

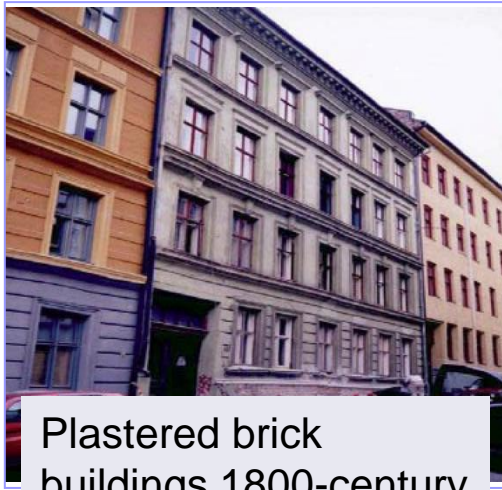
Impact on improved energy efficiency from preserving cultural values of buildings in Norway.

Seminar Oslo 26.02.2015

Content

- Main conclusions of the study (Norconsult & Miljøanalyse):
 - Further knowledge of energy efficiency in existing buildings – potential for energy saving in selected types of buildings with and without consideration of the cultural heritage
- <http://www.byggogbevar.no/miljoe-og-enoek/artikler-miljoe-og-enoek/ny-rapport-om-energieffektivisering-og-bevaring.aspx>
or <http://www.riksantikvaren.no/Tema/Energisparing/Gode-raad-om-energisparing/Energisparing-eller-bygningsvern-Ja-takk-begge-deler>
- An extension of the above study:
 - A comparison of indoor insulation and outside application of plaster with aerogel.

The selected building categories



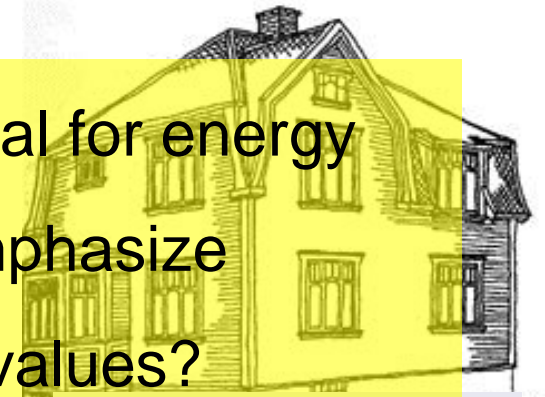
Plastered brick buildings 1800-century

Log buildings with wood

panel pre-1900

How much is the potential for energy saving reduced if we emphasize preservation of cultural values?

And, what does it cost?



Single family homes 1900-1940



Pre-war rental apartments

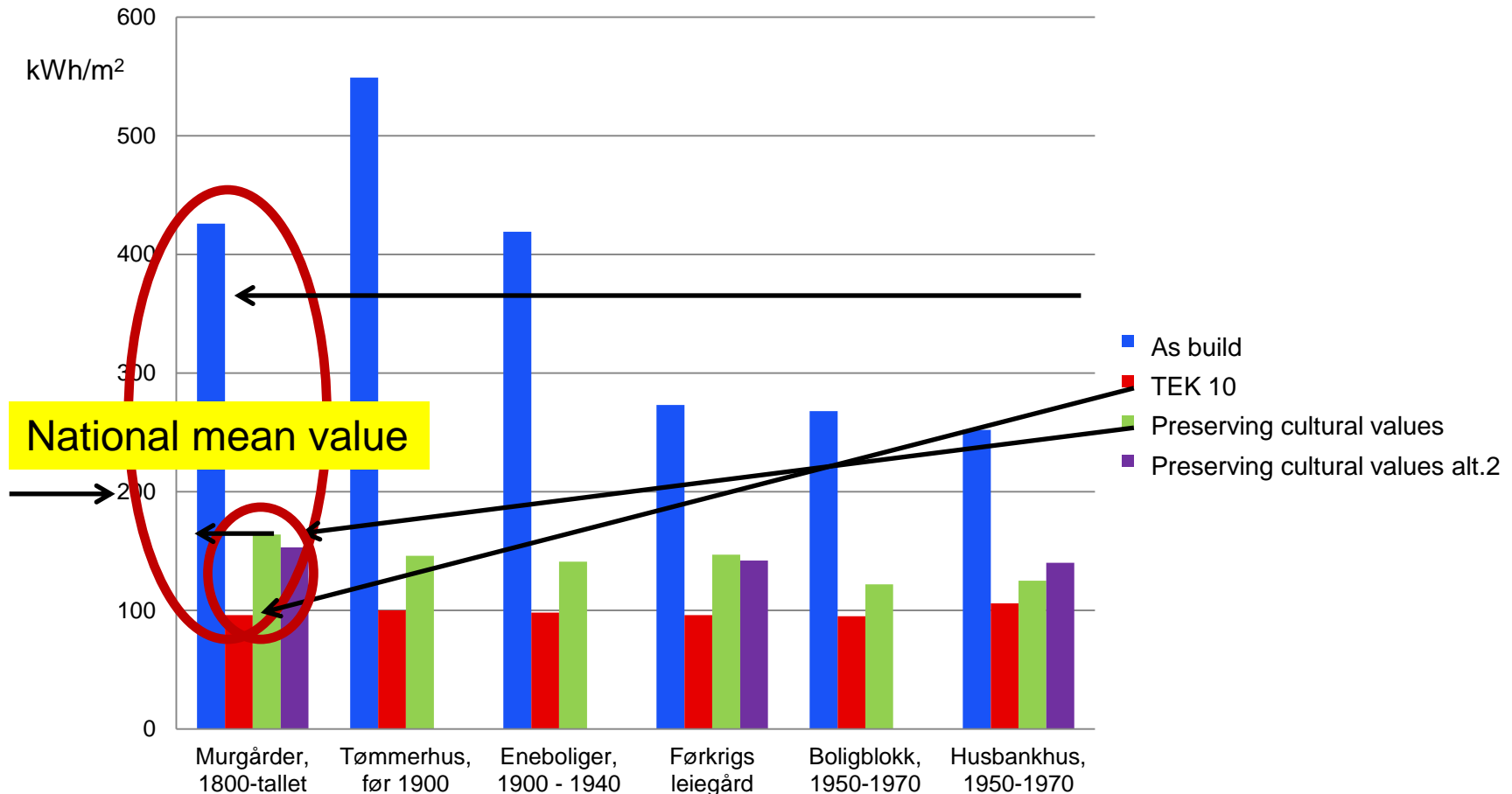


Apartment buildings 1950-1970



Houses supported by the Norwegian State Housing Bank 1950-1970

Specific energy demand



Estimated floor area

	mill m ²
Plastered brick building 1800-century	2,8* – 3,7
Log houses	0,8* – 3,5
Single family homes 1900 - 1940	18
Pre-war rental apartments	5
Condominiums 1950 - 1970	11
Homes 1950 - 1970	37

Verdiene merket med * er beregnet ut fra antall i Sefrakregisteret og eksempelbyggets areal. For husbankhus er Husbankens statistikk lagt til grunn. De øvrige er beregnet ut fra SSBs statistikk over antall og størrelse.

Reduced energy saving potential when emphasizing cultural values

	TWh
Plastered brick buildings 1800-century	0,4 / 0,2*
Log houses	0,1 / 0,04*
Single family house 1900 - 1940	0,9
Pre-war rental apartments	0,3
Apartment buildings 1950 - 1970	0,4
Homes 1950 - 1970	0,7
Total	2,8

These numbers are the difference between complying with the building code, TEK 10, and substantial measures including indoor insulation without altering the facade and windows.

* Values based on data from SEFRAK

What if we use plaster with aerogel on the outside of the 1800-century brick buildings?

- Replacing inside insulation with aerogel on visible facades (front and back) reduces energy consumption slightly.
 - Other measures, e.g, insulating the gable walls towards the adjacent buildings, entryway, etc. contributes more to the energy performance



Measures applied to reduce energy demand

- Insulation of external facade
- Additional glazing mounted inside existing window
- Insulation of the floor towards basement
- Insulation of the floor in the loft
- Automatic reduction of indoor temperature at night

Exstended use of plaster with Aerogel

- Aerogel on other outside surfaces reduces thicknes of insulating layer (20 cm → 15 cm)
- Apply same thickness as original calculation on other surfaces than street facing facade reduces annual energy demand from 168 to 140 kWh/m²

Energy saving potential

- The technical energy saving potential of all apartment buildings build before 1956 is estimated at 1,21 TWh.
Kilde; Enova 2011, Potensial og barrierestudie – energieffektivisering i norske bygg
- The energy saving potential by applying 4 cm of aerogel on front and back facade of all 1800 century plastered brick buildings I estimate at 0,15 – 0,2 TWh.
- That is 12 – 17 % of the potential.
- However, a small part of total technical potential (13,4 TWh) in residential buildings.

Summary

- Applying 4 cm of aerogel on the outside facade improves the energy saving slightly compared to indoor insulation.
- The other measures applied in the study contribute more to the energy saving
- Compared with the technical potential for energy saving estimated by Enova it may amount to 12 – 15 % despite its small share of floor area.