Mikael Hildén[1], Anna Lemström[1], Paula Kivimaa[2] and Miimu Airaksinen

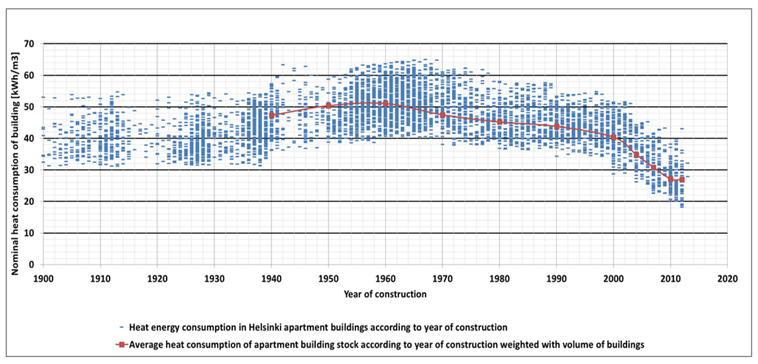
1) **Finnish Environment Institute SYKE**, P.O. Box 140, FI-00251 Helsinki, Finland
E-mail: mikael.hilden@ymparisto.fi

2) Science Policy Research Unit SPRU, Centre for Innovation and Energy Demand CIED
University of Sussex, Falmer, UK
E-mail: p.kivimaa@sussex.ac.uk

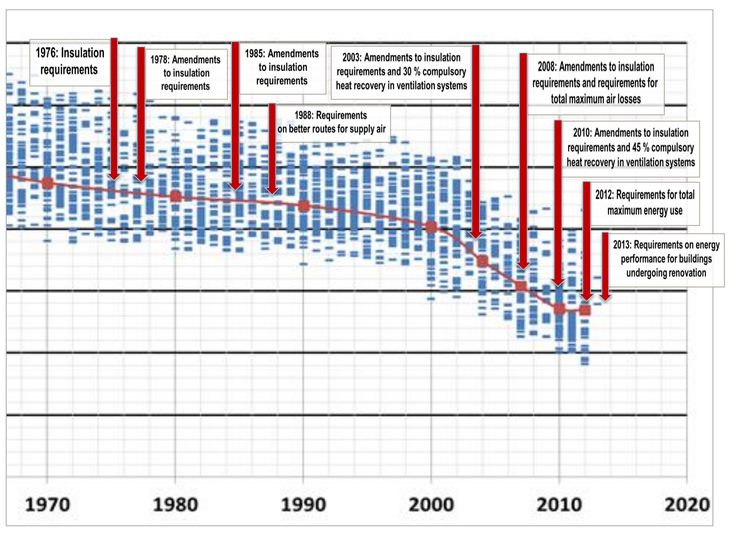
3) VTT Technical Research Centre of Finland LTD P.O. Box 1000, FI-02044 VTT, Finland

Energy Efficiency in Buildings in the City of Helsinki – A Long Run Sustainability Transition

Policies call for a rapid transition towards near zero-energy buildings, but will the policies deliver? The demand for such radical change brings to the fore both opportunities and stumbling blocks of sustainability transitions. Path-dependencies and the dynamics of housing infrastructure make transitions slow. Such transitions occur but require a combination of external shocks (energy crises), technological development (building technology and R&D investments) and policy forcing (building regulations). The legitimacy of the transition is critical for new buildings, but spill-over effects may also occur in the context of the existing building stock thereby speeding up the transition



Snapshopt of the heat energy use in apartment buildings of different age (Helen Ltd [1]



The regulations regarding energy efficiency combined with the energy use of apartment buildings

The change in heat energy use between the years 2003 and 2013 in buildings constructed in the 1960s, 1970s and 1980s

Key observations

1) In buildings several socio-technical solutions exist in parallel: the yearly rate of renewal is about 1 % and major renovations affects about 3.5% of the building stock [2].

2) In Finland the need for a transition in the building stock was formally recognized in 1976 in the wake of the first energy crisis.

3) Until the 2000 the improvements in energy efficiency were modest, mainly returning to the level of 1960 with new technology.

4) Since 2000 several new regulations have been introduced, and post 2010 residential buildings use c. 50 % less energy per m^3 than those of the 1960s (Fig. 1).

5) In parallel with the emergence new energy efficient buildings, the energy efficiency of existing buildings has increased, suggesting links between actors and transition processes at different levels (Fig. 2).

Conclusions

1) Broadly speaking the energy efficiency development in housing appears to display a gradual transformation in which incumbent actors have responded to landscape pressures and regime tensions by adjusting the direction of existing development paths and innovation activities [3].

2) There are also elements of a special kind of reconfiguration in which innovations are adopted into the regime and trigger adjustments and knock-on effects in the basic system architecture (the existing building stock) [3].

3) Such transformation-reconfiguration may be typical for transitions of heavily path dependent systems dominated by heavy and long-lived infrastructure.

4) The observed transformation-reconfiguration interaction may be important as it is one way of overcoming barriers noted in the UK housing, i.e. “a lack of skills and knowledge in the building industry, and poor material supply” [4] and may thus significantly speed up the overall transition

Analysis and material

The study is based on detailed data from the Energy utility of the city of Helsinki, Helen Ltd. The data provides information of the use of heat for each individual apartment block connected to the district heating system. Data on the building years and the evolution of energy related regulation have been used. Findings have been substantiated through interviews with builders, regulators and managers of buildings.

References

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