

EIE EffCoBuild

WP3 Energy saving potentials in building sector and virtual “power saving plant”

Slovenia

Survey on energy consumption in community Jesenice

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Meeting in Berlin, September 26-27, 2006

Survey on energy consumption in Jesenice is based on

Statistical data for municipality (residential sector, construction sector)

Energy concept of municipality (1999) incl. ongoing actualization (2006)

Pole in buildings with extremely high energy consumption



Distribution of energy supply networks



SHEMATSKI ZEMLJEVID OBČINE JESENICE



Other 2%

combined, oil,
biomass 48%

Gas 7%

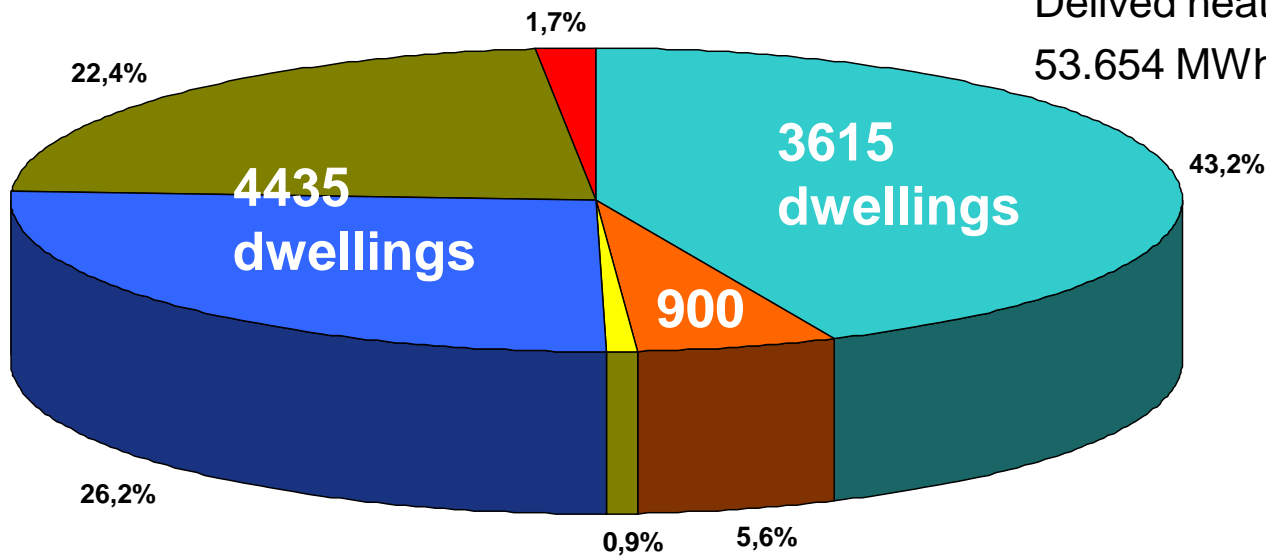
District heating 43%

Delivered energy by energy source per number of dwellings

Energy supply for households

- distric heating
- LPG (liquid-petroleum gas)
- solid fuel
- natural gas
- oil
- other

In 2005:
 Supplied heat to D.H. system
 64.579 MWh
 Delived heat to D.H. users
 53.654 MWh



Energy supply for heating

8590 dwellings in whole municipality Jesenice

3500 dwellings connected to D.H.

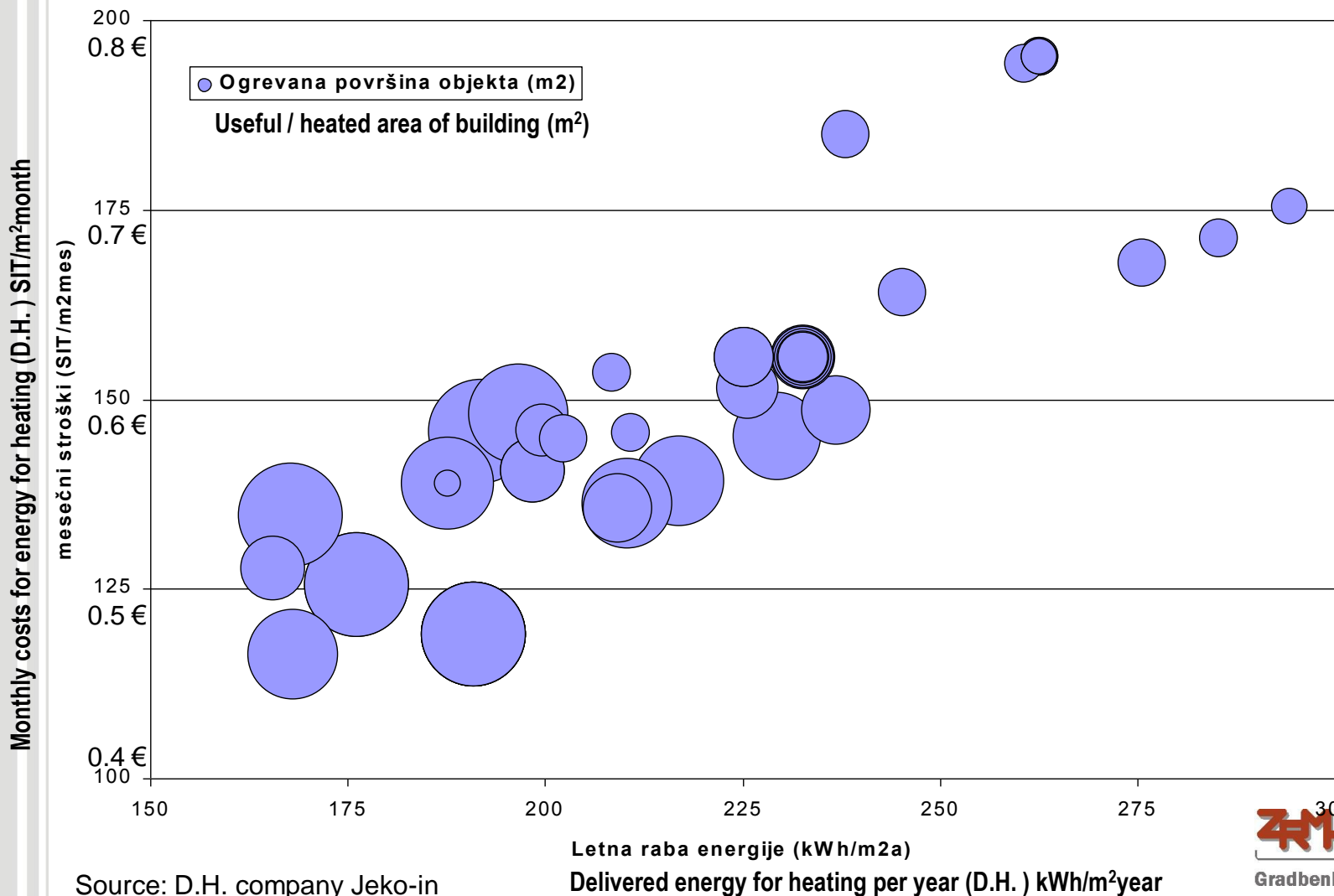
Reliable energy data!

1400 dwellings > 150 kWh/m²year

2000 dwellings < 150 kWh/m²year

Big energy users above 150 kWh/m²year

Delivered energy (kWh/m²year) – heated area of building (m²)
– energy costs SIT/m²month)

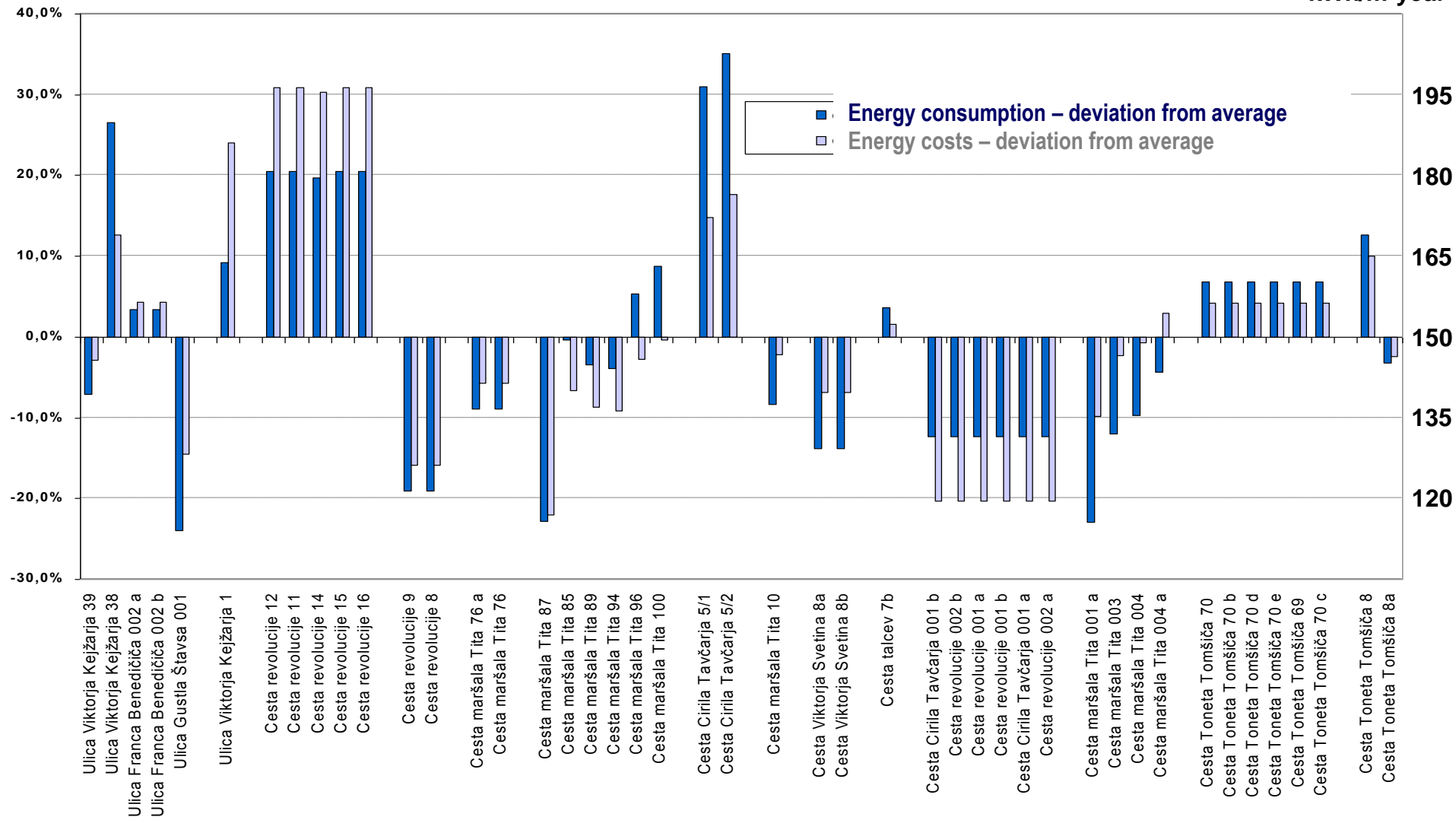


Source: D.H. company Jeko-in

Letna raba energije (kWh/m²a)
Delivered energy for heating per year (D.H.) kWh/m²year

Average delivered energy for heating 150 kWh/m²year – deviation in %

kWh/m²year

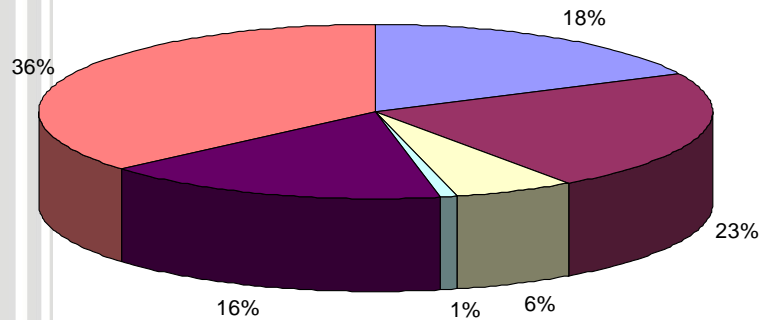


DHW in households per energy source

DHW preparation in households per energy source

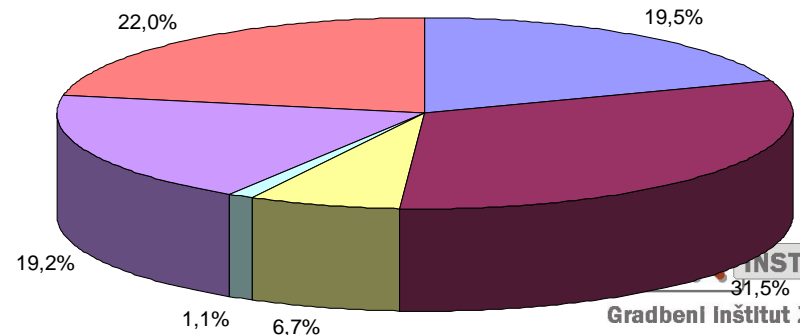
- solid fuel
- natural gas
- oil
- distric heating
- LPG
- other (heat pump, collector, ele

20% solid fuel
 32% distric heat
 7% natural gas
 1% LPG
 19% oil
 22% other (heat



Energy consumption for DHW (domestic hot water)

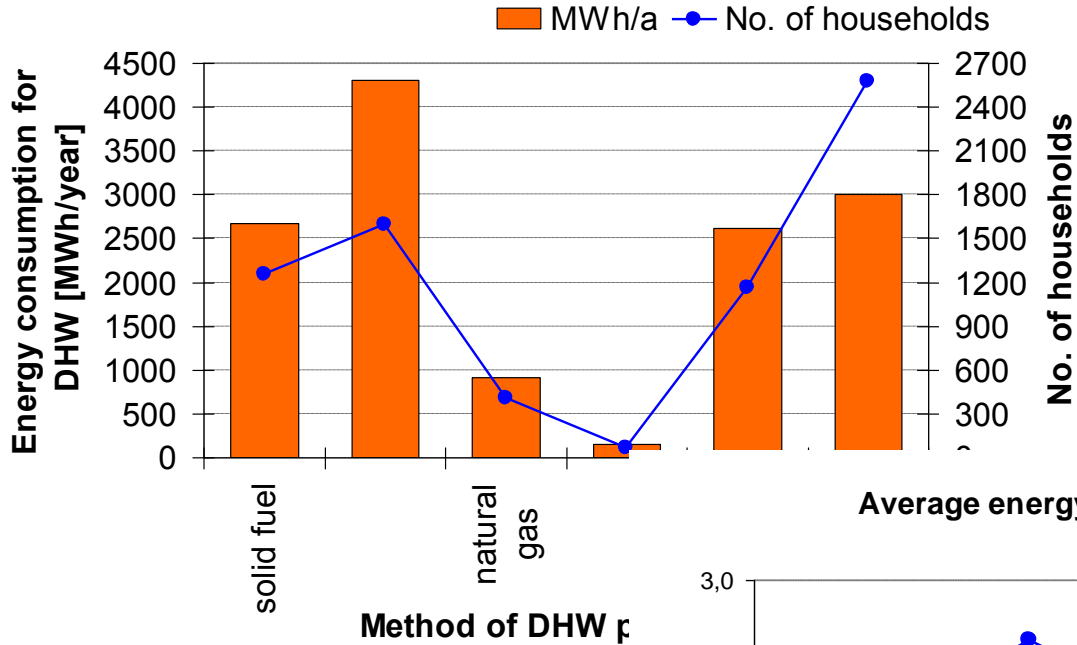
- solid fuel
- distric heating
- natural gas
- LPG



Energy consumption for DHW (domestic hot water)

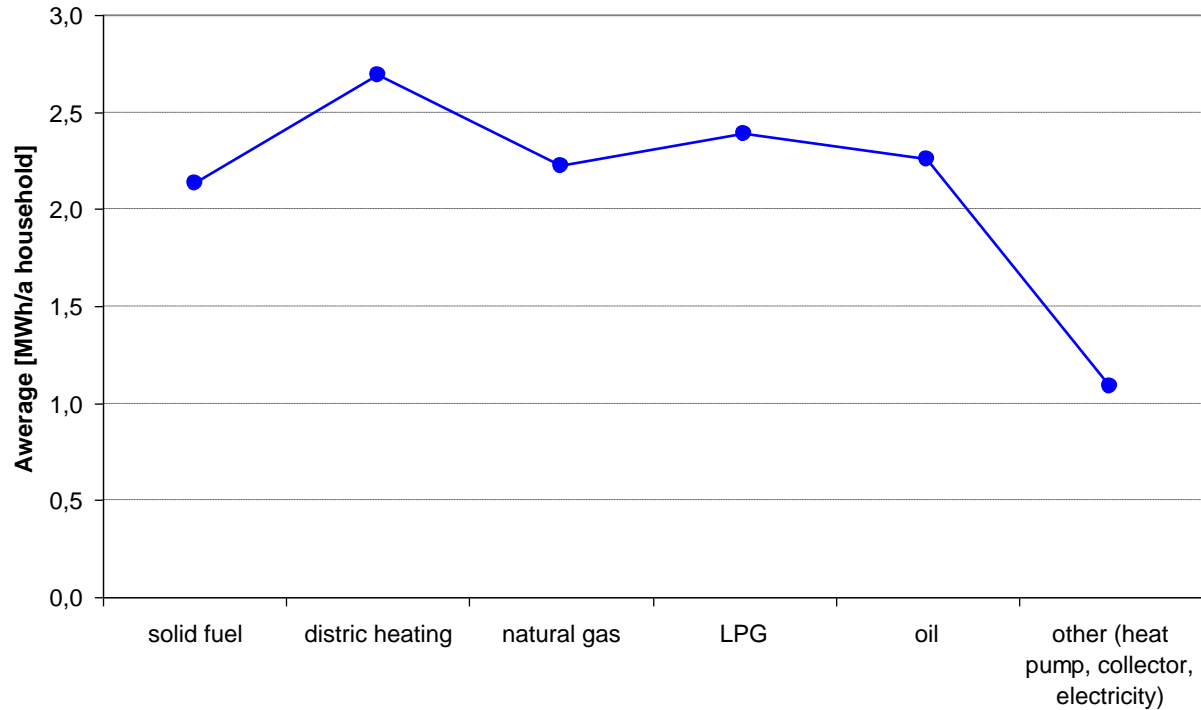
	No. of households	MWh/a
solid fuel	1251	2666
distric heating	1599	4307
natural gas	409	909
LPG	64	153
oil	1160	2617
other (heat pump, collector, electricity)	2578	3000
		13652

Energy consumption for DHW



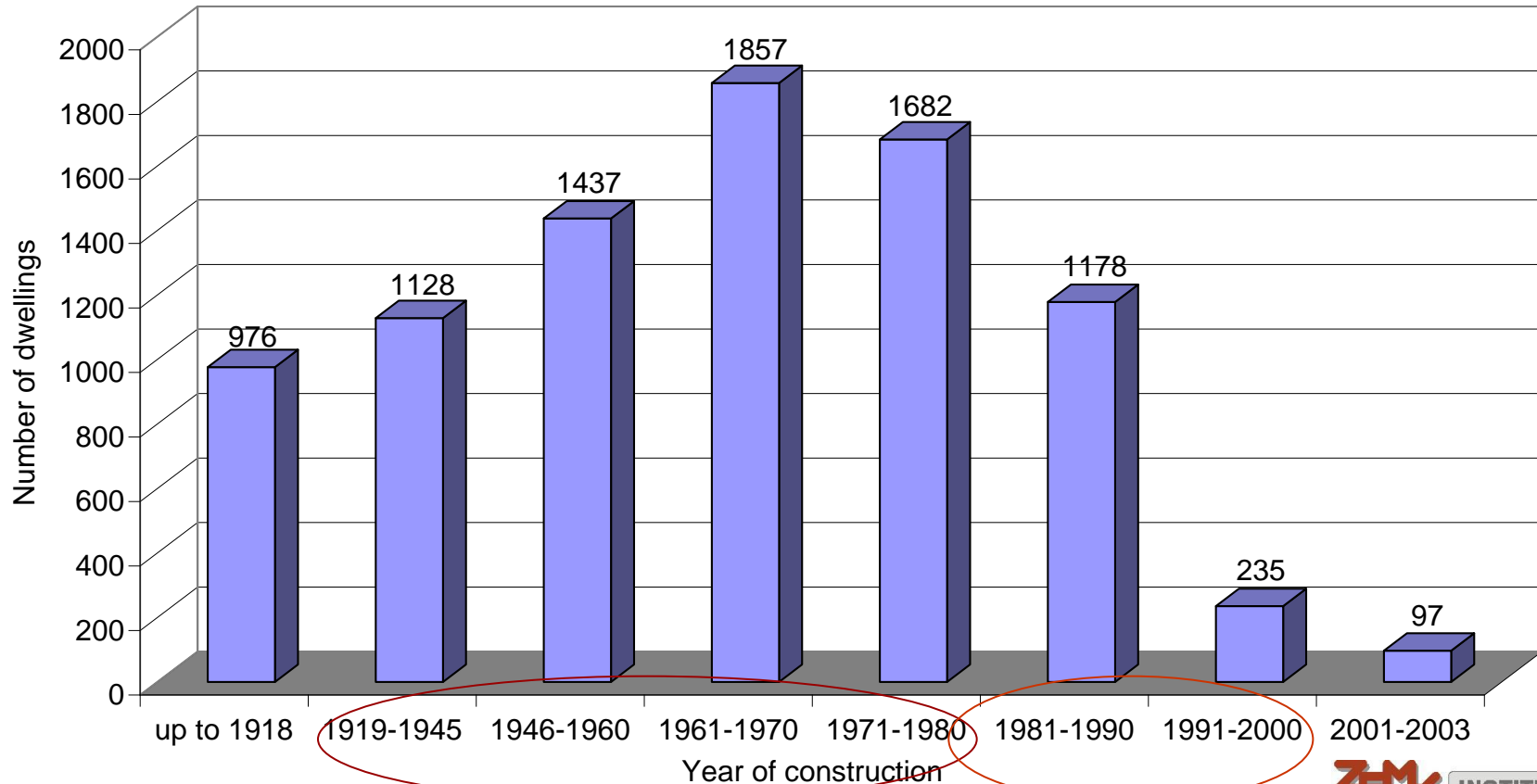
DHW by district heating

Average energy consumption for DHW per household



Existing dwellings (8590 dwellings) by year of construction

Dwelling stock, dwellings by year of construction in Jesenice



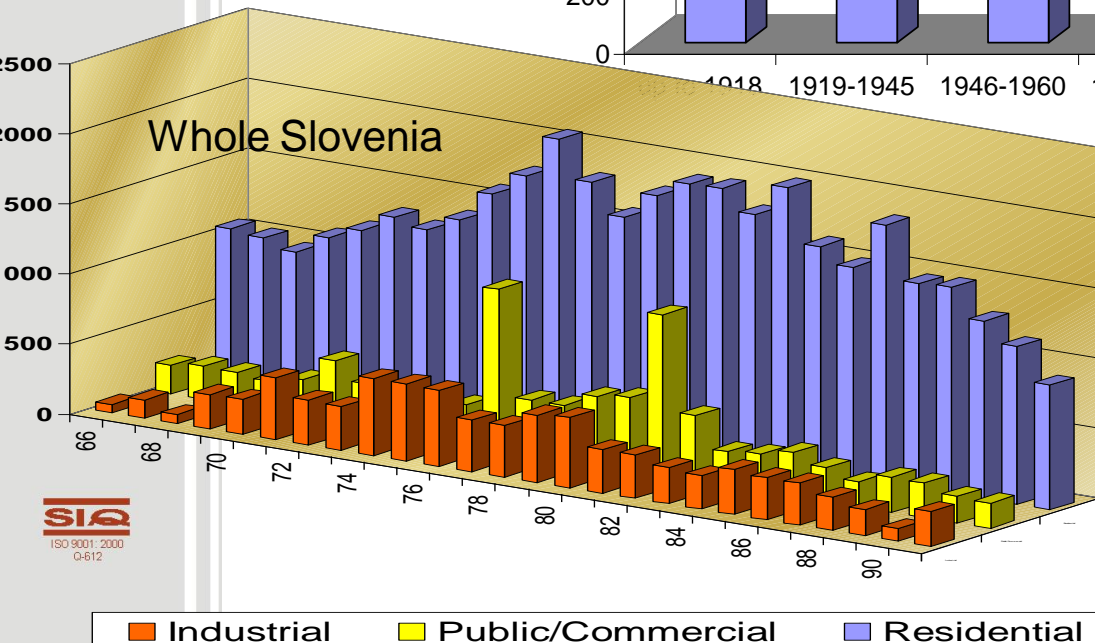
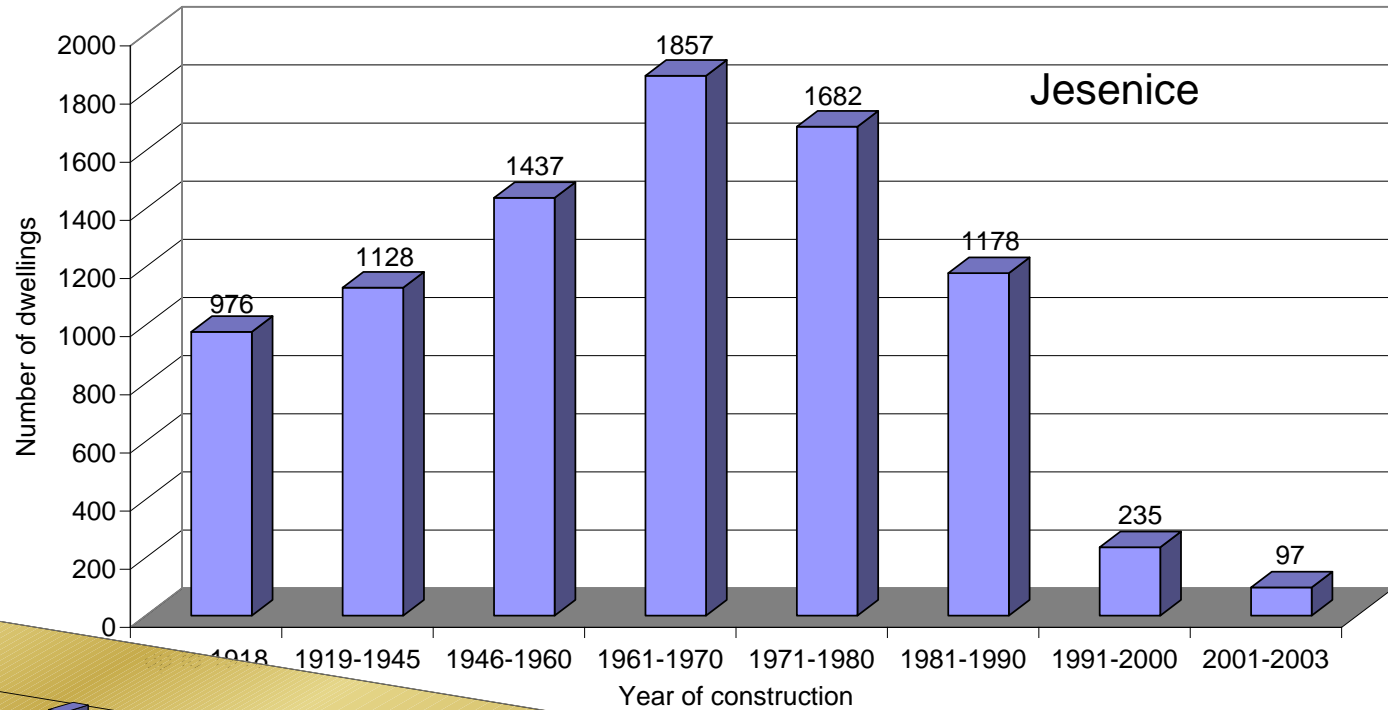
(Source: census 2002)



regulation



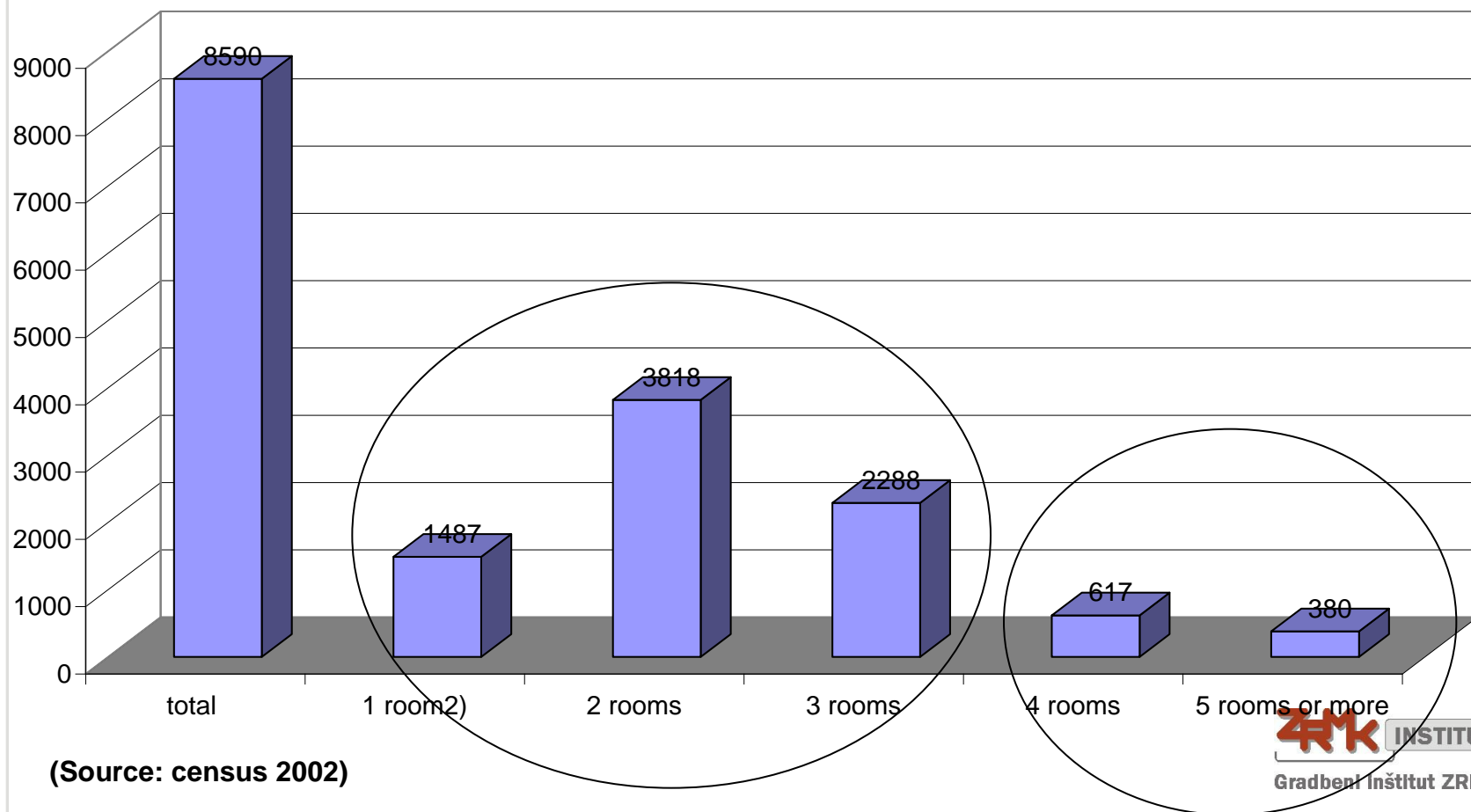
Dwelling stock, dwellings by year of construction in Jesenice



Census 2002:
Jesenice:
2557 residential buildings
8517 dwellings
with 540.298 m2 floor area

Existing dwellings in number by number of rooms

Dwelling stock, dwellings by number of rooms, Jesenice



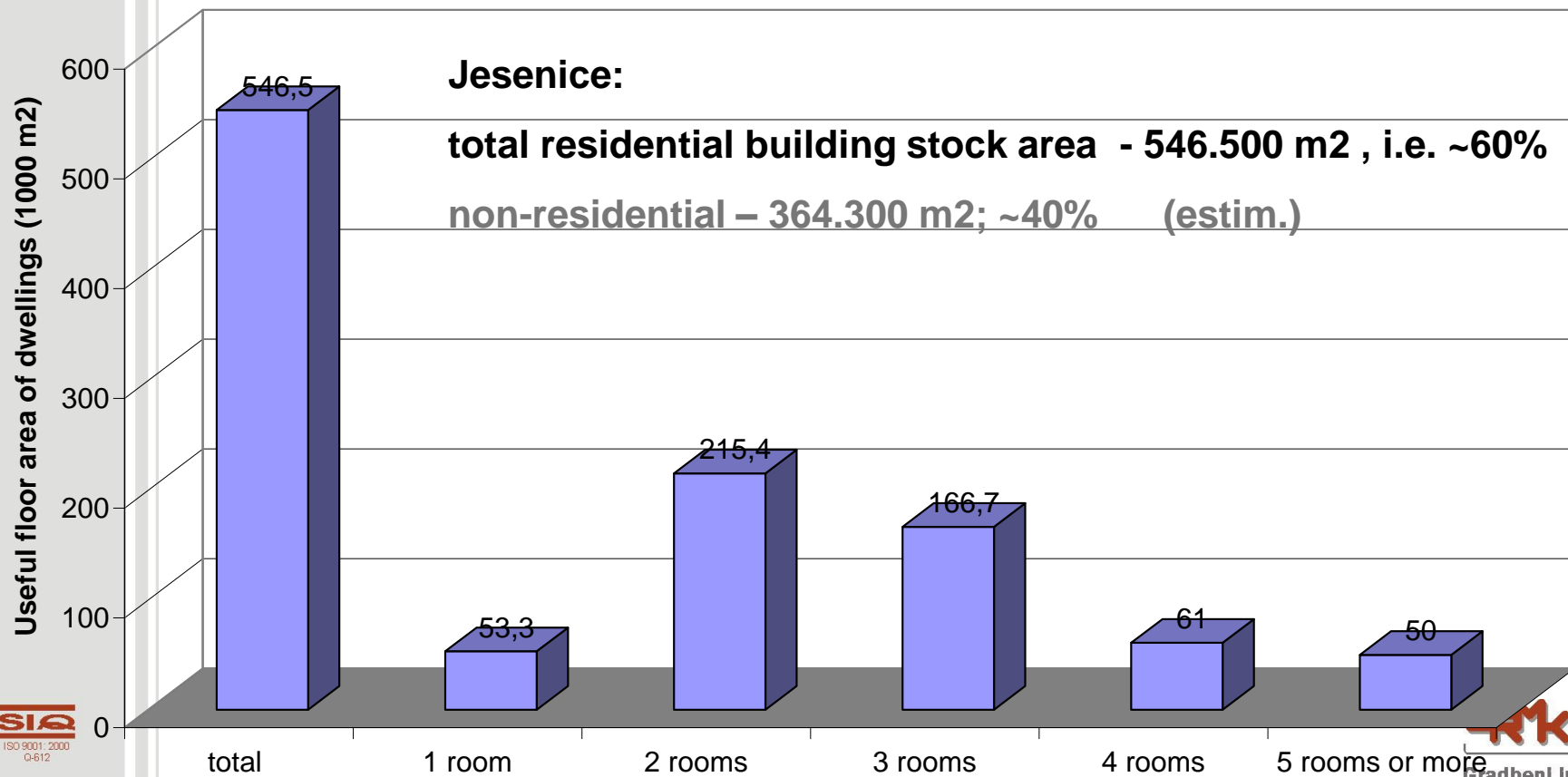
Existing dwellings in total useful floor area by number of rooms

Dwelling stock, dwellings by useful floor area, Jesenice

Jesenice:

total residential building stock area - 546.500 m² , i.e. ~60%

non-residential - 364.300 m²; ~40% (estim.)



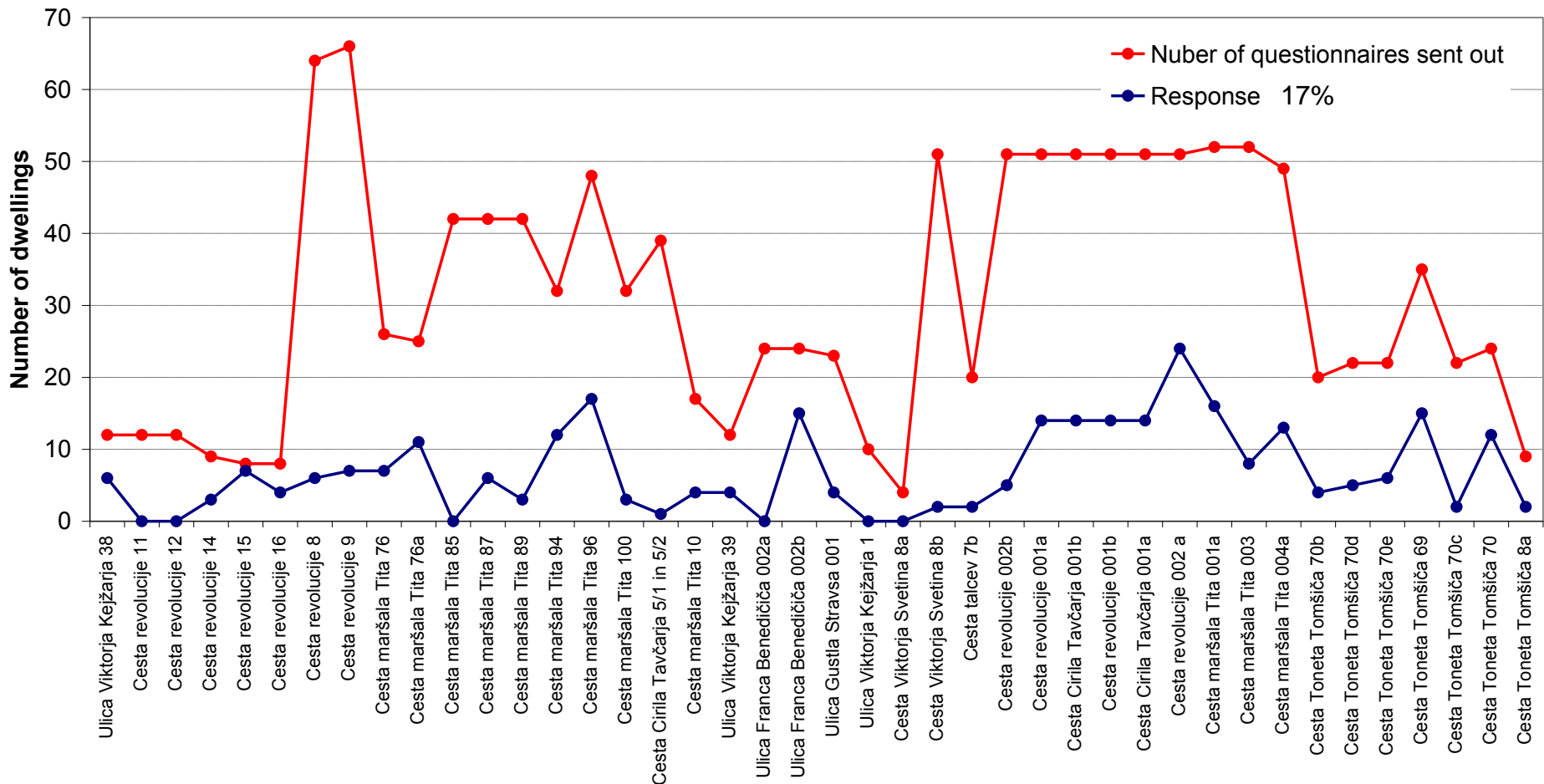
(Source: census 2002)

Pole 1400 dwellings – 44 buildings

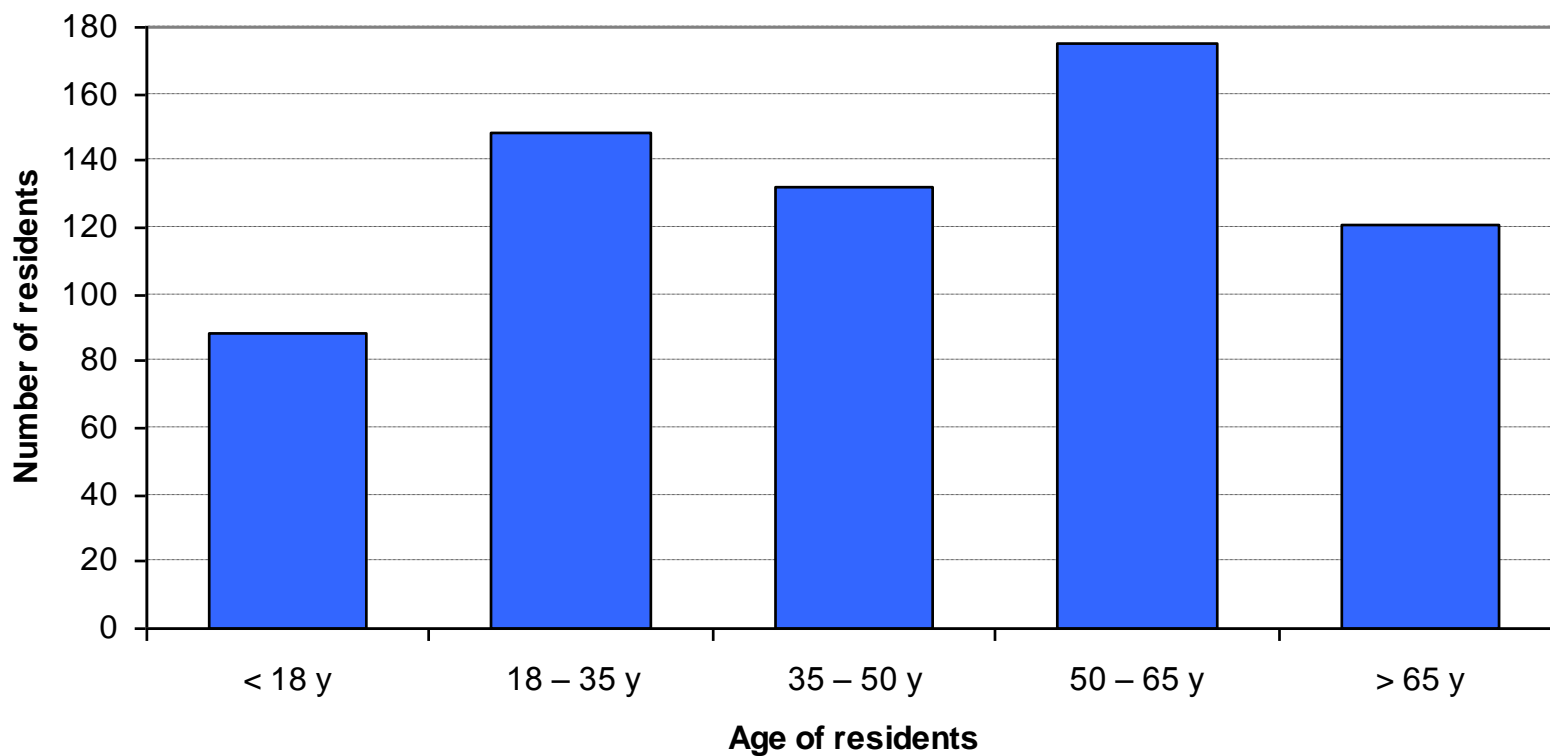
Pole – the biggest energy users

(1400 dwellings, 44 residential buildings)

Municipality Jesenice - pole on energy data
Residential sector (N = 1400)

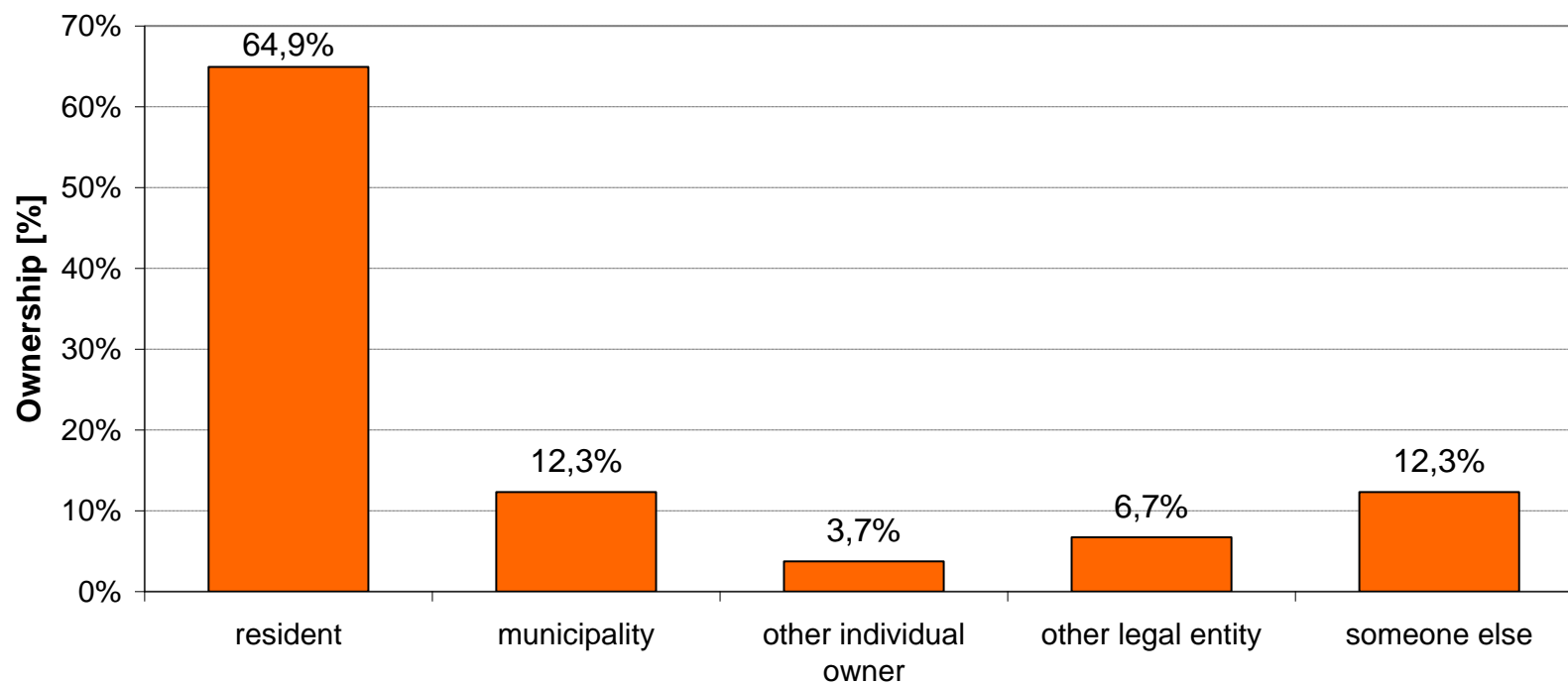


Age of residents in apartment buildings in Jesenice



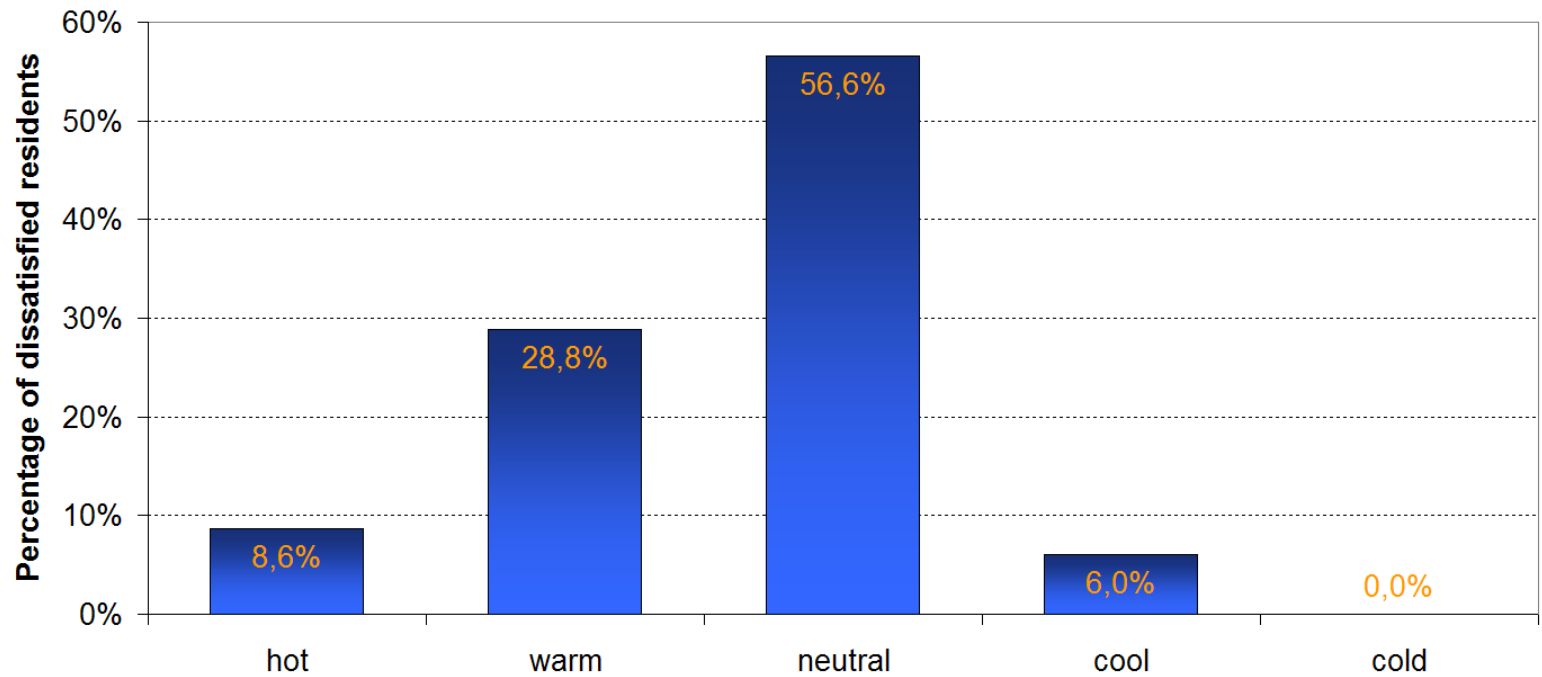
Source: pole 44 buildings

Ownership of dwellings in apartment building



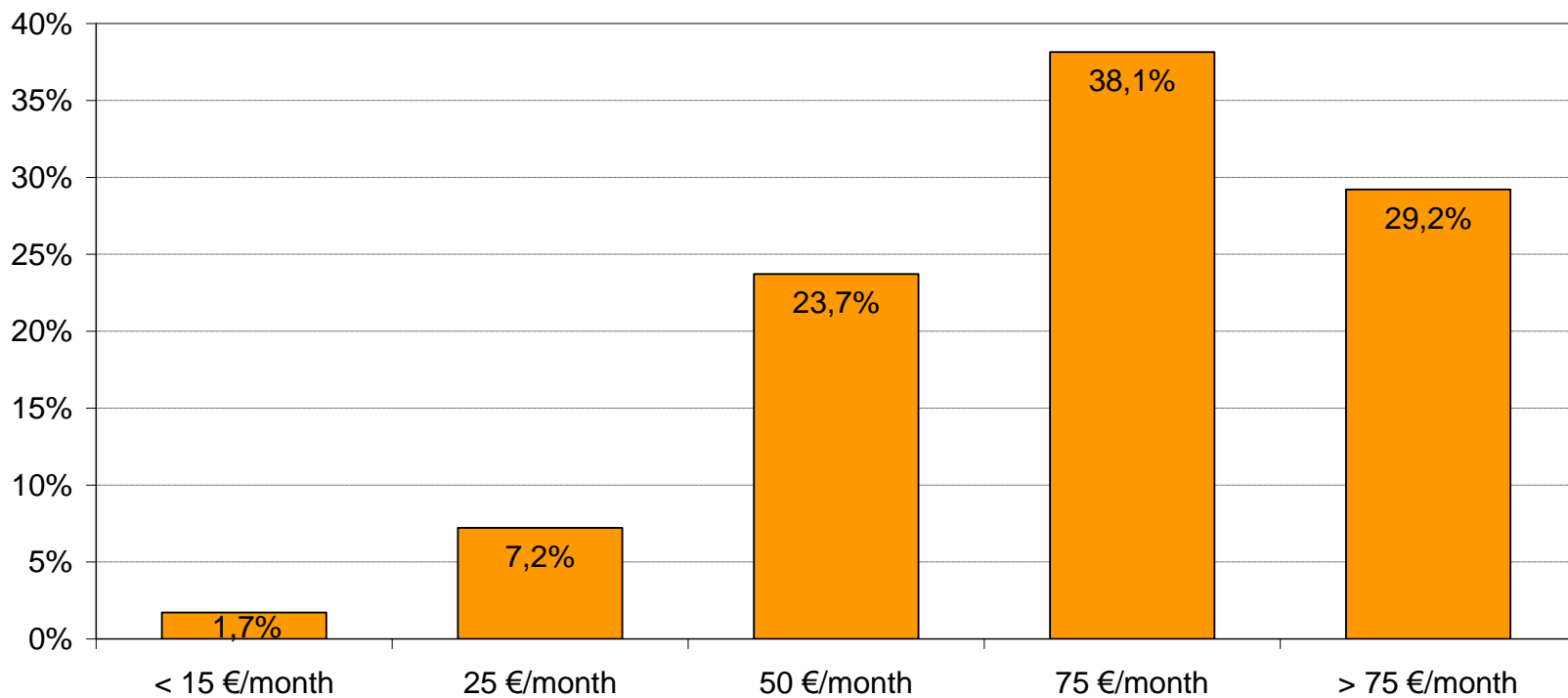
Source: pole 44 buildings

Estimation of thermal comfort in entire dwelling



Source: pole 44 buildings

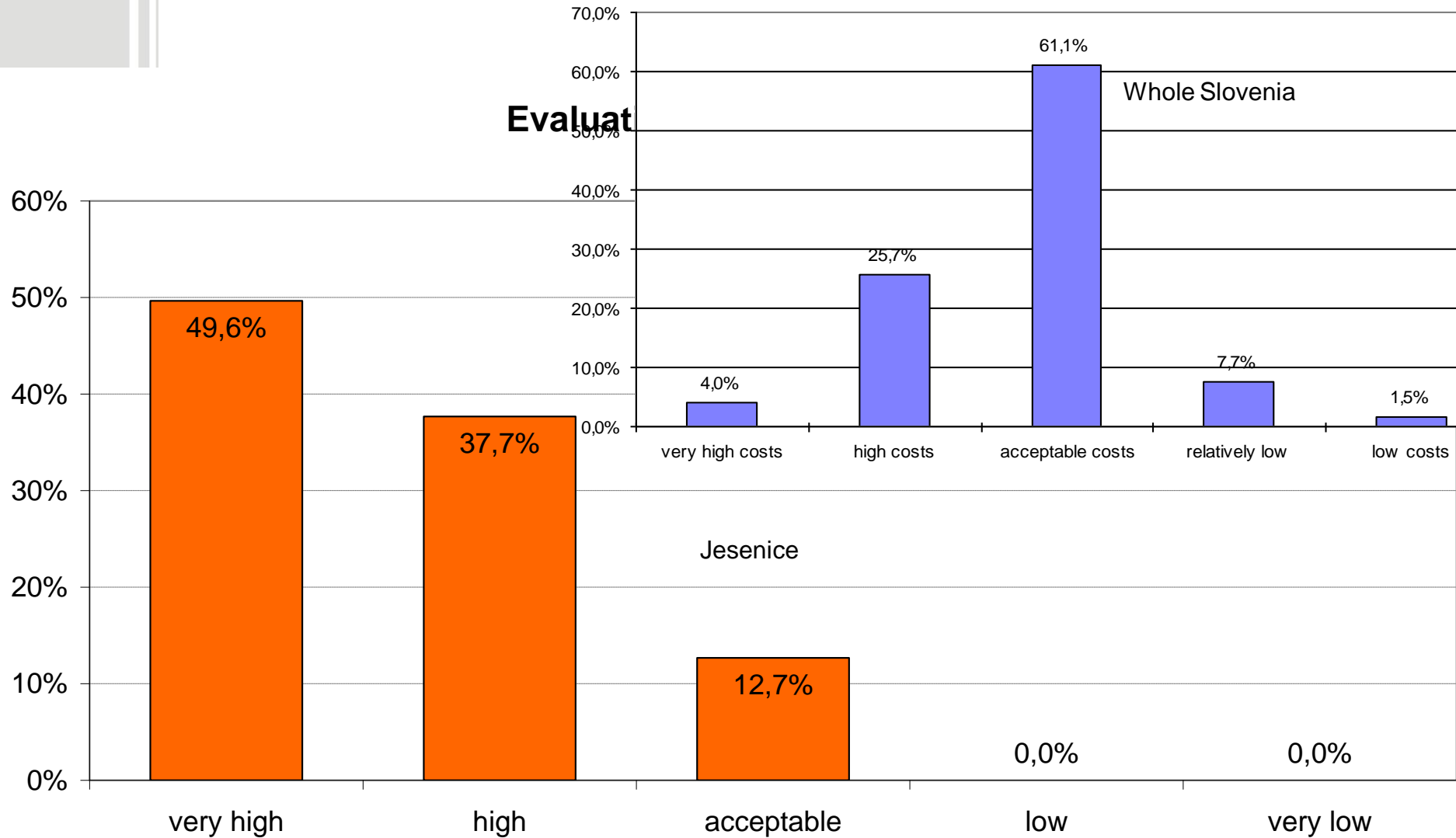
Price for energy consumption per month - Jesenice (apartment buildings)



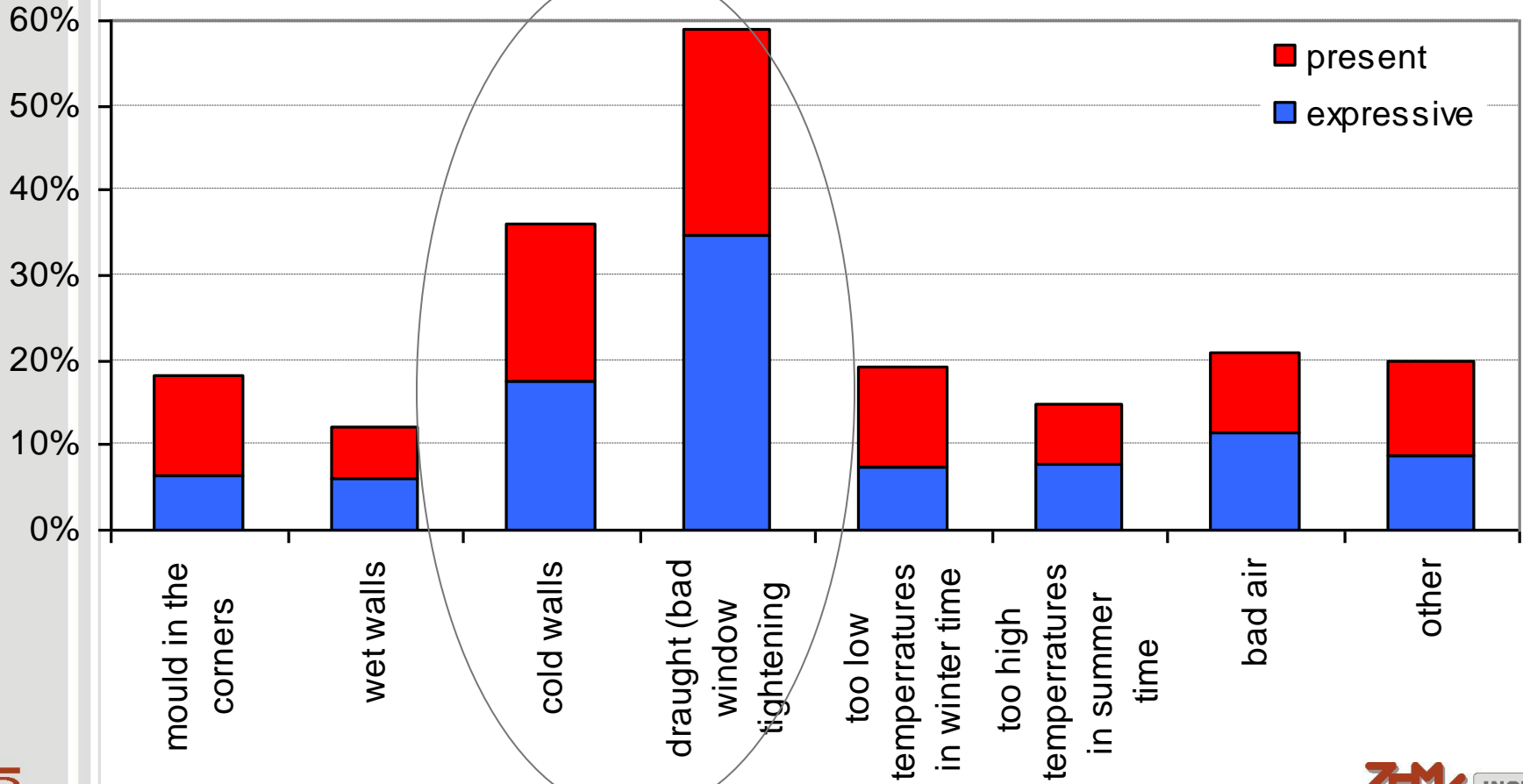
Source: pole 44 buildings

Net average salary 650 EUR

ESTIMATION OF COSTS FOR ENERGY USE IN A HOSEHOLD



Problems with thermal comfort that appear in residents apartment



Refurbishment target

Big energy users (1400 dwellings) in central Jesenice use more than **150 kWh/m²**.

Final target energy use for dwelling with floor area 55 m², is between **100 and 110 kWh/m²**.

Short term target of municipality Jesenice is to reduce delivered energy for heating to **140 kWh/m²**.

Municipality Jesenice developed 150 subsidy programme (started in 2000, currently enlarged!)

Refurbishment target

Municipality Jesenice developed 150 subsidy programme (started in 2000, currently enlarged!)

- thermal insulation of attics (unused attic) or thermal insulation of roofs (used attic),
- thermal insulation and renewal of façades,
- thermal insulation of basement ceilings or flooring,
- replacement of buildings' joinery – windows and doors,
- switch over to district heating (connection to hot-water network and gas grid),
- installation of heat pumps for hot water generation,
- installation of solar systems for hot water generation,
- installation of special wood-fuelled combustion plants for central heating running on logs (biomass).

Poraba energije kwh/m2 letno	% subvencije
150 – 180	10 - 15
180 – 210	15 – 20
210 – 230	20 - 25
> 230	30

Ulica Franca Benedečića 2a

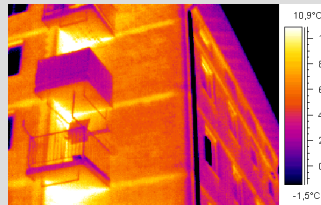
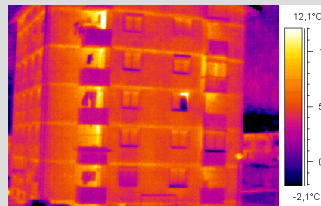
Osnovni podatki

ogr.površina: 1015 m²
št. stanovanj: 24
št. stanovalcev: 74
upravnik: Meting
leto gradnje: 1973



Ovoje zgradbe

Stene (125 m² S, 118 m² J, 177 m² Z, 179 m² V)
teranova, brez toplotne izolacije, nekaj poškodb zaradi zatekanja vode (notranji viri),
Streha (291 m²)
nepohodno podstrešje, salonična kritina, toplotna izolacija: 2 cm tervol, 5 cm kombi plošče
Tla (291 m²)
objekt je podkleten, toplotna izolacija: 2 cm tervol
Okna (34 m² S, 22 m² J, 26 m² Z, 28 m² V + balkonska vrata 20 m² S, 39 m² J)
lesena, vezana,
2 zastekljena balkona
Vrata (5 m²)



Ogrevalni sistem

Objekt napaja toplotna postaja sosednjega objekta (Ulica Viktorja Kejžarja 39) ter zagotavlja samo toploto za centralno ogrevanje stanovanj. Temperatura (sekundarnega) ogrevanega medija v dovodu je regulirana že v toplotni postaji. Centralno ogrevanje objekta je izvedeno z dvocevnim radiatorskim sistemom ogrevanja. V prostorih stanovanj so vgrajeni jekleni radiatorji Trika z ročnim ventilom v dovodu ter brez zapornega holandca v povratku. Temperatura v ogledanem stanovanju je znašala 22°C. Temperatura neogrevanega hodnika v času ogleda je znašala 19°C.



razvodi ogrevanja (CFB2A)



ogrevalo ob vhodu v objekt (CFB2A)

Projektna dokumentacija

SGP Sava, Jesenice, 227/76, I.76, SGP Gorica, 392/71, Centralno ogrevanje

Raba toplote in strošek ogrevanja objekta

števec: 1.104
letna raba toplote za ogrevanje 98/99: 225,4 kWh/m²leto (3,4% glede na povp.)
mesečni strošek ogrevanja 98/99: 155,37 SIT/m²mes (4,3% glede na povp.)

Biggest energy users – (44 buildings connected to D.H.) Estimation of savings Calculation

Računska potreba objekta po toploti

transmijske toplotne izgube: 142,1 MWh/leto
ventilacijske toplotne izgube: 83,4 MWh/leto
specifične toplotne izgube: 194 kWh/m²leto

Predlagani ukrepi z oceno investicijskih stroškov in vračilne dobe

Gradbeni posegi

investicija [000 SIT/obil]	prihranek energije [MWh/leto]	letni prihranek [000 SIT/leto]	vračilna doba [let]
Tesnjenje oken			
264	25	191	1,5
Menjava oken			
6.600	46	353	19
toplotna izolacija fasade			
5.348	60	462	12
toplotna izolacija podstrešja			
437	9	70	6

Posegi na strojnih instalacijah

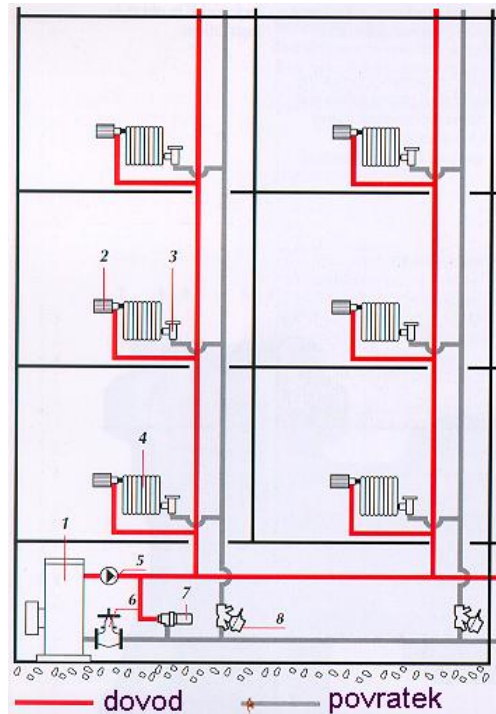
investicija [000 SIT/obil]	prihranek energije [MWh/leto]	zmanjšanje stroškov [000 SIT/leto]	vračilna doba [let]
1. pregled instalacije ogrevanja			
nedol.	-	-	-
nedol.	-	-	-
5. kombinacija ukrepov 2,3,4			
1.814	61	466	3,9
1.814	50	385	4,7
6. vgradnja delilnikov stroškov ogr.			
184	-	-54	-
184	-	-54	-

(prve vrednosti se nanašajo na izvedbo ukrepov brez predhodnih gradbenih posegov, druge pa za primer izvajanja obojih)

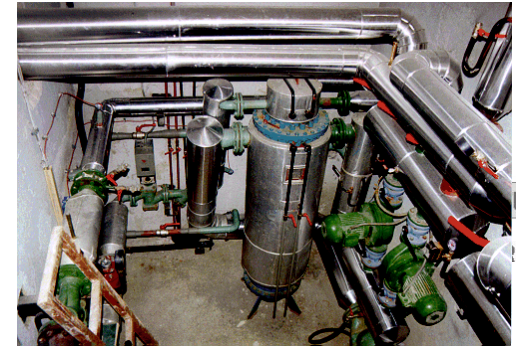
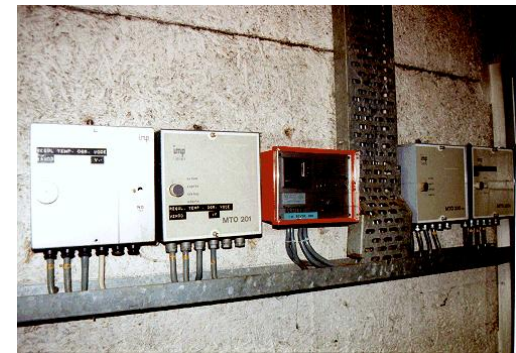
Very detailed information for big energy users

For modest energy users other only in average %

Common refurbishment actions in 1945-1980 buildings



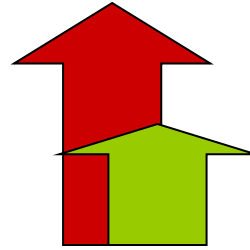
DH connection



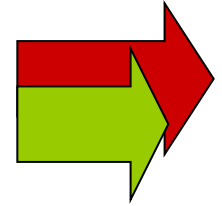
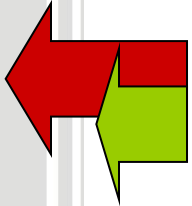
Visualisation of saving potential - ideas

EffCoBuild

Intelligent Energy  Europe



150 kWh/m²year



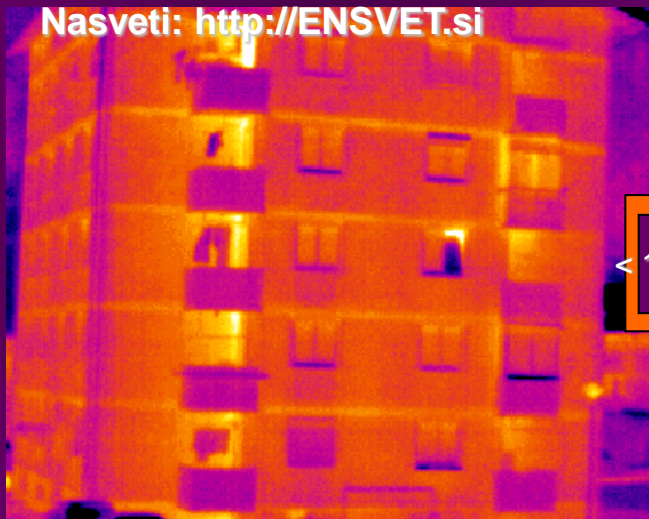
Visualisation of saving potential - ideas

Rabe energije za ogrevanje > 150 kWh/m²leto



Subvencije: <http://www.jesenice.si>

Nasveti: <http://ENSVET.si>

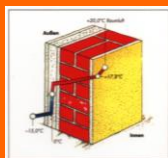
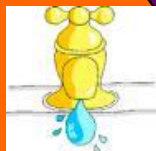


Rabe energije za ogrevanje

< 150 kWh/m²leto

< 150 kWh/m²leto

250 kWh/m²leto





Gradbeni inštitut ZRMK

Thank you for your attention!



ISO 9001: 2000
Q-612