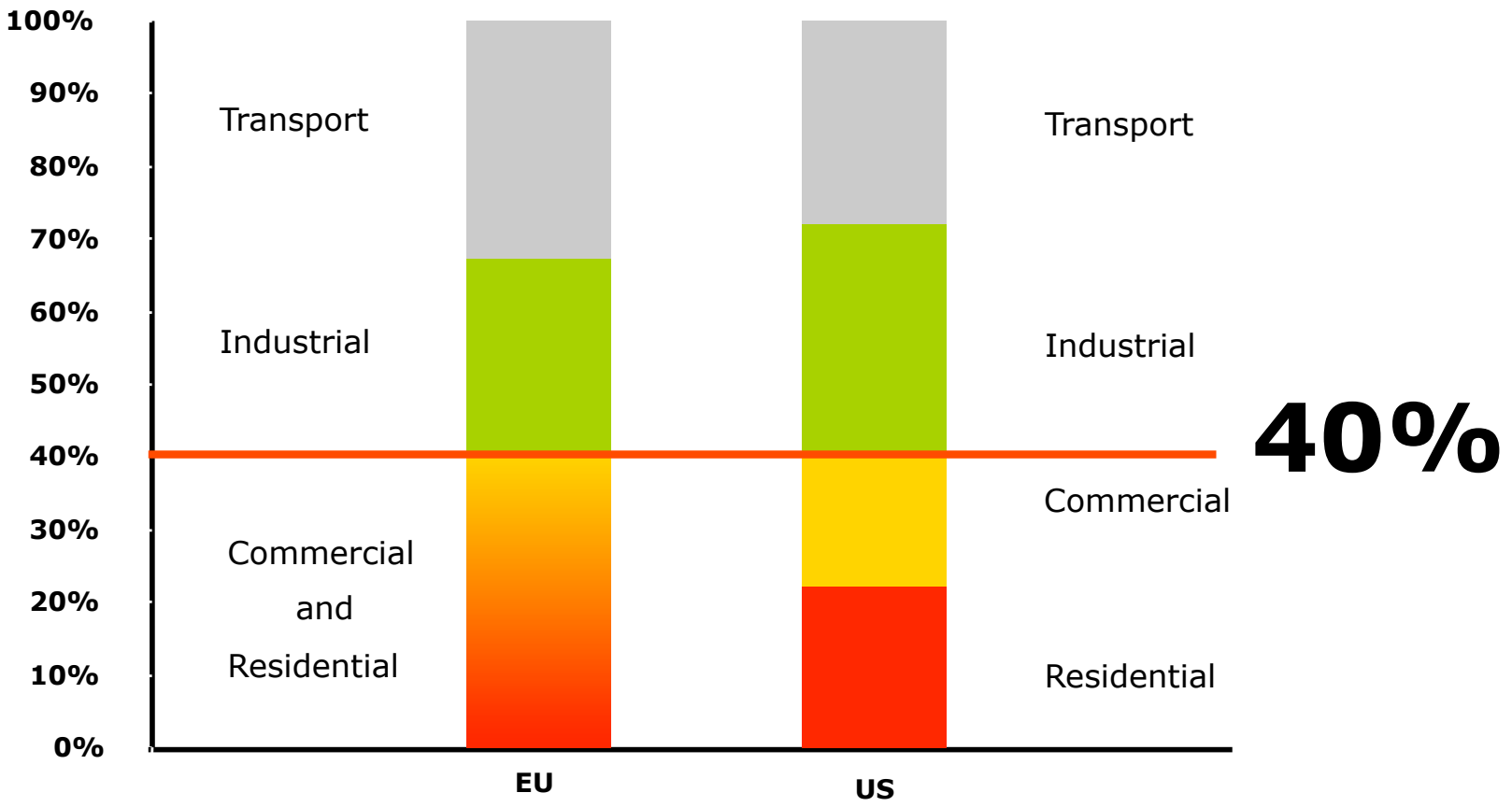
Active House

Development of carbon neutral buildings with healthy indoor comfort

Paper ECEEE conference 1-4. June 2009
Kurt Emil Eriksen VKR Holding A/S

Energy used by sector



Source: DOE and EU commission

EU energy policy

Target 2020

20% (30%) reduction of CO_2 emissions

20% renewable energy

20% reduction in energy consumption

New topics with recast of EU Directive on Energy Performance of Buildings

Target for zero energy housing with renewable energy on site

Alternative energy supply to all new buildings and major renovation

Energy performance shall also include passive heating and cooling elements, shading, indoor air quality, adequate natural light.

Energy used for lightning to be include in domestic buildings

National targets
Very low energy buildings

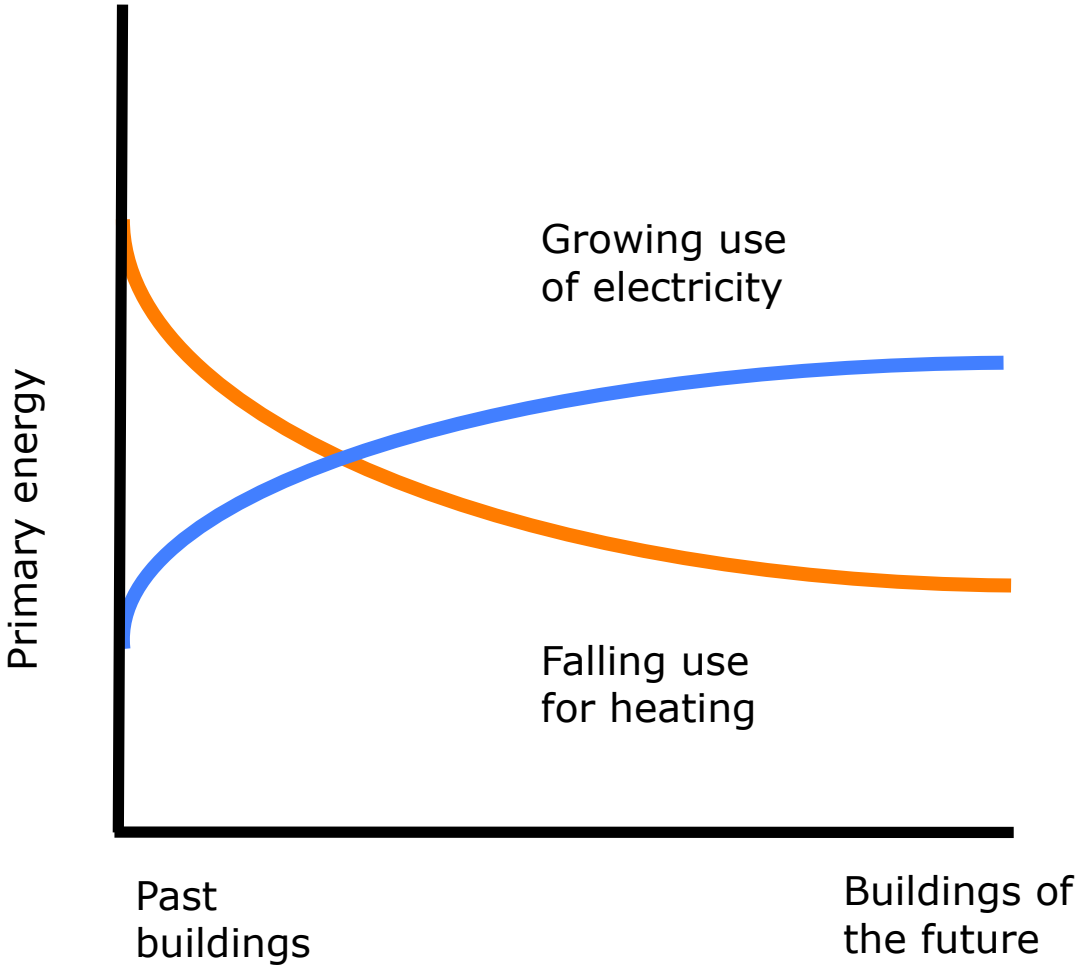
Country/year	2009	2010	2012	2013	2015	2016	2020
Denmark		-25 %[1)]			-50 %[1)]		-75 %[1)]
France			LEB[2)]				E+
Germany	-30 %		-30% [3)]				NFFB
Netherlands		-25 %			-50% [4)]		ENB
United Kingdom		-25 %		-44%[4)]		NZEB	

1) Percentage of the 2006 minimum level, 2) Effinergie standard, 3) Percentage of the 2009 minimum level, 4) Passive House level.

Figure 2. Planned introduction of low energy standards as minimum requirements in MS building regulations. LEB: Low Energy Buildings. E+: Energy positive buildings. NFFB: Buildings to operate without fossil fuels. ENB: Energy Neutral Buildings. NZEB: 0 net. CO_2, incl. heating, lighting domestic hot water and all appliances.

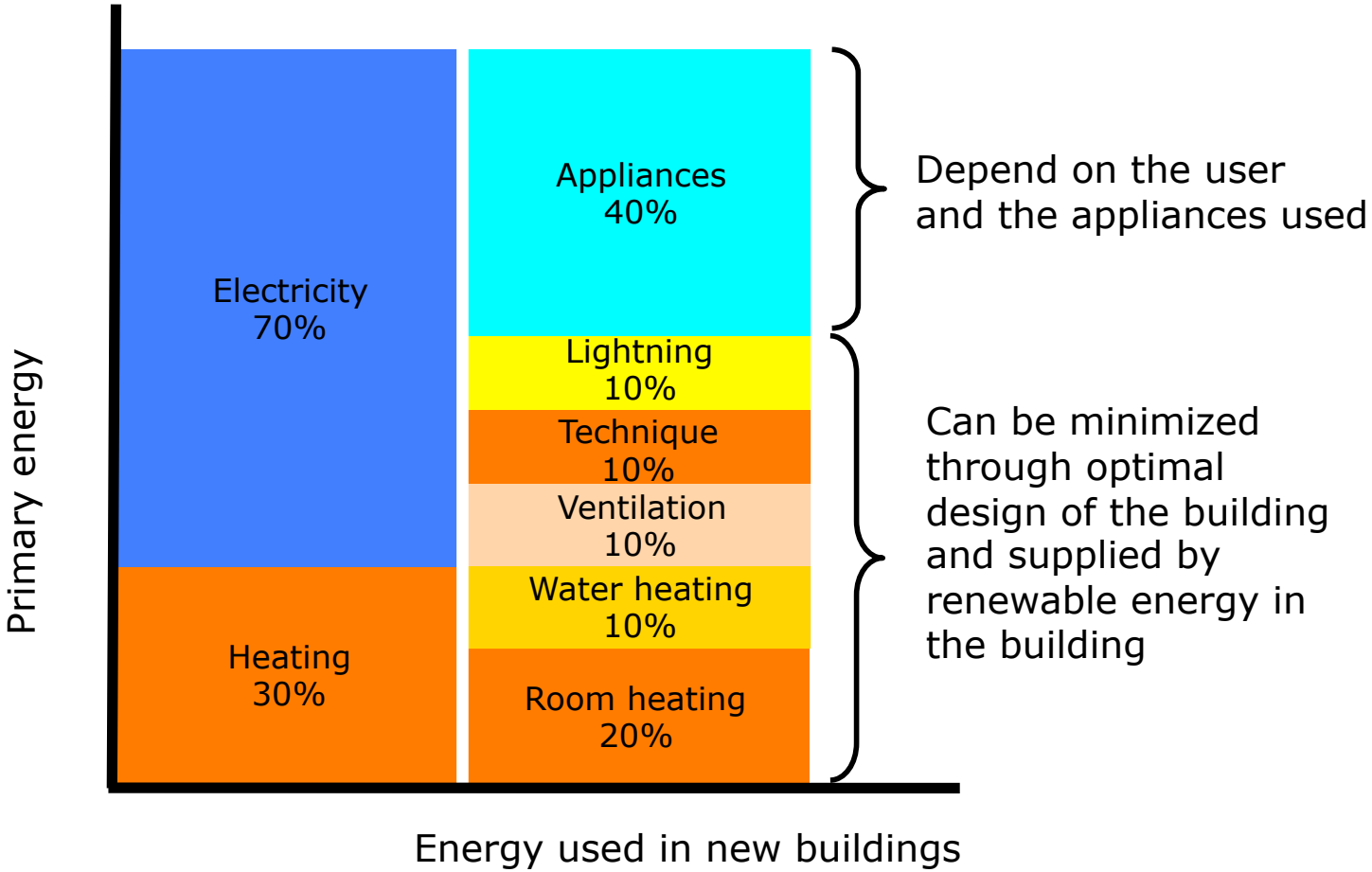
Source: EuroACE and SBi study *"Towards very low energy buildings"*

Energy used in buildings



Source:
Danish Building Research institute, vglcph aps and ARUP

Energy used in new buildings



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EU Directive on Energy Performance of Buildings

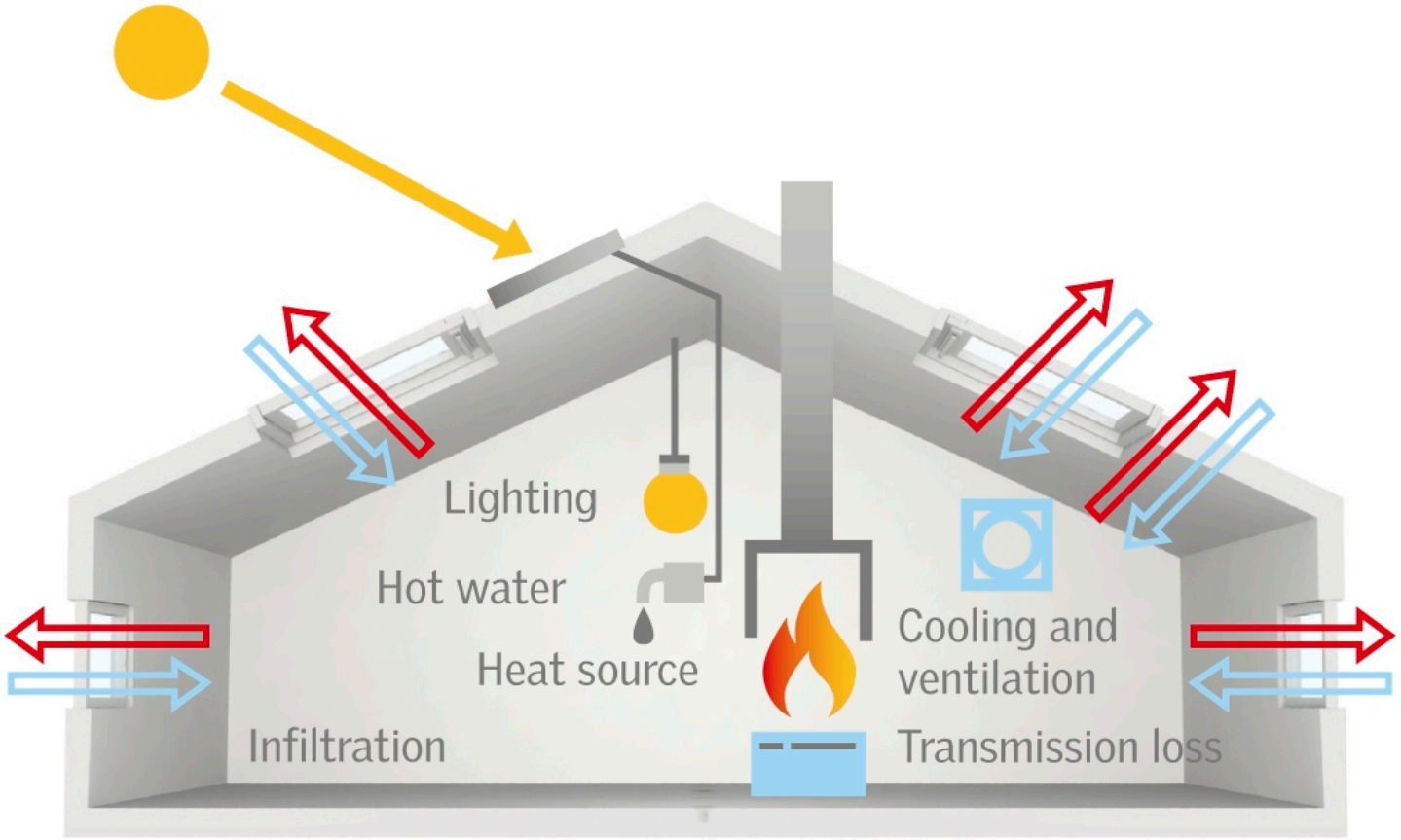
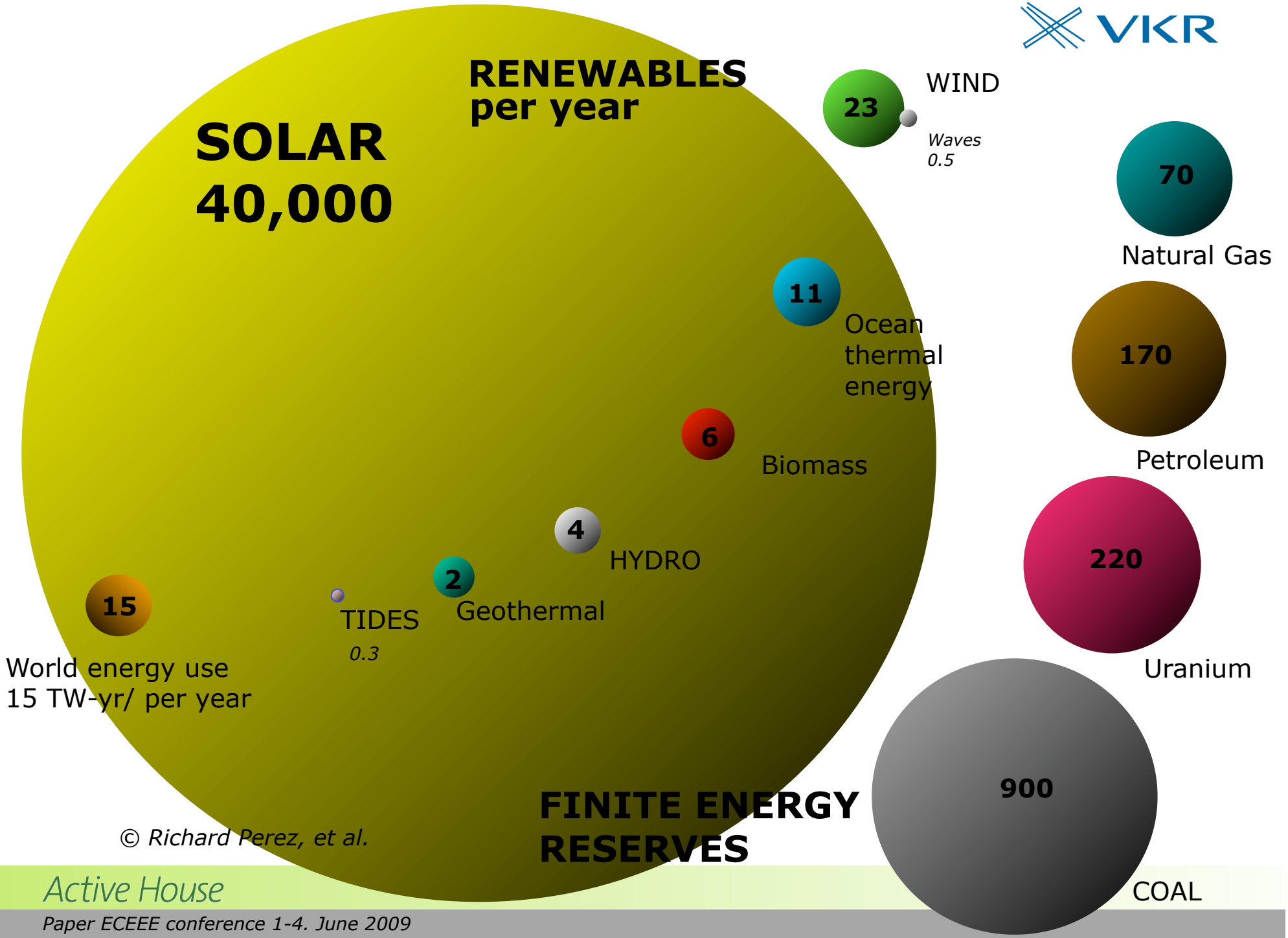


Figure 3.3. Holistic energy calculation method used in for example the Energy Performance of Buildings Directive (EPBD) in Europe.

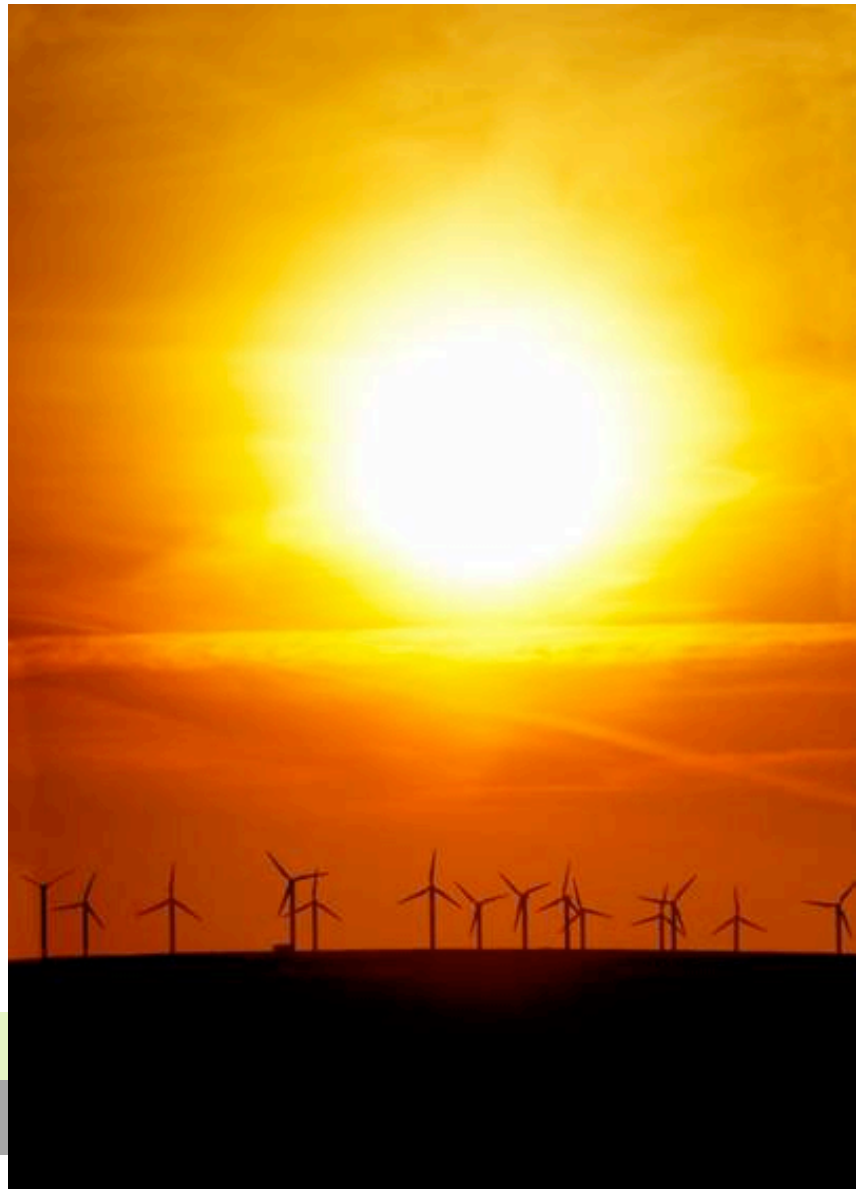

Setting the Scene
World energy use
15 TW-yr / per year
~ 450 exajoules
~ 440 Quads
15


VKR
RENEWABLES
per year
SOLAR
40,000
23
WIND
Waves
0.5
70
Natural Gas
11
Ocean
thermal
energy
170
Petroleum
6
Biomass
4
HYDRO
2
Geothermal
TIDES
0.3
15
World energy use
15 TW-yr/ per year
220
Uranium
900
COAL
FINITE ENERGY
RESERVES
© Richard Perez, et al.

Integrate renewable energy and solar thermal in buildings

It’s notable to see someone somewhere looking beyond fossil fuels, just as Thomas Edison recommended in 1931 when he told Henry Ford and Harvey Firestone:

“I’d put my money on the sun and solar energy. What a source of power! I hope we don’t have to wait until oil and coal run out before we tackle that.”



Integrate renewable energy and solar thermal in buildings

If we use 1 m^2 solar panel / inhabitant in Europe

=

We save energy equal to taking of 20 mill. cars from the road every single year

Indoor comfort and health

People spend 90 % of their time inside the building and up to 30% of our buildings create unhealthy conditions

Several studies shows that people become healthier, more active and children learn better when the indoor comfort is optimized.

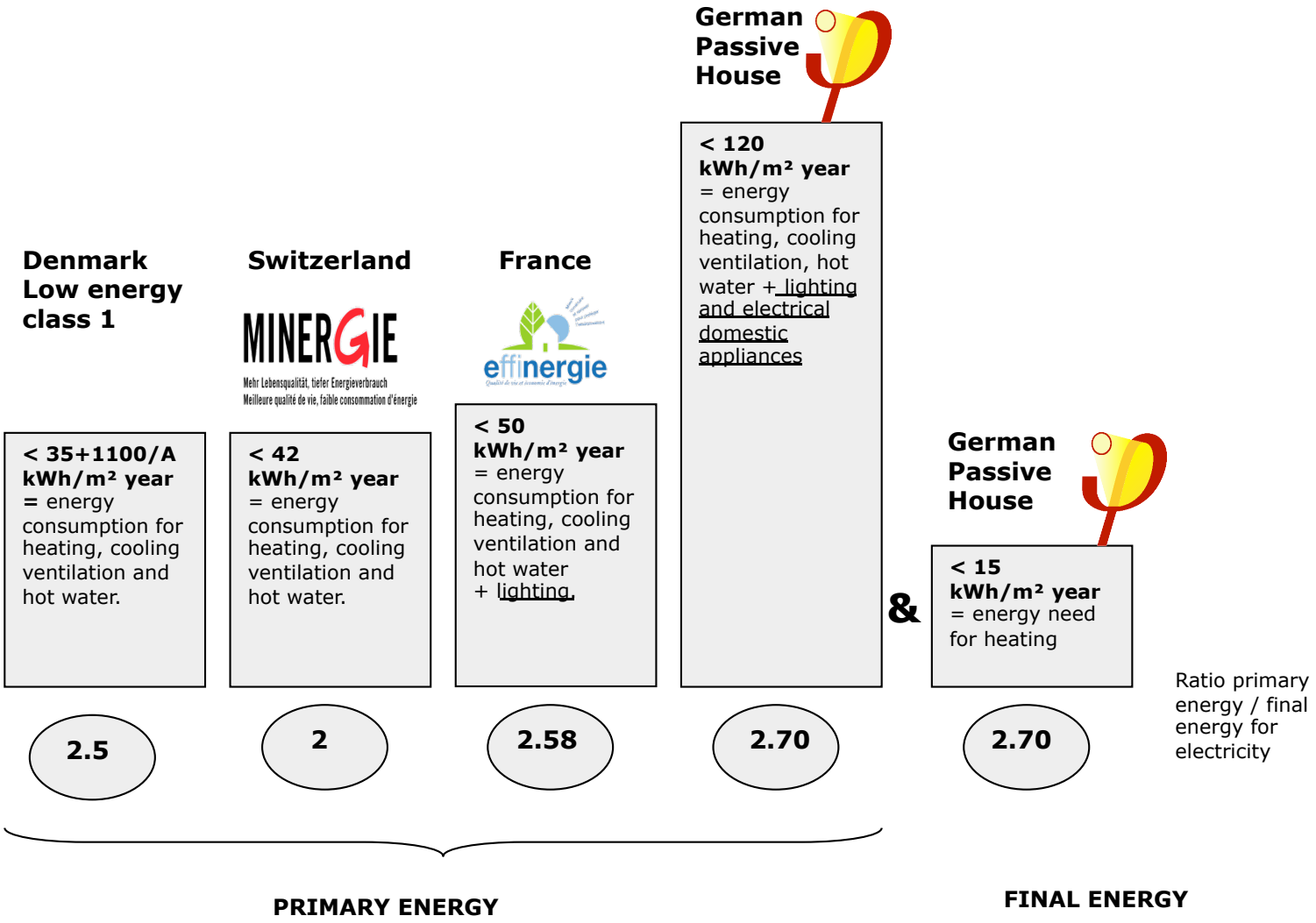
Indoor comfort and health

Experience from the past, where we only focused on heatloss

New buildings must be designed with focus on indoor comfort

National standards for houses

Different methodology, standards and requirement

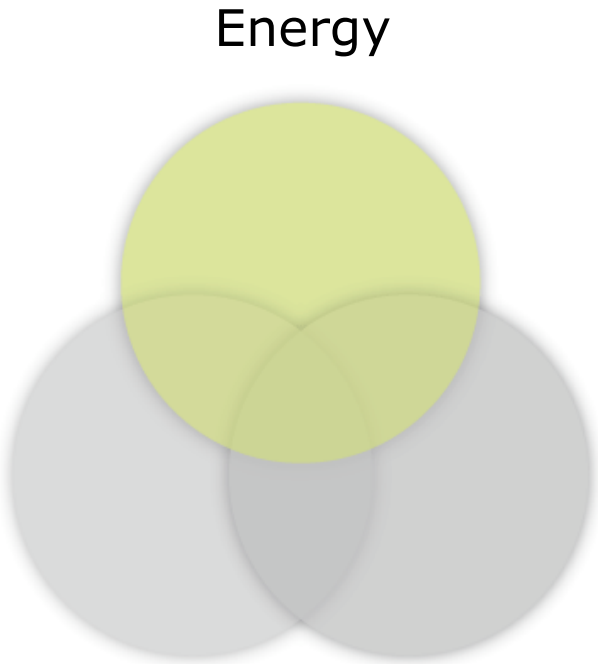


Source: EuroACE and SBi study *"Towards very low energy buildings"*

Active House

Active house could be the common concept that move the development of houses into a new method where:

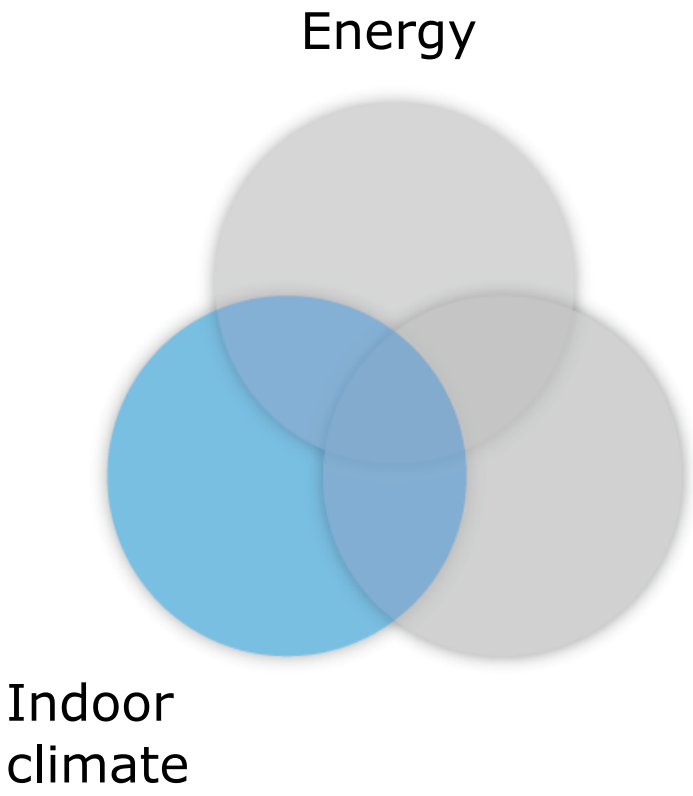
Active House



Active house could be the common concept that move the development of houses into a new method where:

- The use of energy is minimized and all energy is produced by renewable energy sources

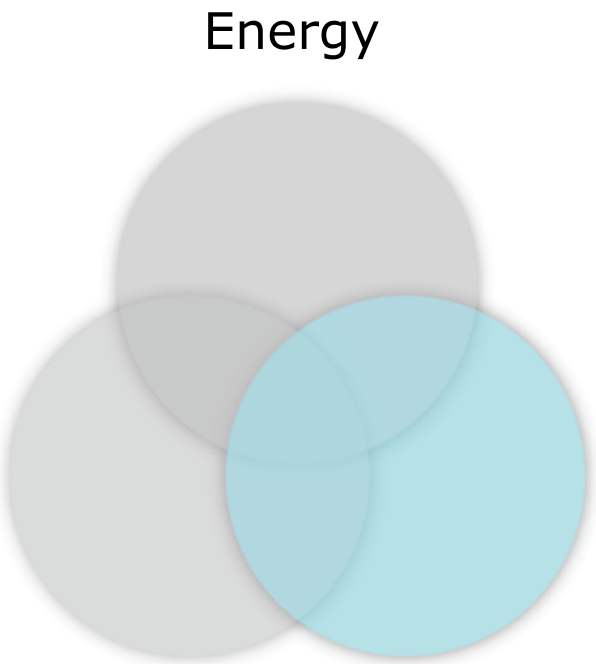
Active House



Active house could be the common concept that move the development of houses into a new method where:

- The use of energy is minimized and all energy is produced by renewable energy sources
- The indoor climate are optimized with daylight, fresh air and use of materials that has limited influence on the environment

Active House



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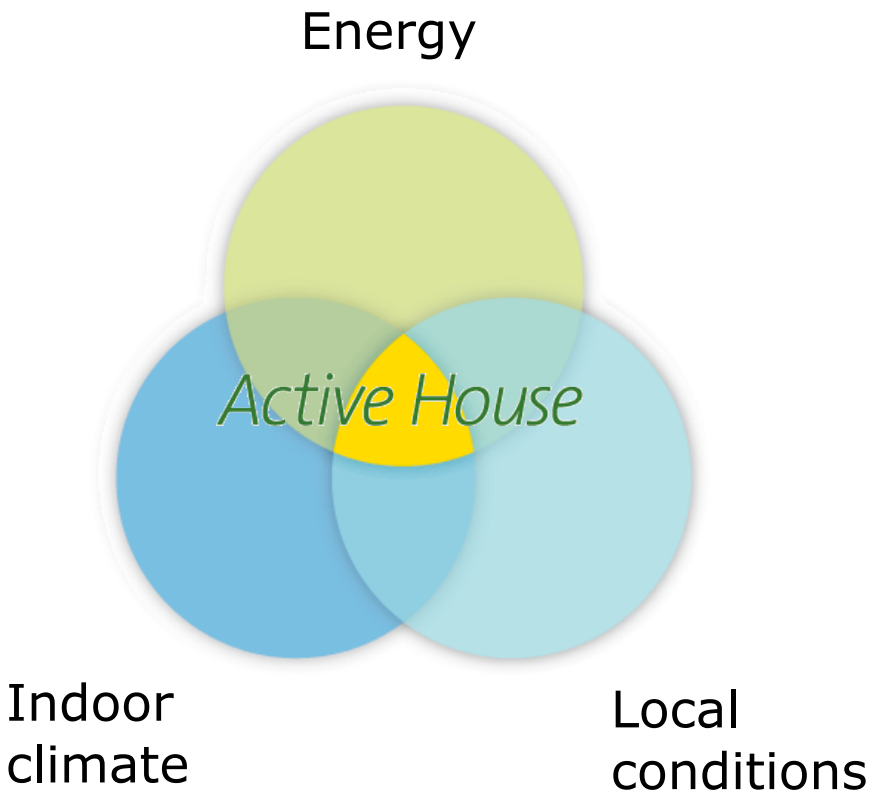

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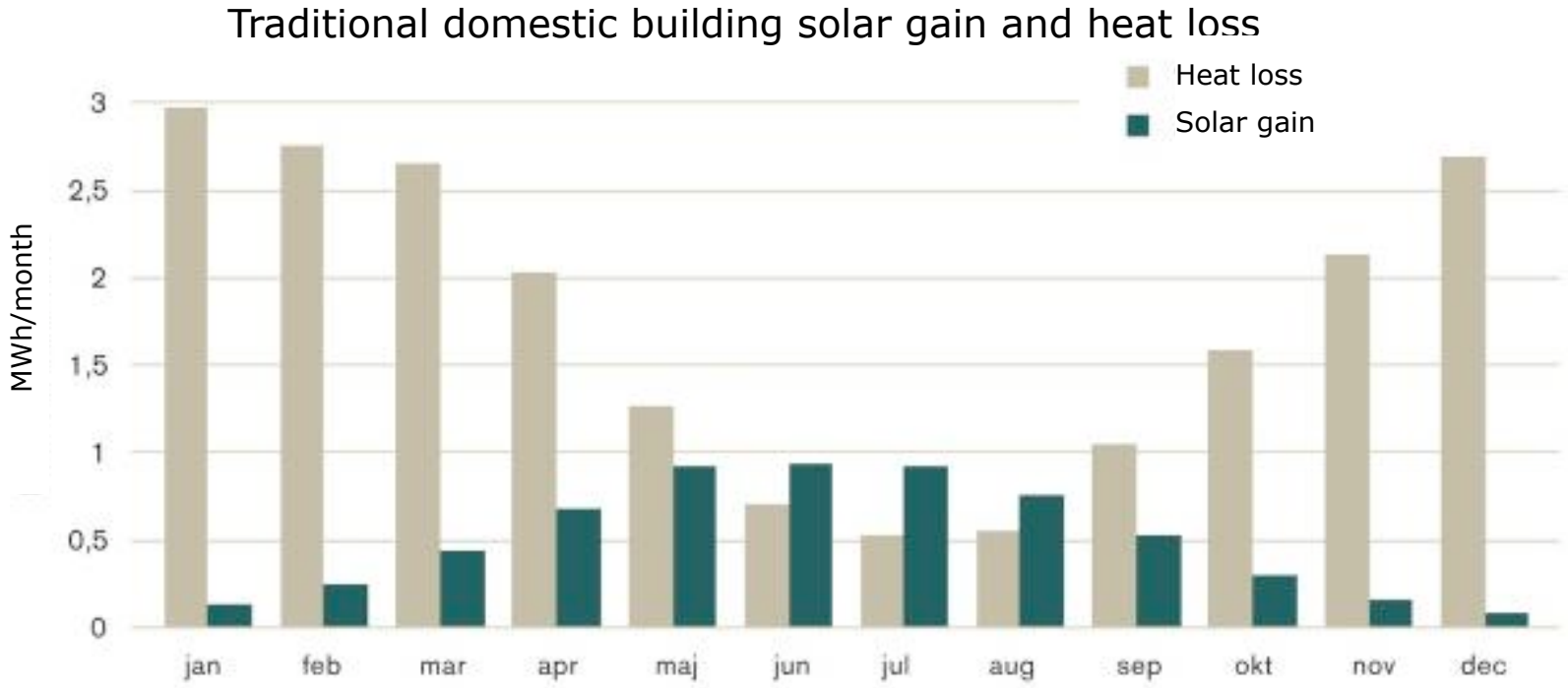
The first Active House

- house for life

The first Active House

- passive solar gain and heat loss



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The first Active House
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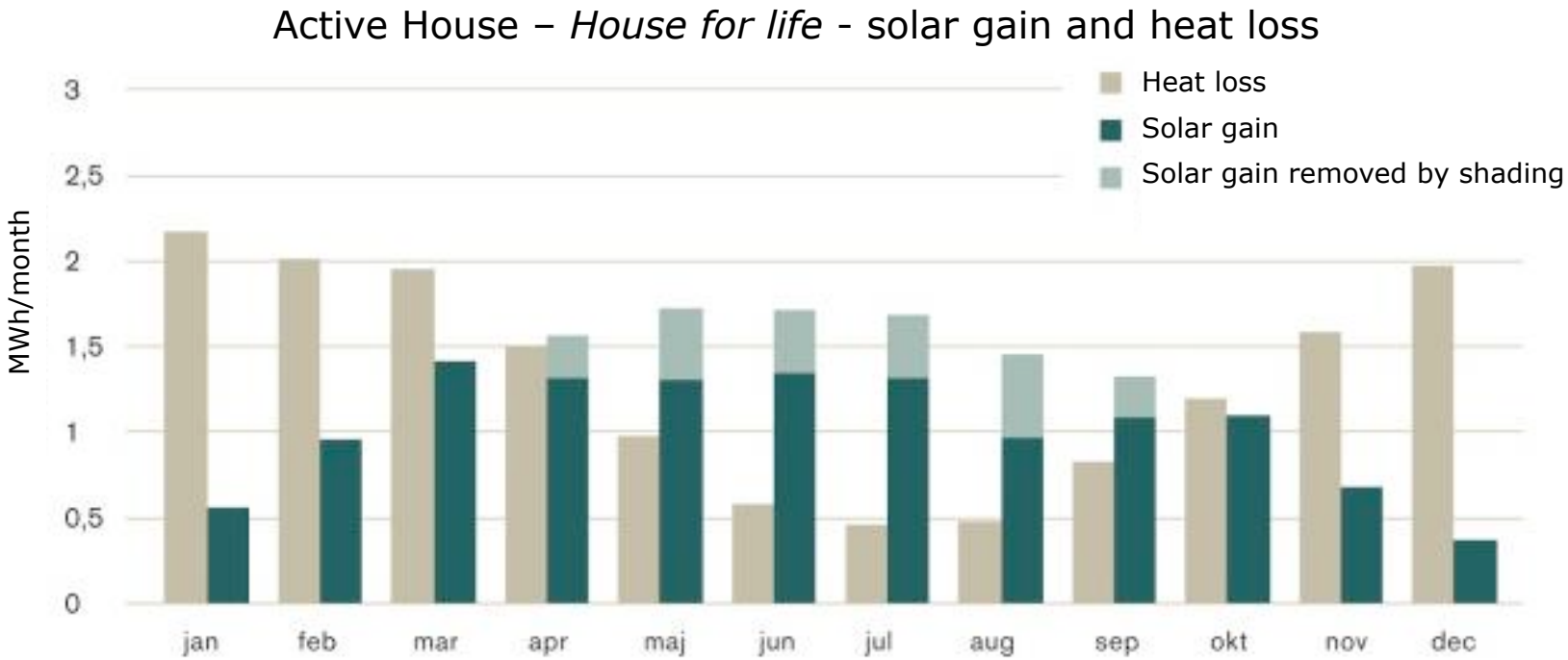
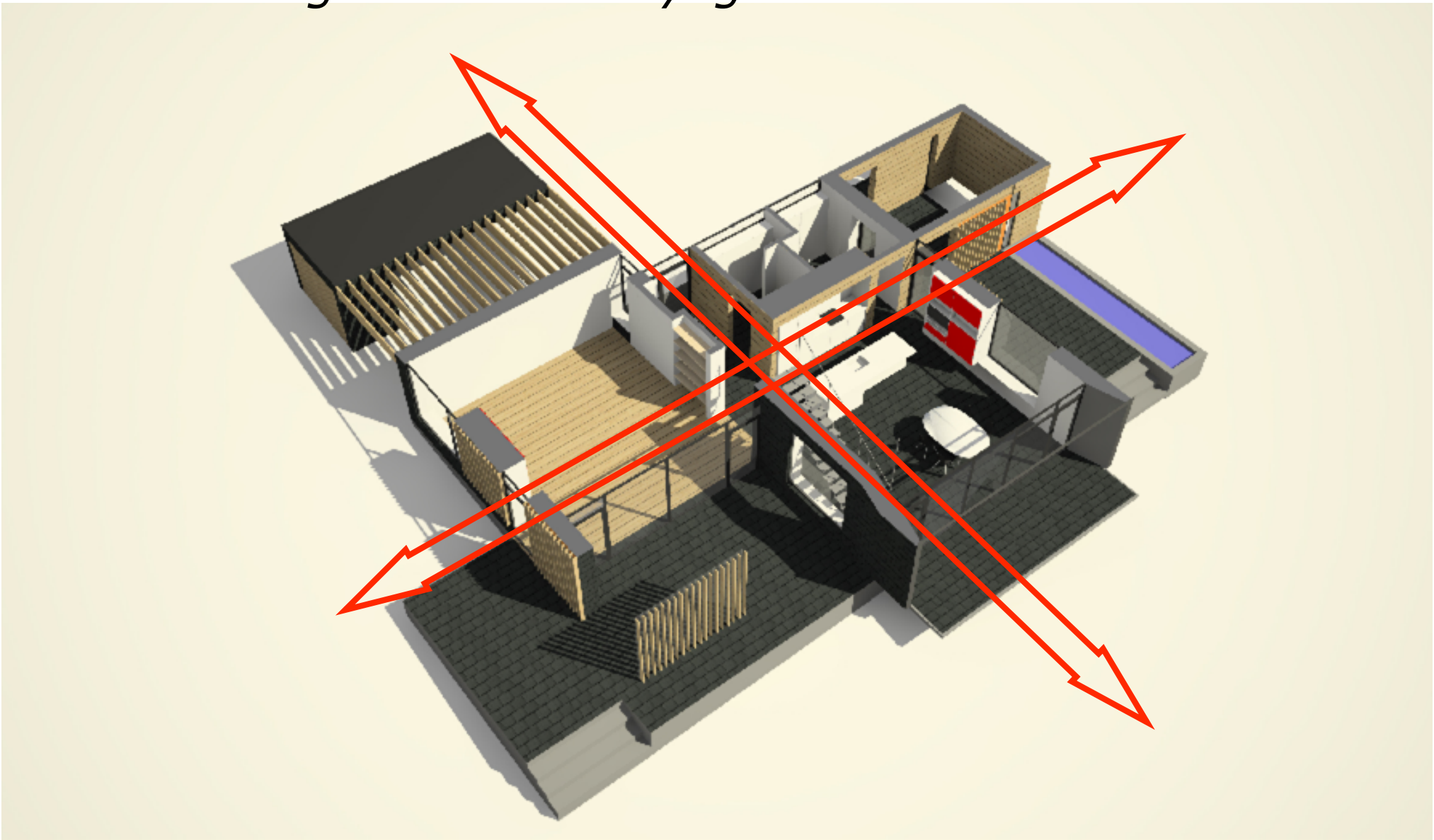


The first Active House

- design focus on daylight and comfort



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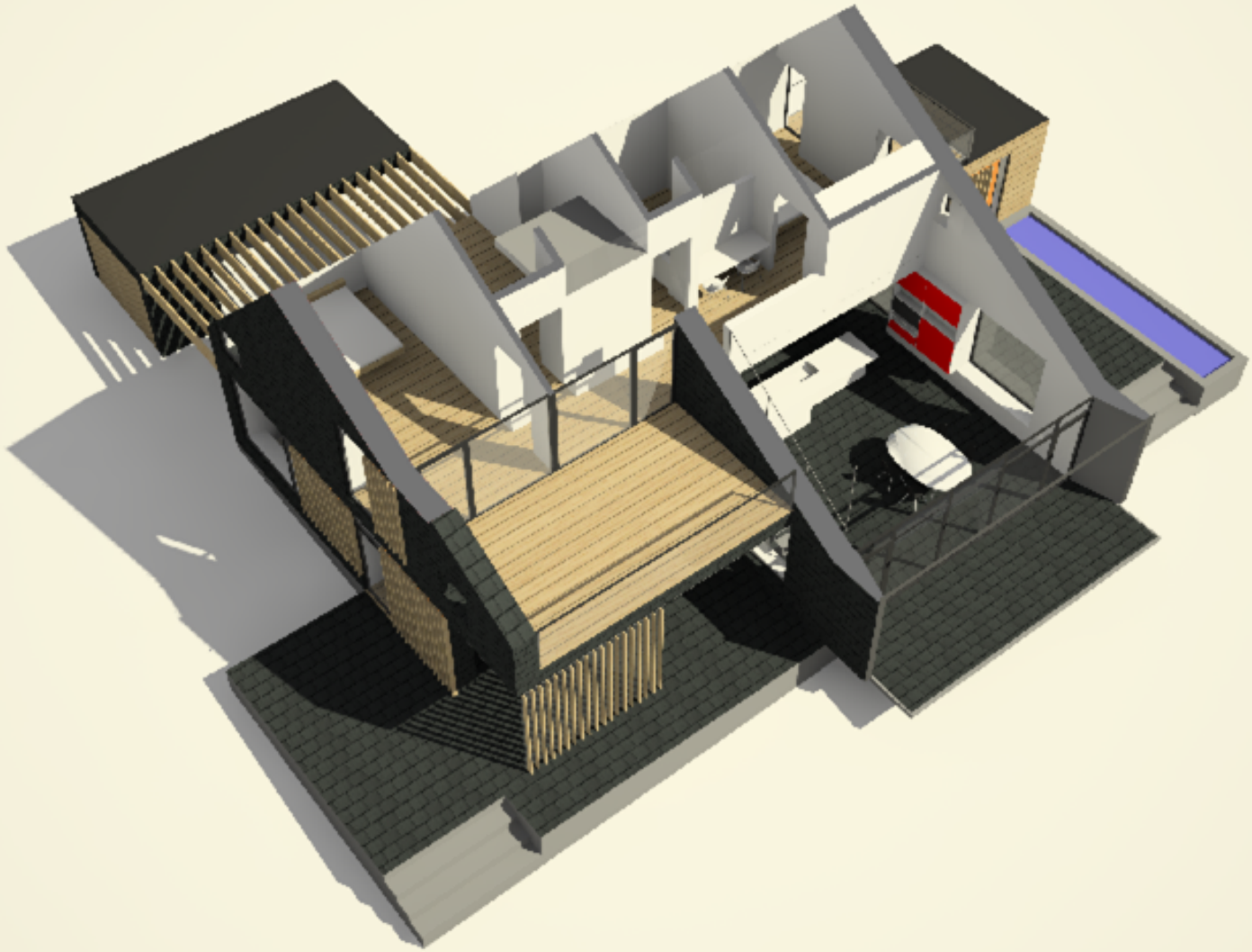

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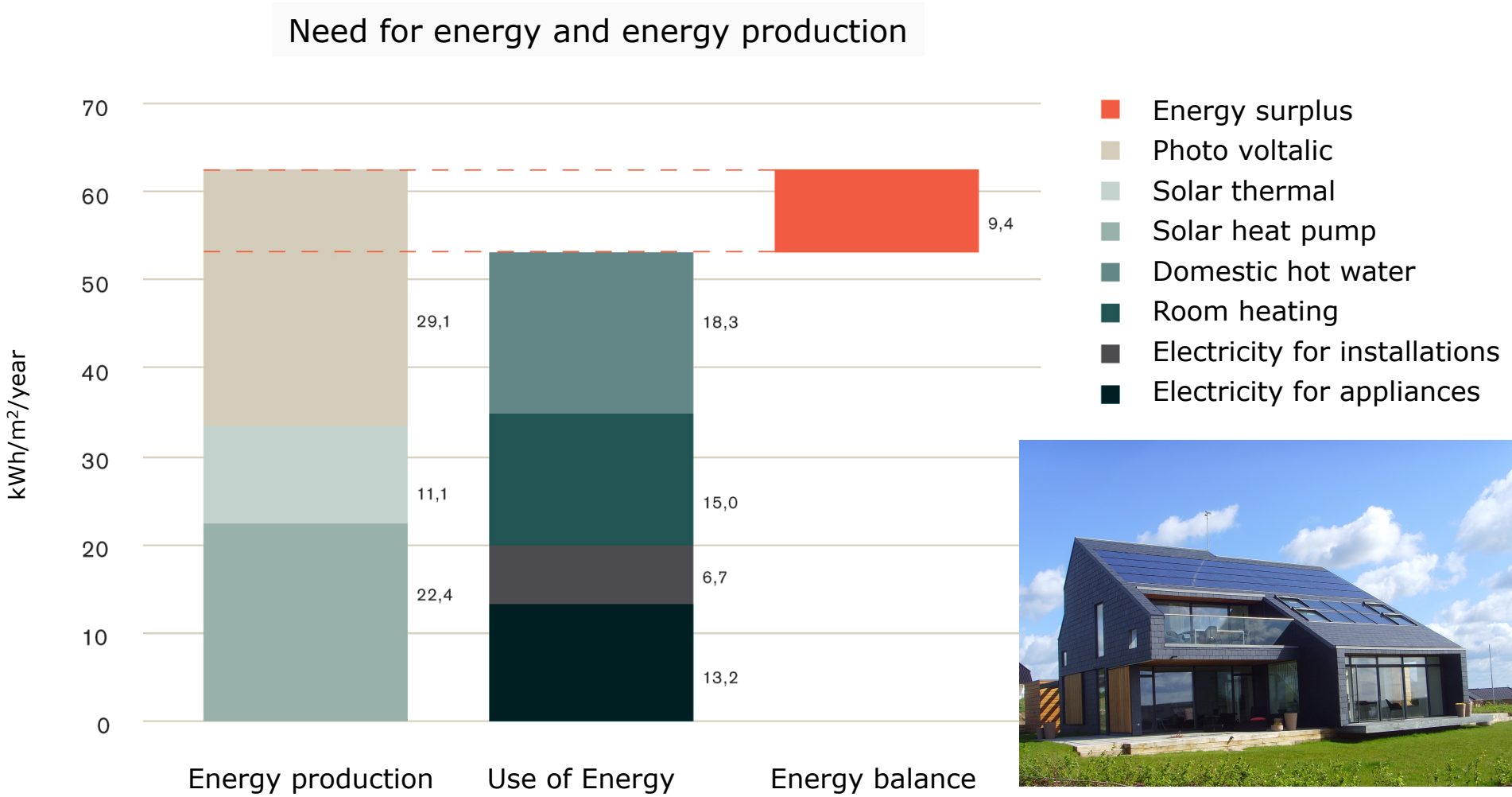
The first Active House
- overall energy balance

Energy



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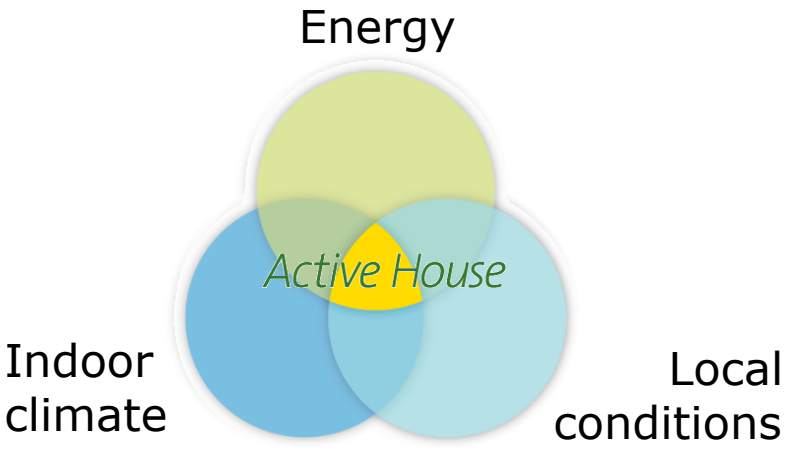
Active House
- the road forward



Development of network

Define a common methodology and standard inspired by the different national standards like “sustainable homes”

Define individual targets/ requirement within:

-Energy

-Indoor climate

-Local conditions

Follow the development on
www.vkractivehouse.com

Registration as interested partner at:
activehouse@vkr-holding.com