

# Ekonomiska analyser av olika energirenoverings lösningar

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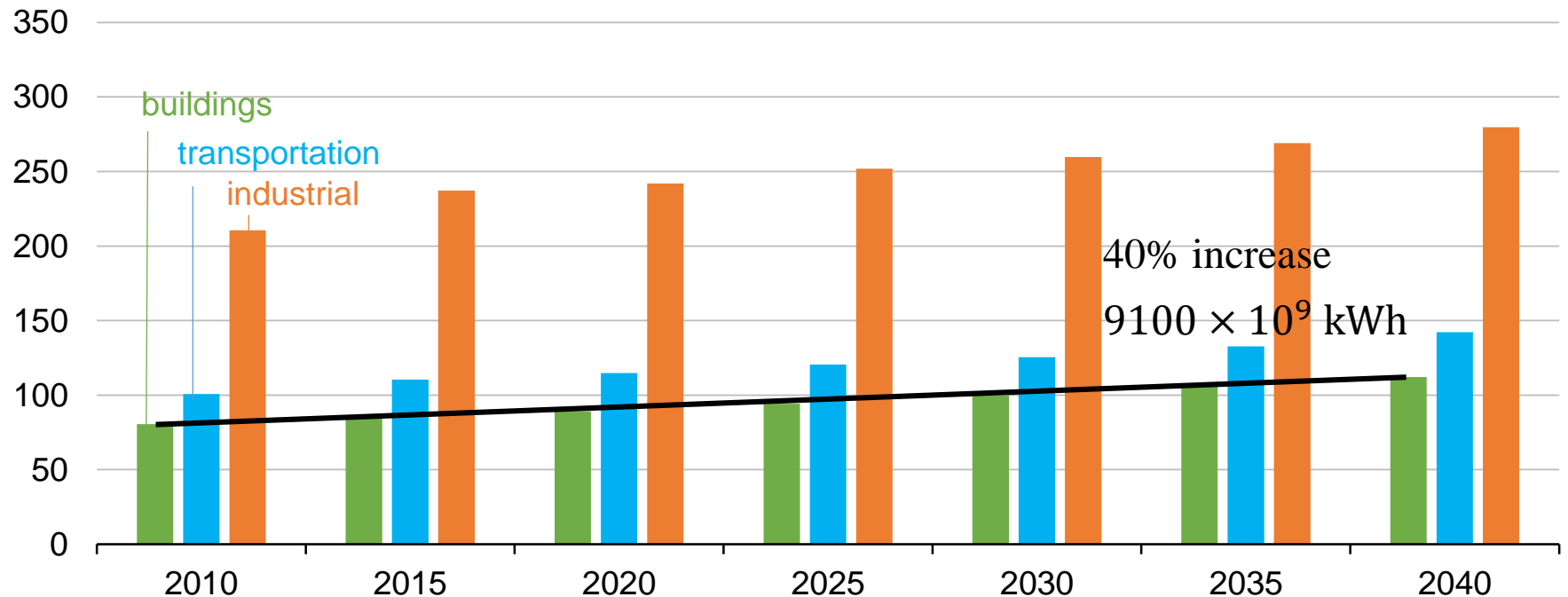
# Agenda

- Varför energirenovering?
- Fallstudie
- Renoverings lösningar
- Resultat

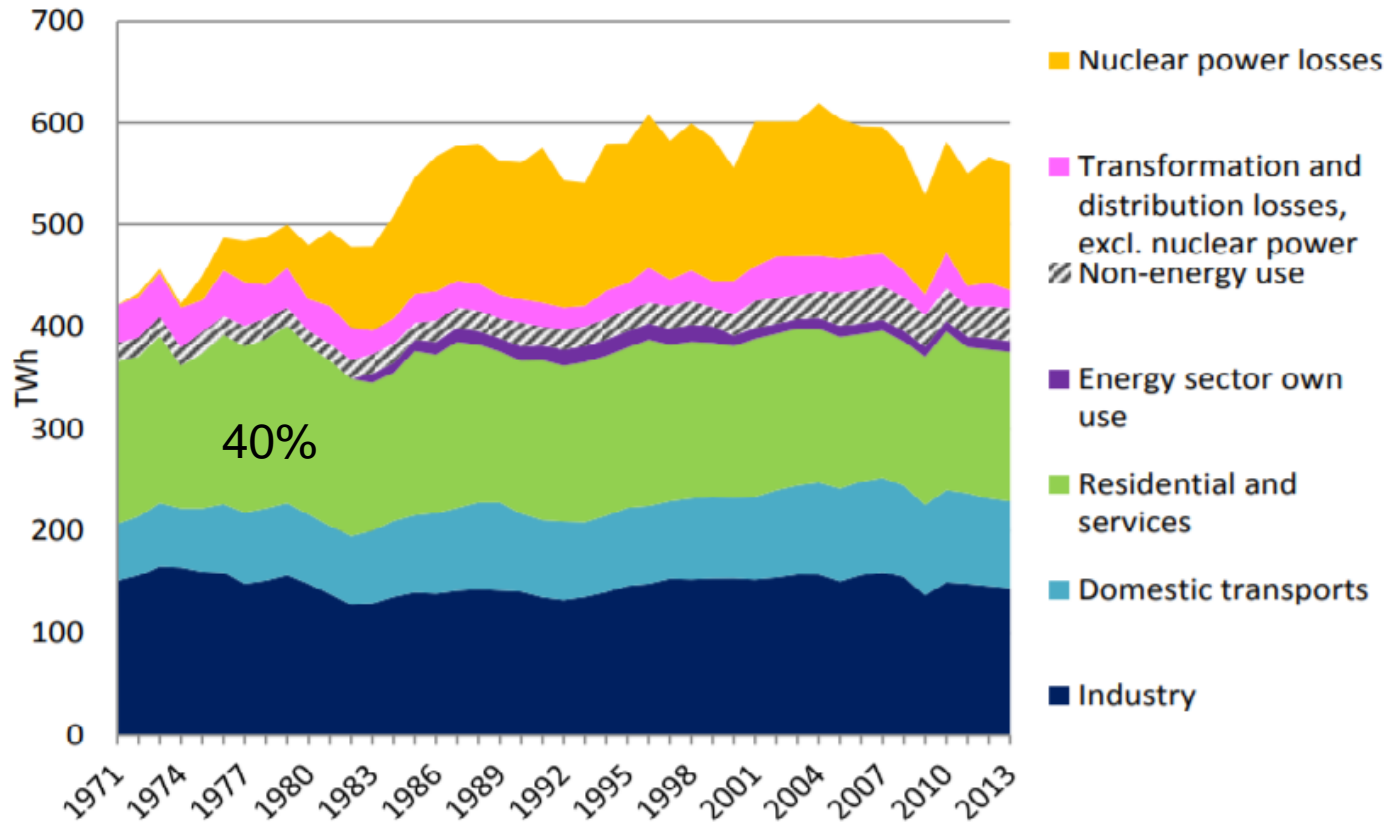


# Varför energirenovering?!

**World energy consumption by end-use sector**  
quadrillion Btu ( $2.9 \times 10^{11}$  kWh)



# Varför energirenovering?!



Feedback

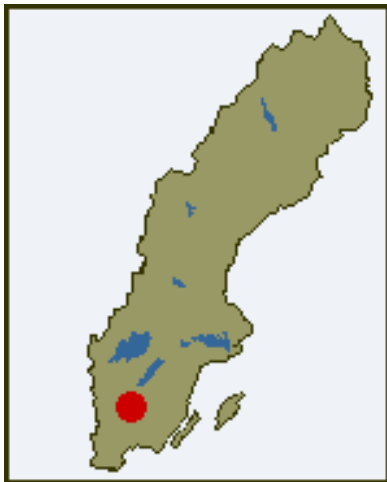


# Fallstudie

Boarea: 178 m<sup>2</sup>

Energiförbrukning= 110 kWh/m<sup>2</sup>

Luftbrune med FTX



# Energirenoverings lösningar

Renovation measures		Total energy consumption kWh/m <sup>2</sup>
Initial	0 No energy renovations were performed	110
single energy renovation measures	1 Only improving the u-value of building envelopes	a+b+c 95,4
	2 Adding a heat recovery for ventilation (In Swedish: FTX med värmeväxlare)	FTX 82,5
	3 Only installing a ground source heat pump (GSHP) for supporting space heating demand and domestic hot water	GSHP 21,8
Multiple energy renovation measures	4 Improving the u-value of buildings envelopes and adding a heat recovery for ventilation	a+b+c+ FTX 71
	5 Improving the u-value of buildings envelopes and installing a ground source heat pump for supporting space heating and domestic hot water	a+b+c+GSHP 19
	6 Improving the u-value of buildings envelopes, adding a heat recovery for ventilation and installing a ground source heat pump for supporting space heating and domestic hot water	FTX+GSHP 17
	7 Improving the u-value of buildings envelopes, adding a heat recovery for ventilation, installing a ground source heat pump for supporting space heating and domestic hot water	a+b+c+FTX+GSHP 15,7
	8 Improving the u-value of buildings envelopes, adding a heat recovery for ventilation, installing a ground source heat pump for supporting space heating and domestic hot water and adding photovoltaic cells for producing electricity	a+b+c+FTX+GSHP+PV 0

a: att lägga extra isolering i ytterväggarna  
 b: att lägga extra isolering i vindsbjälklag  
 c: att byta fönster



# Ekonomiska analyser

$$NPV = \sum_{t=0}^n (D'_t) * \frac{1}{(1+r)^t} - (I_0 + U)$$
$$D'_t = (E_0 - E_t) * \alpha(1+\beta)^t$$

NPV tar hänsyn till:

1. Investeringskostnad
2. Livsperiod
3. Energibesparing
4. Energikostnad per kWh/m<sup>2</sup>
5. Inflation på energikostnaden (%)
6. Underhålls kostnad
7. Ränta



# Ekonomiska analyser

$$NPV = \sum_{t=0}^n (D'_t) * \frac{1}{(1+r)^t} - (I_0 + U)$$
$$D'_t = (E_0 - E_t) * \alpha(1 + \beta)^t$$

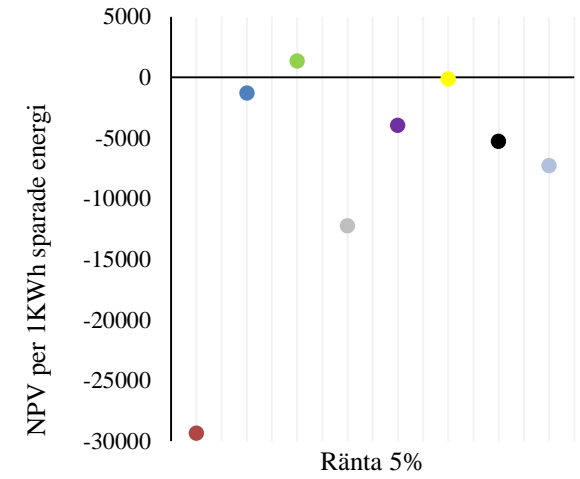
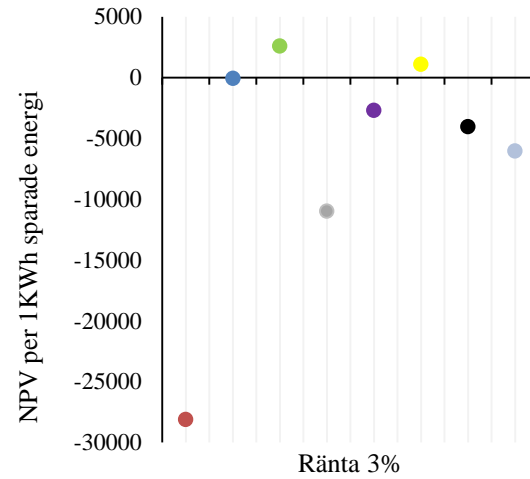
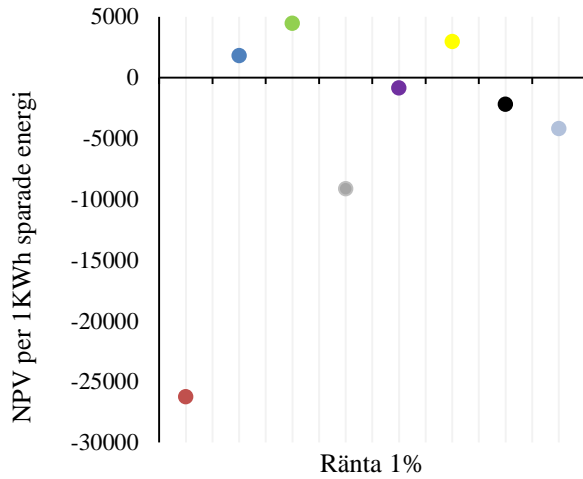
Investeringskostnaden (vilken innefattar materialkostnad, installationskostnad samt arbetskraftskostnad) och underhållskostnaden hämtades från:

- Wikells (Ett effektivt kalkyleringsverktyg inom byggsektorn anpassad för renovering, ombyggnad och tillbyggnad)
- INSPIRE projektet (Ett internationellt projekt för att sänka energiförbrukningen inom byggsektorn i EU)





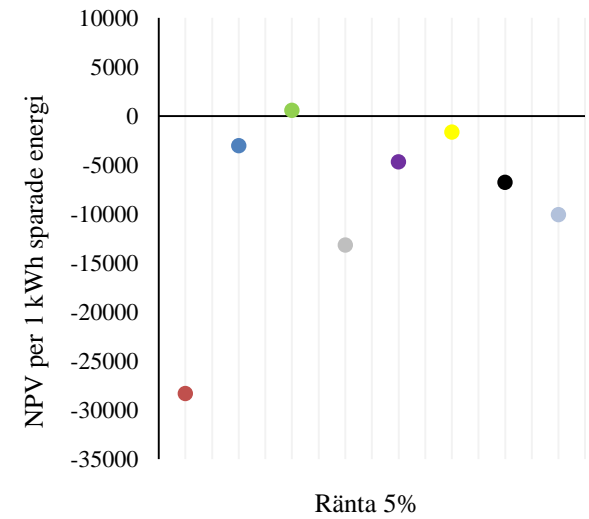
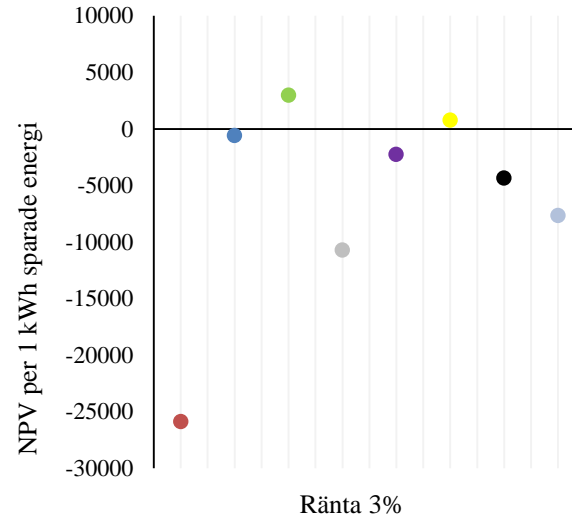
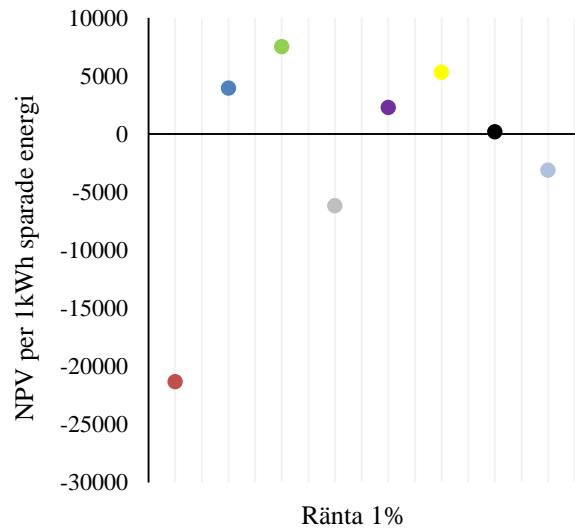
# Resultat (30 år)



- Extra isolering+ fönster
- FTX
- BVP
- Extra isolering+ fönster+ FTX
- Extra isolering+ fönster+ BVP
- FTX+BVP
- Extra isolering+ fönster+ FTX+ BVP
- Extra isolering+ fönster+ FTX+PV



# Resultat (50 år)



- Extra isolering+ fönster
- FTX
- BVP
- Extra isolering+ fönster+ FTX
- Extra isolering+ fönster+ BVP
- FTX+BVP
- Extra isolering+ fönster+ FTX+ BVP
- Extra isolering+ fönster+ FTX+PV



Frågor?

