



RentalCal – European *Rental* Housing Framework for the Profitability *Calculation* of Energetic Retrofitting Investments

Elsebeth Terkelsen

ROUND TABLE ON FINANCE FOR ENERGY EFFICIENCY IN DENMARK

16.11.2017

Round Table Question

- How do we ensure financing for projects that are not eligible for financing?

RentalCal: the objectives

- Introduce the **rental housing perspective** in profitability assessment of energy efficiency investments
- **Improve transparency** of national investment conditions
- **Disseminate knowledge** on green value/premium issues

- Key findings in RentalCal
- Policy recommendations
- Green values
- The RentalCal tool

Disposition



The socio-economic calculation rate



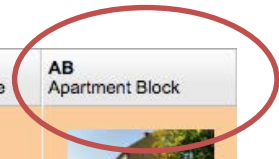
Rental Housing Stock

























- Analysis based on national consensus data, other statistical data and IEE project TABULA (building type and building age)
- Size, age and energy performance of rental housing stocks vary widely across the RentalCal countries.

Focus on DK

Size and age of Danish housing

- TABULA <http://episcopo.eu/building-typology/>



Country	Region	Construction Year Class	Additional Classification	SFH Single Family House	TH Terraced House	MFH Multi Family House	AB Apartment Block		
DK	national (Hele Denmark)	... 1850	Generic (Standard)	 DK.N.SFH.01.Gen	 DK.N.TH.01.Gen		 DK.N.AB.01.Gen		
DK	national (Hele Denmark)	1851 ... 1930	Generic (Standard)	 DK.N.SFH.02.Gen	 DK.N.TH.02.Gen		 DK.N.AB.02.Gen		
DK	national (Hele Denmark)	1931 ... 1950	Generic (Standard)	 DK.N.SFH.03.Gen	 DK.N.TH.03.Gen	DK national (Hele Denmark) 1973 ... 1978 Generic (Standard)	 DK.N.SFH.06.Gen	 DK.N.TH.06.Gen	 DK.N.AB.06.Gen
DK	national (Hele Denmark)	1951 ... 1960	Generic (Standard)	 DK.N.SFH.04.Gen	 DK.N.TH.04.Gen	DK national (Hele Denmark) 1979 ... 1998 Generic (Standard)	 DK.N.SFH.07.Gen	 DK.N.TH.07.Gen	 DK.N.AB.07.Gen
DK	national (Hele Denmark)	1961 ... 1972	Generic (Standard)	 DK.N.SFH.05.Gen	 DK.N.TH.05.Gen	DK national (Hele Denmark) 1999 ... 2006 Generic (Standard)	 DK.N.SFH.08.Gen	 DK.N.TH.08.Gen	 DK.N.AB.08.Gen
DK	national (Hele Denmark)	2007 ... 2010	Generic (Standard)			DK national (Hele Denmark) 2007 ... 2010 Generic (Standard)	 DK.N.SFH.09.Gen	 DK.N.TH.09.Gen	 DK.N.AB.09.Gen

Energy performance in Danish housing

kWh/m ² /year	Before 1890	1890- 1930	1931- 1950	1951- 1960	1961- 1972	1973- 1978	1979- 1998	1999- 2006	After 2006
Farm house	184,3	171,4	161,8	151,2	136,2	116,9	100,3	81	66,6
One family house	170,3	164,7	164,1	154,9	134,3	119,8	105,4	83,9	67,3
Terraced house	158,2	157,7	149,3	142,8	119,9	112,6	96,8	81,5	66,4
Multi story house	151,1	153,9	157	148	132,3	121	108,5	84	60,7
Student home	137,9	149,2	136,4	145,7	130,6	139,1	131,7	84	58,2
Institution	164,1	161,9	152,3	140,2	143,2	136,9	116	94,1	63,3
Others	161,1	165,7	158,4	161,4	135,8	132,7	101	80,4	66,6

Costs of EE retrofitting/saved kWh in multi story buildings

From year	1200	1850	1931	1951	1961	1973	1979	1999	2007		
To year	1850	1930	1950	1960	1972	1978	1998	2006	2012	Total	
1. Area m ²	488.44 5	22.164.7 27	13.557.0 50	7.458.34 7	14.321.9 48	4.624.3 02	7.552.8 28	3.648.3 82	2.807.1 65	76.623.19 4	m ²
2. Present consumption in MWh/year	66.569	3.389.66 2	2.134.81 0	1.043.07 7	1.764.76 2	537.83 8	856.32 4	260.36 7	145.61 9	10.199.02 8	MWh
3. Consumption Scenario A	31.752	1.325.58 0	854.039	408.687	668.868	197.00 8	330.13 0	126.90 4	60.092	4.003.060	MWh
4. Total costs of renovation	870.42 5	45.409.8 04	24.334.6 49	10.784.6 30	19.726.0 92	5.453.2 80	8.945.2 98	2.849.9 42	1.539.4 86	119.913.6 06	1000 kr.
5. Marginal renovation costs	522.25 5	26.833.0 66	14.088.4 81	6.343.90 0	9.863.04 6	2.726.6 40	4.209.5 52	1.067.7 04	684.21 6	66.338.86 0	1000 kr.
6. Total investment costs per kWh saved in the lifetime of the investment	25	22	19	17	18	16	17	22	18		kr./k Wh
7. Marginal investment cost per kWh saved in technical lifetime	15	13	11	10	9	8	8	8	8		kr./k Wh

Other financial factors

- Legal Barriers for Investments
- Depreciation rules
- Tenant Related Barriers for Investments
- Investor Related Barriers for Investments

Legal Barriers: rent and maintenance costs

- Maintenance costs, not improvements are a contractual obligation of the tenants -
 - Creating significant split incentive barriers
 - Lowering green value margins and
 - Prolonging pay back periods for deep retrofits



Depreciation rules

- Maintenance expenses are considered tax-deductible costs
- Investments leading to improvements are recognised as increasing the value of the property
- Lack of precise definitions concerning distinction between those expenditures



Tenant Related Barriers for Investments

- Low income, as a barrier to invest in green initiatives
- Demographic barriers
- Energy efficiency retrofits are perceived as a secondary priority by tenants
- Low stable energy prices



Investor Related Barriers for Investments

- High initial capital outlay
- Access to loans and financial support
- Inability of green value to be fully capitalised into property value
- Informational barriers



Green premiums



Gennemsnitlig stigning i salgspris i kr./m2 og procent ved forbedret energimærke opgjort efter regioner.

Policy Recommendations

- Sound financial incentives are likely to spark action (evidence e.g. from national findings in France (the availability of the zero percent eco loans))
- Improve the negative perception of green investments by reducing uncertainty
- Policies should be directed towards mandatory whole house retrofits

Policy Recommendations

- Energy retrofitting should be affordable to all national income groups
- Support of energy consultants
- Continuous evaluation of achievements
- Establishment of a national roadmap

RentalCal tool: transparent financing



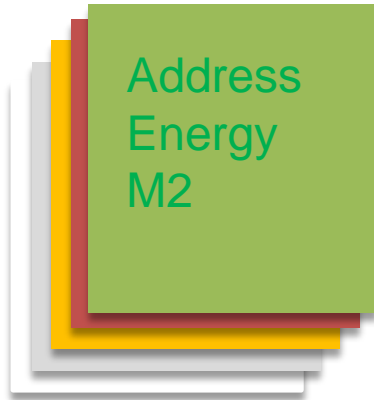
A **web based tool** for the **profitability analysis** of energy related retrofits in **rental housing**

- Provide *transparency* on the profitability of individual energy efficiency retrofits
- Focus on rental *cash flow modeling* with *green premium* or other *energy efficiency related rent increase*
- Including subsidized *funding* and detailed *tax / depreciation* assessment
- The RentalCal tool offers an *international comparative* perspective

Advanced scalability

- Two entrances
 - Data base assisted quick feasibility check
 - Detailed manual entry for individual case assessment
- User specific investment horizon
- User specific assumptions on future dynamics of prices and rents

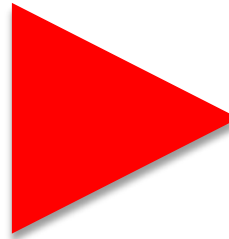
RentalCal tool: the workflow



Input Modules

Property, Investor,
refurbishment, finance, tax
and depreciation, rent and
operation costs

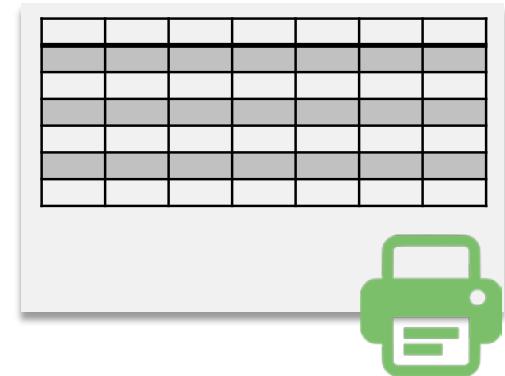
Database guided
User provided



Profitability Analysis

Dynamic calculation using
VoFI (Visualization of
Financial Impact)
methodology

Complex Case
Differentiations



Reporting Modules

Multiple KPIs
Break even assessment
Risk analysis

Target group specific
output

☰
RentalCal English

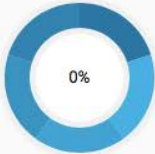
Investor
Property
Refurbishment
Financing
Market

Where am I
Help


Information ▼

- Terms of Service >
- Contributors >
- Tool structure >
- Video tutorial >
- Mode selection >
- Input >
- Output >

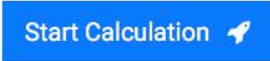
Percent complete:



0%




The RentalCal calculation software was designed for landlords, managers of housing companies/cooperatives, property managers and energy consultants to assess the profitability of energy efficiency refurbishments in the private rental sector.



Visitors so far: <TODO> Piwik Stats

Profitability Calculation Software for the Assessment of Energy Refurbishments of Rental Housing





www.rentalcal.eu/tool

...tool online by the end of 2017



European Rental Housing Framework for the Profitability
Calculation of Energetic Ret rofitting Investments

Contributors



Universitat d'Alacant
Universidad de Alicante



SCHOOL FOR
BUSINESS AND SOCIETY



International Real Estate Business School
Universität Regensburg



European Green
Cities Network



UNIVERSITY OF
CAMBRIDGE
Department of Land Economy



Thank you

<https://youtu.be/m3hgXdPHT4E>