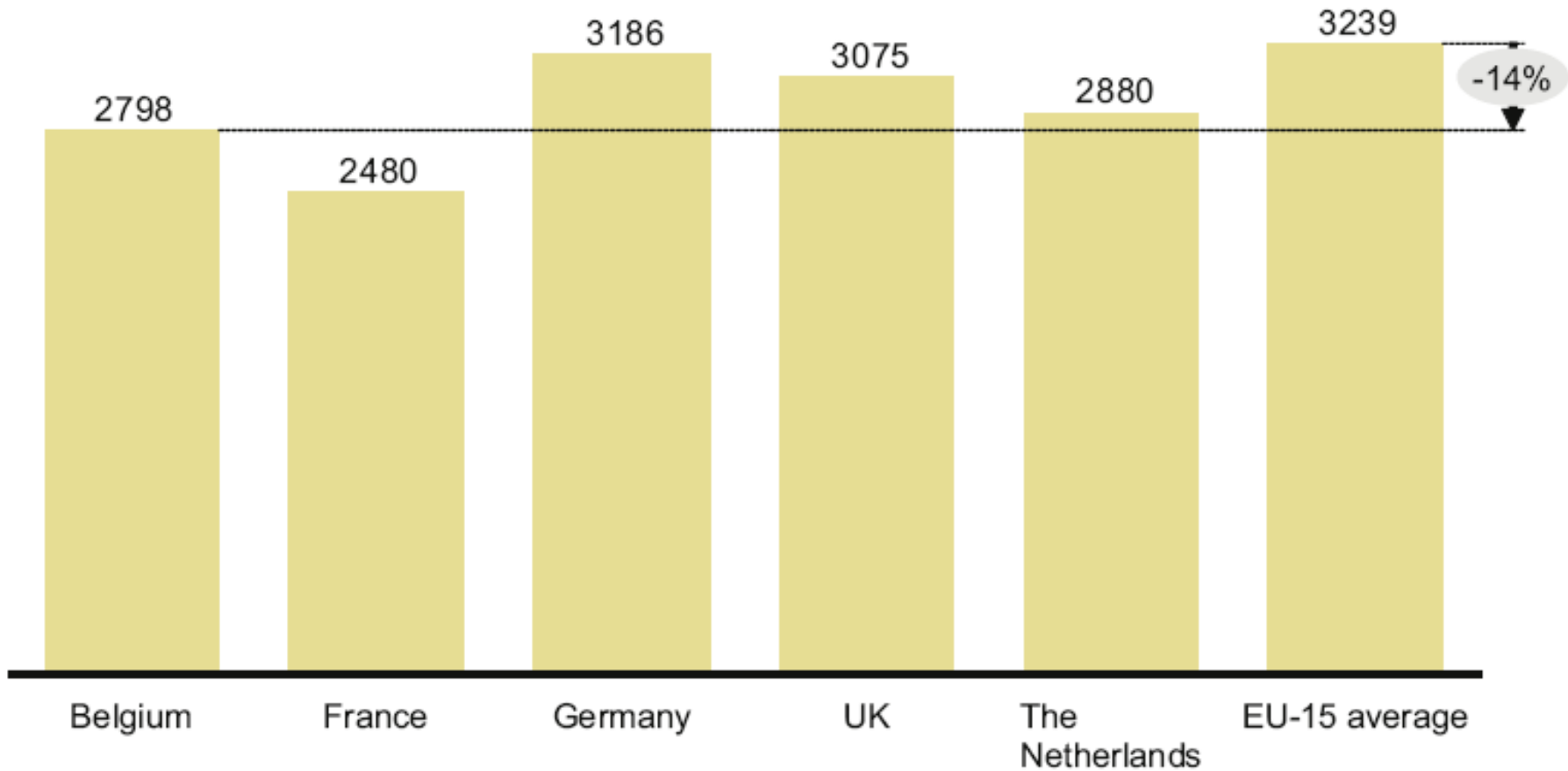
WTCB - CSTC

Jaargemiddelde Ukkel 1833-2008

<http://www.lne.be/themas/klimaatverandering/situering/ons-klimaat-verandert>

Heating demand in selected European countries

Heating degree days¹, 2004



¹ Reflect the demand for energy needed to heat a home or business: the difference between a reference value of 18°C and the average outside temperature for that day, summed up for all days in a given year

SOURCE: Eurostat; McKinsey Greenhouse Gas Abatement Cost Curve V2.0; ODYSEE Indicators

It's Belgian:



Rene Magritte

The **age of Belgium's building stock**

A **higher percentage of single-family houses** than in other European countries.

A **lower penetration of energy efficiency features**, such as double glazing and insulation, than other European countries. In the absence of strict construction standards, only 41 percent of Belgian homes have wall insulation¹⁶; 36 percent¹⁷ have full double-glazed windows, compared to 71 percent of homes in the UK; 58 percent of Belgian homes have roof insulation compared to 73 percent of homes in the UK¹⁸.

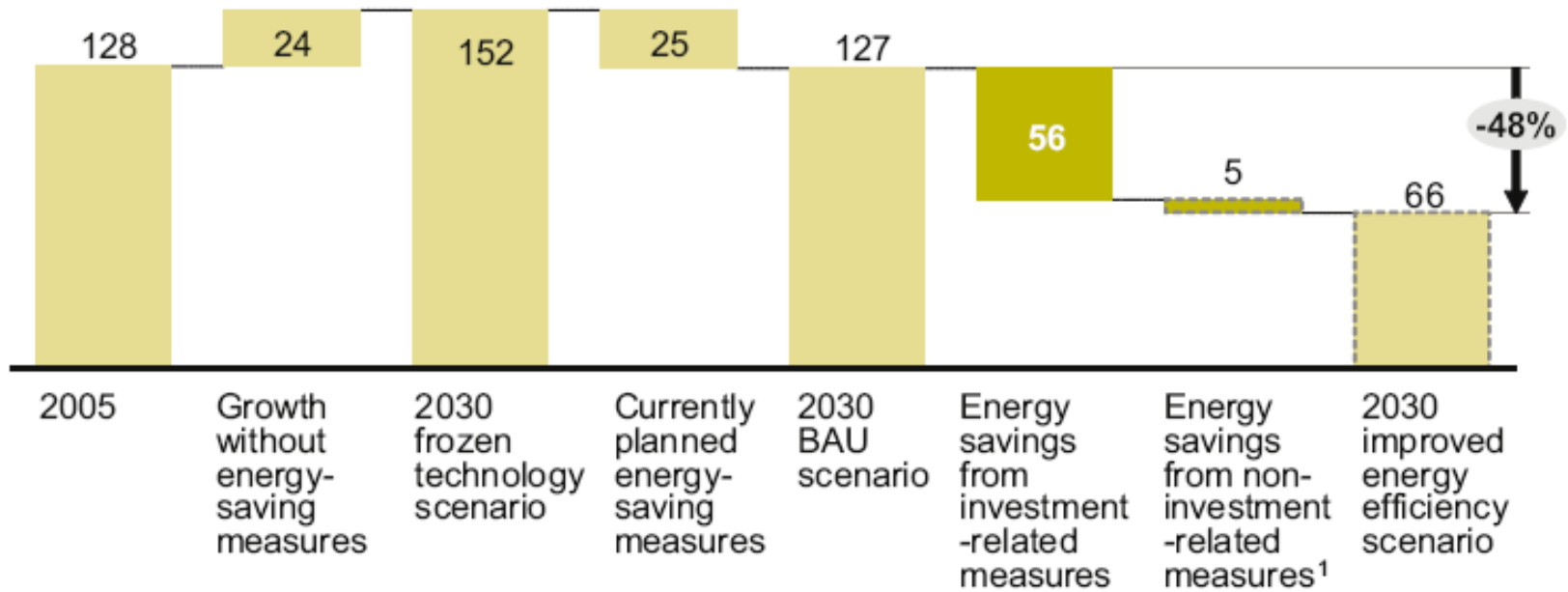


IMPROVING ENERGY EFFICIENCY IN BUILDINGS

Scenarios for energy demand evolution in Buildings in Belgium

Primary energy consumption, Boe Millions

■ Theoretical energy savings potential



Examples of measures

- Growth in floor space (1% CAGR²)

- Shift from incandescent lamps to CFLs

- High-efficiency building envelopes
- High-efficiency heating & cooling systems, appliances and lighting

- Reduced usage of HVAC, water heating, lighting & appliances
- Structural shift towards smaller houses

¹ Includes behavioral changes
² Compound annual growth rate

SOURCE: NTUA (PRIMES forecast 2007); McKinsey analysis

Residential

Electronics: Consumer	Purchase high efficiency consumer electronics (e.g., PC, TV, VCR/ DVD, home audio, set-top box, external power, charging supplies) instead of standard items
Appliances	When refrigerator/ freezer, washer/ dryer, dishwasher, and fan reach the end of their lifecycle, replace with high efficiency model
Lighting: Switch CFLs to LEDs	Replace CFLs with LEDs when technology becomes viable
HVAC: Retrofit gas/oil heating	When current gas/ oil furnaces or boilers reach the end of their lifecycle, replace with the highest efficiency model, with AFUE (annual fuel utilization efficiency) rating above 95
HVAC: Retrofit electric resistance heating to electric heat pump	When current gas/ oil furnaces or boilers reach the end of their lifecycle, replace electric furnace with high efficiency electric heat pump
HVAC: Retrofit maintenance	Reduce energy consumption from HVAC and AC through improved maintenance
Water heating: Replacement of electric	<ul style="list-style-type: none"> • When existing standard gas water heaters reach the end of their lifecycle, replace with solar water heaters, or with tankless/ condensing models • When existing electric water heaters reach the end of their lifecycle, replace with solar water heaters, or with tankless/ condensing models
Building envelope: Retrofit package 1	<ul style="list-style-type: none"> • Improve building air tightness by sealing baseboards and other areas of air leakage • Weather strip doors and windows • Insulate attic and wall cavities • Add basic mechanical ventilation system to ensure air quality
Building envelope: Retrofit package 2	<ul style="list-style-type: none"> • Retrofit to "passive" standard in conjunction with regular building renovations • Install high efficiency windows and doors; increase outer wall, roof, and basement ceiling insulation; mechanical ventilation with heat recovery, basic passive solar principles
New buildings: Efficiency package	<p>Achieve energy consumption levels comparable to passive housing</p> <ul style="list-style-type: none"> • Reduce demand for energy consumption through improved building design and orientation • Improve building insulation and air tightness; improve material and construction of walls, roof, floor and windows • Ensure usage of high efficiency HVAC and water heating systems

IMPROVING ENERGY EFFICIENCY IN BUILDINGS

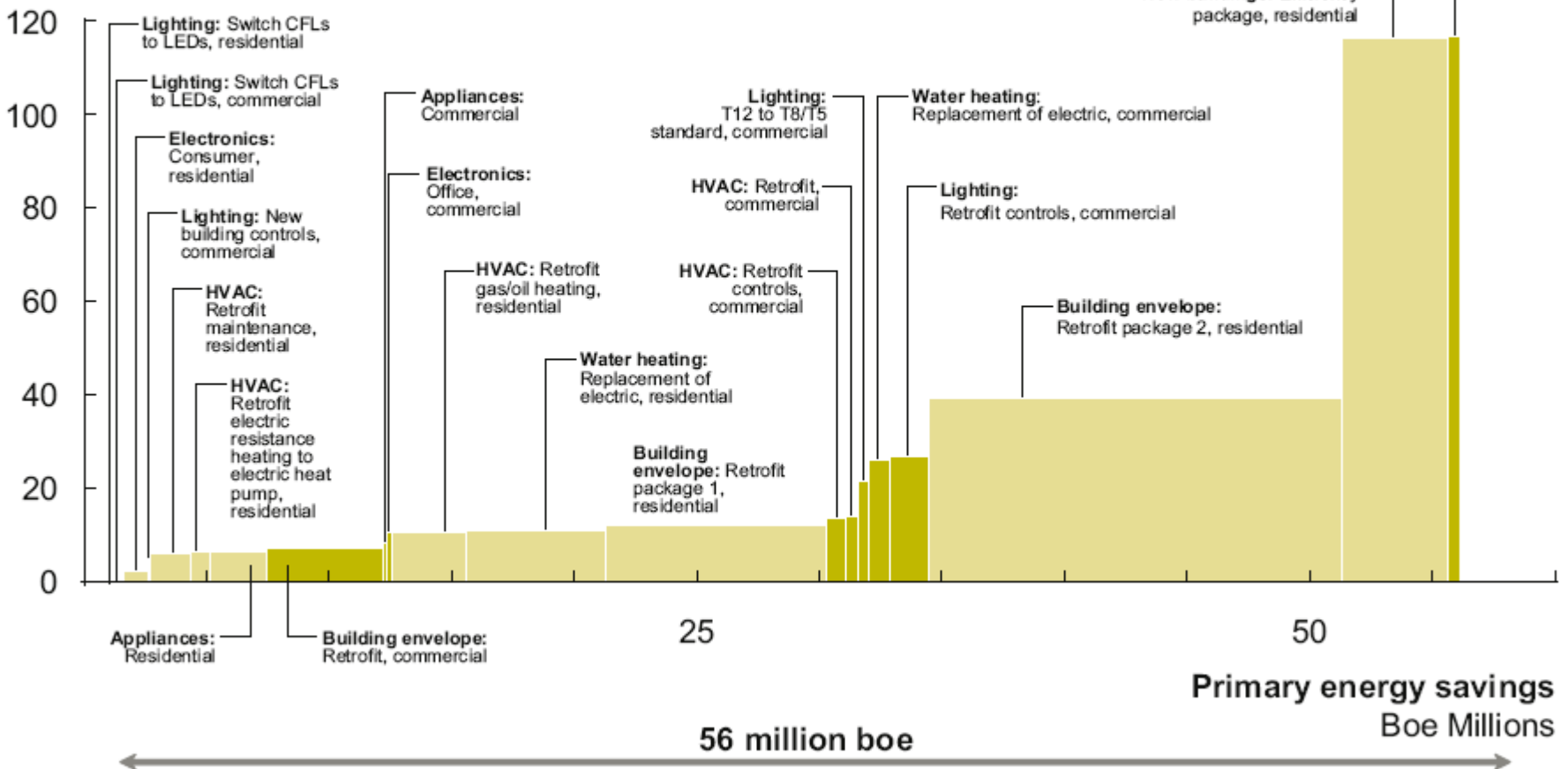
Theoretical energy savings potential in Buildings in Belgium

Investment-related measures, 2030

- Residential
- Commercial and public

Break-even crude oil price

\$/bbl



Resulting reduction in GHG emissions¹: 25 MtCO₂e

¹ Includes non-investment-related measures

Brussels we have a problem... but we see some solutions:

- | | |
|--|--------------------------|
| 1) Improving the energy efficiency of the existing building stock | 31 M boe |
| * pack 1 windows, roofs,.. | 14 M boe @ NPV+ \$17/bbl |
| * pack 2 E30-E60 php of 15-35 kWh/m2 | 17 M boe @ NPV+ \$40/bbl |
| 2) Raising the energy efficiency standards for new buildings | 5 M boe |
| * E30 php 15 kWh/m2 | 5 M boe @ NPV+ \$117/bbl |
| 3) Improving energy efficiency of lighting, appliances & electronics | 8 M boe |
| * LEDs | 4 M boe @ NPV+ \$27/bbl |
| * Efficient electronics | 4 M boe @ NPV+ \$11/bbl |
| 1) Installing more efficient HVACs and water heating systems | 12 M boe |
| | 12 M boe @ NPV+ \$26/bbl |
| 2) Instilling behavioural changes | 5 M boe |

Energy Efficiency & Nearly Zero Energy Buildings

Solutions: Industry Response

OK, Yes, but.....

Passive house standard, OK but is it really a must to have 0.6 /h as a criteria (story with the elevator)....



Federale belastingvermindering 2010 : 3 groepen

❖ "Laag Energie"

- energiebehoefte $\leq 30 \text{ kWh/m}^2$
- Steun van 300 €/jaar gedurende 10 jaar



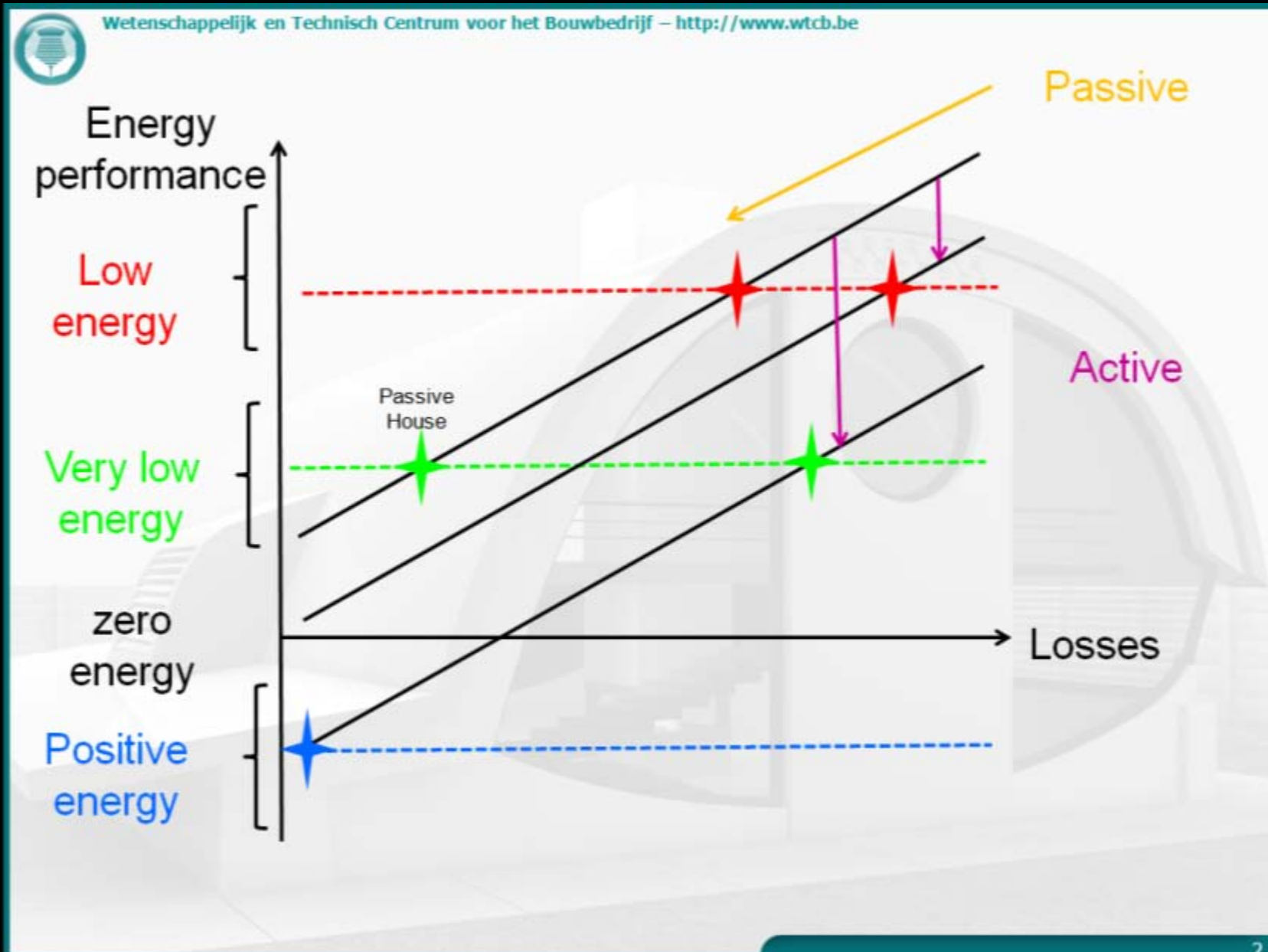
❖ "Passiefhuis"

- ❖ luchtdichtheid $\leq 0,6 \text{ h}^{-1}$
- ❖ Energiebehoefte $\leq 15 \text{ kWh/m}^2$
- ❖ Steun van 600 €/jaar gedurende 10 jaar

❖ "Nul energie"

- Luchtdichtheid $\leq 0,6 \text{ h}^{-1}$
- Energiebehoefte = 0 kWh/m^2
- Steun van 1200 €/jaar gedurende 10 jaar

Passive house standard, OK but is it really a must to have 0.6 /h as a criteria (story with the elevator)....



DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the Energy Performance of Buildings (Recast)

Whereas:

(17) Measures are needed to increase the number of buildings which not only fulfill current minimum energy performance requirements, but are also more energy efficient, thereby reducing both energy consumption and carbon dioxide emissions. For this purpose Member States should draw up national plans for increasing the number of nearly zero-energy buildings and regularly report such plans to the Commission.

Article 2

Definitions

For the purpose of this Directive, the following definitions shall apply:

(2) "nearly zero-energy building" means a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby;

Article 9

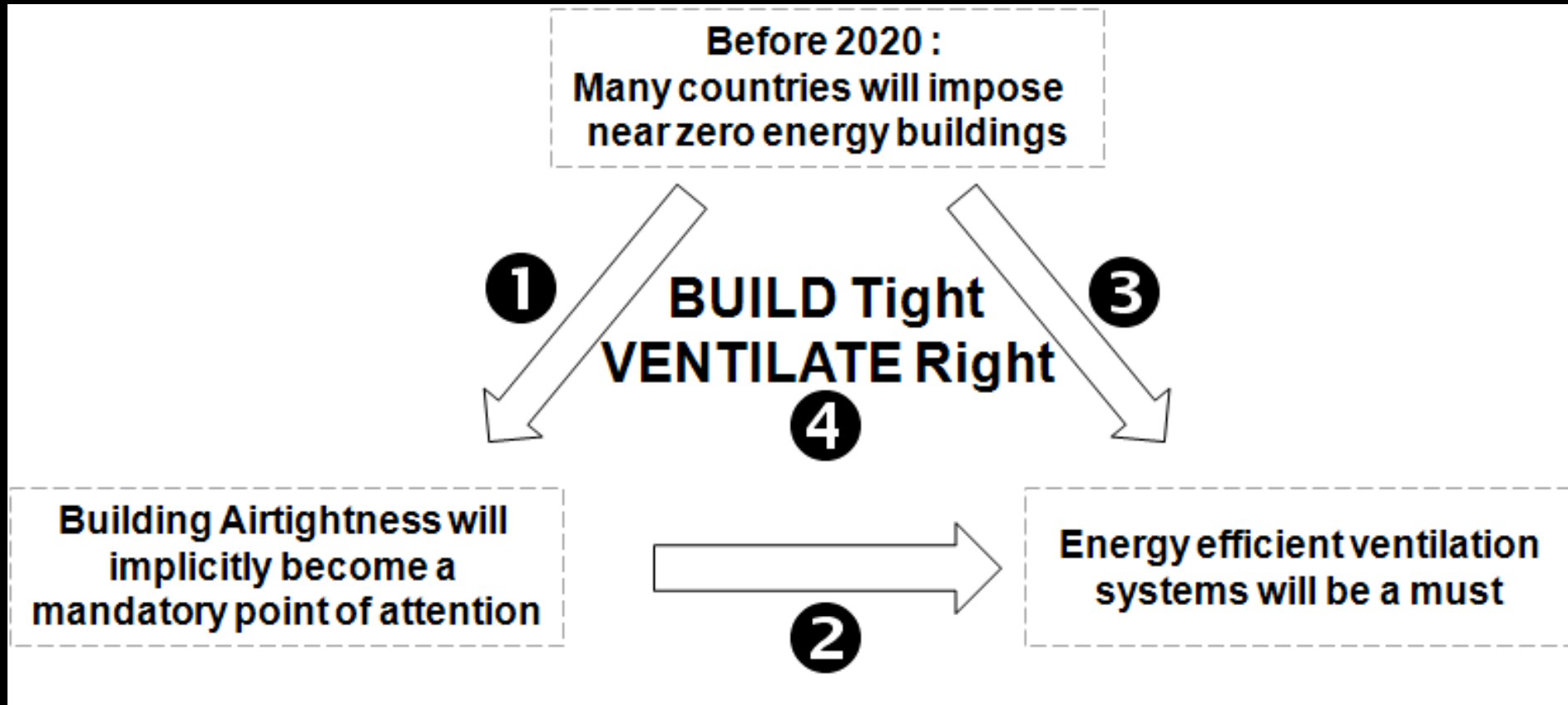
Nearly zero-energy buildings

1. Member States shall ensure that:

(a) by 31 December 2020, all new buildings are nearly zero-energy buildings, and

(b) after 31 December 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings.

Passive house standard, OK but is it really a must to have 0.6 /h as a criteria (story with the elevator)....



International workshop on “Large scale national implementation plans for building airtightness assessment : a must for 2020!”

“We should start now to be ready in 2020”

June 14-15 2010 in Hotel Crowne Plaza – Brussels (Belgium)

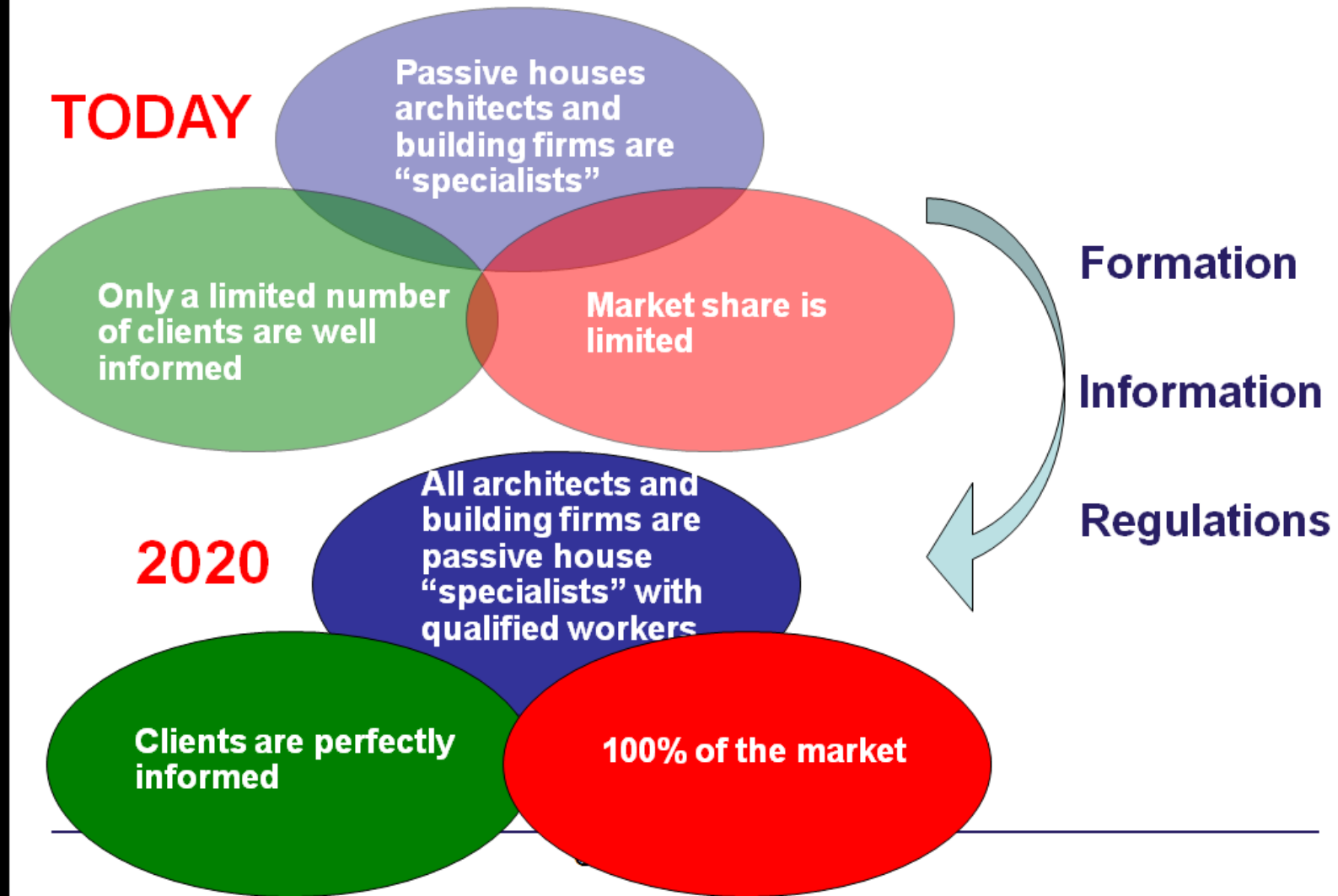
An initiative of AIVC and INIVE

What about summer comfort?



Are our SME's ready ?

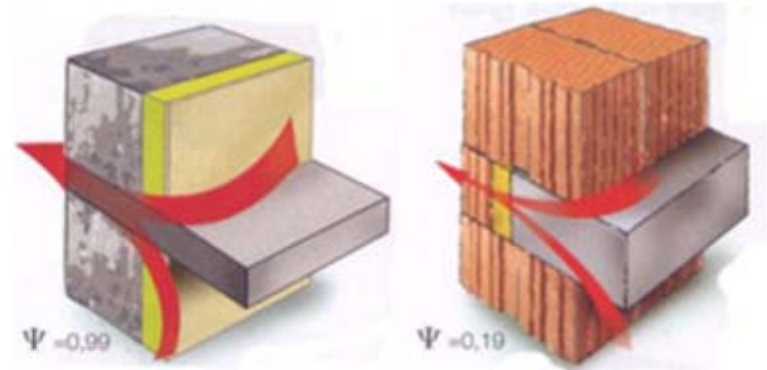
Green building – Passive house



Is our labour force ready? (education, training, recognition,)

Formation

Architects:
building design



Workers: air tightness
Blower door test can
fail only with missing
tapes on electrical plugs



Is there sufficient knowledge about the integration of different techniques and what to use where and when?

Green building Energy production



▶ The cherry on the cake

▶ PV



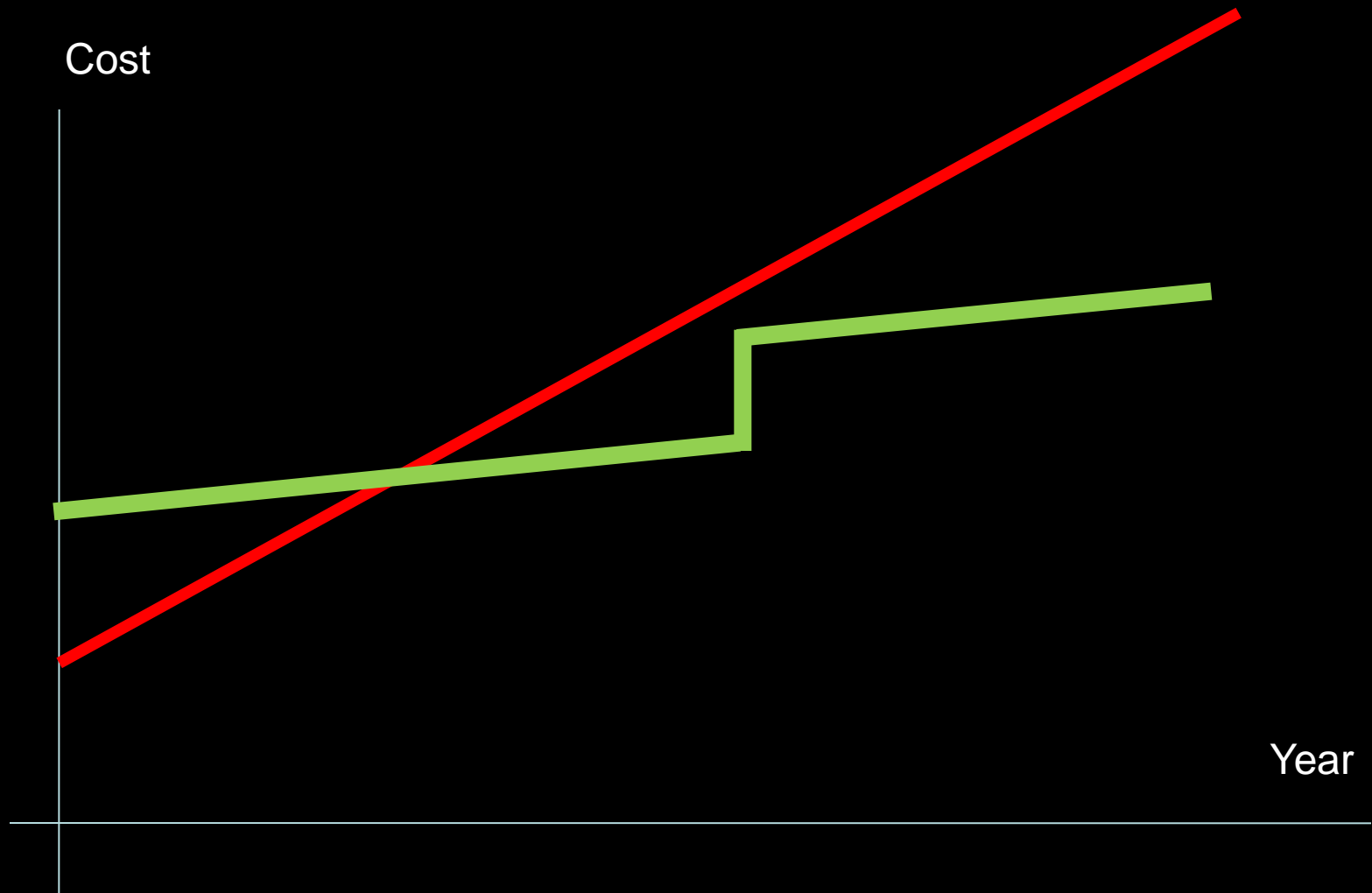
▶ Thermal solar
kW cr /m² ~ 5 times higher than PV!

▶ Other : heat pump, wind,...



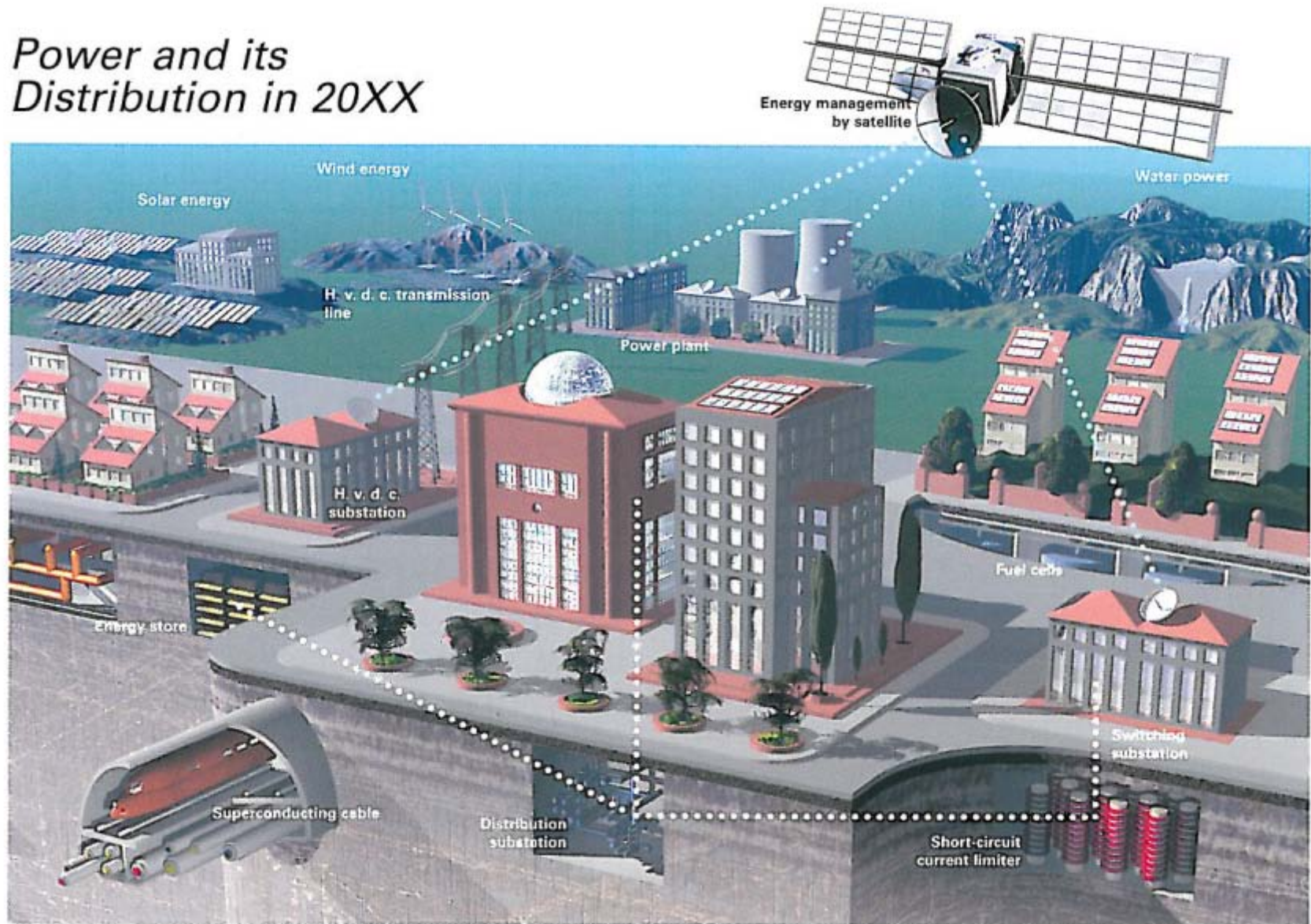
A huge potential: only 0.3% of the WW electricity is produce by PV

Are the systems by themselves durable and eco-efficient (PV's made in China)?



Is our Electricity grid ready and/or are the appropriate storage systems available?

Power and its Distribution in 20XX



Is our Electricity grid ready and/or are the appropriate storage systems available?

Are we coherent in promoting electrical cars but banning electrical heating?

Are our building regulations up to date (example of PV's in conditions of fire, sunshine on roofs)

What about offering appropriate housing to more people.
The problem of the tenants?

Is Energy Efficiency alone sufficient?

Energy – Efficiency is only part of the story....

Green building - Global approach Not only energy

- ▶ Acoustic
- ▶ Air quality (COV,)
- ▶ Lighting (natural & artificial)
- ▶ Water management (rainwater harvesting,...)
- ▶ Ventilation
- ▶ Construction materials
- ▶ Maintenance
- ▶ Waste management,...
- ▶ Life cycle
- ▶ ...

The 4 themes of the VALIDEO reference guide



Site &
construction

Comfort &
health



Management

Social value



The 16 sections of the VALIDEO reference guide

1. Site & construction

- 1.1 integration & value
- 1.2 construction site
- 1.3 materials
- 1.4 adaptability



3. Comfort & health

- 3.1 hygrothermal comfort
- 3.2 visual comfort
- 3.3 acoustic comfort
- 3.4 health



2. Management

- 2.1 energy
- 2.2 water
- 2.3 maintenance
- 2.4 operational waste



4. Social value

- 4.1 living environment
- 4.2 accessibility
- 4.3 mobility
- 4.4 protection against intrusions



Use of “natural materials”, yes, but....
Quality assurance, transport, LCA ?



nourriture

sécurité

NIT/TV

vent

fondation

toitures

plates

entretien

isolation

matériaux durables

ENERGIE

rénovation

CT/TC

ventilation

plafonds

GPS / ICT



News

E-Peil 80 voor Vlaanderen

Sinds 1 januari 2010 is voor alle nieuwe woningen in Vlaanderen het maximaal E peil 80 van kracht.

EPB opleidingen

Er zullen EPB opleidingen georganiseerd worden voor het Waals Gewest (zie agenda)

EPB regelgeving in Waals Gewest

Vanaf 1 mei 2010 zijn er nieuwe eisen van toepassing betreffende energie-efficiëntie van gebouwen.

[+ Lees meer](#)

[Toon alle News](#)

Nuttige links



INFOFICHES EPB

Alle publicaties over
Energie





Brussels, 26.11.2008

COM(2008) 800

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN COUNCIL

A European Economic Recovery Plan

9. Developing clean technologies for cars and construction.

To support innovation in manufacturing, in particular in the construction industry and the automobile sector which have recently seen demand plummet as a result of the crisis and which also face significant challenges in the transition to the green economy, the Commission proposes to launch 3 **major partnerships between the public and private sectors**:

In the construction sector, a **'European energy-efficient buildings' initiative**, to promote green technologies and the development of energy-efficient systems and materials in new and renovated buildings with a view to reducing radically their energy consumption and CO₂ emissions (5). The initiative should have an important regulatory and standardisation component and would involve a procurement network of regional and local authorities. The estimated envelope for this partnership is €1bn. The initiative would be backed by specific actions proposed under actions 5 and 6 on infrastructure and energy-efficiency;

(5) Buildings currently account for 40% of energy consumption.



ENBRI

