Presentation on:

EU Energy Performance of Buildings Directive: Evaluation of National Implementations in CZ and AT and their effectiveness

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Introduction

EU targets climate neutrality by 2050

Buildings:
about 40% of energy use

EPBD:
Framework for energy efficiency in buildings

Focus:
Compare AT and CZ implementations

The EPBD - Overview

Introduced 2002, Latest amendment in June 2024

Covers new/existing buildings

Goals: energy efficiency, (n)ZEBs, smart tech, long-term strategies

Key Articles of the EPBD

- Art. 2a: Long-term renovation strategies (LTRS)
- Art. 3: Energy Performance Calculation Methodology
- Art. 6-7: Minimum energy standards & renovations
- Art. 8a: Smart Readiness Indicator (SRI)
- Art. 10: Financial Incentives
- Art. 11 - 13: Energy Performance Certificate (EPC) display in buildings

Austria – OIB-Richtlinie 6

Latest amendment:
May 2023

Strengths:

Harmonized Calculation Methods, EPCs and nZEBs

Gaps:

No SRI, GWP, or renovation passports; LTRS not implemented

Czech Republic – Act No. 4 06/2000 Coll.

Latest amendment:
January 2024

Strengths:
Covers EPCs, inspections, nZEBs

Gaps:

No SRI, GWP, or renovation passports; LTRS not implemented

Techno-Economic Model

Family House Model in Prague and Vienna

Part	Default	With insulation
Walls	Fired brick	Fired brick & 15 cm EPS (graphite)
Windows	Wooden frame + Single glazing	PVC frame+3 layers of glass
Roof	Clay tiles, wooden battens, no heat insulation	Clay tiles, wooden battens, with heat insulation EPS (graphite)

- Build-up area 120 m^2
- One floor

1. Technical calculations:
2. Total thermal transmittance of the structures
3. Total specific heat loss (heat transfer&air ventilation)
4. Heating degree days
5. Total annual heat demand

Techno-Economic Model

Annual Heat Demand Calculation

Heating degree days		
Czech republic	1 973	K*day
Austria	1 671	K*day

- Energy demand ↓ ~66% after insulation
- Difference: climate/heating degree days

Heat demand of the default house		
Specific Heat Loss of a Building by Heat Transfer (HT)	371	W/K
Air exchange rate	0.5	1/h
Specific heat loss by ventilation	91	W/K
Total specific heat loss	462	W/K
Annual Heating Energy Demand CZ	21 867	kWh/year
Annual Heating Energy Demand AT	18 518	kWh/year

Heat demand of the insulated house		
Specific Heat Loss of a Building by Heat Transfer (HT)	67	W/K
Air exchange rate	0.5	1/h
Specific heat loss by ventilation	91	W/K
Total specific heat loss	157	W/K
Annual Heating Energy Demand CZ	7 456	kWh/year
Annual Heating Energy Demand AT	6 314	kWh/year

Techno-Economic Model

Price of Investment

Price of work	CZ	AT	
Average hourly rate	8.53	19.68	EUR
Working hours	160	160	EUR
Duration of work on roof	100	100	hours
Duration of work on walls	200	200	hours
Duration of work on 1 window	5	5	hours
Duration of work on all windows	50	50	hours
Total work	355	355	hours
Total	3030	6986	EUR

Price of material	CZ	AT	
Price of EPS+accessory per m2	25	25	EUR
Price of walls insulation	4 022	4 022	EUR
Price of roof insulation	3 890	3 890	EUR
Price of 1 window	361	361	EUR
Number of windows	10	10	-
Price of fasade plaster	10.04	12.00	EUR/m2
Price of fasade plaster	1 615	1 930	
Total	13 141	13 456	EUR

Margin of supplier	50%	50%	-
Total investment	**24 256**	**30 663**	**EUR**

20-year horizon, 3% discount rate

Techno-Economic Model

Energy Prices and Subsidies

Subsidies Czech Republic	Amount	Units	MAX
Insulation of walls	52.21	EUR/m2	
New windows	197	EUR/m2	
Insulation of roof	52.21	EUR/m2	
Total	19 688	EUR	40 161

Subsidies Austria	Amount	% of invest.	MAX
State subsidy	15 332	50%	27 000
Federal subsidy (Wien)	10 732	35%	12 000
Total	26 064	EUR	

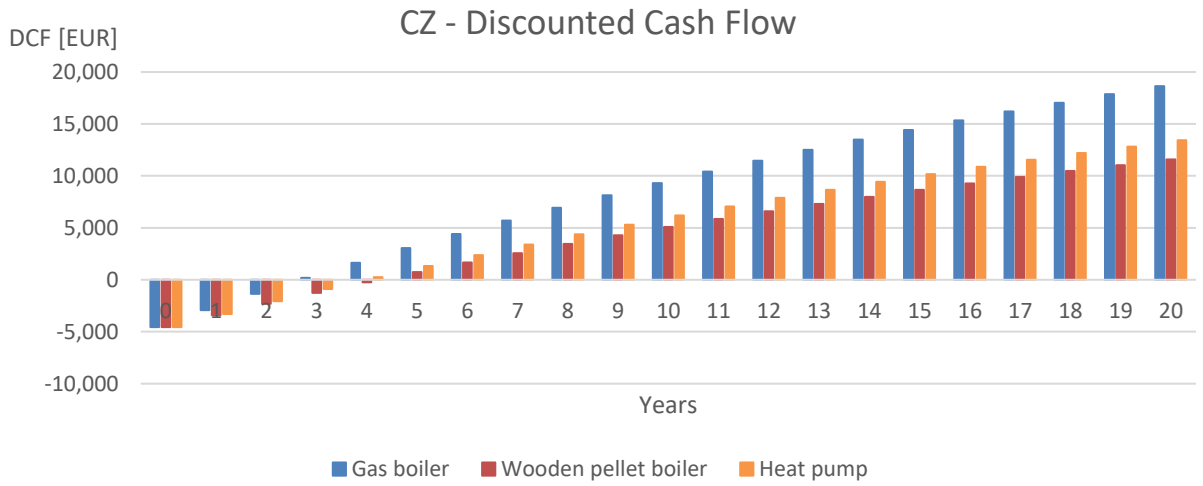
Efficiencies	-
Efficiency of heat distriution syst	97%
Efficiency of heat pump	350%
Efficiency of gas boiler	95%
Efficiency of wood pellet boiler	90%

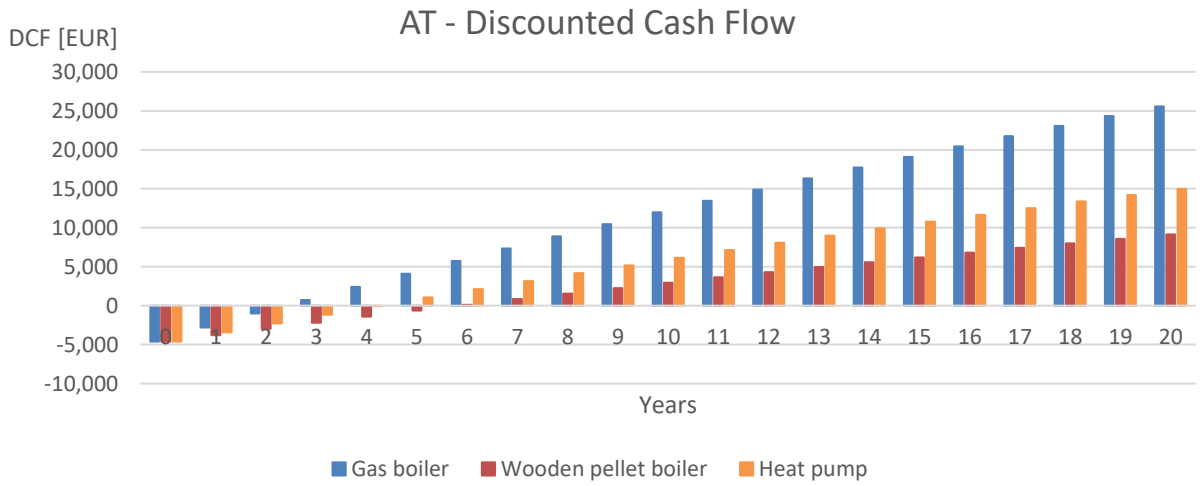
Price of primary energy source	CZ	AT	Units
Price of natural gas:	108	138	EUR/MWh
Price of wooden pellets:	71	60	EUR/MWh
Price of electricity:	310	330	EUR/MWh

Price of useful heat	CZ	AT	Units
Gas boiler	118	150	EUR/MWh
Wooden pellet boiler	82	68	EUR/MWh
Heat pump	91	97	EUR/MWh

Techno-Economic Model

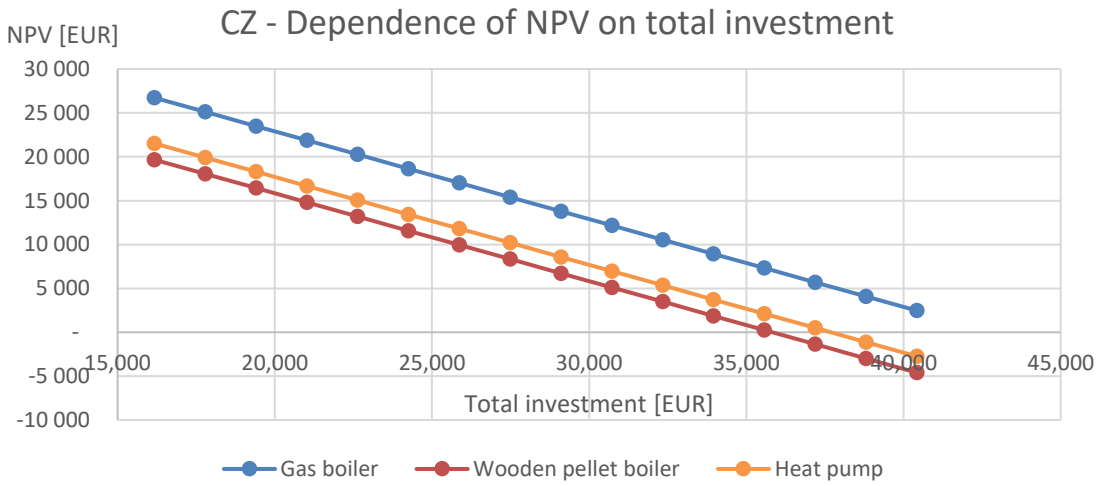
Discounted CF

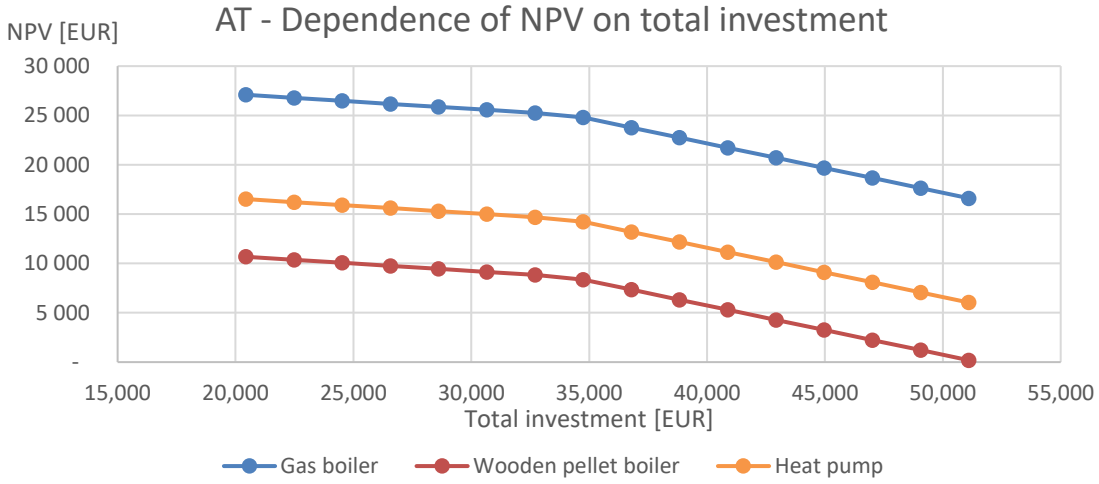




Techno-Economic Model

Dependence of NPV on total investment





EU Comparison of Subsidies

CZ:
One-time, New Green Savings

AT:
% subsidies + tax breaks, klimaaktiv linked

DE:
BEG - subsidies + loans

PL:
Czyste Powietrze – grants + tax reliefs

Conclusion

- AT & CZ meet technical EPBD goals
- Missing digital & environmental targets (SRI, GWP)
- Insulation is economically viable
- Future: embed LTRS, support smart tech

Thank you for your attention