

ReBuild

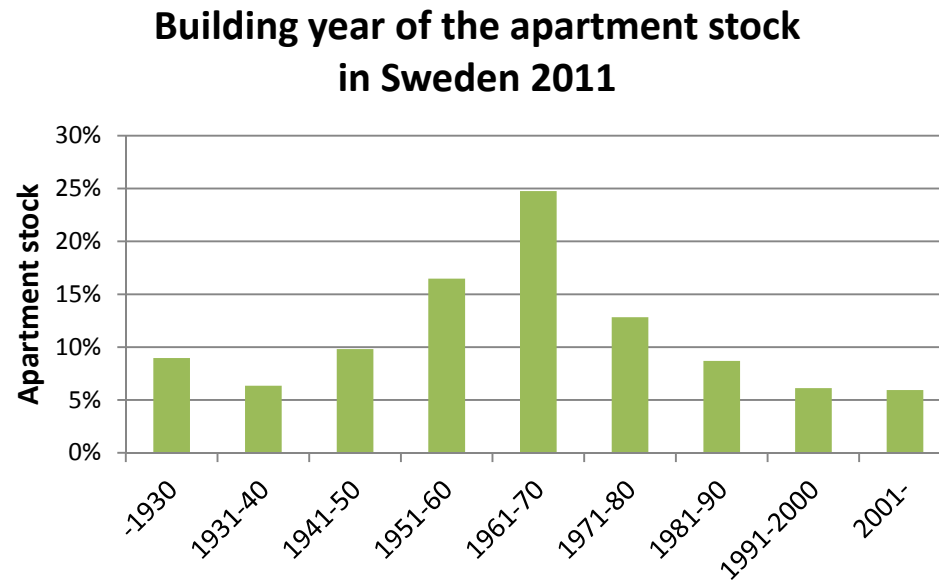
Innovation in early
planning and design for
energy efficient retrofitting

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Passivhus Norden 2013



Background



Statistiska centralbyrån, 2013

- Many Swedish/European apartment buildings are from the post war era
- They are 40-60 year old today
- Extensive renovation needed
- Wet areas, pipes, electricity, ventilation, windows, balconies, facades...

Renovation barriers

- Financial hinders, large investment costs
- Operation and maintenance costs increase due to old materials/installations
- Can lead to socio-economic segregation
- Often isolated renovation measures based on short-term strategies
- May hinder future renovations



Voiron – Before renovation
Foto: E2ReBuild

Renovation opportunitets

- See the life cycle profitability!
- Energy and operation savings helps funding the investment cost
- More attractive building and surroundings
- Social benefits for the tenants
- Added rentable area
- Possible rental increase
- Replication potential



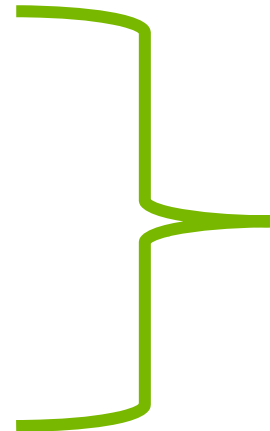
Voiron - During renovation
Foto: E2ReBuild

Objectives

- Create innovative decision criteria for energy efficient renovation (energy goal of 30-50 kWh/m²,year delivered energy for heating, hot water and ventilation)
- Identify successful renovation strategies
- Evaluate and spread the on-going work with the Retrofit Advisor - a new easy-to-use decision tool for property owners in early stage

Method

- Evaluation of the seven demonstration buildings
- Questionnaires sent to demonstration leaders
 - Location, construction, before energy use, ownership structure, costs
- Before facts, before energy (energy bills)
- Demo facts, demo energy (calculation results)
- Socio-architectural benefits for tenants



Evaluation and national adaption of The Retrofit Advisor

Evaluation of renovation measures

Envelope improvements

- Prefabricated façade elements (4)
- Additional external insulation in façade (2)
- New windows (5)
- Additional insulation in roof (7)
- Additional insulation in floor (5)
- Improved air tightness (5)



Foto: Frank Lattke

Evaluation of renovation measures

Heating and ventilation improvements

- District/central heating (2)
- Improved heating supply system (4)
- Heat pump (air-water) (1)
- Mechanical return air (1)
- Mechanical return/supply air with heat exchanger (3)
- Window supply (trickle vents) (1)



Foto: Stephen Burke

Evaluation of renovation measures

Renewable energy

- Solar thermal energy (4)
- Heat pump (air-to-water) (1)

Additional improvements

- New wet areas/kitchens (3)
- Added rental space (3)



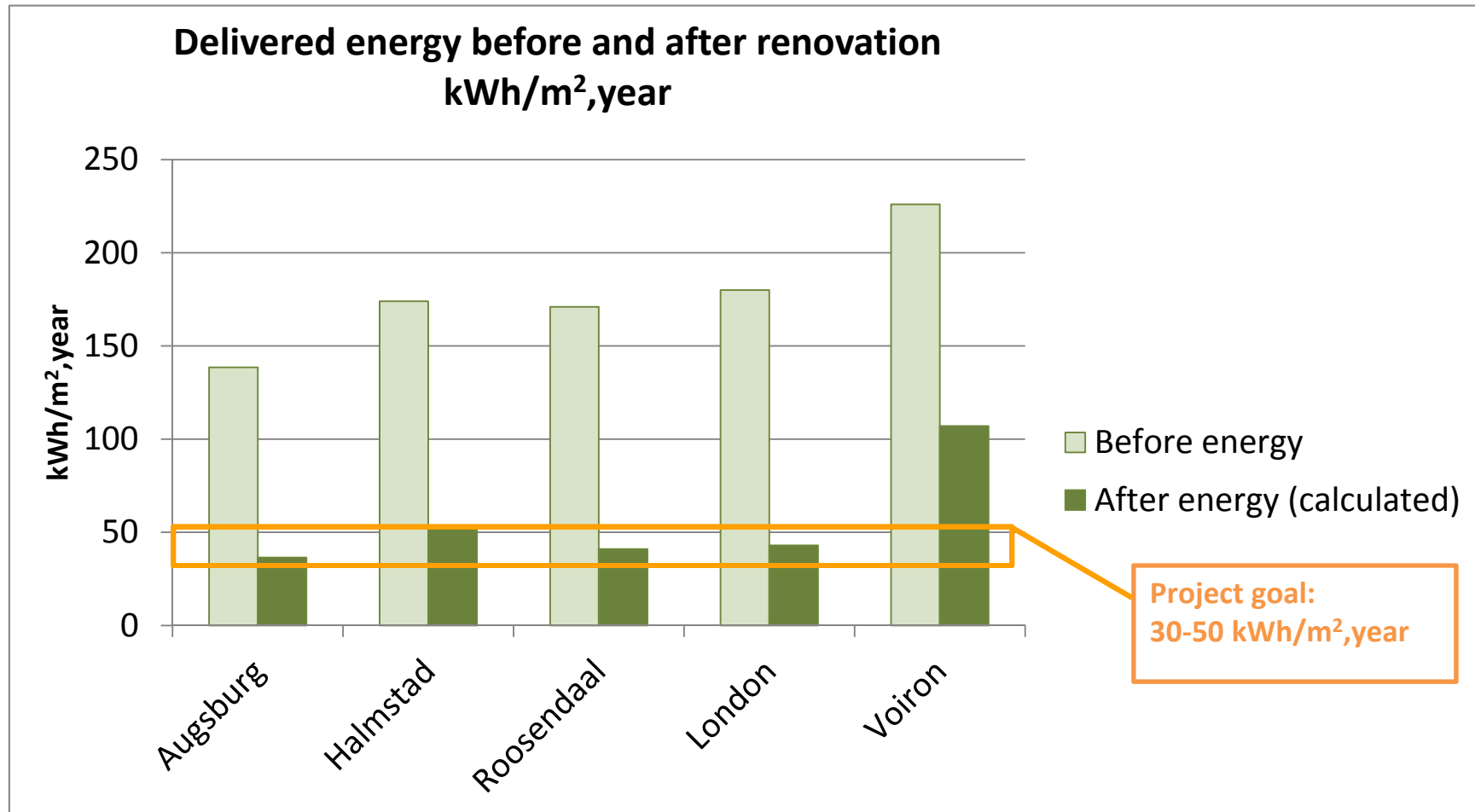
Foto: Chiel Boonstra



Foto: E2ReBuild



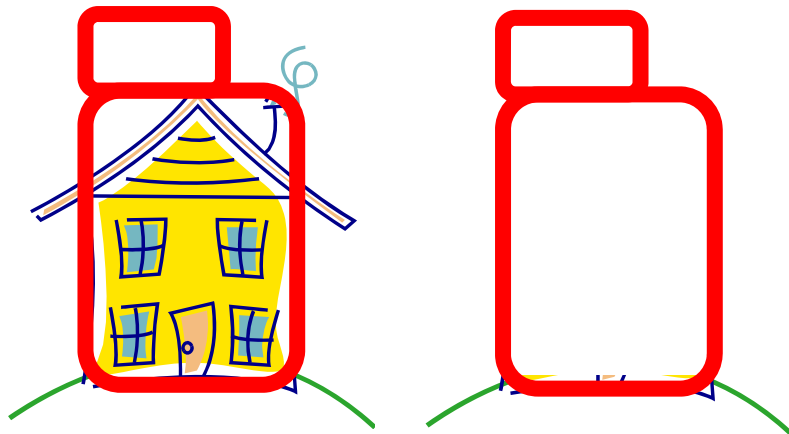
Evaluation of energy use



Early stage decision



- Actual state/repair
- Partial renovation/repair
- Comprehensive renovation
- New construction



The Retrofit Advisor

Retrofit Advisor

Apartment buildings renovation and reconstruction guide

The Retrofit Advisor allows a simple evaluation of retrofit options for apartment buildings. Based on few input-data, the actual value of the property, its value after renovation and the estimated cost for refurbishment may be evaluated. It is an ideal tool to evaluate financially retrofit scenarios.

Please, choose the building type that fits best to your own building

Land Country Pays
Switzerland

Sprache Language Langue
English










Anderer
Gebäudetyp

Other
Building Type

- Excel-based online tool for building owners
- Empa 2007, beta version 2011 final version 2014
- Ecological data from Ecoinvent
- Investment and operation costs
- Social aspects

Step by step

1. General "before data"
2. Financial key figures
3. Desired renovation level
4. Social aspects questionnaire
5. Potential energy savings are given
6. Final total evaluation

Retrofit Advisor

Actual State

Standard renovation

SIA standard Minergy Minergie-P

Retrofit

New balconies **Steep roof attic** **Flat roof attic** **Room extension**

7.8 Total renovation of building envelope with standardised renovation modules according to Minergie-P-standard:
 Compact or ventilated façade insulation 250mm, window replacement U=0.7 W/m²K, removal of existing roof and addition of attic floor with flat roof, insulation of roof space and basement (ceiling), replacement of balconies by large balconies, installation of a mechanical ventilation system with heat recovery, extensive renovation of interior with floor plan alterations, living room extensions and addition of new elevator

Actual state	Building data	Retrofit	8	Reconstruction	
700	Heated floor area	m²	784	m²	812
203	Unheated floor area	m²	203	m²	244
2.5	Room height (in apartments)	m	2.5	m	2.4
5	Floors (ground floor and above)	Number	5.6	Number	5.8
no	Elevator	yes/no	1 new elevator	yes/no	1 elevator
280	Plot size	m²	280	m²	280

Quality of building and situation

Architecture	average to good	important
General condition of building	good	average to qc
Quality of apartments	Minergie-P	Minergie-P
Energy consumption		

Financial factors

830 700	Rents without auxiliary costs	SEK/Year	2 092 100	SEK/Year	1 483 500
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Economy
 ▶ START Type **Renovation** RESULTS Building Finances Measures Society DCF Is DCF Repair DCF Renovation DCF Reconstruction

Energy Label*

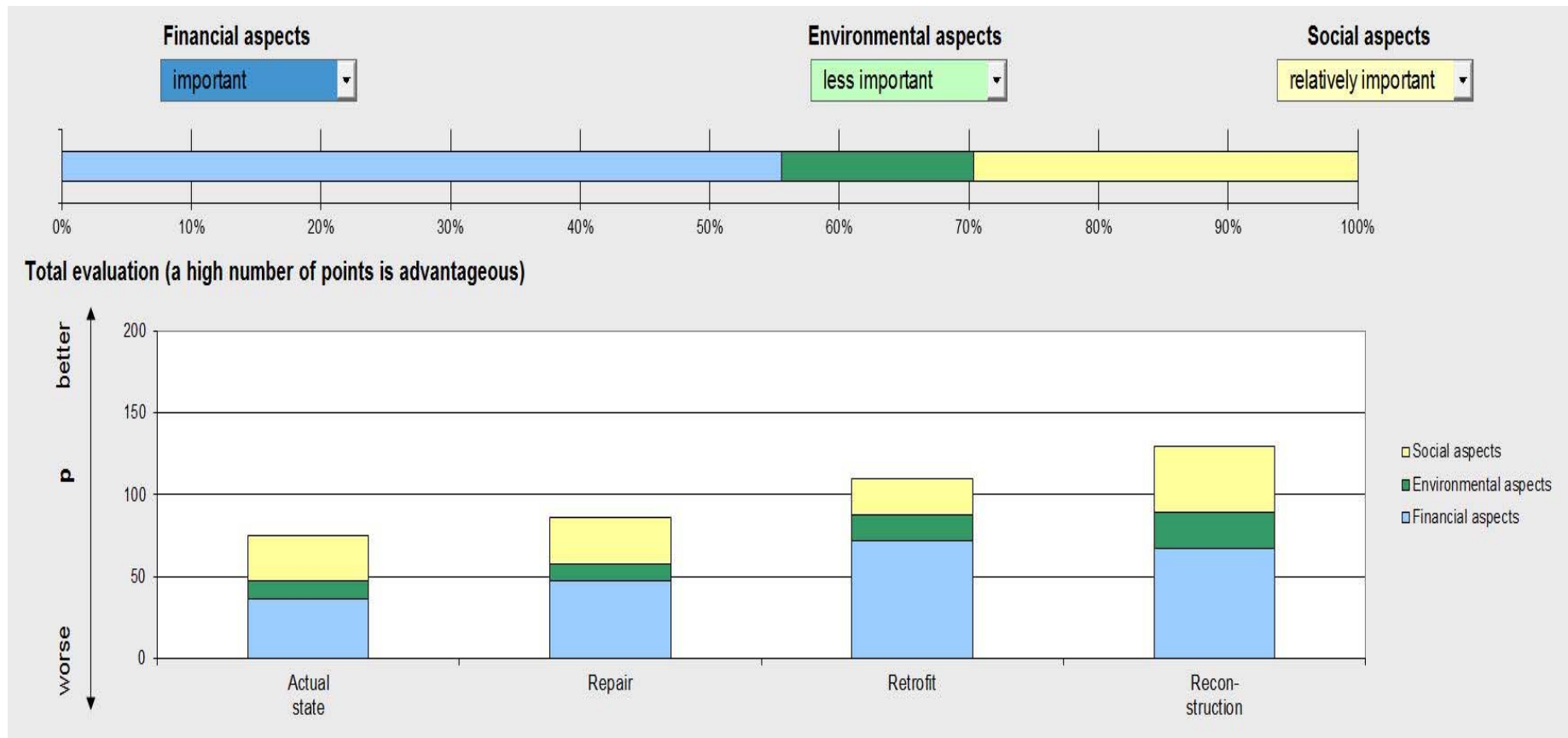
	Actual-state	Repair	Retrofit	Reconstruction
efficient			A 43%	A
A				
B				
C	C 144%	C 126%		
D				
E				
F				
G				
less efficient				
Global warming potential	C	B	A	
Heating energy demand	D	C	A	
Renewable energies	0%	0%	15%	3%

* Indicative, no official label

worse points

Social aspects	Weighting	Actual state + repair	Retrofit	Reconstruction
Rent increase	rather important	59%	136%	
Quality of living				
Quality of apartments	rather important	low	high	average to high
Flexibility of floor plans	rather important	low flexibility	average to low flexibility	average to high
Access for handicapped	rather important	good access	bad access	good access
Social contacts				
Mix of apartment sizes	rather important	bad	bad	average to good
Common room	rather important	no common room	no common room	common room
Laundry	rather important	laundry in house, with drying room	laundry in house, with drying room	laundry in house
Private garden	rather important	poor choice	average choice	average choice
Play ground	rather important	poor choice	poor choice	average choice
Architectural and cultural context				

Total evaluation



Discussion

- Further development of the Retrofit Advisor
- Innovative and thorough programme
- The Retrofit Advisor as an easy-to-use decision tool?
- How reliable is a Life Cycle Analysis?
- Does the building owner care about social aspects or is it all about the money?