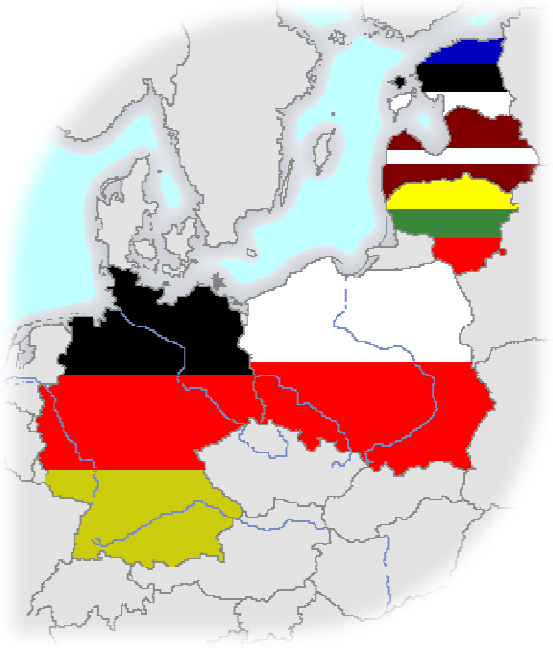
Urb. Energy builds upon **BEEN**



Urb.Energy
Kick-Off-Conference
15-16 June 2009

Senatsverwaltung für Stadtentwicklung Berlin

Barbara Berninger, Peter Wollschläger

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Berlin
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Subject of BEEN: The Traditional Package of Energy-Saving Measures

Measures		Function and purpose of measures
Insulation	gable	Reduction of heat loss
	longitudinal walls	
	top floor ceiling	
	cellar ceiling	
	heating pipes	Avoidance of unnecessary heat loss
New windows		Reduction of heat loss via window panes and frames
		Avoidance of unnecessary heat loss (due to unwanted draughts of rickety windows
Heating system		To enable the realisation of energy savings

The Structure of the BEEN Results

Reports and documentations on WPs

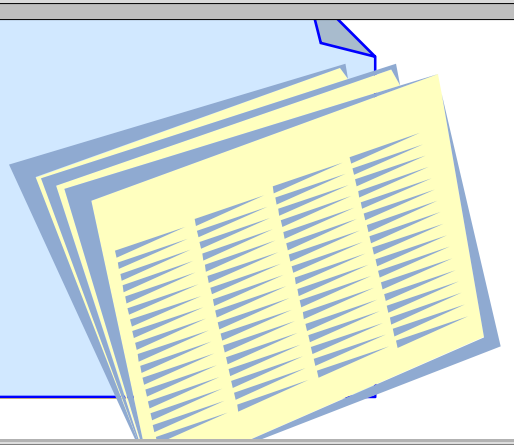
Info-leaflets to WP 2 through WP 4

Policy paper to WP 1

Reports on best practice projects

Policy Paper

BEEN Results Manual



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Pilot Project in Beijing (GTZ China)

Focus of Urb.Energy

Focus of BEEN:

- What is the optimal package of energy-saving measures for prefabricated housing?
- How can be achieved, that the condominium ownerships (installed after privatisation) become able to implement these measures?

Focus of Urb.Energy:

- Upgrading of the residential environment and infrastructure
- Integrated concepts for holistic rehabilitation of residential areas

Questions regarding energy efficiency:

- How to make district heating competitive?
- How to reduce primary energy and CO_2-emissions?
- How to use renewable energies?

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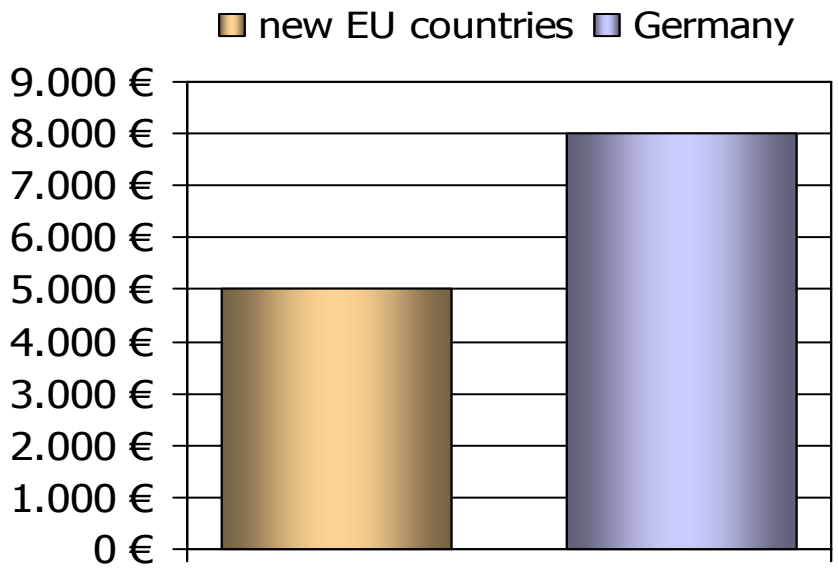
Savings Potential in terms of the Final Energy Need of Dwelling

Costs of energy-saving measures
per flat



Achievable Energy Savings: 50 %

i.e. per flat (54 m²) annually:

- reduction of heating need: **4.200 kWh**
- saving primary energy: **500 to 700 litres oil** (or equivalent gas, coal)
- reduction CO_2: **1 to 1,4 t**

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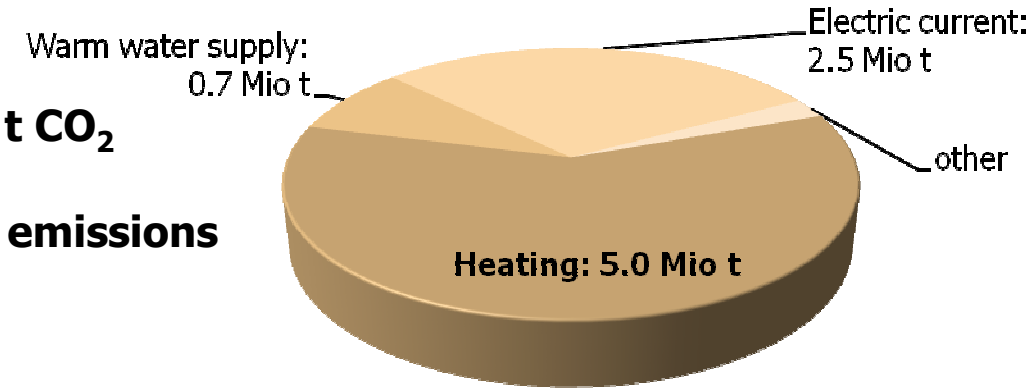
Berlins Climate Objectives up to 2020

- **Target: CO_2- Reduction (compared with 1990) 40 %**
  - 25% reduction achieved (2005) (1990: 29 Mio t; 2005: 22 Mio t)
  - To do: Further reduction of 4,3 Mio t CO_2 (15%) is needed
    (aim 2020: 17,6 Mio t = 5,2 t per inhabitant)
- **The residential housing stock can and must deliver an above average contribution**
- **CO_2-Emissions of the housing stock 2005:**
  - **Sum dwelling: 8,2 Mio t CO_2**

    = 37 % of Berlin`s CO_2 emissions



Berlin's Own Housing Stock sets a Good Example

Heat energy consumption of Berlin's communal flats		Sum	thereof HOWOGE	Berlin's Average
	number of flats	**267.824**	**48.433**	**1.840.000**
	living space	16.746.648	2.970.212	128.248.000
	m² per flat	**62,53**	**61,33**	**69,70**
Final energy consumption	in MWh	1.912.809	229.732	20.519.680
	kWh per flat	7.142	4.743	11.152
	kWh/m²a	**114,22**	**77,35**	**160,00**
		100 %	**68 %**	140 %
Primary energy consumption	in MWh	1.715.185	160.518	
	kWh per flat	6.404	3.314	
	kWh/m²a	102,42	**54,04**	135,00
		100 %	**53 %**	
CO2-emissions	in t/a	377.896	37.750	4.924.723
	tons per flat annually	1.411	0,78	2,68
	kg/m²a	22,57	**12,71**	38,40
	kg CO2 per kWh final energy consumption	**0,198**	**0,164**	**0,240**
		100 %	**56 %**	

CO2-Emissions of Different Energy Supply

Specific values of energy supply and CO2 -emissons		
Energy supply	**Specific CO_2-emissions (kg CO2 per kWh final energy)**	**Primary energy coefficient**
Electric current	**0,58 bis 0,70**	**2,70**
Lignite	0,410	1,20
Hart coal	0,350	1,20
Oil	0,266	1,10
Natural gas	0,211	1,10
Timber (peletts)	-	0,20
Solar (thermal panels))	-	-
District heating		
Vattenfall	**0,149**	**0,567**
FHW MV	0,217	1,300
District heating Neukölln	0,220	0,940
BTB	0,046	0,387

Berlin‘s Contribution for Urb.Energy

Case study about the concrete development of quarters

- in the urban district Berlin- Lichtenberg
- with the housing stock of the housing company HOWOGE

...composed of 4 parts

- Compilation of the relevant elements of the applied integrated urban development concept
- Inventory (state 1990), appraisal and detected deficits
- Planned concepts and their down-to-earth implementation
- Achieved state (2009), open issues and plans for the further development

What Renovation Investments can be financed?

		EST LT LV PL	D (East) in the 1990th
Loan conditions	Term in years	8 to 12 years	20 to 25 years
	Interest	4,5 to 7 %	6 to 8 %
	Annuity (Σ redemption and interest)	**15 %**	**8,5 %**
Financing scope		**35,00 €**	**145,00 €**
Achievable loan		**2.625,00 €**	**20.470,59 €**
By comparison: costs of energy-saving measures		ca. 5.000 €	ca. 8.000 €

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Decision Rules for Condominium Ownerships

<table>
<tr><th>Measures</th><th>EST LT LV PL</th><th>D</th></tr>
<tr><td>Necessary repairs (M1)</td><td colspan="2">Owner vote not required (compulsory task of the housing manager)</td></tr>
<tr><td>Large-scale maintenance</td><td rowspan="3">Majority vote (50% + 1)</td><td></td></tr>
<tr><td>General modernisation</td><td rowspan="2">Unanimous agreement</td><td>75% after 01 July 2007</td></tr>
<tr><td>Energy-saving measures</td></tr>
<tr><td>Structural changes</td><td colspan="2"></td></tr>
<tr><td>Required building work</td><td colspan="2">as M1</td></tr>
</table>

BEEN Recommendations ....Put into Reality

BEEN- Recommendation 1:

- The scope of Art. 6 of the EPBD should be extended to apply to smaller residential buildings (not only to those exceeding 1,000 m² of living space)

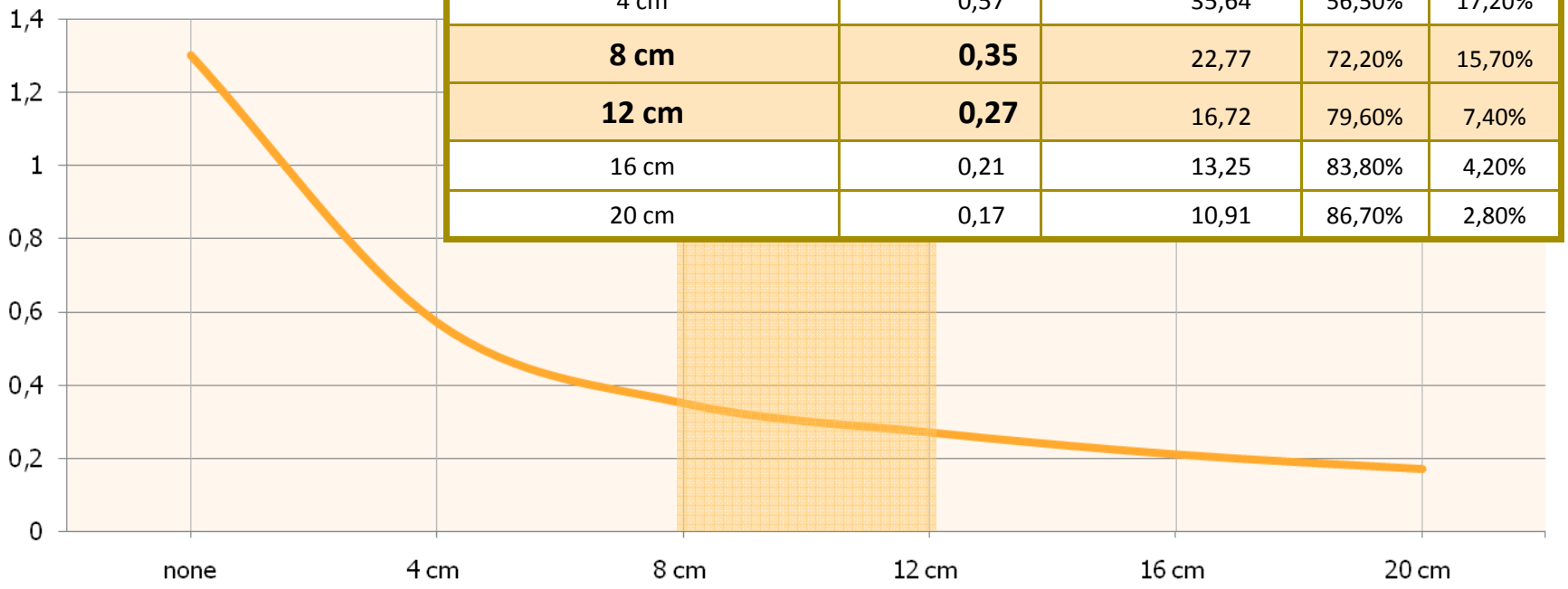
Recommendation 1b:

- National energy requirements for window replacement should be simple and practice-orientated and avoid abstract references to complex regulations for new buildings. There is no sensible reason to allow the installation of new windows with U-values higher than 1.3 W/m²K.

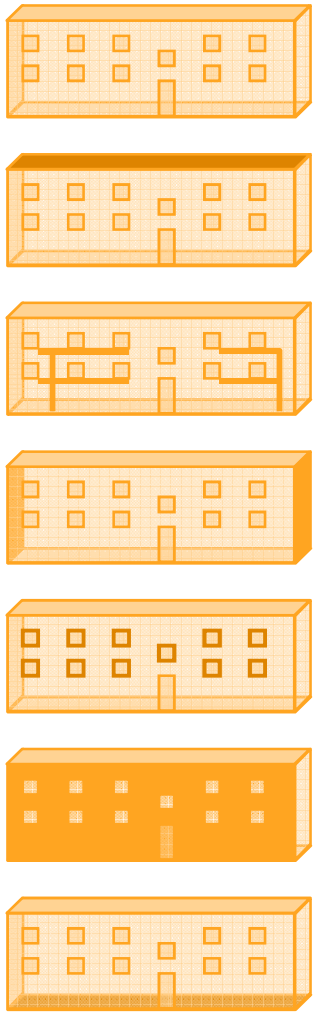
Insulation Layer Thickness

Influence of the insulation thickness in respect of the heat energy losses of prefabricated housing (Type 2)

Thickness of insulation layer	U-value in W/m²K	Heat energy loss in kWh/m² per annum	Savings	Increase
Uninsulated exterior wall	1,30	82,00	–	–
1 cm	0,98	61,88	24,50%	24,50%
2 cm	0,79	49,70	39,40%	14,80%
4 cm	0,57	35,64	56,50%	17,20%
8 cm	**0,35**	22,77	72,20%	15,70%
12 cm	**0,27**	16,72	79,60%	7,40%
16 cm	0,21	13,25	83,80%	4,20%
20 cm	0,17	10,91	86,70%	2,80%



Ranking of Energy-saving Measures for Renovation Step-by-step



Measures	Amortisation period [years]	Ranking score
Insulation top floor ceiling	6	**1**
Insulation heating pipes	6	
Insulation gable walls	12	**3**
New windows	13	**4**
Insulation longitudinal walls	14	**5**
Insulation cellar ceiling	25	**6**

BEEN Recommendation for State Support Programmes

Affordable Loan ...

Optimum Support

....from one source..

.... covering 100 % of the refurbishment costs.

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Continuation of the German KfW Loan Support Programmes

Germany's Support Programme "KfW- CO2- Gebäudesanierungsprogramm" in 2007 und 2008			
	Granted loan volume with reduced interest rates *)	Number of flats supported	Average loan per flat
2007	**1.861 Mio €**	**83.345**	**22.324 €**
2008	**2.841 Mio €**	**122.016**	**23.284 €**

**) Current conditions for energy efficient measures:*
Interest rates 2,55 % to 2,80 %; loan duration 20 or 30 years.
Premature repayment possible without prepayment penalties.

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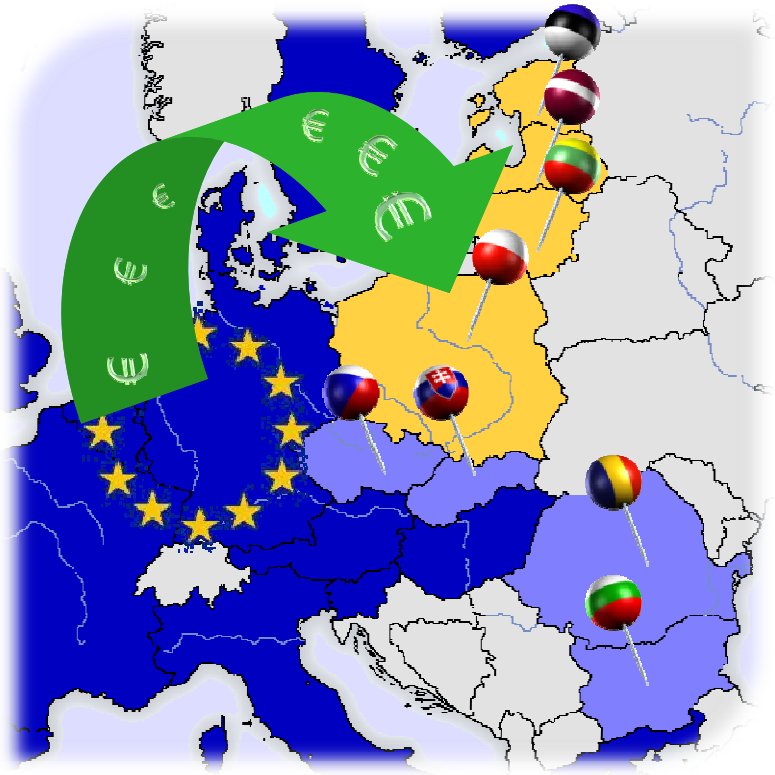
BEEN Recommendation for State Support Programmes



EU Structure Funds Periode 2007 to 2013

EU Structure Fonds useable for refinancing of national support programmes ....

...aiming energy efficiency of the residentail building stock.

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BEEN Best-Practice Projekt
Paldiski Road 171, Tallinn (Estland)

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