



STATE OF WASHINGTON, DISTRICT HEATING AND MOBILITY **BUILDING ENERGY POLICIES DENMARK**

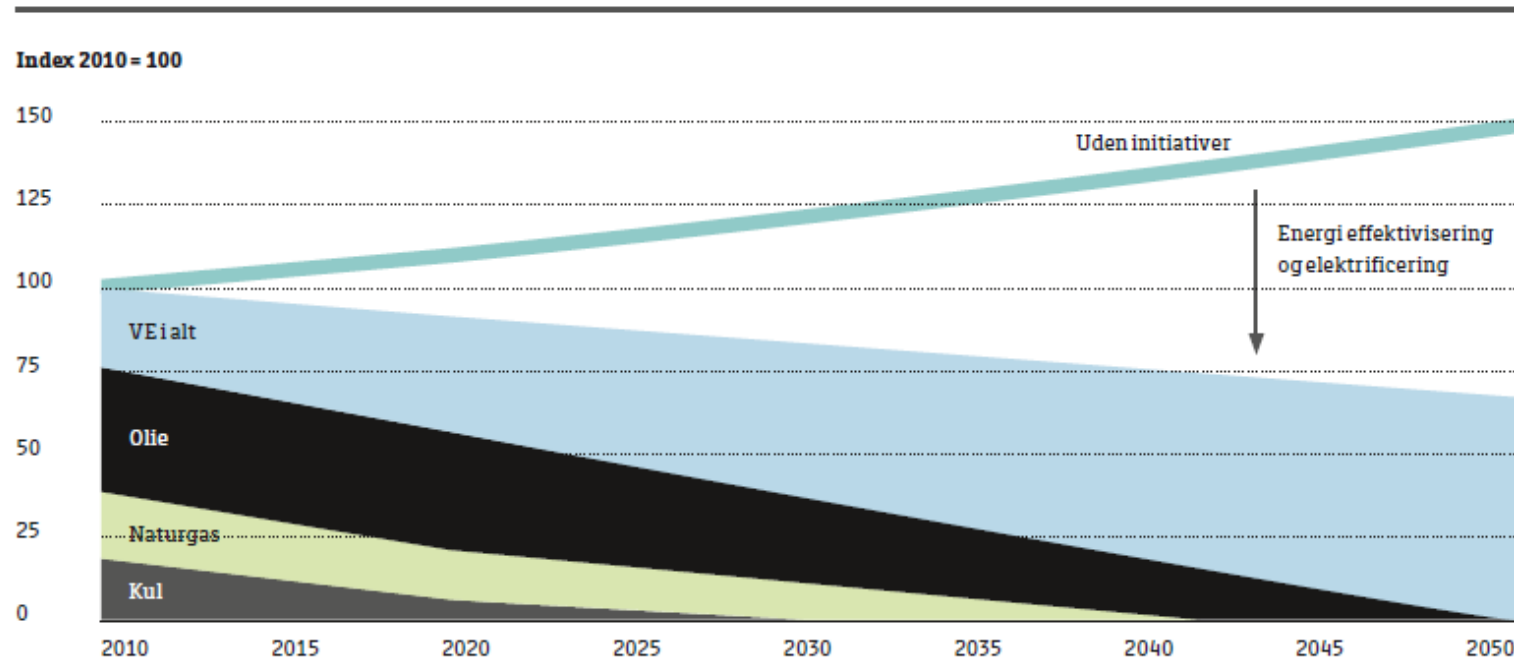
DANISH ENERGY AGREEMENT, MARCH 2012

Goal: independency of fossil fuels in 2015

Requires:

- Energy efficiency
- Decarbonisation of the energy system

Figur 1 Udviklingen i energiforbruget frem mod 2050



Kilde "Vores energi"

STRATEGY FOR ENERGY RENOVATION OF BUILDINGS (2013)

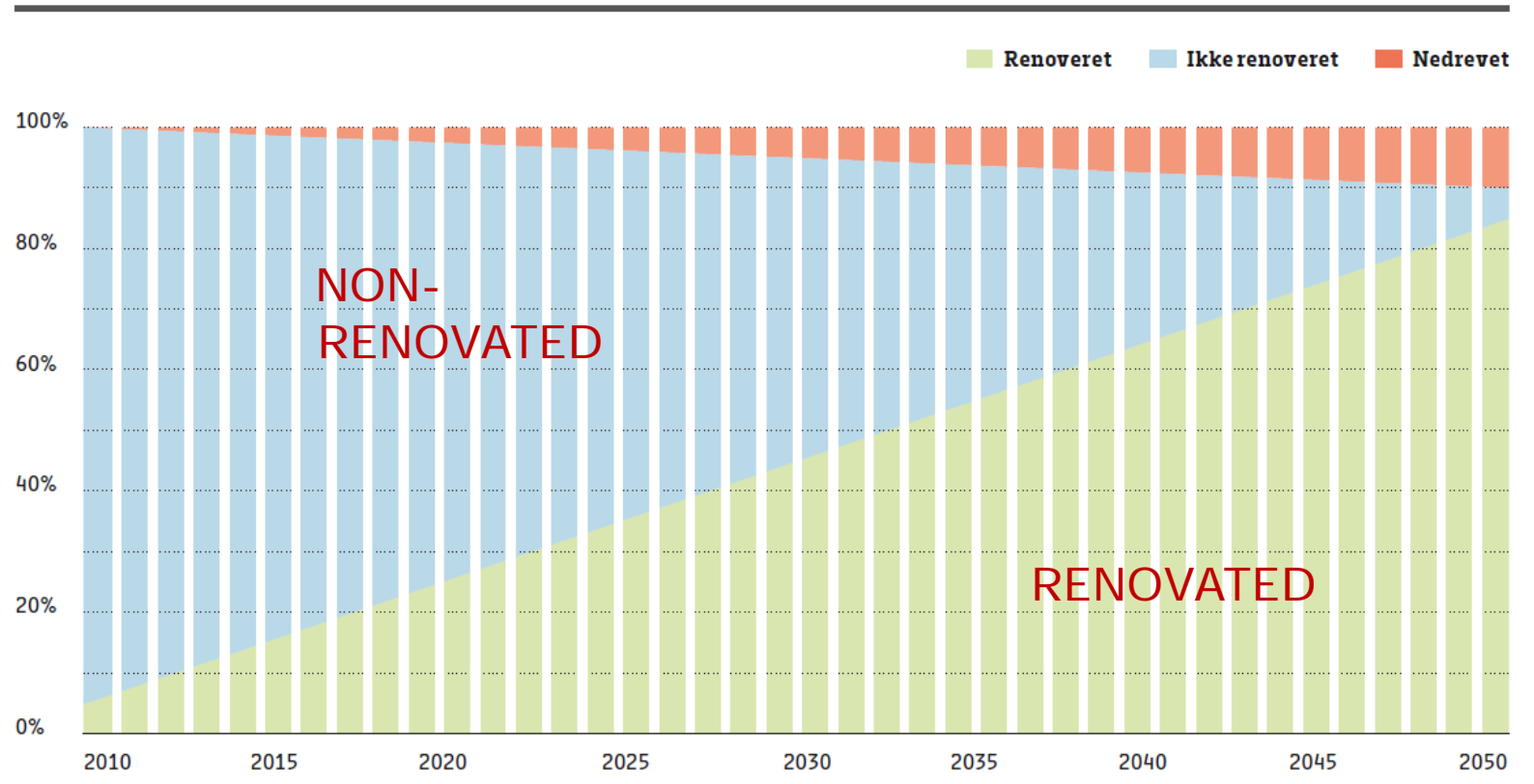
MAJOR PART OF BUILDINGS TO BE RENOVATED

Strategi for energirenovering af bygninger

Vejen til energieffektive bygninger i fremtidens Danmark



Figur 7 Energirenovering af bygninger



Note Der er alene tale om en illustration af, at hovedparten af bygningerne skal renoveres frem til 2050.

Kilde Energistyrelsen

BUILDING REGULATION REQUIREMENTS

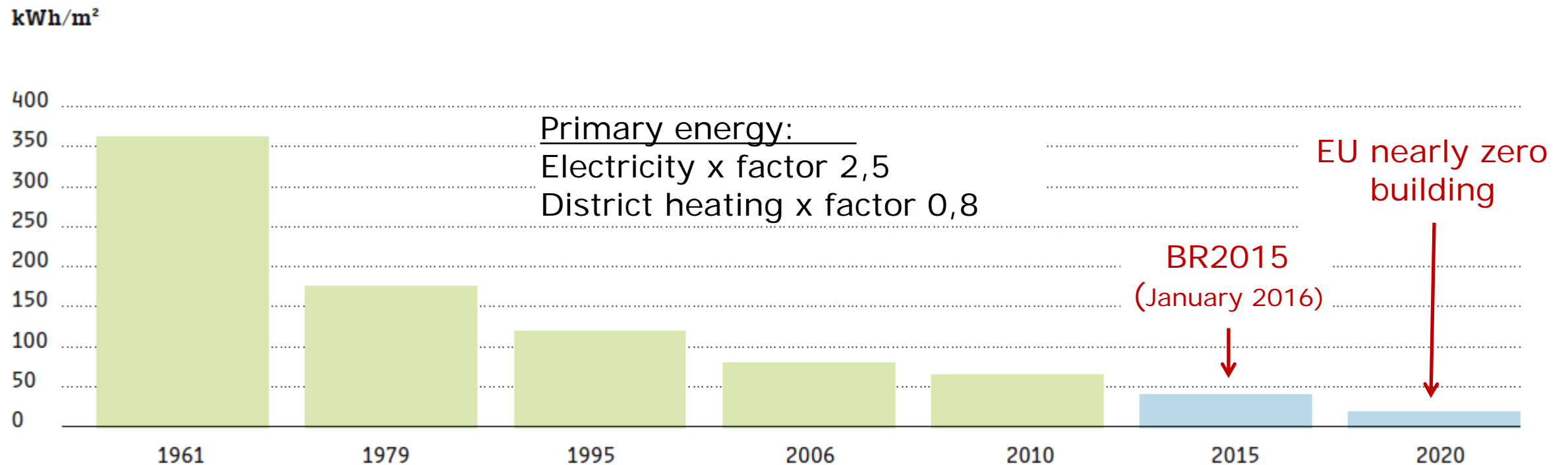
DOMESTIC BUILDINGS (KWH/M² PER YEAR)

Strategi for energirenovering af bygninger

Vejen til energieffektive bygninger i fremtidens Danmark



Figur 2 Energiforbrug til bygningsdrift af nye bygninger

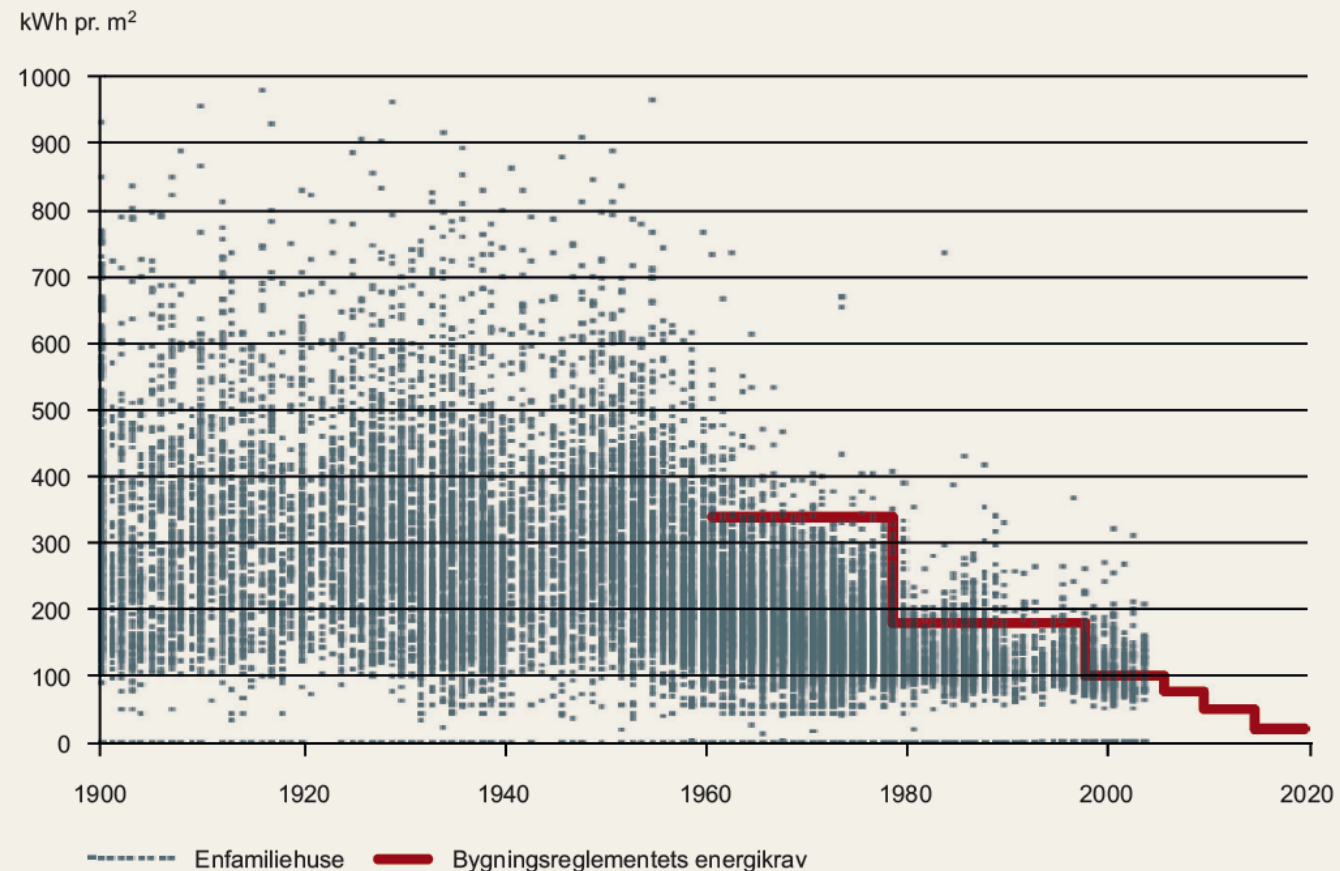


Kilde Energistyrelsen

EFFECTS OF BUILDING REGULATIONS

DOMESTIC BUILDINGS

Figur 9. Energiforbrug i enfamiliehus til opvarmning, køling, ventilation og varmt vand efter opførelsesår sammenholdt med bygningsreglementets krav



Kilde: Statens Byggeforskningsinstitut (SBI), 2004, og Erhvervs- og Byggestyrelsen, 2008.

BUILDING REGULATION 2015 REQUIREMENTS

New buildings

- Max. 30,0 kWh/m² year for domestic buildings, hotels and dorms. (~ 3 kWh/sqrf yr)
- Max. 41,0 kWh/m² year for offices, schools, institutions, (hospitals). (~ 4 kWh/sqrf yr)
- Primary energy:
 - Electricity x factor 2,5
 - District heating x factor 0,8
- Minimum indoor climate demands for domestic building
- Low energy Building Class 2020 is still voluntary.

VOLUNTARY ENERGY LABELS FOR EXISTING BUILDINGS

Existing buildings


- Component demands: Minimum requirements for envelope, windows and technical installations

Existing buildings – voluntary energy labels

Voluntary energy labels as an alternative to component demands.

- Minimum improvement: 30 kWh/m² year.
- Renovation Class 1 og 2 for domestic buildings and offices.

Skalatrín	Grænseværdi i kWh/m ² ár
A2020	< 25
A2015	< 41
A2010	< 71,3 (Renoveringsklasse 1)
B	< 95,0
C	< 135 (Renoveringsklasse 2)
D	< 175
E	< 215
F	< 265
G	> 265



Energimærkningsskala for handel, service og offentlige bygninger pr. 8 september 2013



EU DIRECTIVE 2012/27/EU – CHAPTER II

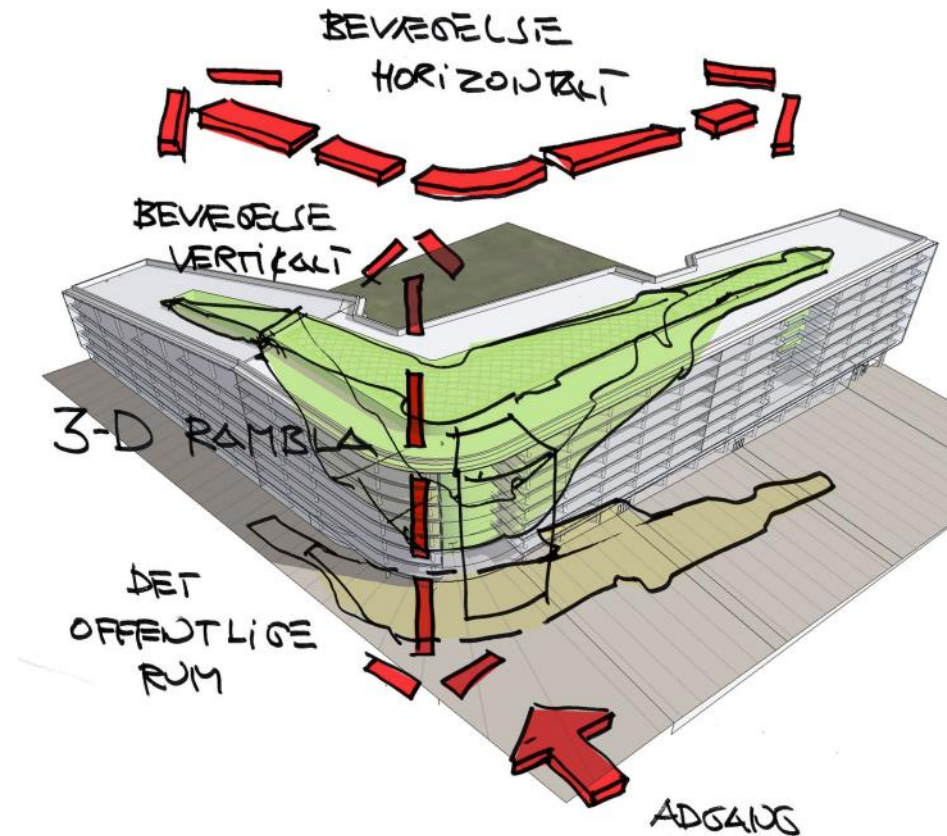
- Chapter II - Efficiency in energy use
 - Building renovation
 - Exemplary role of public bodies' buildings
 - Energy efficiency obligation schemes
 - Energy audits and energy management systems
 - Metering
 - Purchasing by public bodies

Ramboll Head Office



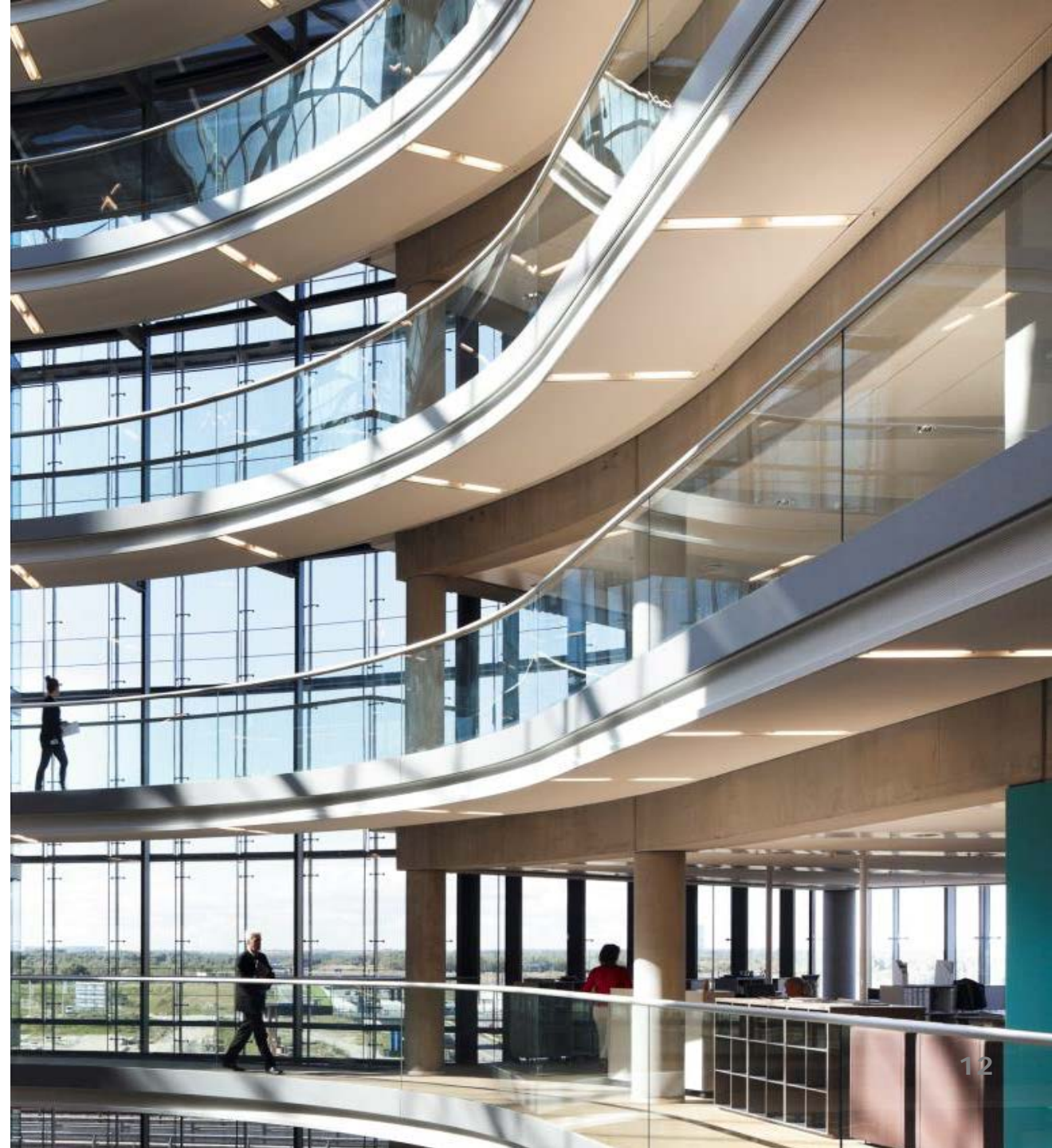
FOCUS AREAS FOR THE NEW HEAD OFFICE

- Transparency, cooperation and knowledge sharing
- Sustainability
- 50% reduction of the operational costs compared to previous locations
- Life Cycle Costs (LCC) indoor climate and architecture
- “The Rambla” in Barcelona inspired the architect to design the atrium

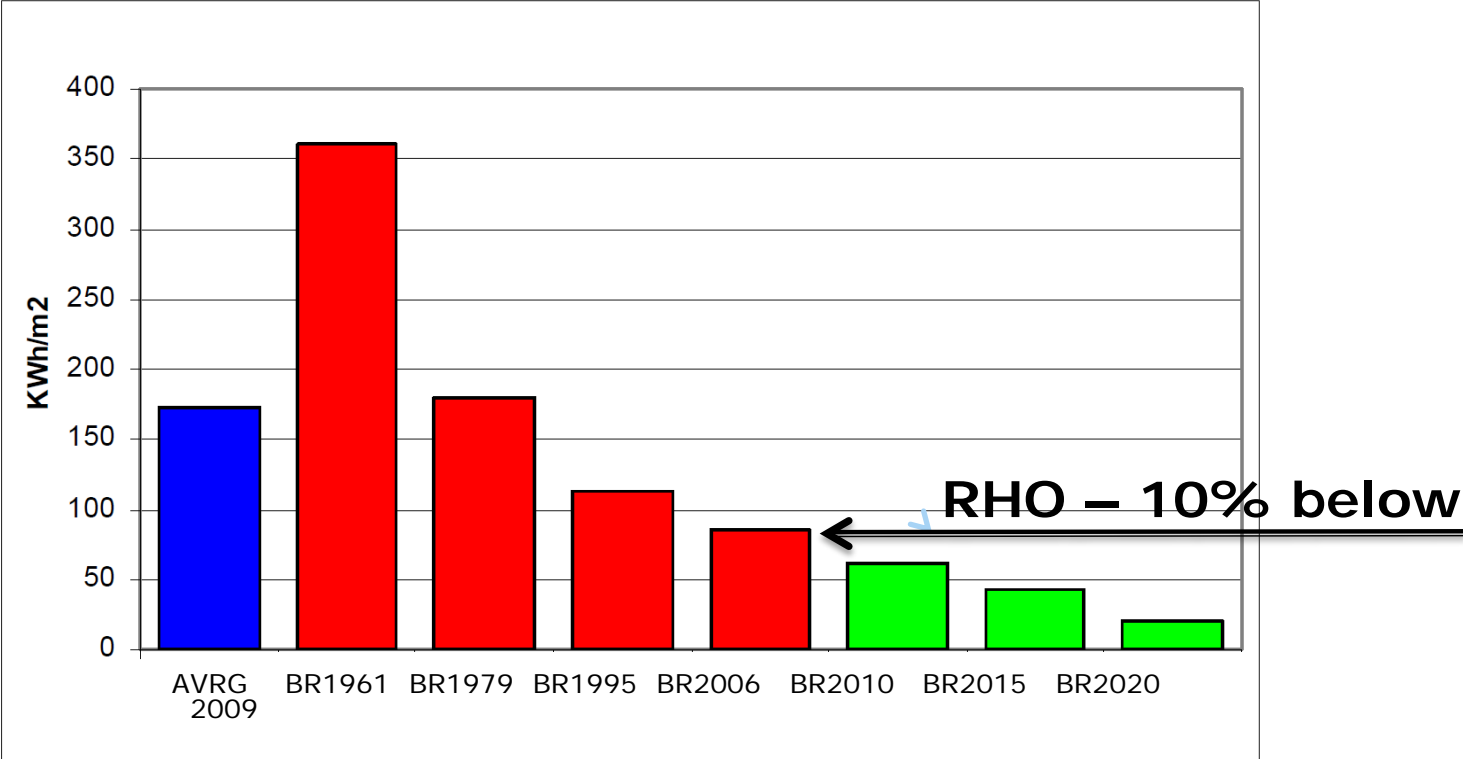


INDOOR CLIMATE RHO

- Daylight
 - Work spaces by facade
- Acoustics
 - Double facade towards highway / metro)
- Thermal
 - External solar shading
 - Chilled beams
- Air quality
 - CAV ventilation in office areas
 - VAV ventilation in meeting rooms (100% fresh air)
 - Large air volume in atrium as buffer.

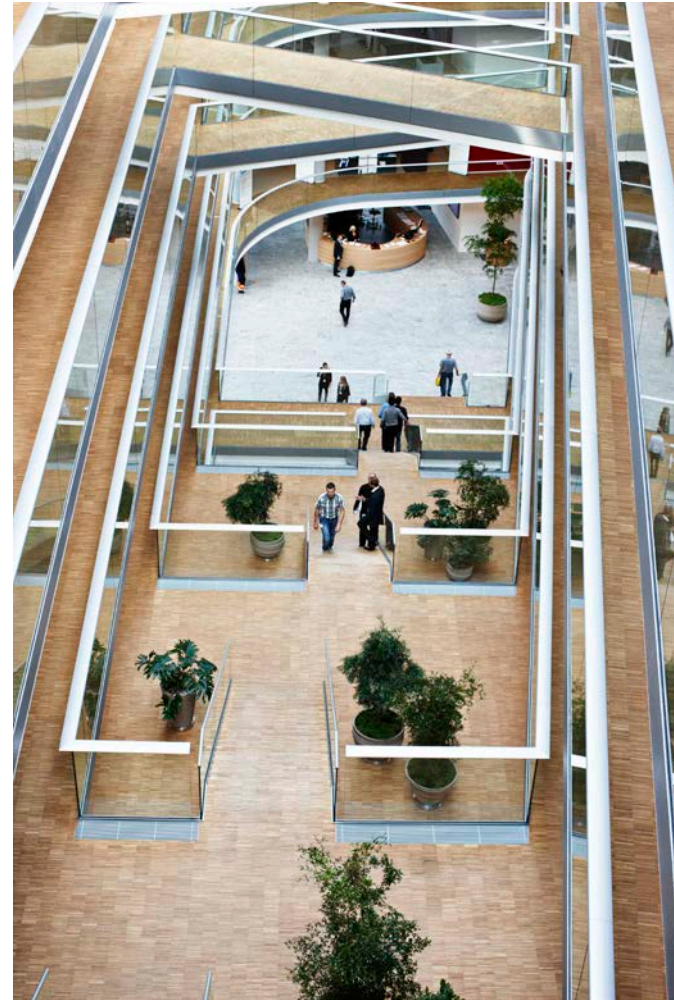


DANISH BUILDING CODES DESIGN CRITERIA FOR MAXIMUM ENERGY USE



SUSTAINABLE SOLUTIONS

- District heating with low carbon emissions
- Ground water cooling system
- Water born heating with radiators
- Water born cooling with chilled beams
- Energy efficient mechanical installations
- Energy efficient office equipment
- Video conference systems
(reduces transport)



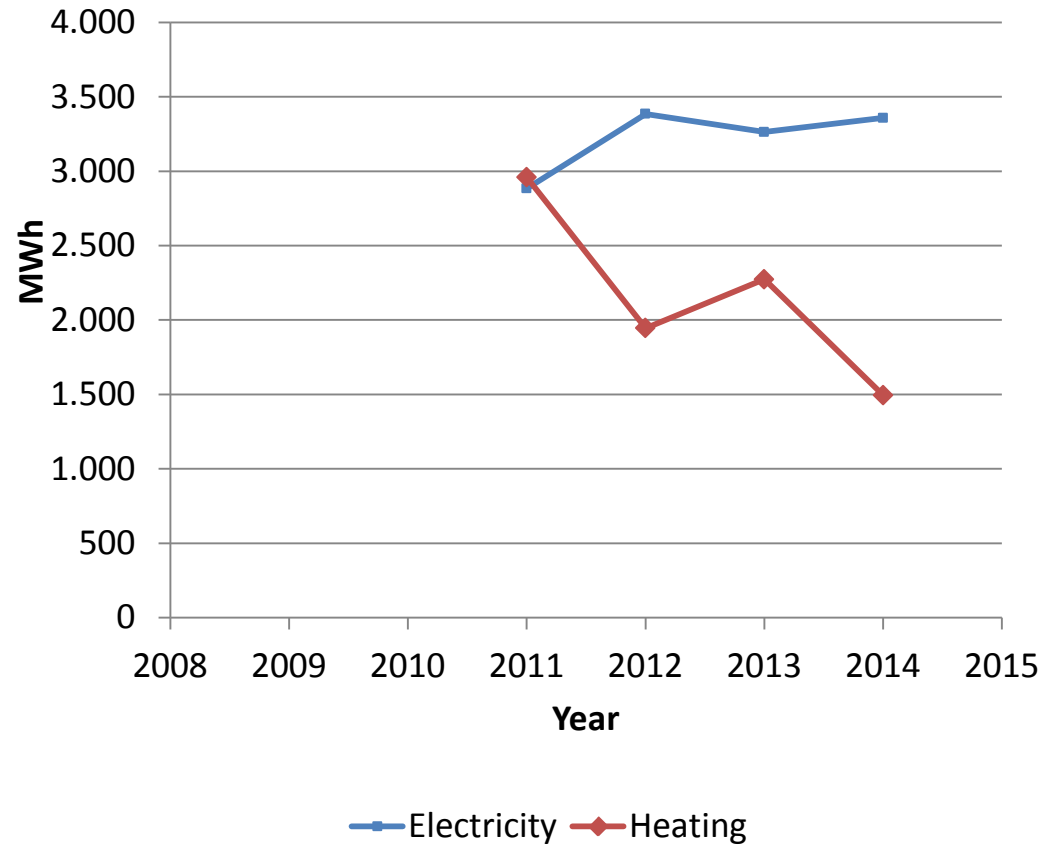
SUSTAINABLE SOLUTIONS

- Collection and reuse of rainwater for toilet flushing on site saves 2500 m³ drinking water pr. year (1/3 of annual consumption)

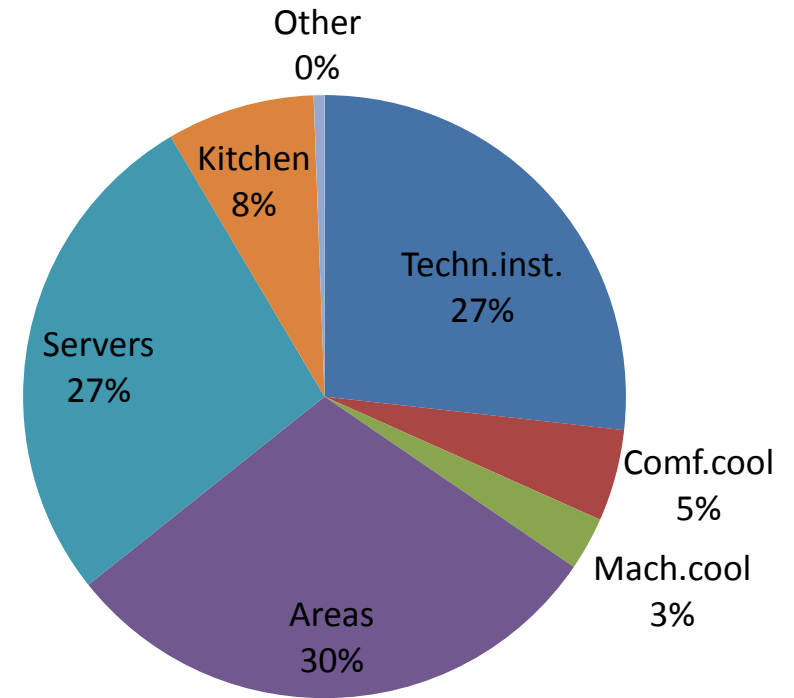


RAMBOLL HQ – ENERGY

Electricity and heat consumption



Electricity distribution





THANK YOU.
QUESTIONS?