

**Building and Civil Engineering Institute ZRMK
BCEI ZRMK**

WP2: Regional cooling market

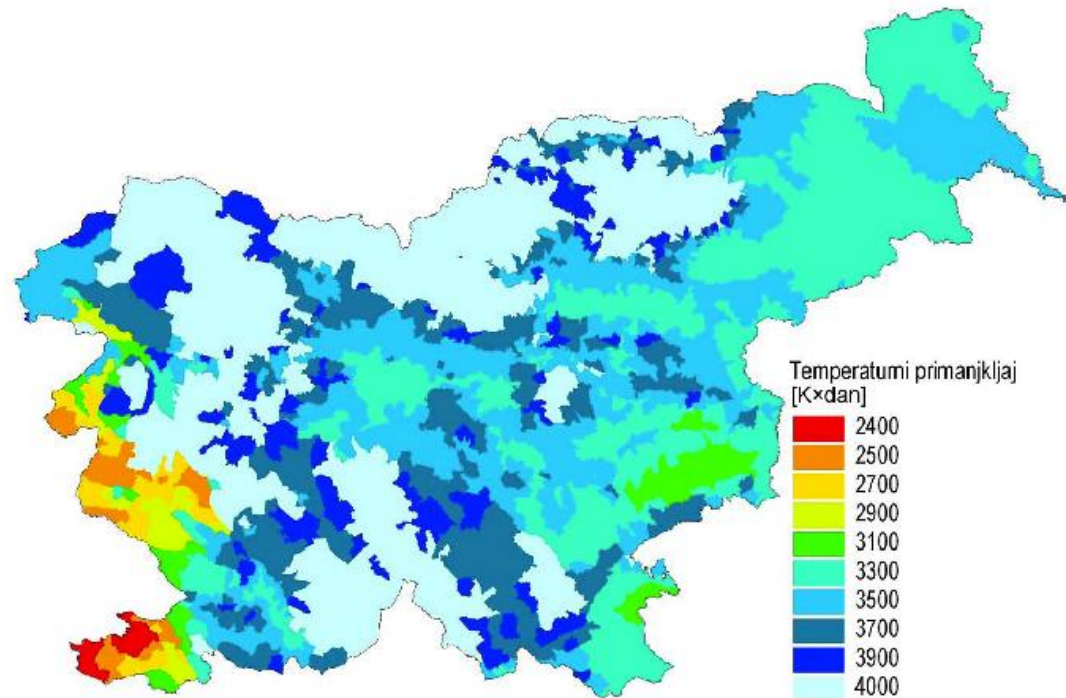
Slovenia

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COOLREGION

2nd project meeting, Ljubljana, April 17-18, 2007

General data - Slovenia



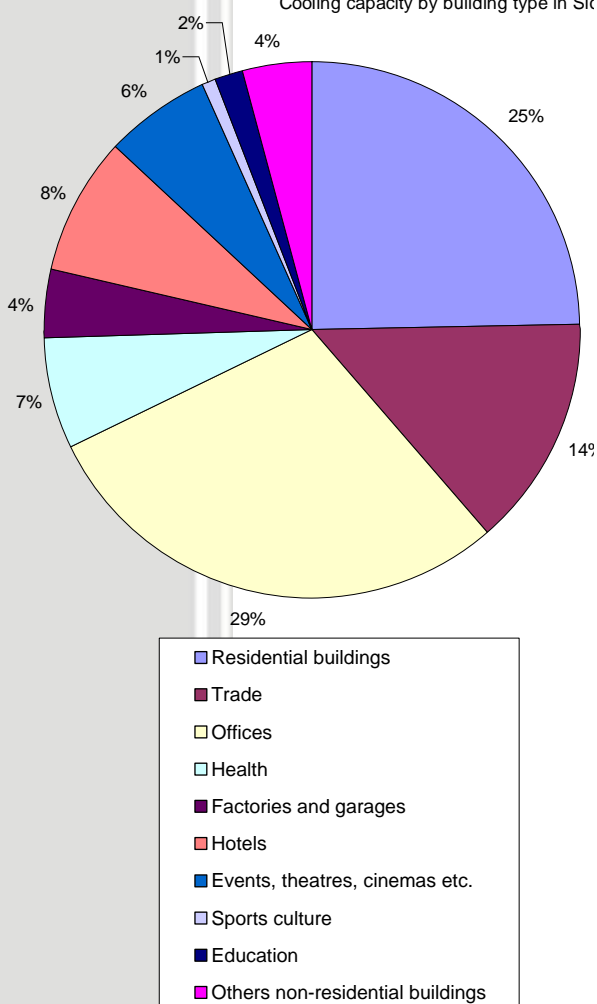
SLOVENIA: 2 mio inhab.
20.000 km²

CLIMATE: from 2400 to 3900 DD

ENERGY USE: Industry 29%
Traffic 34%
Other 37%
(60% in residential sector)

Regional cooling market Slovenia

Cooling capacity by building type in SIc



	Cooling capacity [MW]	Operation [h/year]	Cooling ratio COP	Energy consumption [MWh/year]
all	236	0	0	60.415
Residential buildings	59	250	2,5	5.877
Non residential buildings	177	0	0	54.538
Retail	0	650	1	-
Trade	33	900	2,8	10.652
Offices	69	700	2,8	17.250
Health	16	1050	2,8	6.000
Factories and garages	10	400	1	4.000
Hotels	20	1050	2,8	7.500
Events, theatres, cinemas etc.	15	1050	3	5.250
Sports culture	2	450	2,8	321
Indoor swimming pool	0	650	1	-
Education	4	500	2,8	714
Agricultural used buildings	0	500	1	-
Others non-residential buildings	10	650	1	6.500

Table : Cooling capacity and cooling energy consumption, Slovenia (Source: SDHK)

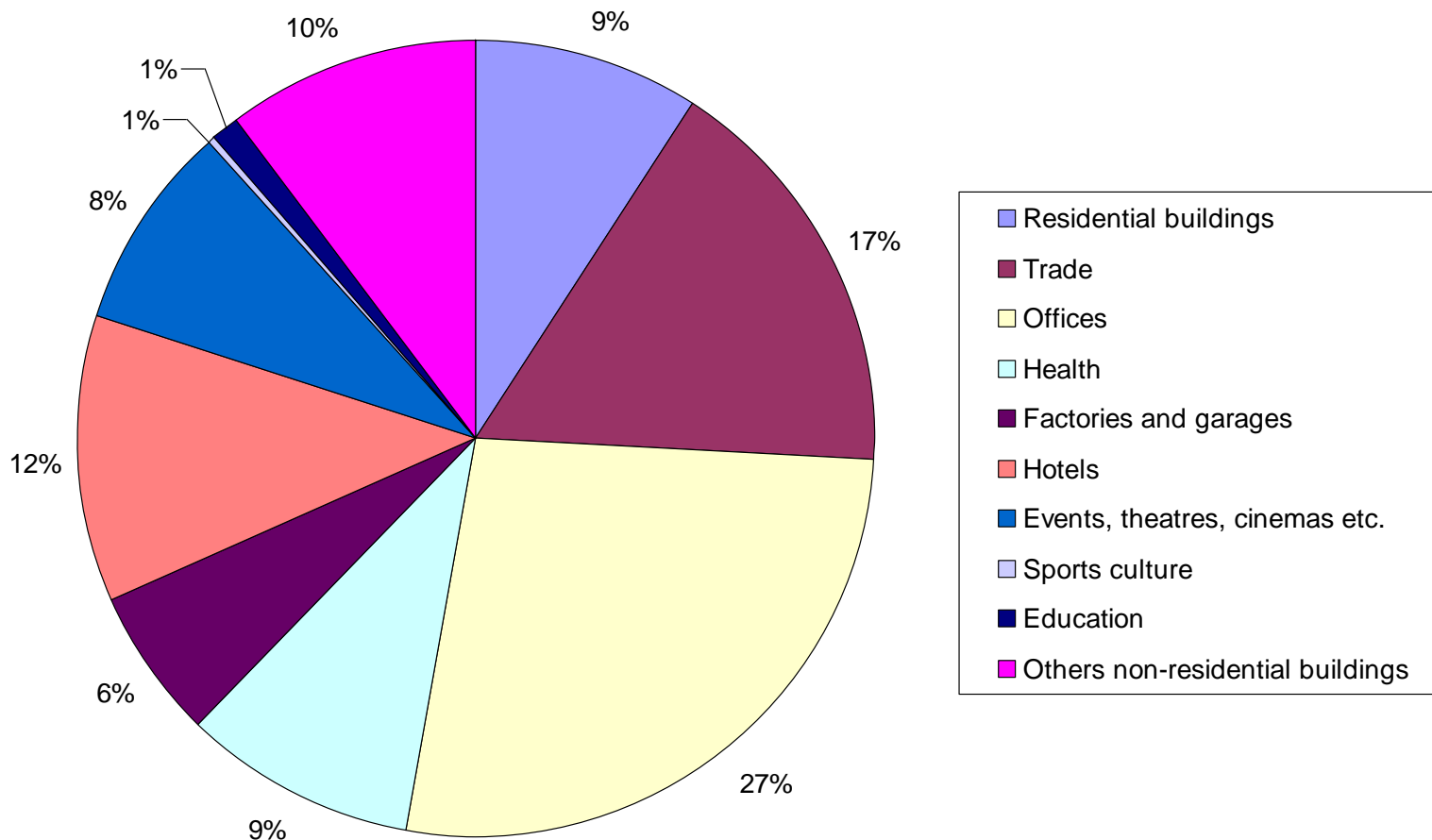
About 70% of data collected by local register, another 30 % data are estimated.

Poll criteria: devices > 3kg CFC

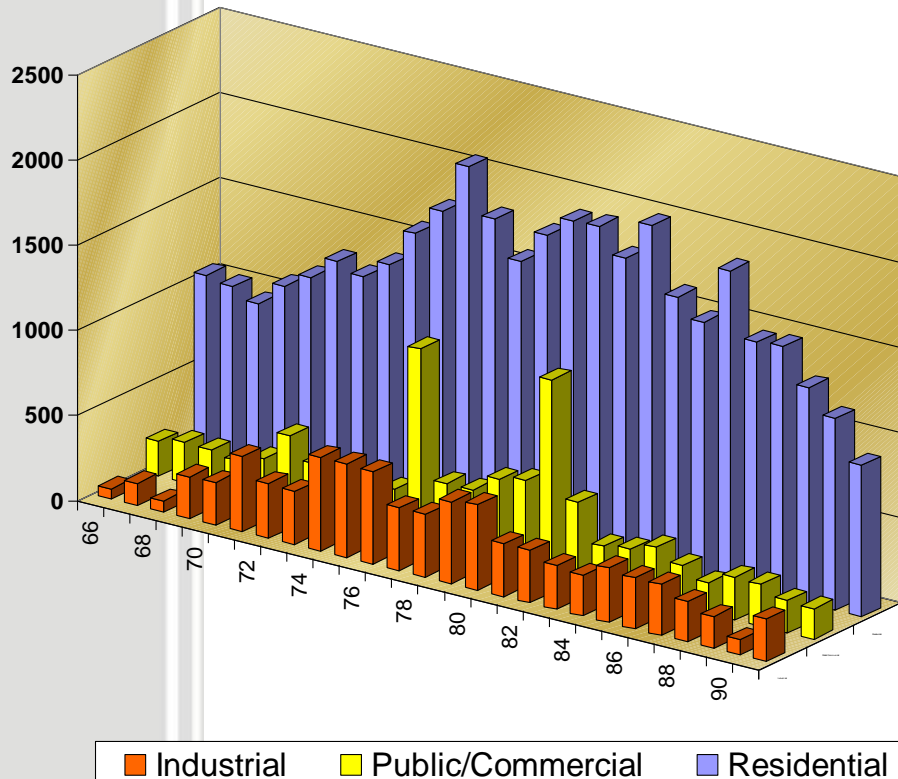
Cooling floor areas were not collected!

Cooling consumption (SDKH poll)

Cooling consumption by building type in Slovenia



Information on the building stock in Slovenia



Currently no data are available on floor areas of non-residential building stock

Statistical data on new gross areas constructed per year.

Building cadaster on-going (expected 6/2007)

The graph below shows the surface distribution per type of building in the tertiary sector in Slovenia: 79 % of the tertiary surfaces are used for offices (27%), commerce (44%) and education (8%).

Surfaces in the tertiary sector in Slovenia

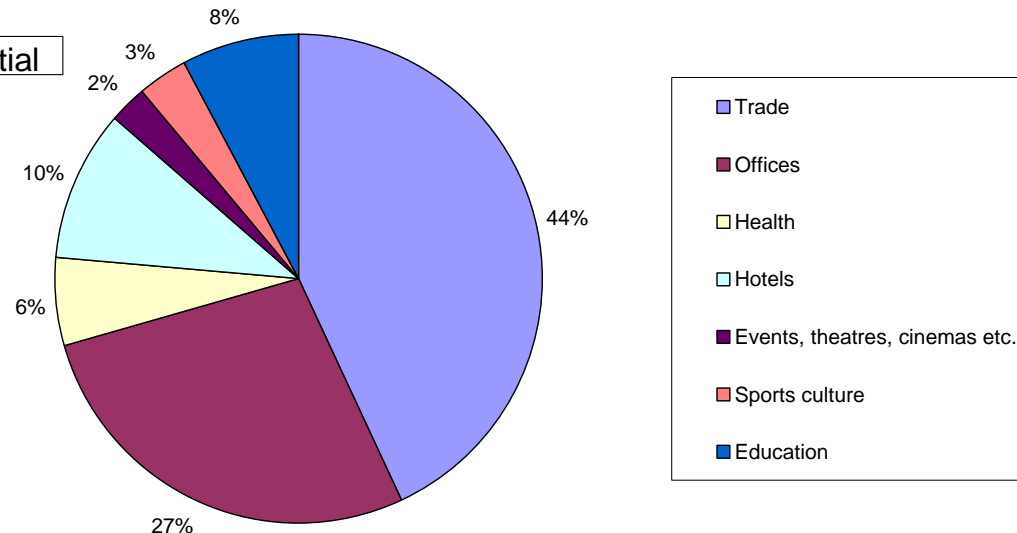


Figure : Data net floor space of the buildings according to their type (Source: SURS)

Cooling capacity and consumption data are not are not fully compatible!

Identification of regional Actors

Relevant for definition and implementation of actions to improve energy efficiency of air conditioning in buildings:

- **National / Local authorities:** - Ministry of the Environment and Spatial Planning
Regional
 - Regional Energy Agencies (SAVE agencies)
- **Professional organisations**
 - Slovenian association for cooling technologies (SDHK)
 - Slovenian Chamber of Engineers
- **Manufacturers of cooling devices**
 - Manufacturers and/or retailers
- **Architects**
 - Chamber of architects (ZAPS, architectural competitions)
- **Planners**
 - Regional level: IBE d.d., ENERGO PLUS d.o.o., IMP KLIMA d.o.o., MENERGA d.o.o.
- **Energy utilities**
 - ENERGETIKA LJUBLJANA d.o.o.
- **Building owners**
 - retail trade shops – chains(i.e. Mercator),
 - governmental buildings, housing funds, municipal public buildings;
 - Hospital (national level)
- **Technological centres and Universities**
 - RTC INSTITUT KGH d.o.o.
 - University

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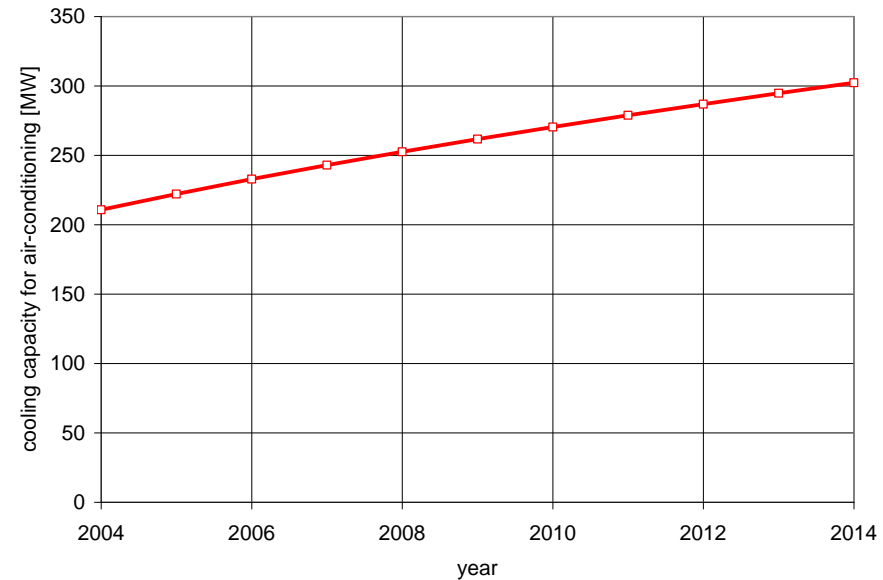
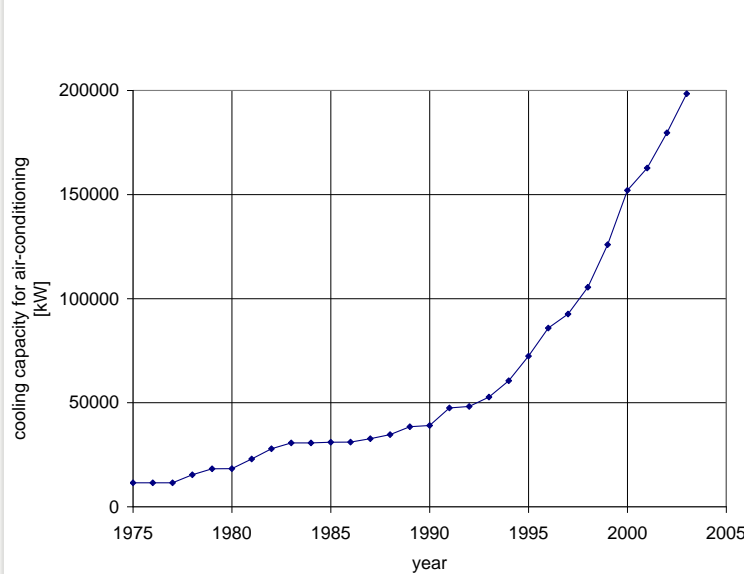
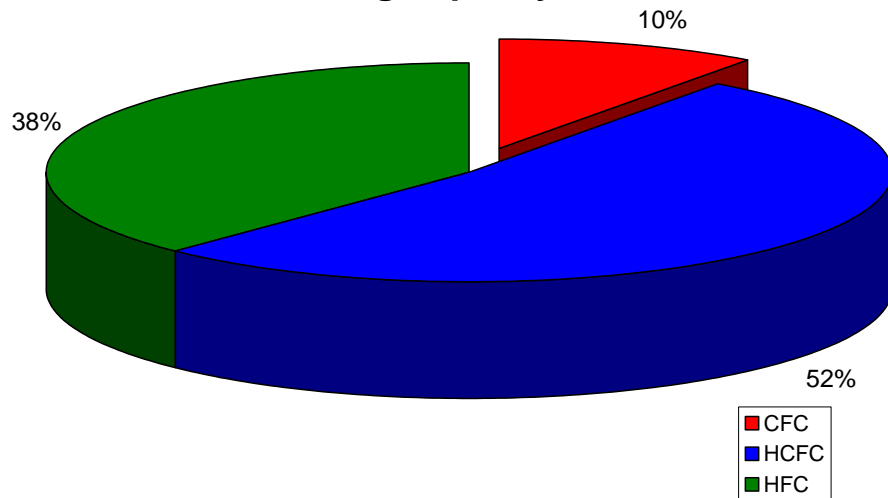


Figure : Growth of cooling capacity between 1975 and 2005 and expected growth of cooling capacity between 2004 and 2014 (Source: SDHK)



- The first air conditioners used some R11 or R12 (CFC) which had a very harmful impact on the ozone layer and caused greenhouse effect (not allowed now).
- Then, their use was prohibited and they were replaced by R22, which makes part of the family of the HCFC (after 2010 not acceptable!).
- HFC (38%) is acceptable medium.

Figure : Share of individual group of cooling media, year 2003 (Source: SDHK)

Regional cooling market Slovenia



Figure : Evolution of residential and other non residential cooling electricity consumption (Source: SDHK)

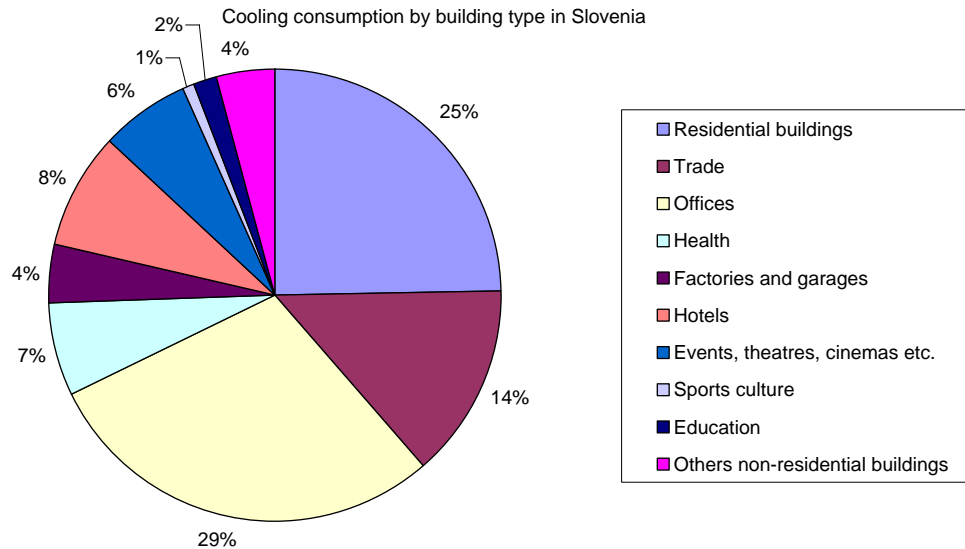
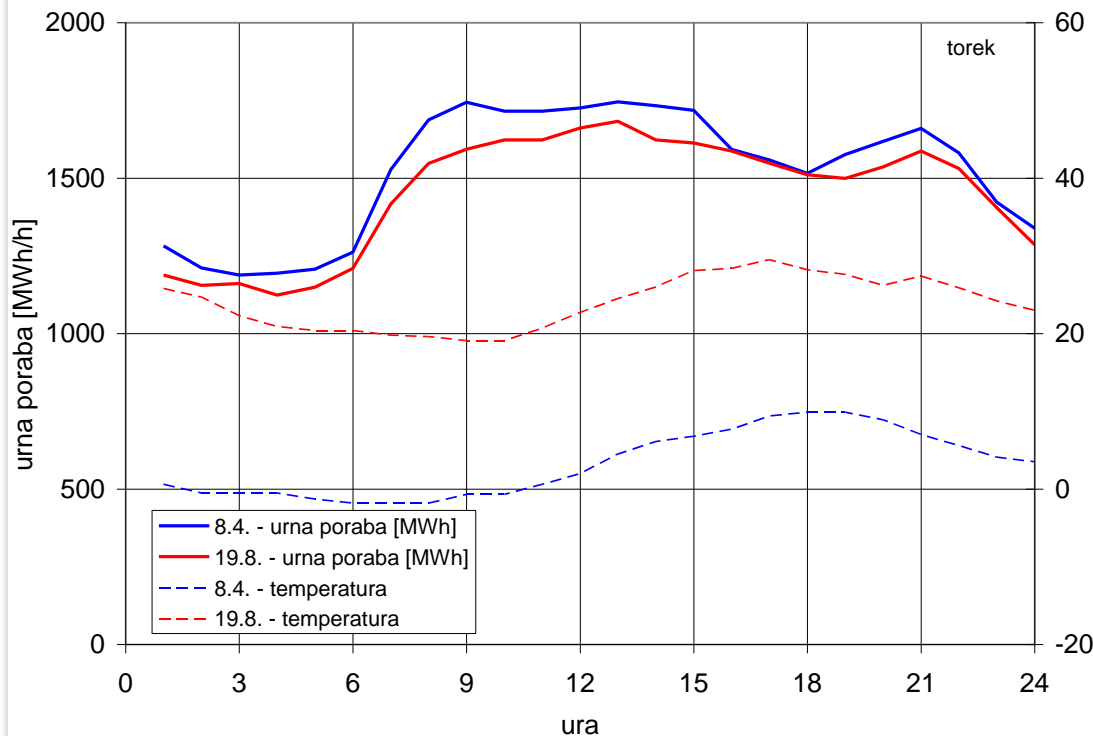


Figure : Cooling consumption by building type (Source: SDHK)

Summer peak electrical loads

The following graphs show trends of electrical consumption in Slovenia in year 2006. There is a well seen (an expressed) trend of electrical consumption increasing till 9.00 a.m. After 9.00 o'clock the electricity usage is reduced, what is even more noticeable in spring period. At that period a trend of electrical reduction is till 20.00 or till 21.00, after when it increases again.



In summertime after some slight reduction, the trend of electrical consumption continues increasing till around 15.00 p.m., when the consumption starts to drop again. Peak in consumption is repeated in summer at 21.00, what is a bit later than in spring period.

Figure 5: Comparison of hourly distribution of electricity and temperatures in chosen period – total use - Tuesday (Source: Elektro Slovenije)

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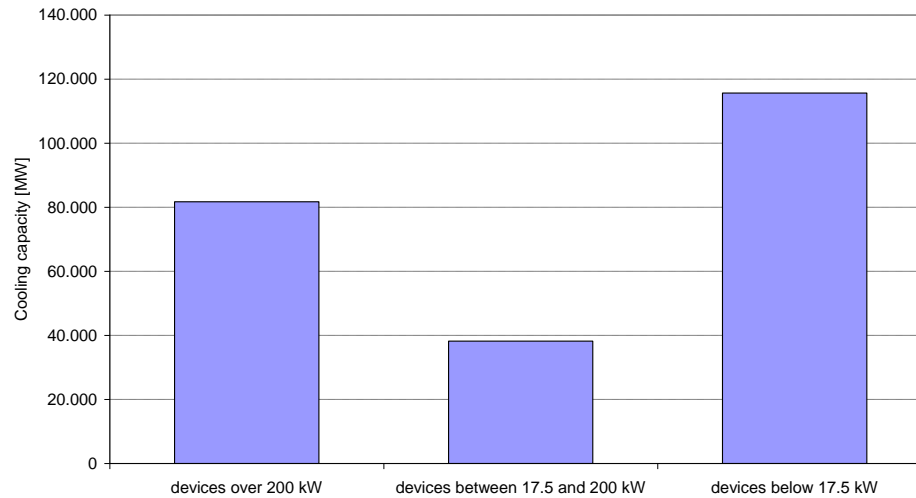


Figure : Cooling capacity divided by power size (Source: SDHK)

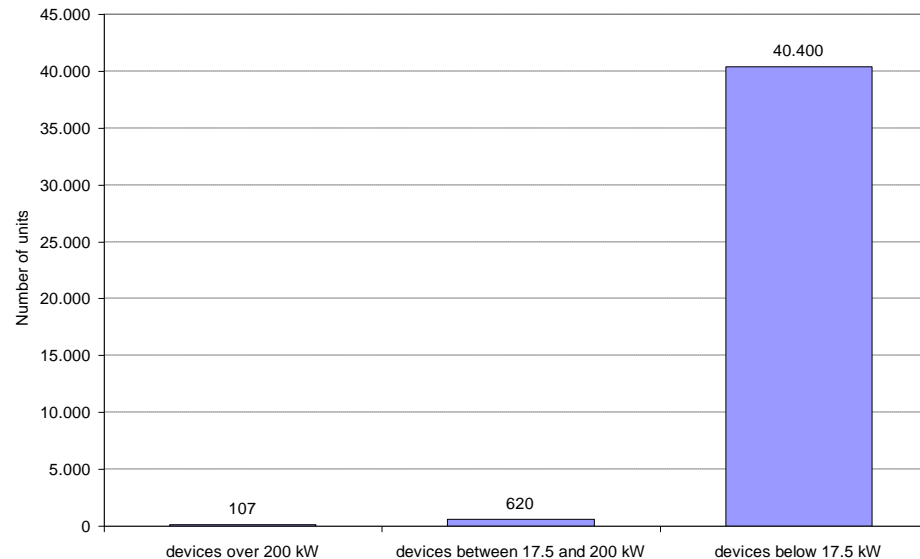


Figure : Number of cooling devices divided by power size (Source: SDHK)

Regulation and cooling - min. requirements

External shading on glazing in NE-S-NW orientation, solar protection glazing acceptable as well (Regulation for thermal insulation and energy eff. of buildings, 2002)

Inspection of air-conditioning systems

Regular check-up of ventilation systems without air conditioning prescribed **min. once per year** or more, min. efficiency of cooling device (Regulation on ventilation and air conditioning, 2002)

EPBD - Lack of qualified experts for inspection of AC – additional 3 years period was be requested for applying this provision

EPBD - Inspection of AC systems has already been transposed on the legal level with amendment to Energy Act (Nov. 17, 2006)

Detailed by regulation will be prepared based on *Energy Act*, so that regular inspection of air conditioning systems **will be in place in Jan. 1, 2008**. The system will be developed taking into account the existing regular check-up of ventilation systems (in place since 2002).



Regional cooling market Slovenia and national targets

Targets:

Resolution on National energy programme (April 2004)

defined the following goals in building sector for the period until 2010:

- increase energy efficiency in building sector by 10% and for 15% in public sector;
- foster the penetration of RES for heating applications from 22% to 25%,
- more specifically to raise to use of RES for electricity from 32% to 33,6%.

Increasing the energy efficiency in building sector focuses the reduction of energy needed for heating as well as for cooling!

Regional cooling market Slovenia

Influence of the prohibition of R22

In 2010 R22 will be prohibited in Slovenia. The first air conditioners used some R11 or R12 which had a very harmful impact on the ozone layer and caused the greenhouse effect.

Electricity consumption

It is expected that electricity consumption in Slovenia will increase in next period (5 - 10 years) due to increase in industrial production and residential building sector, too. Actual estimation is between 4 and 6% per year.

Cooling systems efficiency

Efficiency of cooling system will increase due to better cooling devices, insulation (distribution of cold / cooling media) and higher level of knowledge about appropriate temperature levels.

Obligatory EU labelling of devices!

Type of cooling system depends on application of air-conditioning.

Central cooling is used in big buildings and could be combined with cooling needed in industry.

Split systems are predominantly used in residential

sector and small business sector. A lot of split installations are also in commercial sector, but it is expected to be transferred to central cooling.





Gradbeni inštitut ZRMK

Thank you for your attention!

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