

IEA ECBCS Annex 50

Prefab Retrofit of Buildings

Prefabricated Systems for Low Energy Renovation of Residential Buildings

Austria, Czech Rep, France,
Netherlands, Portugal,
Sweden, Switzerland

Mark Zimmermann
Operating Agent

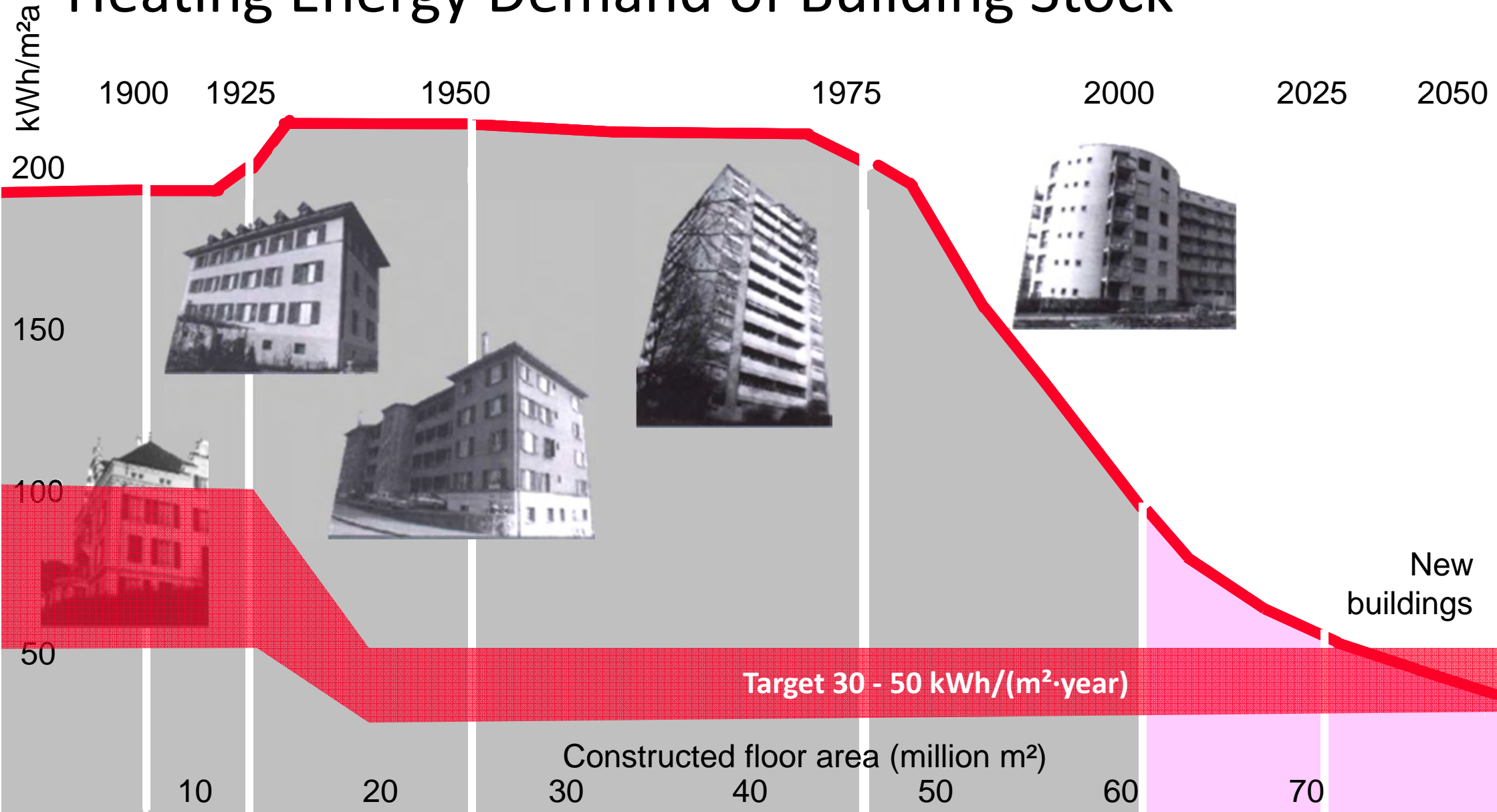


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Heating Energy Demand of Building Stock



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Building renewal with prefabricated elements

80-90 % energy savings + added values (room extension, attic apartment)



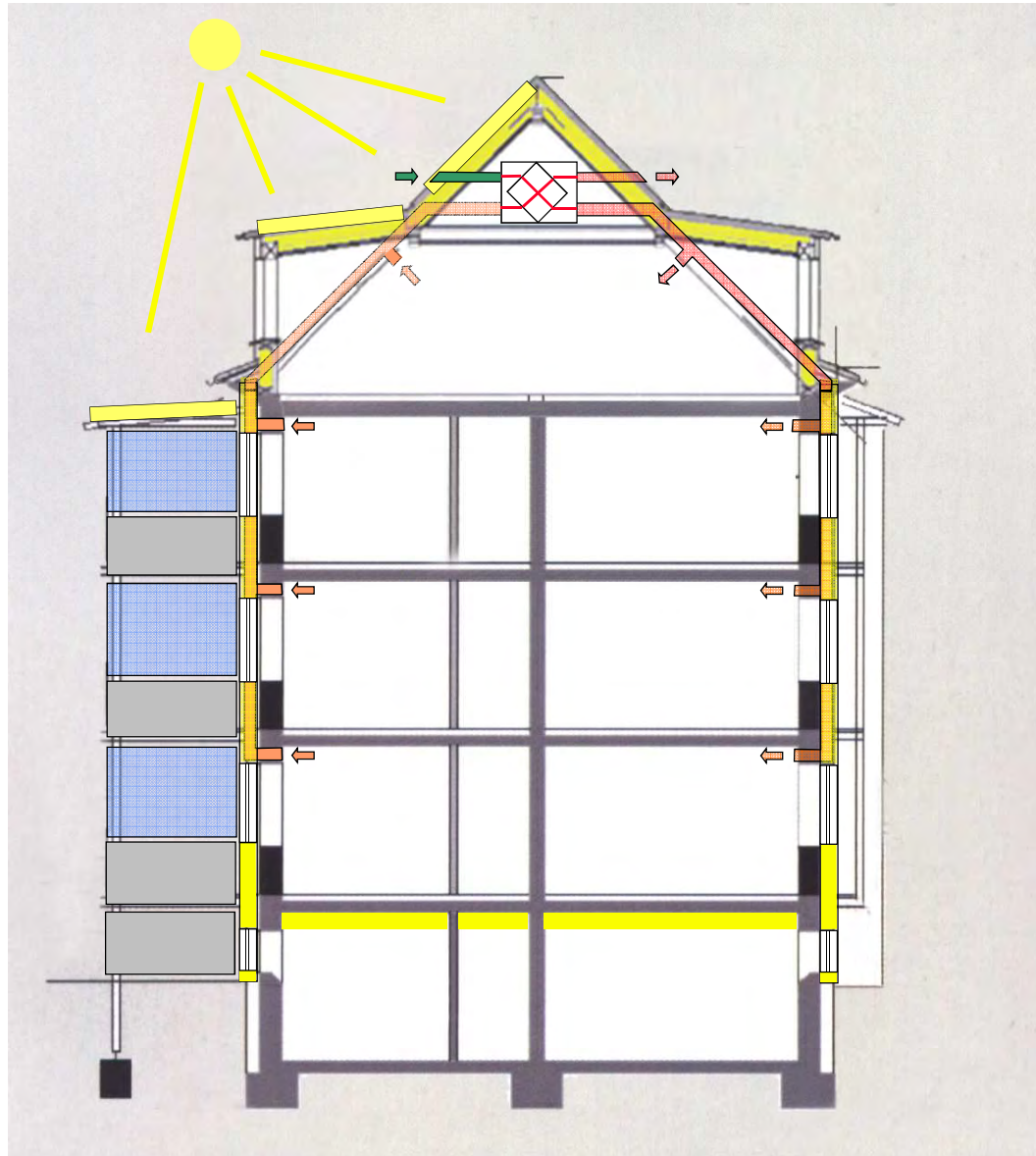
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Prefab Building Renovation

- Whole building concept
- no technical compromises
- few companies involved
- well coordinated modules
- quality assurance
- rapid construction processes



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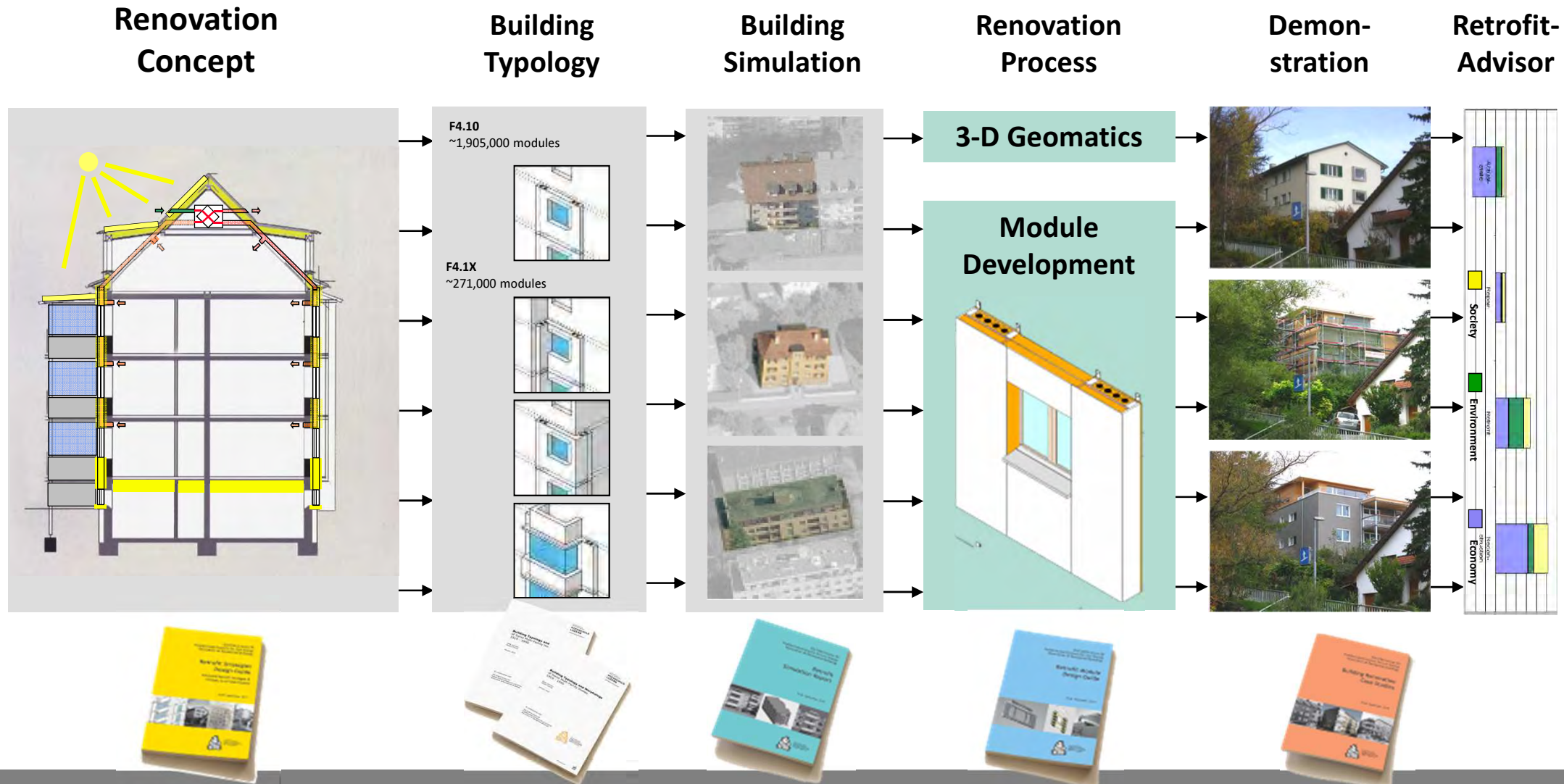


Soltag project by Velux, Copenhagen Denmark





Overview of Annex 50 Tasks



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Modular approach

Large size modules
developed by
Austrian team

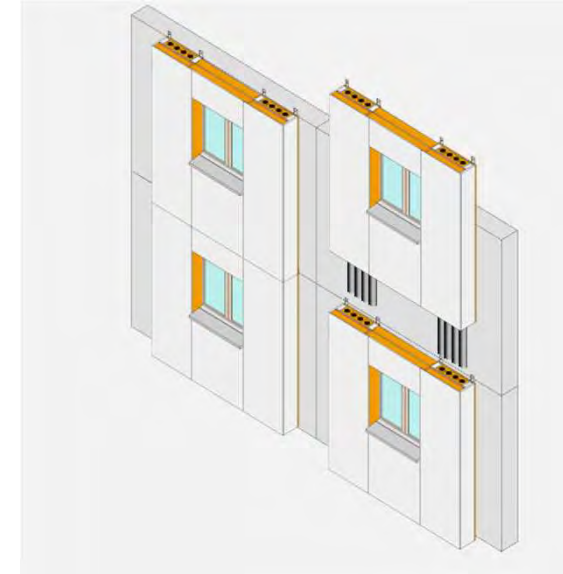
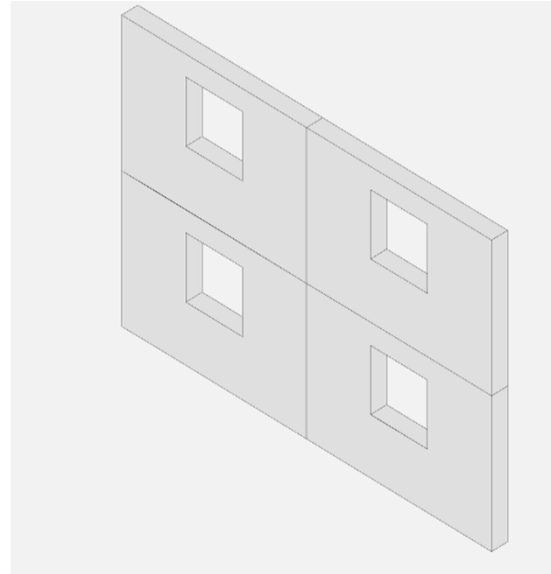


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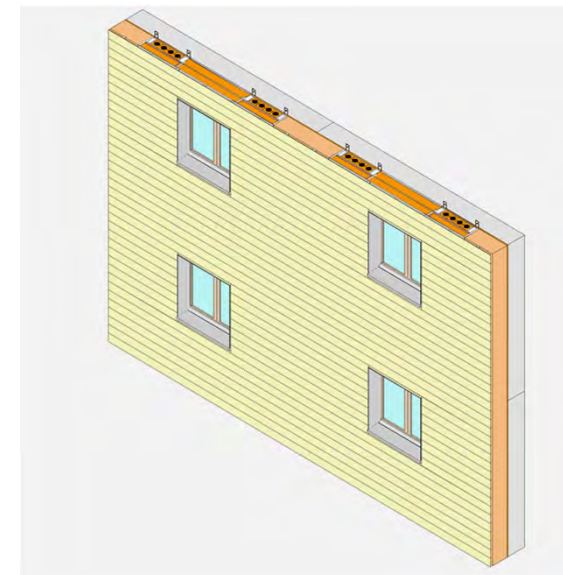
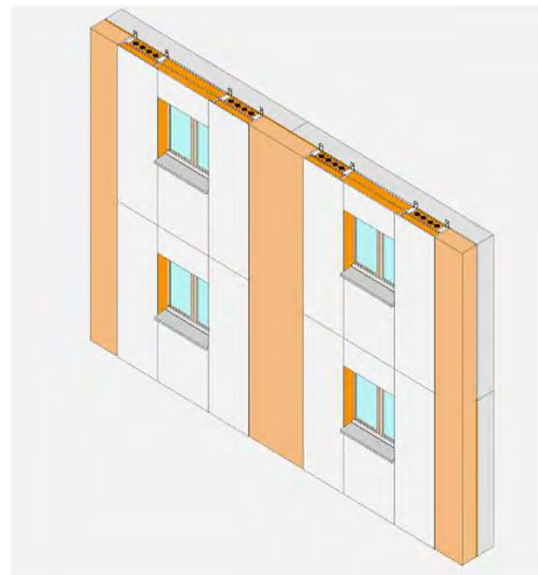
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Modular approach



Small size modules developed by Swiss team

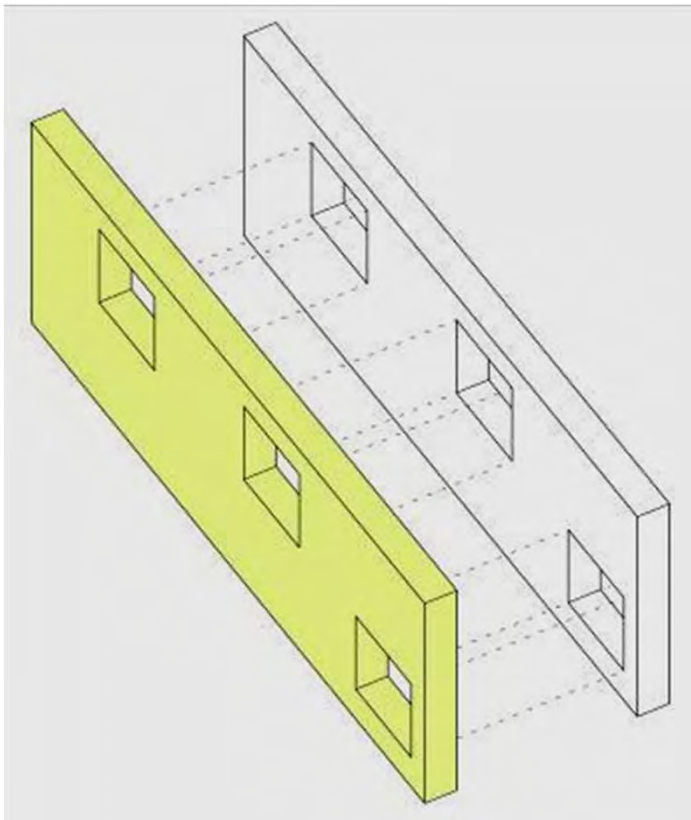


**FHNW
(CH)**



Challenge of Pre-Fabrication

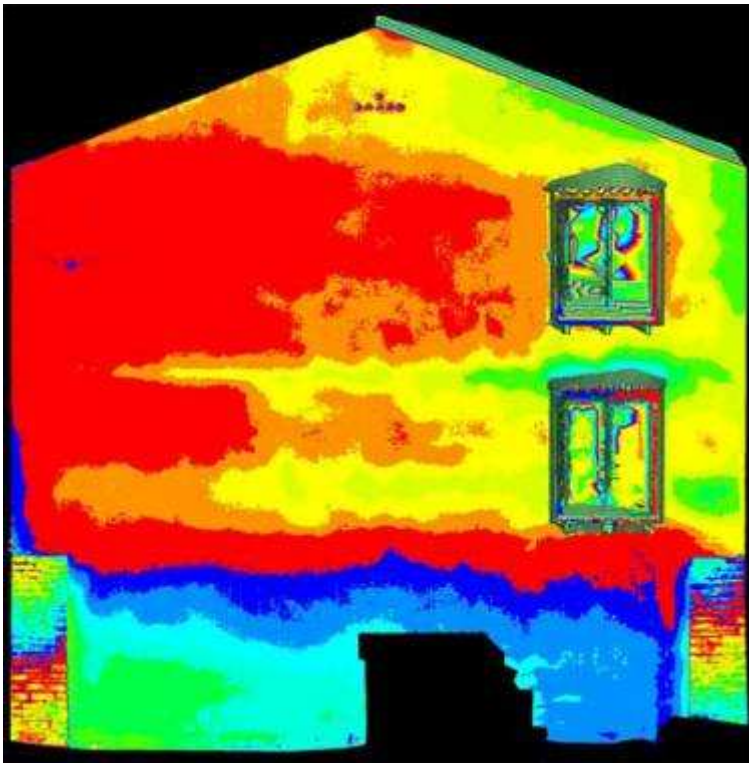
Prefabrication of large elements has to ensure that the elements will fit to the existing building



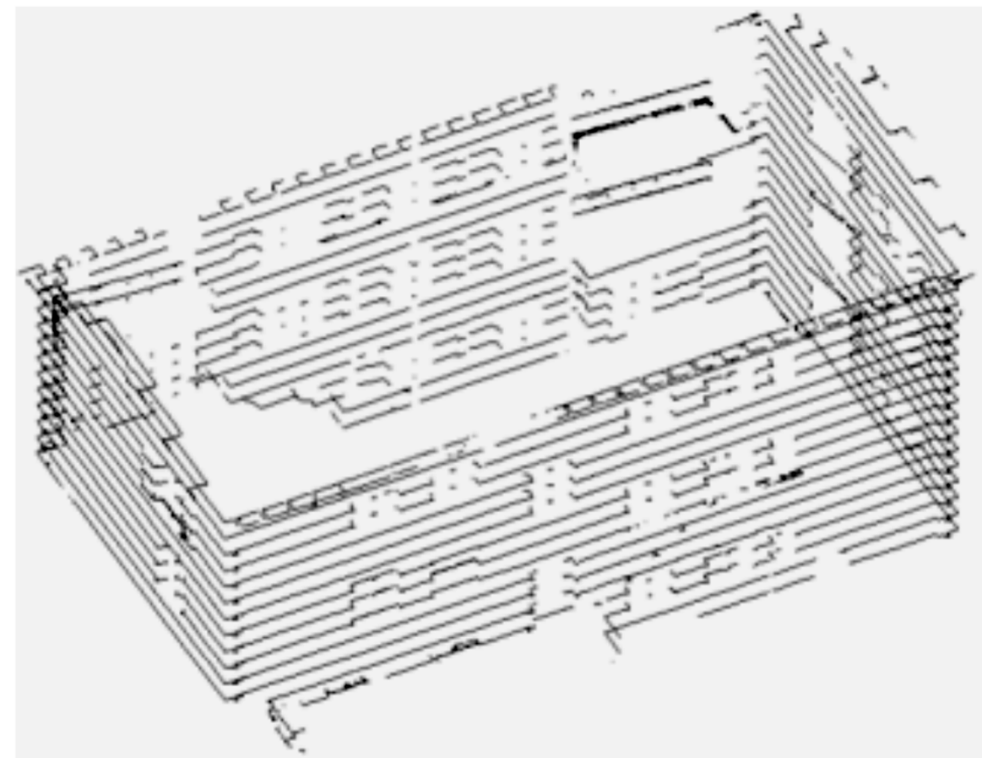
Picture: Wood-Wisdom, TES-EnergyFaçade



Laser Scanning – Design Support



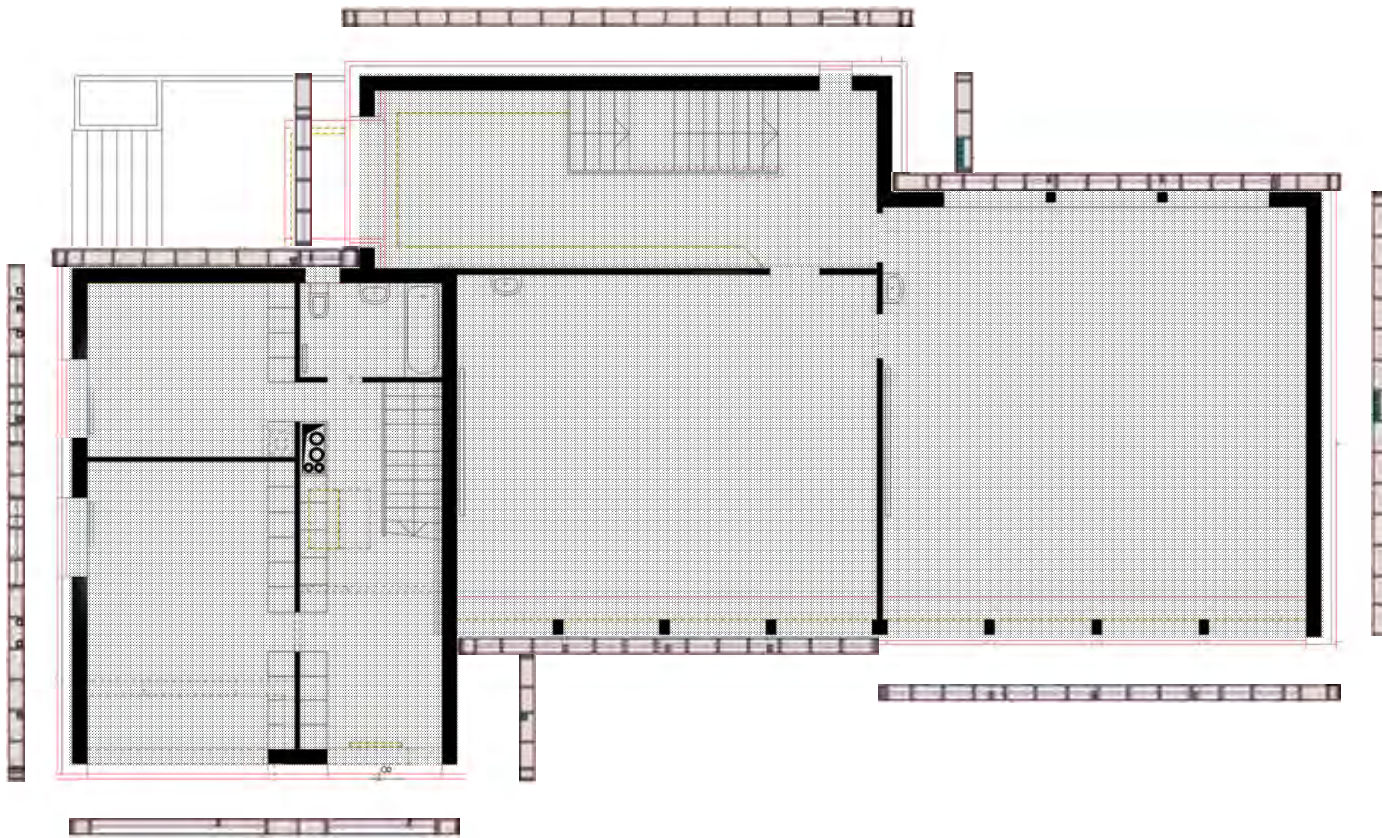
Planarity of façades



Horizontal sections



Planning of façade modules



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Geuensee, Switzerland



**Renovation of school building (1952)
completed 2011, Bruno Thoma / Alexander Ritz**



Zug, Switzerland



**Renovation of apartment building (1952) completed
2010, Miloni Architects**

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Zurich, Switzerland



**Renovation of apartment building (1952) completed 2009,
Beat Kaempfen Architects**

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Graz, Austria



**Renovation of 3 apartment buildings (1959) completed 2008,
GAP-Solution / AEE INTEC**

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Graz, Austria



**Renovation of 2 apartment buildings (1970) completed 2009,
GAP-Solution / AEE INTEC**

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Graz, Austria



**Renovation of row house buildings (1952) completed 2009,
GAP-Solution / AEE INTEC**



Roosendaal, Netherlands



Renovation of residential area by DAT architecten / Trecodome



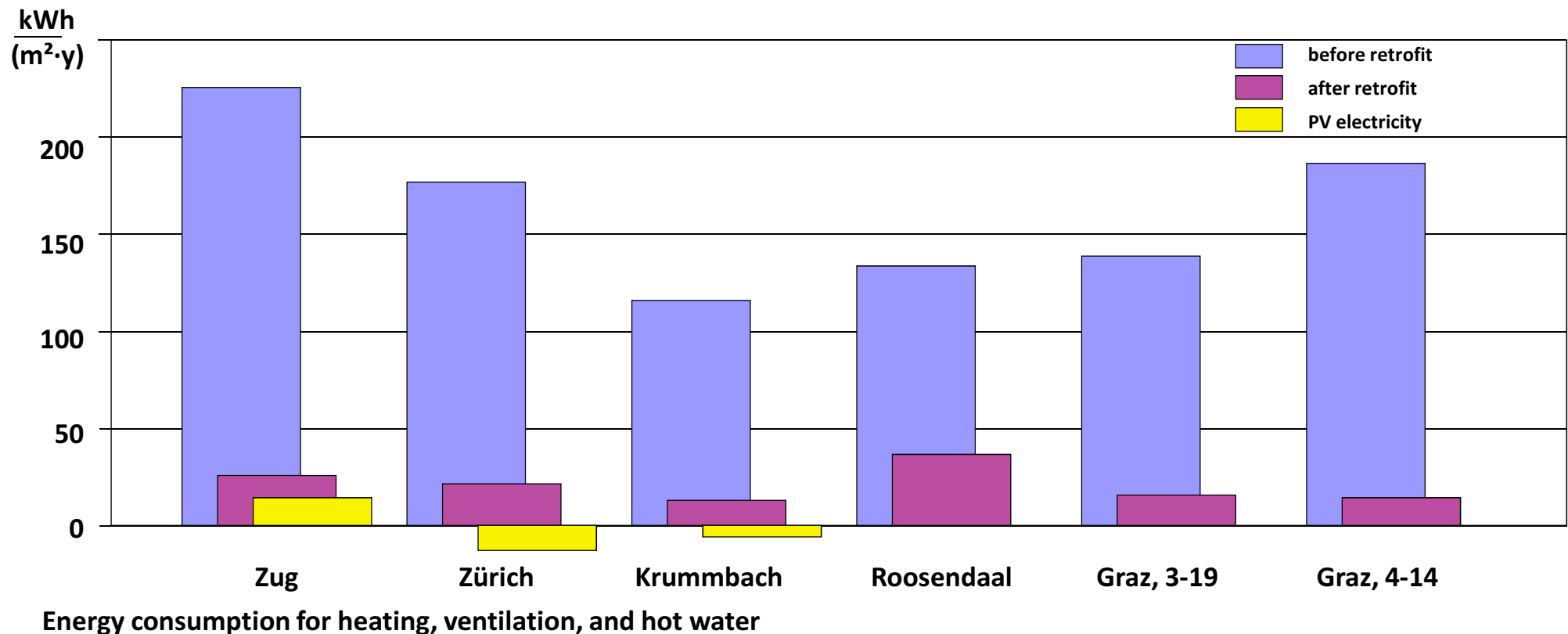
Results of Demonstration Buildings



Demonstration projects in Austria, Netherlands, and Switzerland



6 Demonstration sites with totally 363 apartments and 1 school





ECBCS Retrofit Advisor

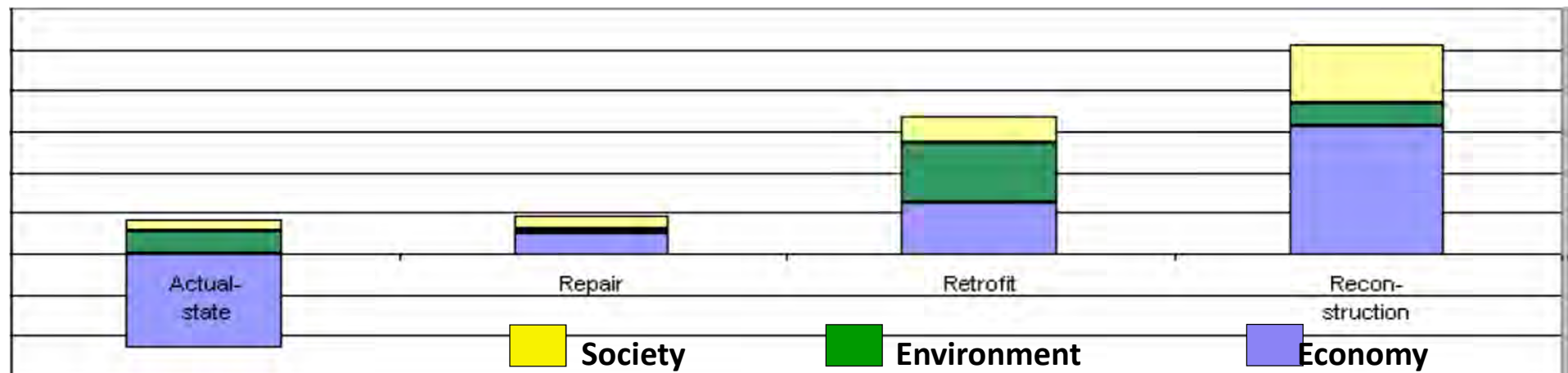


**Actual
state**

**Repair
only**

**Low energy
renovations**

**Demolition
reconstruction**



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Retrofit Advisor

Apartment buildings renovation and reconstruction guide

Land Country Pays

Austria

Sprache Language Langue

English

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



**Anderer
Gebäudetyp
Other
Building Type**

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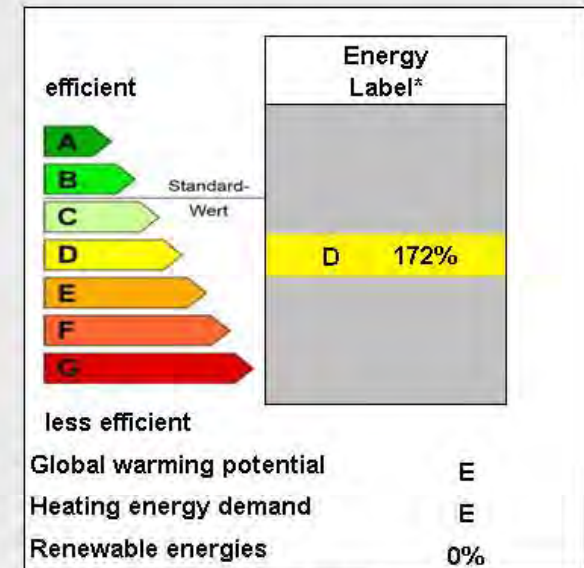


Retrofit Advisor

Description of reference building



Building type 1:
Simple, detached suburban apartment building, constructed about 1930
Simple to average standard, relatively small apartments, normally 3 stories, raised ground floor, massive wall construction, artificial stone reveals, overhanging balconies, roof space not or little used as living space, simple staircase without elevator.



* Indicative, no official label

Information about your own building

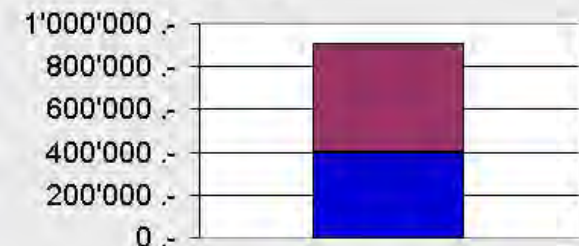
Default values of the selected building type will be used for missing information. The more information you can give, the more precise the evaluation will be.

Building data

Heated floor area
Unheated floor area
Room height (in apartments)
Floors (ground floor and above)
Elevator
Plot size

m ²	540
m ²	186
m	2.45
Number	4.0
yes/no	no
m ²	650

Market value €



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Retrofit Advisor

Actual State



Standard renovation



SIA standard



Minergie



Minergie-P

Retrofit



New balconies



Steep roof attic



Flat roof attic



Room extension

1.2 Renovation of building envelope according to Minergie-standard:
Compact façade insulation 200mm, window replacement $U=1.1 \text{ W/m}^2\text{K}$, insulation of roof space and basement (ceiling), installation of a mechanical ventilation system with heat recovery, renovation of interior

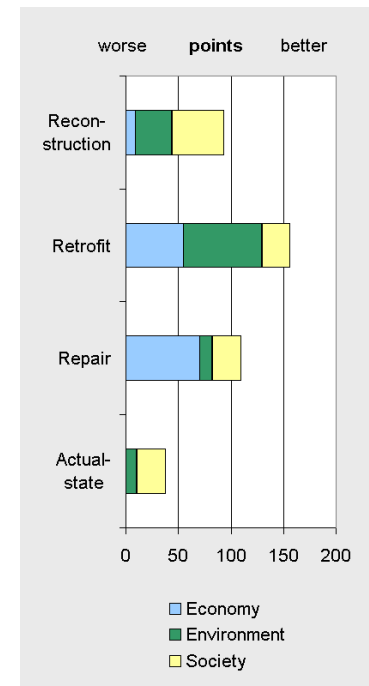
Energy Label*

	Actual-state	Repair	Retrofit	Reconstruction
efficient			A 49%	A 39%
B		C 146%		
C	D 172%			
D				
E				
F				
G				
less efficient				
Global warming potential	E	D	C	A
Heating energy demand	E	D	A	A
Renewable energies	0%	0%	0%	35%

* Indicative, no official label

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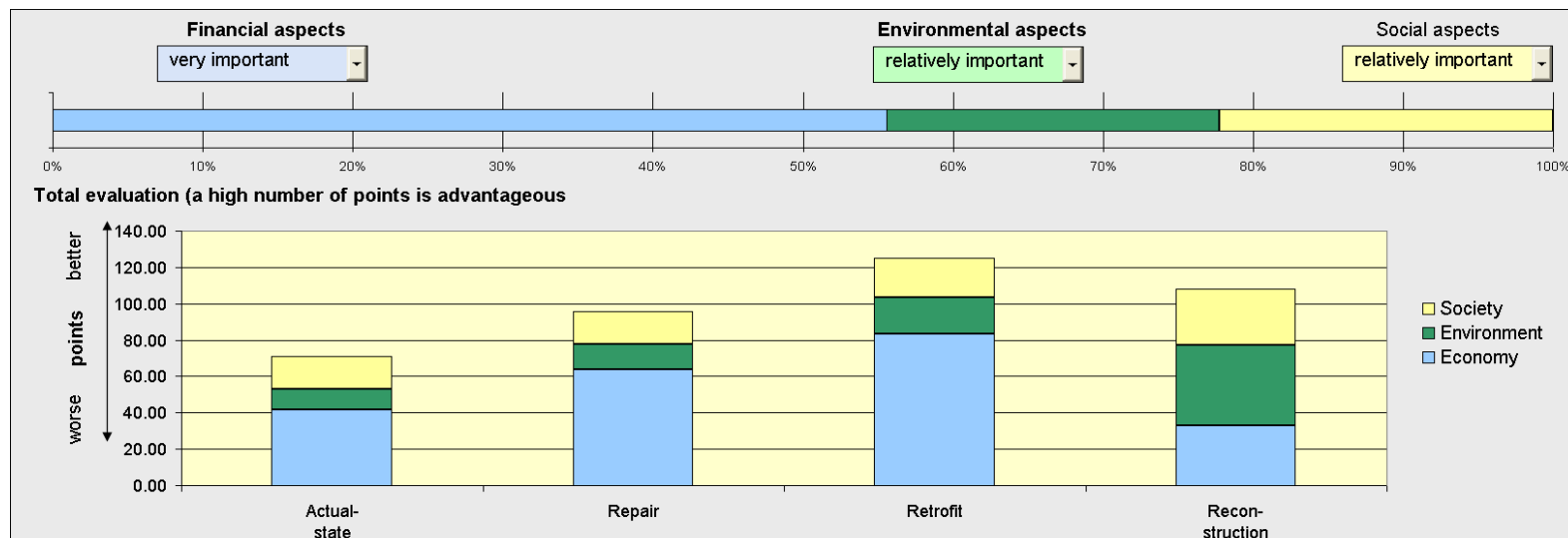


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	Primary energy Actual State	Primary energy Repair	Primary energy Retrofit	Primary energy Reconstruction
Sehr energieeffizient A B C Standard-Wert D E F G Wenig energieeffizient				A 45%
	D 188%	D 153%	C 105%	
Global warming potential	F	E	C	A
Heating energy demand	E	D	C	A
Renewable energies	0%	0%	0%	28%





**Thank you for your
attention!**

www.empa-ren.ch/A50.htm