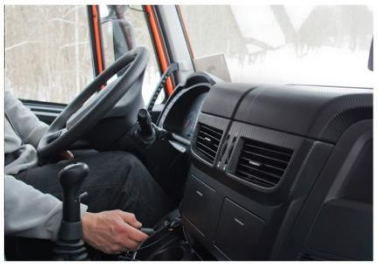
Trafik-, Bygge- og Boligstyrelsen
Danish Transport, Construction and Housing Authority

Energy performance of buildings in Denmark





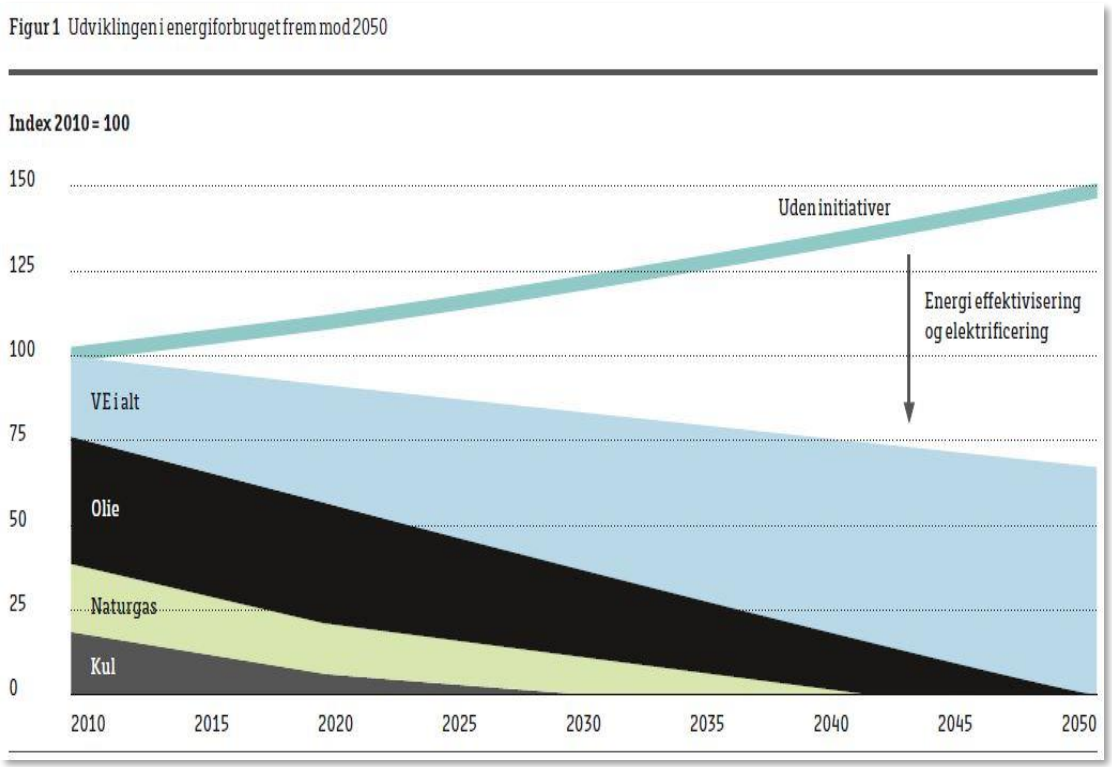


Trafik-, Bygge- og Boligstyrelsen
Center for Buildings

Transport-, Bygnings- og Boligministeriet

The challenge

100 percent RES i 2050



A important assumption: Transition to renewable energy **and** a large reduction of the energy consumption

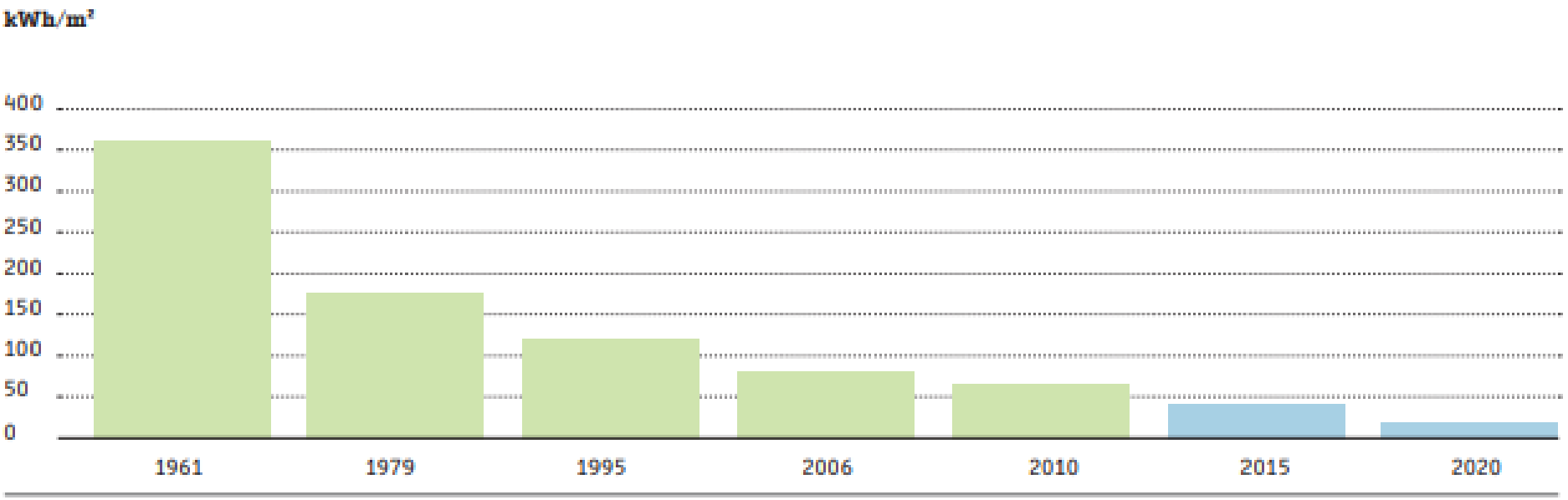
Requirements for new buildings

- Requirements based on ”energy frame”, which is the danish implementation of the energy performance of buildings from EPBD
- The energy frame at the moment
- Residential buldings:
  (30+1000/A) kWh/m2 per year
- Non-residential buildings
  (41+1000/A) kWh/m2 per year
- Its in primary energy
- Heating, cooling, ventilation, domestic hot water, lighting, pumps and renewable energy is counted
- We have developed a computer program, that can calculate the energy performance of buildings

Primary energy

- Primary energy factors at the moment
  - Electricity = 1,9
  - District Heating = 0,85
  - Other types of energy = 1,0

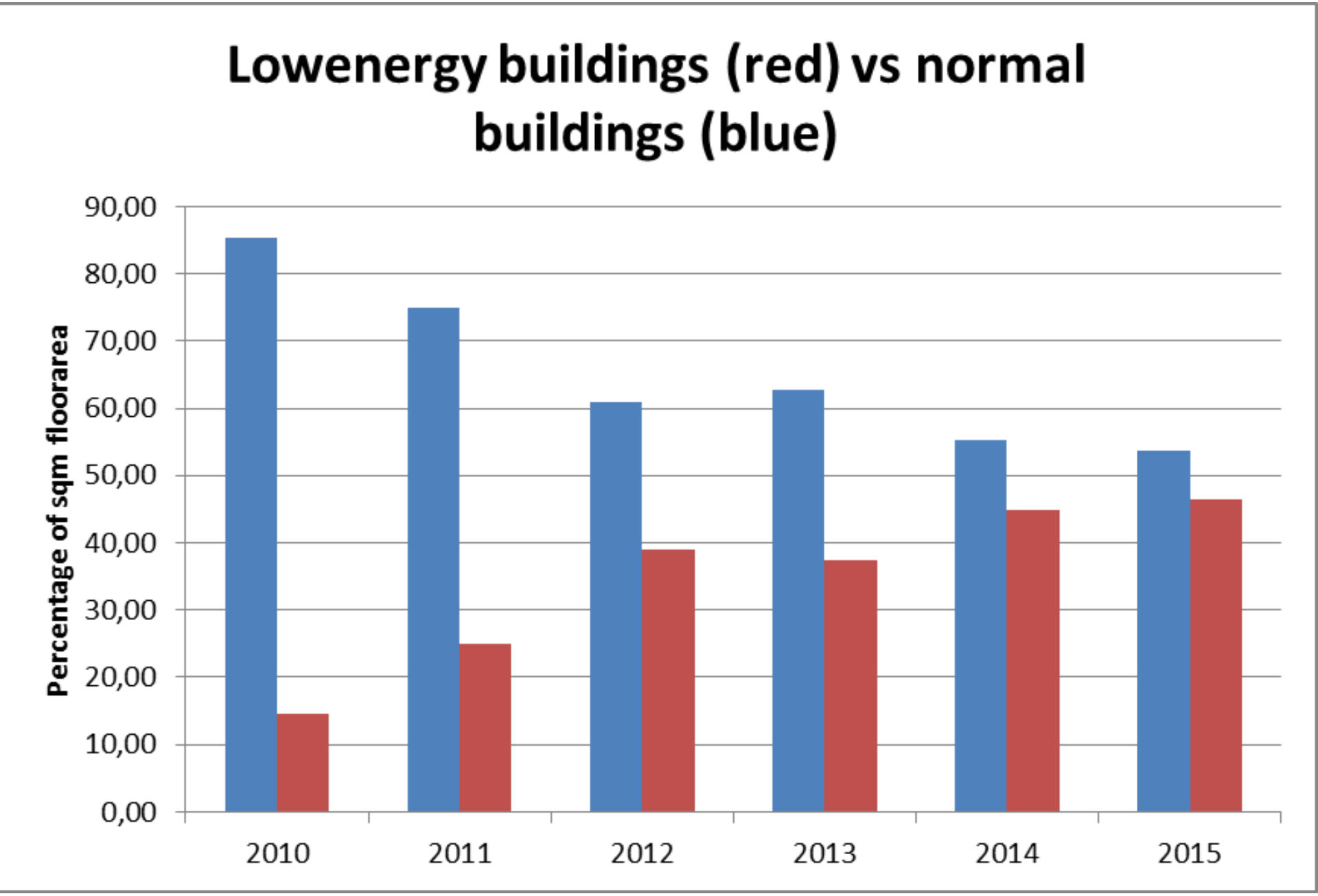
Development in requirements for new buildings
Case: One family house



Kilde Energistyrelsen

Introduction of future requirements

- We have introduced future requirements in the building regulations as low energy classes since 2006
- When the requirement was tightened i 2015, it had been possible to build according to that class since 2006
- It gives designers a way to prepare for the future
- At the moment we have one low energy class, but no intention of making it mandatory. It is simply to tight to be the minimum requirements in the building regulation.


Lowenergy buildings (red) vs normal buildings (blue)
Percentage of sqm floorarea
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
2010
2011
2012
2013
2014
2015

Requirements for existing buildings

- There are two equally valid ways of fulfilling the requirments for existing buildings that are renovated

1. Cost-effective measures should be implemented for the renovated building elements
2. Fulfilment of a energy frame, corresponding to the energy frame for new buildings

- Building owners decide for themselves which of the above ways to fulfill the requirements they will use.

Requirements for building elements

- If it is cost-effective, the U-values to the right should be fulfilled
- A lower insulation level could be cost-effective, even if fulfilment of the level in the tabel is not. In that case, the lower level of insulation should be completed

Building part	U value [W/sq. metre K]
Outer walls and basement walls adjacent to soil	0.18
Storey partitions and partition walls adjacent to rooms with a room temperature between the rooms of 5 °C or more	0.40
Ground slab, basement floors adjacent to soil and storey partitions to open air or a ventilated crawl space	0.10
Ceiling and roof structures, including cupboards under roof slopes, flat roofs and sloping walls adjacent to roofs	0.12
Gates	1.80
Hatches, storm windows and dome lights	1.40
Renovated storm windows	1.65
Building part	**Linear thermal transmittance [W/metre K]**
Foundations	0.12
Joint between outer wall, windows or outer doors, gates and hatches	0.03
Junction between roof structure and skylights or dome lights	0.10

Requirements for energy frame for existing buildings

- Two levels for energy frame for existing buildings. A minimum requirement and a more ambitious level for building owners, that want to go beyond the requirements
- Residential buldings:
  (70+2200/A) kWh/m2 per year
  (52,5+1650/A) kWh/m2 per year

- Non-residential buildings
  (95+2200/A) kWh/m2 per year
  (71,3+1650/A) kWh/m2 per year

Our requirements can be seen

Bygningsreglementet.dk

Link to the danish building regulation in English:

http://bygningsreglementet.dk/~/media/Br/BR-English/BR18_Executive_order_on_building_regulations_2018.pdf