



Cyprus Energy Agency



Nearly Zero Energy Buildings



2009

Energy efficiency of buildings - status

33%

of all energy in EU is used for **transport**



26%

of all energy in EU is used by **industry**



41%

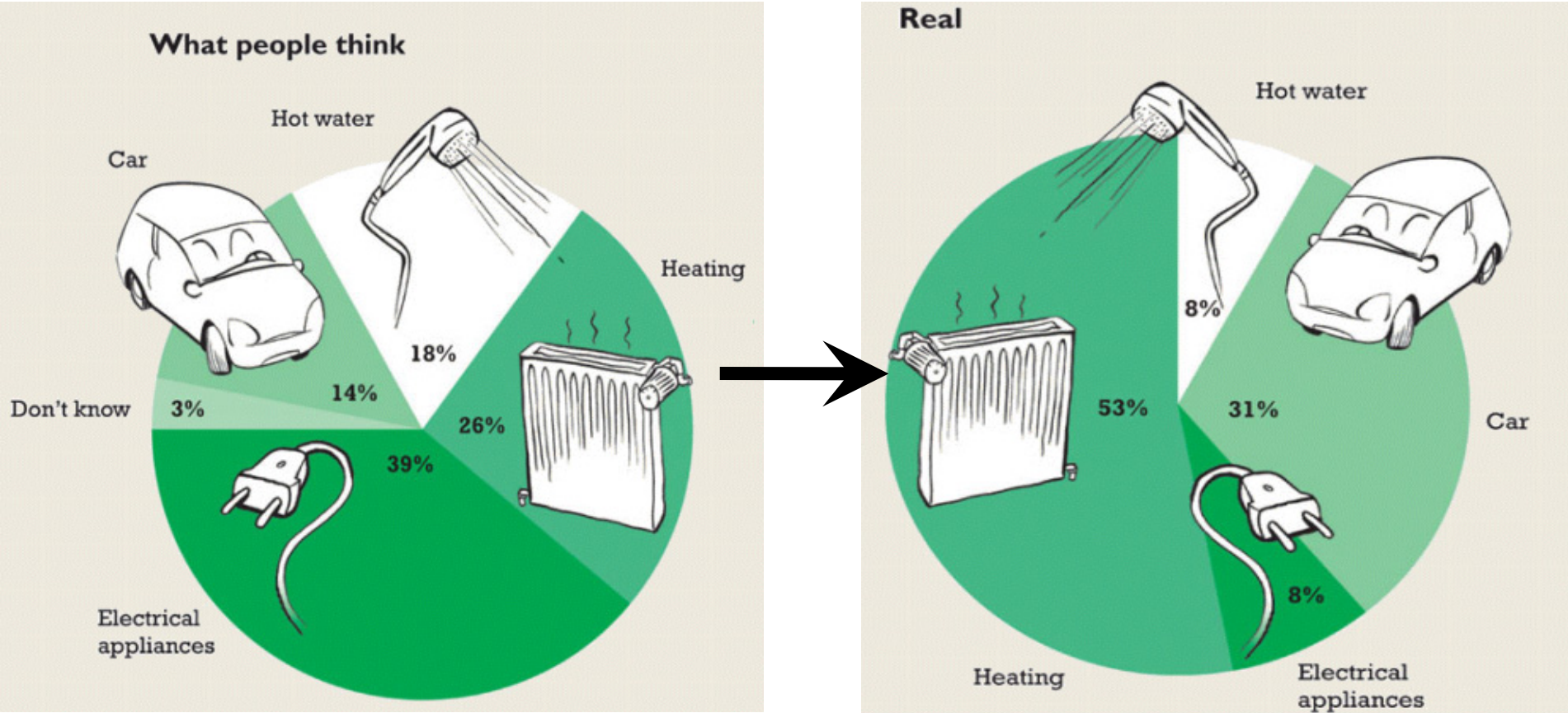
of all energy in EU is used by **buildings**



66% of energy consumption in buildings is used for heating and cooling.

80% of energy consumption is used in small buildings < 1000 m²

Use of energy





Recast of the Directive 2002/91/EC on the Energy Performance of Buildings

Golden opportunity!



Deadline for political agreement: 7/12/2009



Recast of the Directive 2002/91/EC on the Energy Performance of Buildings

5 main points

- **All existed buildings (removal of the 1000m² limitation)**
- **Minimum energy performance requirements and updated methodologies**
- **Nearly zero energy and carbon buildings**
- **Improvement of the management mechanism of the energy performance certificates**
- **The importance of independent monitoring and evaluation of the Directive 2002/91/ECH implementation**



Recast of the Directive 2002/91/EC on the Energy Performance of Buildings – Article 2(1a)

Definition:

“Nearly zero energy building” means a building that has a very high energy performance, determined in accordance with Annex I. The nearly zero or very low amount of energy required should [] to a very significant extent be covered by energy from renewable sources, including renewable energy produced on-site or nearby



Recast of the Directive 2002/91/EC on the Energy Performance of Buildings – Annex 1

1. The energy performance of a building shall be determined on the basis of the calculated or actual annual energy that is consumed in order to meet the different needs associated with its typical use and shall reflect the heating energy needs and cooling energy needs (energy needed to avoid over-heating) to maintain the envisaged temperature conditions of the building , and domestic hot water needs.



Recast of the Directive 2002/91/EC on the Energy Performance of Buildings – Annex 1

2. The energy performance of a building shall be expressed in a transparent manner and shall include an energy performance indicator and a numeric indicator of primary energy use, based on **primary energy** factors per energy carrier , which may be based on national or regional annual weighted averages or a specific value for on-site production.

The methodology of calculation of energy performance of buildings should take into account European standards and shall be consistent with relevant Community legislation, including Directive 2009/28/EC on the promotion of energy from renewable sources.

Only 7 Member States have an official definition for the «very low energy buildings»

- **Austria**
- **Czech Republic**
- **Denmark**
- **Finland**
- **France**
- **German**
- **United Kingdom (England and Wales)**



Powerful legislative framework



- The member states that were mentioned have implemented the definition «low energy houses» into the National Regulations for the energy performance of the buildings

Motivation in Economy and Taxes



- Vat reduction
- Other taxes reduction and tax exemptions
- Subsidies
- Grants
- Low-rated loans

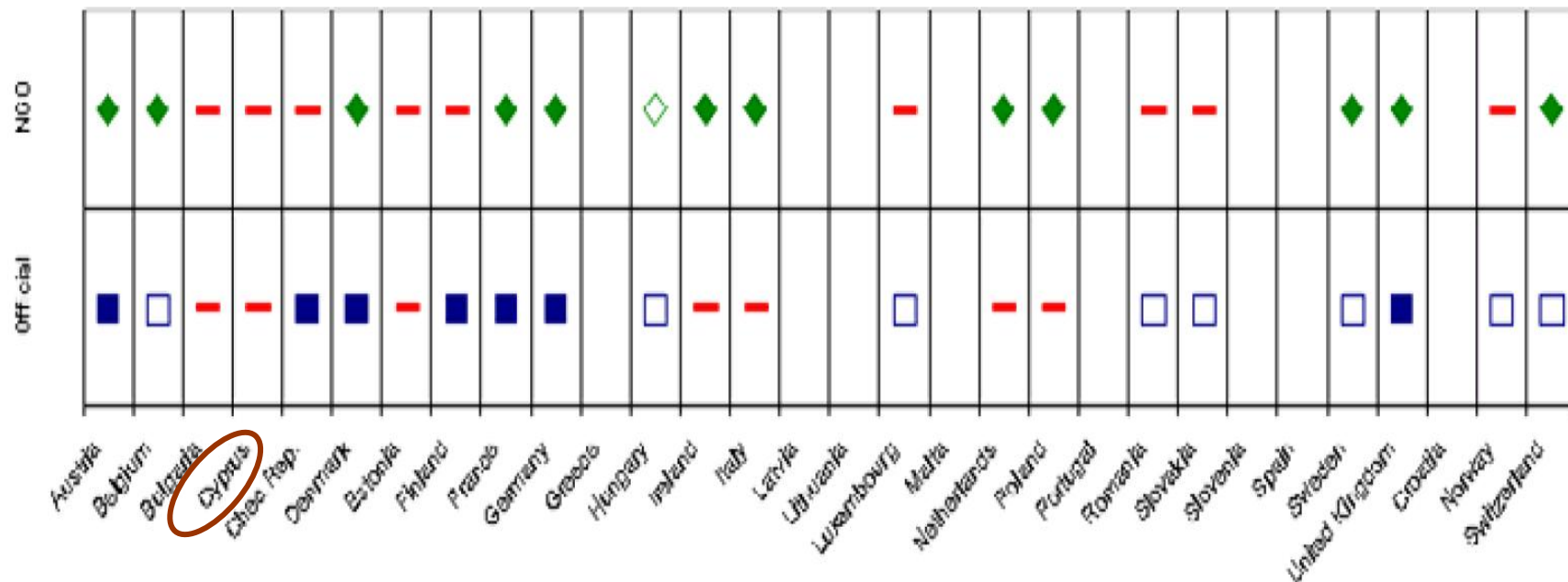


↪ 7 m-s with official definition

↪ the adoption of the official definition is programming in another 7 member-states BE, LU, RO, SK, NO, SE, SW

↪ 5 m-s with definition from NGOs

- **Cyprus is not included in any category**



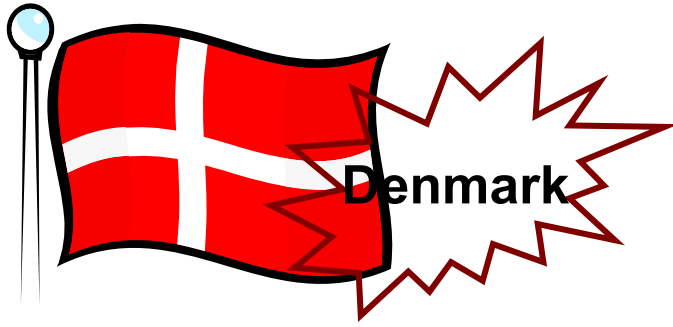
Source: European National Strategies to move towards very low energy buildings, AALBORG UNIVERSITET



Energy requirements for «very low energy buildings»

- Low-energy buildings are buildings with annual heating energy consumption (calculated demand) below 60-40 kWh/m² gross area.
- Passive buildings are defined according to the passive house standard heating requirement less than 15 kWh/m² . In Austria, the indicator 15 kWh/m² refers to useful area.





Energy requirements for «very low energy buildings»

- The minimum requirement for residential buildings is given by: $70 + 2200/A$ kWh/m² per year (A is the heated gross floor area).
- For other buildings the minimum requirements are given by: $95 + 2200/A$ kWh/m² per year. The minimum requirement for non-residential buildings includes electricity for building integrated lighting.





Energy requirements for very low energy buildings

- BBC Label for "Low Consumption Building":
For new dwellings: the annual requirement for heating, cooling, ventilation, hot water and lighting must be lower than about 50 kWh/m² (in primary energy) (40 kWh/m² to 65 kWh/m², depending on climatic area and latitude).
- For other new buildings: the annual requirement for heating, cooling, ventilation, hot water and lighting must be at least 50 % lower than what is required by the current building regulation for new buildings.
- For renovation, the Grenelle de l'Environnement is likely to adopt a BBC label of 80 kWh/m² a year for heating/cooling, ventilation, hot water and lighting, starting in 2009..



Energy requirements for «very low energy buildings»

- The minimum requirement for new buildings is given by:

$$50.94 + 75.29x \frac{A}{V_e} + \frac{2600}{100 + A_N} \text{ kWh} / \text{m}^2$$

- A external area, V_e is the volume, A_N the useful area
- the primary energy demand is limited by 40 kWh/(m²a) or 60 kWh / (m² a) and then it can be granted.
- In addition, there is a subsidy program for "Passiv-Häuser", which is defined in accordance with the Passiv-Haus-Institute as "KfW-40-buildings with an annual heat demand lower than 15 kWh/m²".



United Kingdom

Energy requirements for «very low energy buildings»

Indicative timetable to become regulatory requirement: :

- 2010 level 3(25 % better than current regulations)
- 2013 level 4(44 % better - similar to Passiv Haus)
- 2016 level 6(zero carbon requirement for heating and lighting)



Switzerland

Energy requirements for «very low energy buildings»

- For new buildings from 01.01.2009 the minimum requirement is 38 kWh/ m².
- The energy consumption consists of heating, hot water and ventilation needs.
- Furthermore, there are minimum requirements for electrical appliances.



Zero energy building

- Is the building which produces the same energy that it consumes, through the use of the available on-site or nearby Renewable Energy Sources, reinforced with energy performance technologies of buildings. In this way, it provides an important reduction on the energy demand and a sustainable life to its residents.

Delivered energy consumption, following the national building regulation minimum requirement, for different kinds of new buildings in kWh/m². The values are expressed in terms of primary energy with a factor of 2.5 – 2.7 for electricity and 1 for all other energy sources.

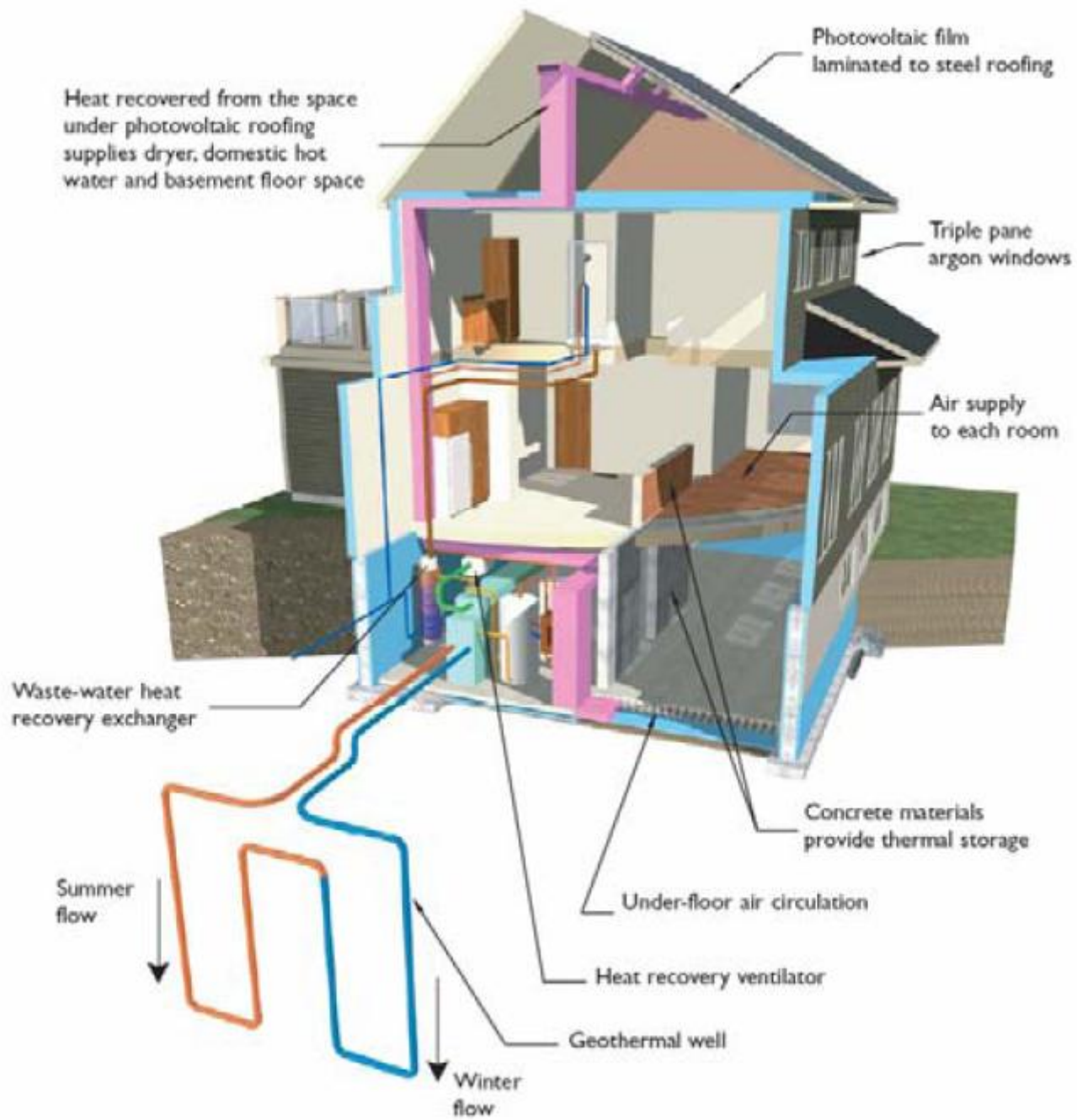
Building Type	Denmark	France	Germany	Netherlands	UK
Single family houses of different types	90	90-180	80-150	100-130	85-95
Block of Flats	75	80-150	n.a.	95-100	n/a
Non residential buildings (excluding hospitals)	80-150	75-180	80-150	120-315	170-270

Source: Towards very low energy buildings, AALBORG UNIVERSITET

Delivered energy consumption, following the national VLEB definition in kWh/m².

Building Type	Denmark	France	Germany	Netherlands	UK
Single family houses of different types	45	40-65	42	50-65	50
Block of Flats	37	40-60	42	50	n/a
Non residential buildings (excluding hospitals)	37-50	30-75	42	60-158	95-151

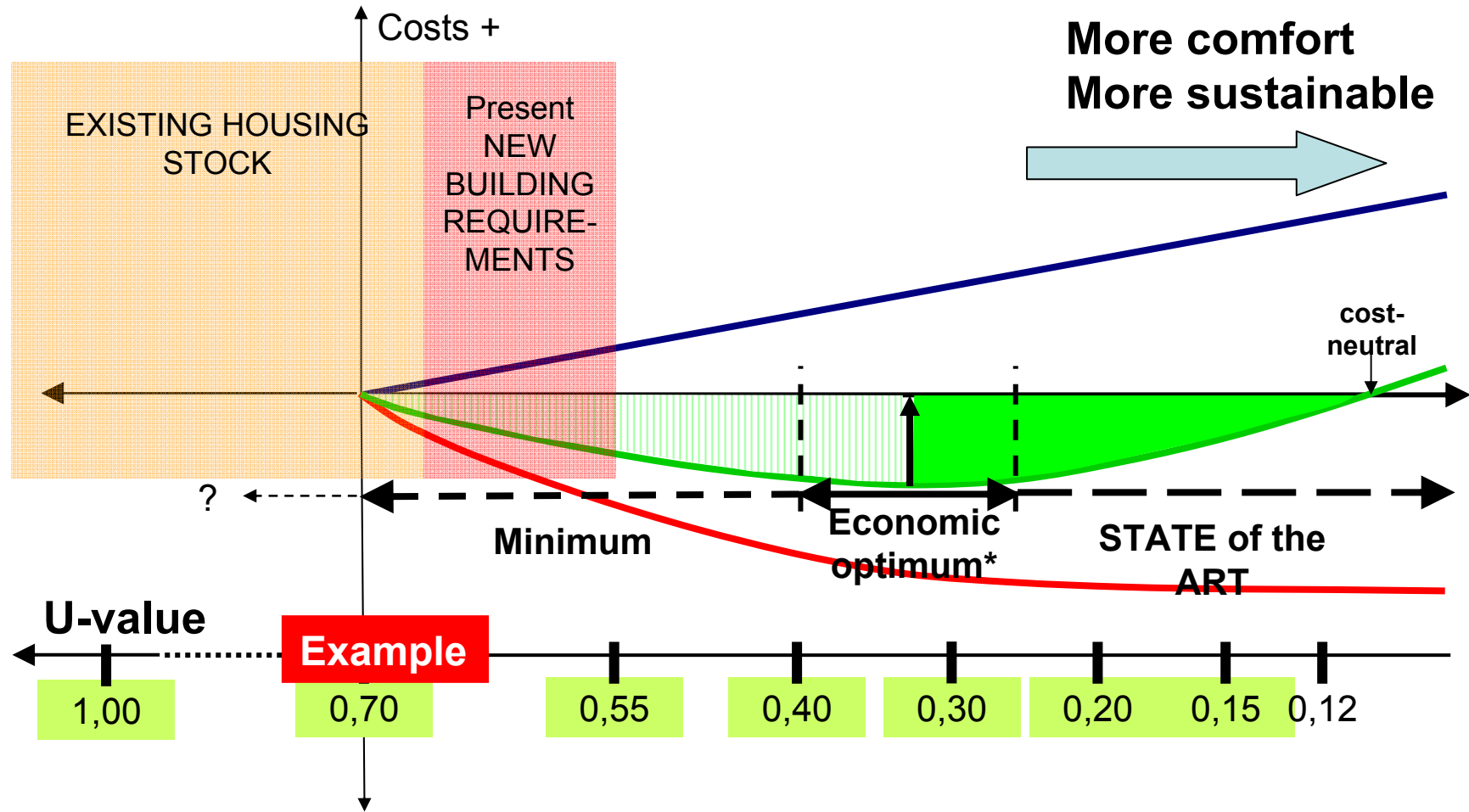
Source: Towards very low energy buildings, AALBORG UNIVERSITET



High-priority technologies for low energy consumption residences

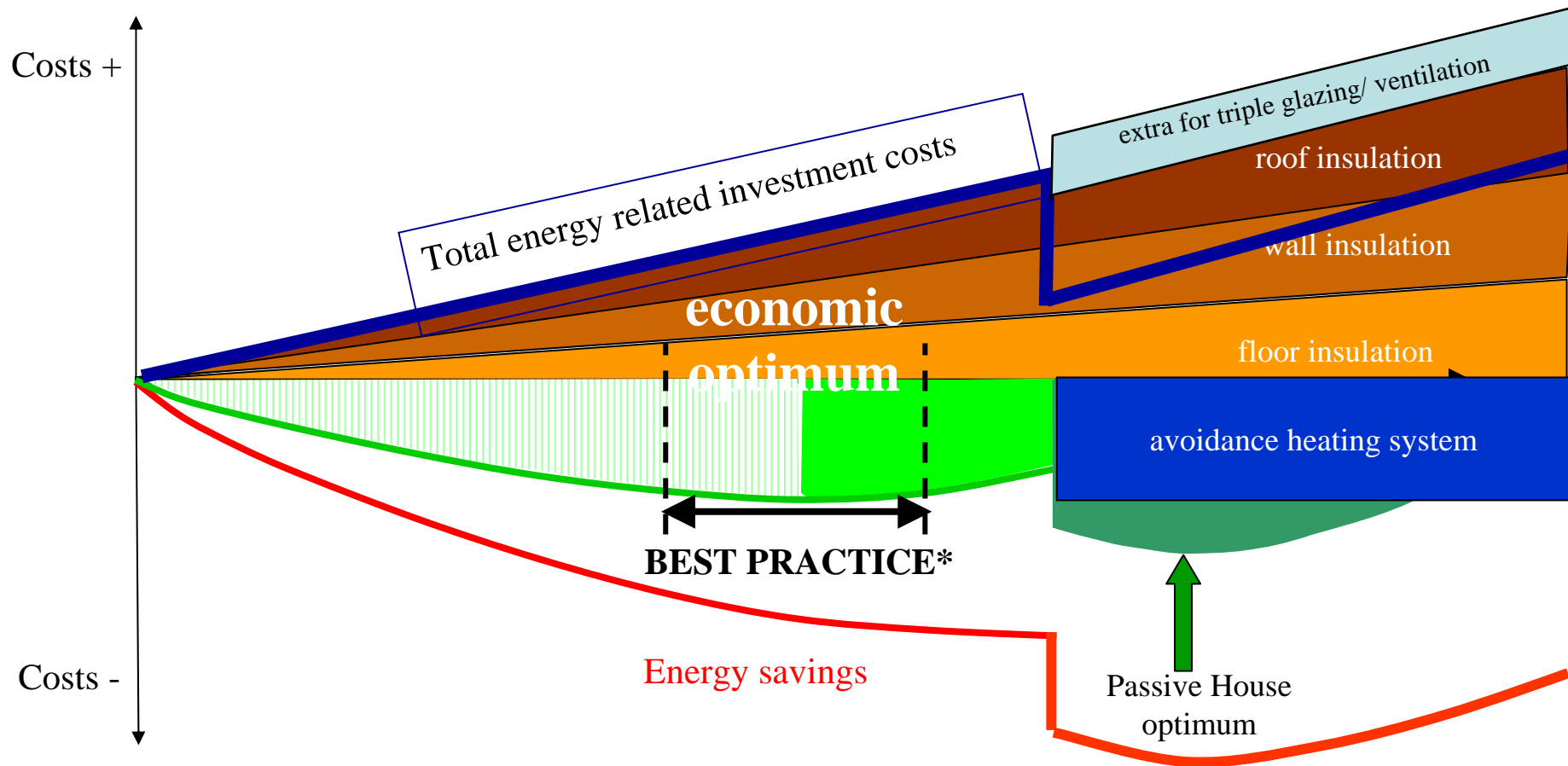
Technology	Desirable efficiency/ characteristics	CO ₂ reduction
Photovoltaics	2-5 kW	
Solar Technology for space heating/cooling	42-100% load reduction	
Solar thermal for hot water	>82% hot water needs	
Electric Appliances	Energy class A+	
Τοιχοποιία	U value	
Roof	U value	
Windows	U value	
Geothermal energy (space heating/cooling)	30-70% load reduction	
Lighting	100 lumens/watt	
Small wind turbines		
Biomass for space heating (energy fireplaces)	70% efficiency	

From cost optimum to U-values



*Based on oil price study hypothesis

Whole building approach & Passive House



*Based on oil price study hypothesis

Zero energy consumption buildings: Perhaps not as much difficult as it seems...

We can make the difference:

- If we adopt a powerful **legislative framework**
- If we implement a training/ information program for those who are involved in the construction process of the buildings
- If appropriate **economic motivations** will be provided
- If we spread the best practices
- If we create the appropriate support structures

Political Will is Required!

