

”But don’t you want a Danish solution?”

Transition elements in the delayed uptake
of the Passiv Haus concept in Denmark

Erik Hagelskjær Lauridsen
MAN/ Innovation and sustainability
Technical University of Denmark
ehl@man.dtu.dk

Passive Houses in Denmark



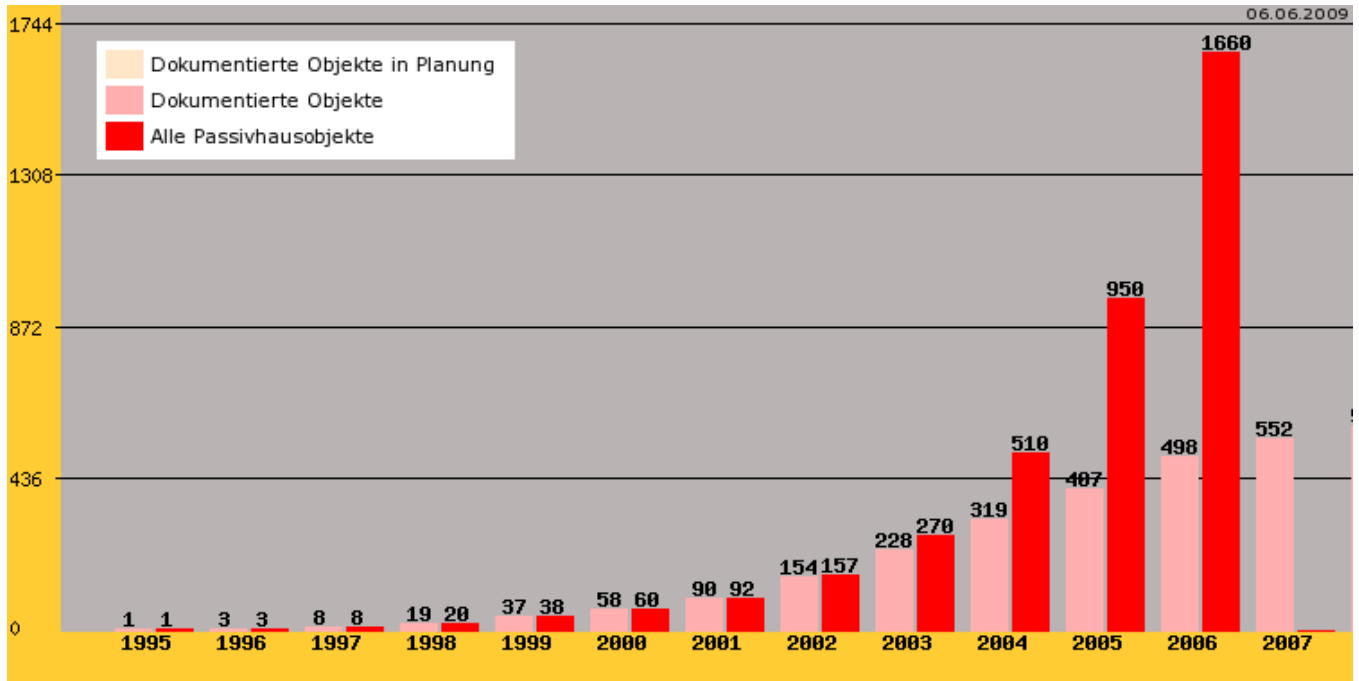
**Rønnebækshave II,
Marc 2006.
Photo: Domea.**

**Villa Langenkamp,
2008.
Photo: Olav
Langenkamp**



Passive houses in Germany and Austria

First pasivhaus in Darmstadt 1991.



Passive houses in Austria until 2006.

DtH 0-energy house 1973.

PassivHaus

Wolfgang Feist – Darmstadt

Inspiration from the 0-energy house

Experimental buildings in the period
1988-1992:

Insulation

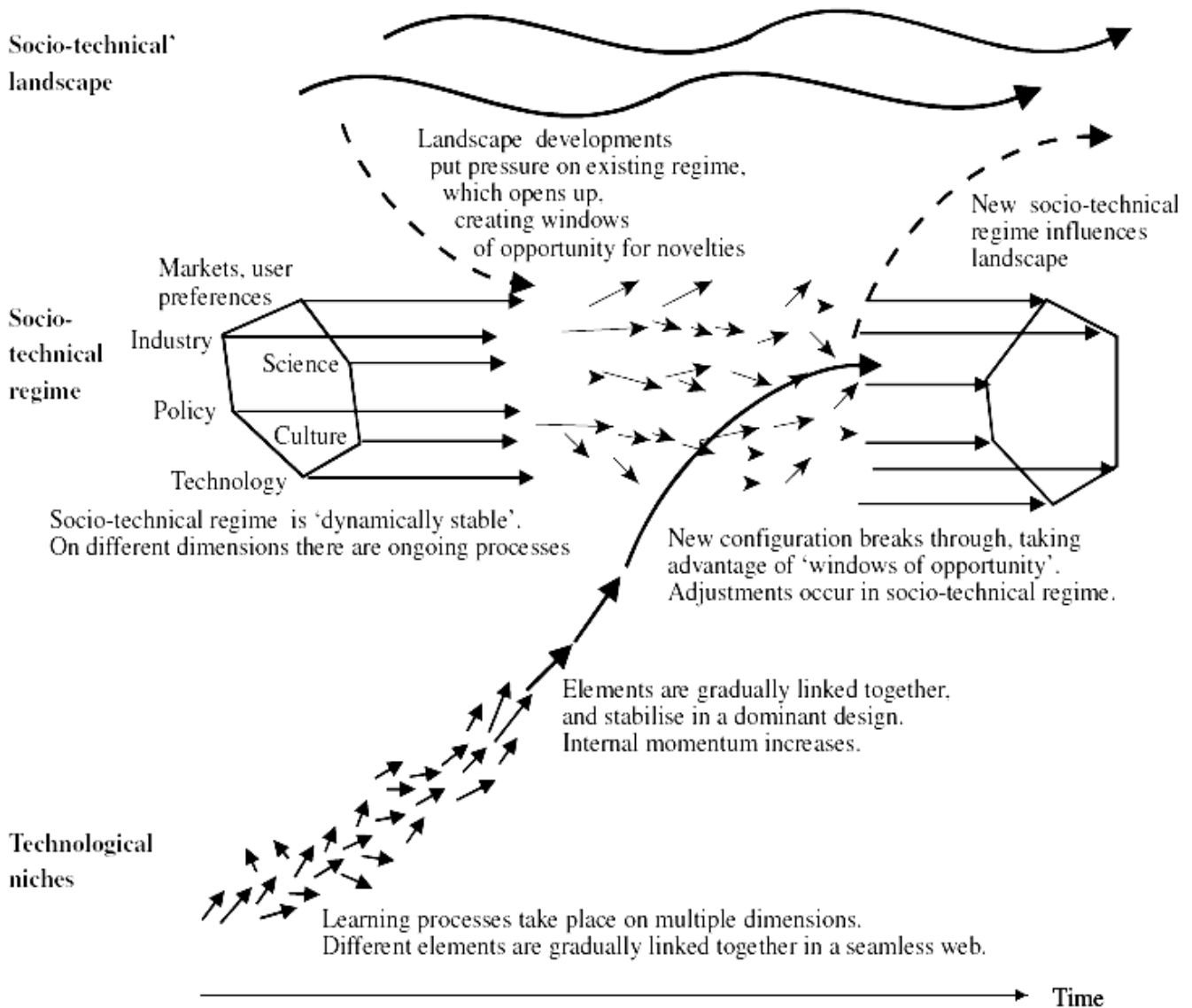
Windows and doors

Air tight construction and ventilation with
heat recovery

Heating max 15 kWh/m²*year

Certified components for ventilation,
doors and windows.

A multi level perspective on system innovation



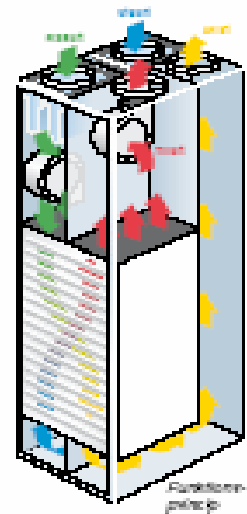
Components

- Innovation in the building sector originate from component manufacturers

- Insulation



- Windows



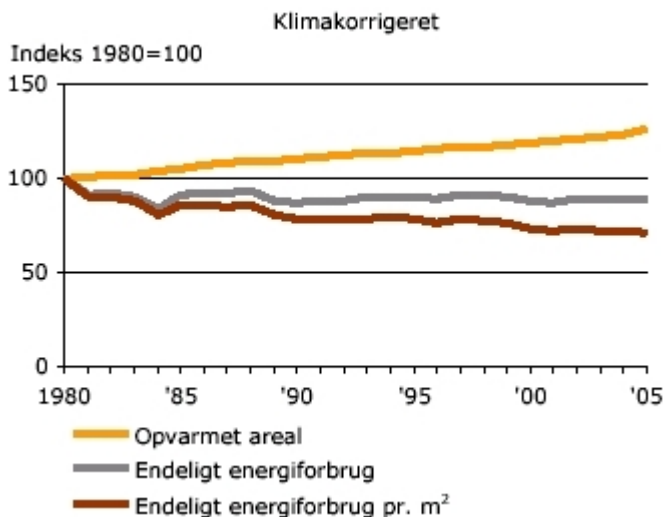
- Ventilation

The worlds best building code

BR 61	Minimum insulation standards
BR 77	Increased insulation requirements + max windows area
BR 82	Max heating energy app. 120 kWh/m ² *year
BR 95	Total energy app. 95 kWh/m ² *year
BR08	Total energy app. 85 kWh/m ² *year Low energy class 2: 62 kWh/m ² *year Low energy class 1: 43 kWh/m ² *year

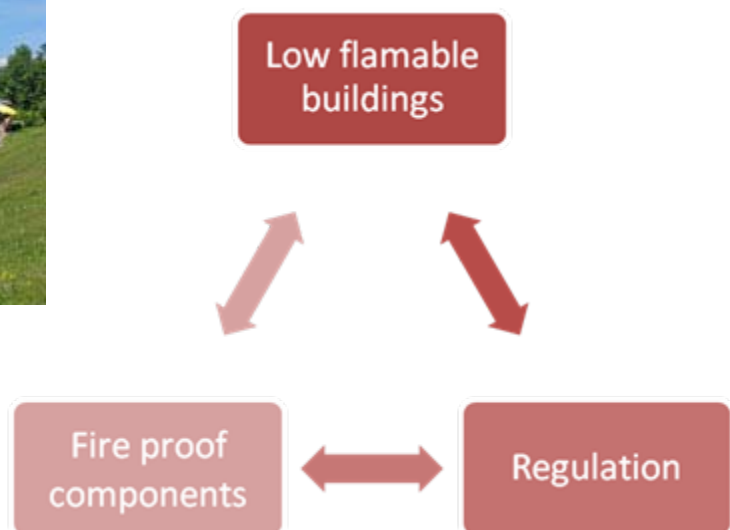
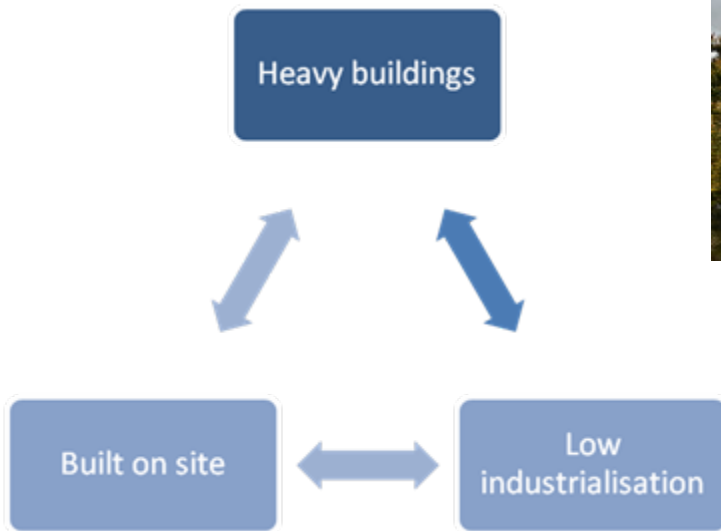
Danmark 85 kWh/m²
Sverige 110-130
kWh/m²
Norge 135 kWh/m²
Finland -
Tyskland 122 kWh/m²

(Erhvervs- og byggestyrelsen)



(Miljø- og energistyrelsen)

Standards and tradition



Social housing cooperatives as implementers

- 20% of housing stock – 500.000 dwellings in Denmark
- Tradition for testing of sustainability components as :
 - Passive solar heat,
 - Rainwater storage and reuse
 - Heat pumps
 - Ventilation with heat recovery
- Experiences are shared
- Associated group of consultants
- Depend on access to low interest, state guaranteed loans
 - Fixed margin of expenditure

Professional networks

- Public housing consultants
- Technology specialists (water, solar heat, heat pumps etc)
- Researchers at the technical university and building research institute
- After year 2000 slowly taken up by architectural schools
- A handful of enthusiasts eventually succeed in introducing the passivhaus standard in DK
- "But don't you want a Danish solution?"

Sustainable houses 1: Pioneer projects



Sustainable houses 2: The intelligent house



Translations performed by passivhaus



Energy security

Economy and energy
consumption

Indoor climate and
convenience



Comfort



Why are the passivhaus elements not integrated?

- Bad fit with the traditional heavy brick and concrete buildings
- Bad fit with existing component manufacturers strategies – notably the window industry
- The implementing network of public housing cooperatives are economically strained

Stability of Danish low-energy building regime

- Elements of a low-energy building regime already existed in DK
- Most of these elements are quite stable, notably:
 - A strong building tradition
 - A dominant group of component manufacturers
 - The worlds best building code – which is continuously developed
- High energy prices of the winter 2008 may only have established a temporary window of opportunity