Improving the Social Dialogue for Energy Efficient Social Housing

Final Report
December 2007

http://www.isees.info

a project supported by the European Commission

Imprint:
This report has been prepared in the course of the ISEES project, partly funded by the European Commission

Intelligent Energy Europe

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December 2007
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Consultants & Engineers

I. Summary

I.1 Objectives of the action

The purpose of ISEES was to examine the rationality behind the consumers' choices and the influence of the individual user behaviour on the energy demand in social housing. It developed solutions to integrate energy efficiency and renewable energy measures in social housing based on a concept using "social dialogue". The dialogue was targeted at involving all stakeholders – tenants/owners of dwellings, housing associations, municipalities and energy service providers – into the refurbishment process, to develop efficient and feasible models of user participation and implement exemplary participation processes in planned or ongoing renovation activities.

Furthermore, through the action the quality of services provided by utilities and district heating companies was assessed, and concrete solutions provided to overcome barriers on the way to achieve energy efficient social housing.

Model buildings have been identified in the 5 participating countries, namely Bulgaria, Czech Republic, Lithuania, Slovak Republic and the United Kingdom. During the heating season 2006/07, energy behaviour of tenants has been continuously measured. Using this measured data the participants in the each country have attempted to advocate the development of a model refurbishment process, with respect to the engagement and inclusion of all stakeholders in the process, in the hope that the refurbishment will provide additional value to all than would have otherwise been the case.

The scope of social dialogue

ISEES considered the social dialogue in respect to the following activities associated to social housing:

- Reduction of the household energy use (and improvement of thermal comfort conditions) through modifying "user behaviour"
- Maximising the benefits of the building refurbishment
- Improvement of communal district heating services

I.2 Achieved results

The main activities of the ISEES project were related to the following:

- **Socio-economic analysis:** (quantitative and qualitative) surveys and interviews with energy suppliers and tenants (in selected pilot buildings, and tenants especially participating in user behaviour measurement programme)
- **Assessment of the user behaviour** through a standardised monitoring scheme using specific equipment installed in 5 flats of one model building in 5 countries (over a full heating period)
- **Pilot activities to realise a social dialogue** in the target buildings

I.3 Conclusions

The main conclusions of the action can be summarised as follows:

- The quality of the building substance – in particular, the quality and air tightness of the windows and the thermal quality of the building shell – play the key role in terms of defining the energy saving potential from existing residential building stock.
- The potential for improvements in user behaviour alone to save energy is limited in non-refurbished residential buildings. Poorly sealed buildings in particular are responsible for an uncontrolled loss of warm air on one side, and cold draughts on the other. In order to achieve comfort levels, these draughts are typically countered with higher room temperatures resulting in still higher heat consumptions rates and higher losses.
- Opportunities to optimize user behaviour were revealed in all countries, and optimally should go hand-in-hand with potential refurbishment activities. The exception is the UK, where additional pilot actions were not developed due to redevelopment plans for the model buildings. Nevertheless, good behavioural "practices" have been demonstrated in the other four countries (CZ, SK, BG, LT), based on the feedback from the measurement programme to be implemented to achieve an optimal balance of heat use, indoor comfort and air quality.
- Generally, user behaviour of tenants did not change because of measurements performed, although the distributed information leaflets were considered useful. However, residents show in many aspects appropriate user behaviour, but at the same time there is a high potential for improvement (for example: ventilation).
- Concerning heating, the majority is satisfied with the average room temperature and heat regulation, but many residents claim that the heating system should be improved – draught, too low temperatures in single rooms are considered as dissatisfying.

- The majority only heat those rooms which are mostly used. The heated rooms have an average room temperature between 19-22 degrees, and this is also perceived as the most comfortable room temperature by most residents.
- The majority of residents in all countries have no blinds to regulate temperature or don‘t use them. Those who have blinds in use, usually close them during the evening and night and open them during the day. They do not close the blinds when nobody is at home, which is supposedly the case because of security reasons.

I.4 Lessons learnt

Subsequently, the main lessons learnt can be summarised as follows:

- Further information on correct user behaviour is regarded necessary by tenants, as they seem to lack the appropriate know-how on how to "behave energy efficient". Occupants in general are not able to give any recommendations on how they think energy efficient user behaviour should look like, though they sometimes practice it. However, as the results of the survey performed at the level of the tenants revealed, better and more qualitative information on user behaviour is only relevant to tenants when the buildings are in a good condition. For most of the surveyed model buildings this is not the case, therefore people do not see any chances to benefit from behavioural changes they would otherwise be ready to take. To motivate residents to improve their user behaviour will hardly be fruitful as long as the user behaviour shows no effect because of the inadequate building structure. Subsequently, in these cases activities to raise awareness and to inform about user behaviour can only be a second step after a renovation of the building.
- Generally, the attitude of tenants towards renovation is favourable. Majority of interviewed persons think a renovation would improve the living standard. Disturbing aspects of a renovation like noise and dust are willingly accepted as the benefits outweigh the irritation. However, almost half of the interviewees are afraid that a renovation would raise the rents. A high percentage would like to be informed regularly about all work being undertaken and want to be involved in decisions about renovation. This leads to the argument, that social dialogue must become more widely used in the case of planning refurbishment activities in the residential sector. The involvement of housing owners, local decision-makers, planners/architects, energy utilities in this process is crucial.
- Altogether, a higher awareness and information for energy saving measures and a communication which highlights the benefits (e.g. reduced operation costs) would be sensible, but this has to be combined with subsidies or special tariffs for social housing as the residents often do

not have the means to invest in these measurements. Yet, these supporting instruments must go hand in hand with clear strategies on the local (and partly national) level on how to tackle the issue of refurbishing existing building stock.

II. Partners

Project co-ordination:

KWI Consultants Ltd., Austria

Project partners:

Inter-University Research Centre for Technology, Work and Culture, Austria

ACE Group, Austria

Energy for Sustainable Development Ltd., UK

CityPlan s.r.o., Czech Republic

Energy Centre Bratislava, Slovak Republic

Lithuanian Energy Institute, Lithuania

Sofia Energy Centre, Bulgaria

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1 Assessment of user behaviour in social housing

1.1 Selection of model buildings

In each participating country, namely Bulgaria, Czech Republic, Slovak Republic, Lithuania, United Kingdom: 3 social apartment buildings have been selected for WP2 using the following guidelines:

- Connected to district heating
- Pre-cast concrete panel construction, about 30 years old, not renovated.
- Each building with about 30 apartments.
- All available households have been interviewed in WP2 (approx 90/country).

One building per country was involved in active data measurement,

- Preferably building with horizontal heat pipe distribution
- 5 model households per building agreed to participate over 8-12 months.
- It was foreseen that measures to help tenants to optimize their energy consumption would be implemented in this building

The following buildings were selected to become model buildings for monitoring user behaviour and implementing social dialogue activities in the framework of ISEES:

① **Czech Republic**

1. Vitezna 2958, 27204 Kladno (chosen for building monitoring)
2. Vitezna 2959, 27204 Kladno
3. Vitezna 2960, 27204 Kladno

Building data:

- Year of construction: 1954
- Year of heating system renovation: 1998
- Number of apartments: 78/building
- Number of floors: 13
- Exterior wall construction: brick
- Heat distribution pipes: horizontal, apartment specific
- Heat consumption meters: Trasco (1 meter per apartment)

- Thermostatic valves: Installed for each radiator
- Rental/Ownership: regulated rents
- Owner: City of Kladno -Správa bytoveho fondu Kladno (Kladno Housing Association)
- DH Utility: TEPO s.r.o. (municipal owned)

② Lithuania

1. Baltijos 63, 47136 Kaunas (chosen for building monitoring)

Building data:

- Year of construction: 1992
- Number of apartments: 38
- Number of floors: 9
- Exterior wall construction: brick
- Heat distribution pipes: vertical single pipe system
- Heat consumption meter: Siemens WHE 30 (measures delivered heat for space heating and domestic hot water consumption for entire building)
- Thermostatic valves: installed on each radiator
- Heat cost allocators: installed – manual readings reported by occupants each month
- Rental/Ownership: private ownership Organization: housing association
- DH Utility: *Kauno energija* (supplies space heating and domestic hot water)

③ Slovakia

1. Hàlova 19, Block D3-15, 85101 Bratislava (chosen for building monitoring)

Building data:

- Year of construction: 1984
- Year of heating system: 2000 – changed to horizontal distribution
- Number of apartments: 48/ building
- Number of floors: 13
- Exterior wall construction: pre-cast concrete sandwich panels
- Heat distribution pipes: horizontal, apartment specific (feed located on floor below)
- Heat consumption meter: one for entire building located on ground floor (Techem) – occupants pay per m² area for space heating and per m³ for domestic hot water consumption
- Thermostatic valves: Installed for each radiator
- Heat cost allocators: none installed
- Rental/Ownership: Ownership Organization: Housing association
- DH Utility: C-TERM spol. s r.o. for space heating and domestic hot water

④ United Kingdom

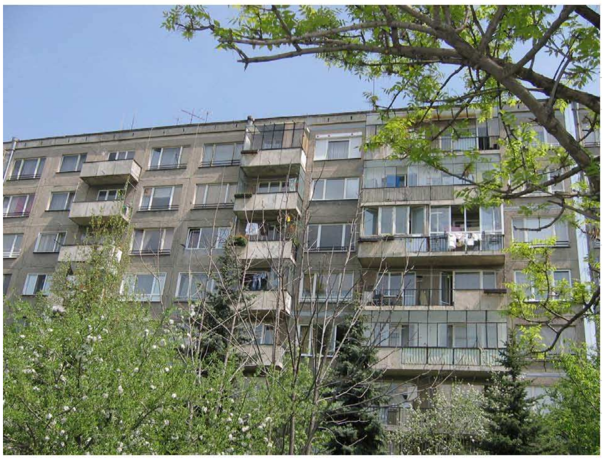
1. Wiggen block, Leverton Towers, Leverton Drive, Sheffield
2. Gregory block, Leverton Towers, Leverton Drive, Sheffield
3. Keaton block, Leverton Towers, Leverton Drive, Sheffield

Building data:

- Year of construction: 1960
- Year of heating system: 1960
- Number of apartments: 60/ building
- Number of floors: 15
- Exterior wall construction: brick
- Heat distribution pipes: horizontal, thermal store (heat exchanger) located inside each apartment to supply domestic hot water and space heating
- Heat consumption meters: one per apartment (Mainmet E25) at thermal store
- Thermostatic valves: Thermostat located in main living space of each apartment and most radiators are equipped with regulation valves
- Rental/Ownership: Subsidized rental Ownership: Municipal council
- DH Utility: Sheffield Heat and Power

⑤ **Bulgaria**

Building 65/4 -Mladost I , Sofia



Building data:
- Year of construction: 1970
- Year of heating system: 1970
- Number of apartments: 24
- Number of floors: 8
- Exterior wall construction: precast concrete panels
- Heat distribution pipes: vertical
- Heat consumption meters: 1 meter for 3 buildings
- Heat cost allocators Techem – non transmitting
- Heat regulation: Thermostatic valves on all radiators
- Rental/Ownership: occupant owned
- DH Utility: Sofia District Heating Company

1.2 Interview series

To learn more about the quality of energy supply and about user behaviour in social housing, two surveys took place.

(1) **Interviews with utilities and district heating companies** to assess the quality of energy supply, the scope and reasons for consumers' disconnection, social support and possibilities to use RES/RUE measures.

The questionnaire focused on four main areas:
- Consumers' arrears in regard to
- Quality of energy services provided
- The scope of disconnections from the DH system and reasons for disconnection
- Activities of DH companies and business environment related to the use of RUE and RES measures

(2) **Interviews with tenants in selected model buildings** and in-depth interviews with 5 residents per building, participating in the voluntary

measurement programme to assess the influence of user behaviour in energy consumption,

The aim of these interviews was to receive more detailed information from tenants living in social housing and to be able to estimate which kind of strategies to change user behaviour are feasible in the model buildings of the ISEES project.

The interview questions focused on

- The current living situation (satisfaction with building and flat, property management, energy bill)
- Reasons to participate in the measurement
- Energy saving measures
- User behaviour (ventilation, district heating regulation, blinds, warm water)

1.3 Interview results

Interviews with utilities and district heating companies (supply-side analysis)

1) Consumers' arrears

Czech and UK companies do not disclose their arrears, which among the rest are highest in Bulgaria (35-47%) followed by Lithuania (18-21%) and lowest in Slovakia (< 5%). All suppliers facing with this problem also disclose negative impact on company activity; increased demand for working capital, lack of means for fuel purchasing, need for short term credits. All this result increased capital costs and finally – higher total heat supply costs and heat tariff.

Prevailing reason of customers' arrears as indicated by heat suppliers are insufficient family income and other related issues – unemployment, emigration, and addiction. Bulgaria's suppliers also noticed imperfective legislation as a reason of consumers' indebtedness.

2) Quality of energy services

One of key indicators enabling to judge on heat supply efficiency is a ratio of sold heat to fuel input here named as overall system efficiency. The heat losses in pipelines throughout insulation (network losses) make a biggest part of all supply losses. Highest heat losses were declared by Lithuanian and Bulgarian DH companies (26-29%). Lower losses (12-17%) are in Czech companies. Less than 10% network losses were reported by Slovak and UK heat suppliers. Very high supply efficiencies in UK may be explained by comparatively small DH systems and short well insulated networks, built using advanced technologies.

Heat supply quality and reliability are the corner stones when talking about DH competitiveness. Therefore, DH companies in Lithuania, Czech Republic, and Slovakia have to pay lots of attention to service quality assessment, in order to remain competitive. Periodic interviews with occupants or housing association is the main approach for heat supply quality assessment chosen in most countries. Such a dialog can prevent disconnection and is much more effective than monitoring of disconnected consumers.

3) Reasons for disconnection

Resuming the survey results it is evident, that prevailing reasons of consumers' disconnection are economic – mainly low income levels (all Bulgarian companies and half of Lithuanian companies) and the fact that DH is more expensive, than alternative heating sources (companies from all countries except UK). Another reason is the consumers' willingness to be independent from centralized heat supply. Other reasons are being viewed as less important. Willingness to use of RES and alternative sources were mentioned by Bulgarian and Slovak heat suppliers.

Disconnection problems are being regarded as an urgent issue in four New Member States. The opinion of the surveyed companies is focused on fulfilling better the consumers' needs for comfort control and possibilities to regulate heating intensity at house and room levels. A possibility to reduce heat tariffs has been mentioned by Slovak and Bulgarian companies. Transparency in billing, education campaigns are also considered as important issue preventing disconnection. Meanwhile, the reduction of heat tariffs, to which the main customers' complaints were addressed, are not considered as a relevant measure preventing disconnection.

4) Activity of DH company related to the use of RUE and RES measures

Companies indicated that high awareness about supply side possibilities exist in all countries. Majority of DH companies have implemented one or several energy efficiency measures. The main attention is paid to the replacement of old and obsolete heat supply pipes and reduction of heat losses in network. Meanwhile less attention can be seen in implementing demand side measures, such as promotion of demand side refurbishment processes. This might be conditioned by imperfect regulations, when heat supplier is not responsible for rational energy use by the customers. New challenges in this field can be expected while implementing Energy efficiency and energy service Directive.

Interviews with tenants (demand-side analysis)

1) In general, the **satisfaction with the living situation** turned out to be **rather high**, although there are many aspects in individual apartments and the exterior area which are not satisfying (e.g. old windows, draught, smell from sewage, leaking roof, mould on outside walls, rain sewerage in cellar, too little parking place, disturbing neighbourhood, rubbish lying around (rats), broken lifts, thermal insulation is missing, balconies should be glazed). Consequently, the majority of residents are in favour of a refurbishment of the building.
2) In almost all countries the residents had mentioned they are in **good knowledge about their energy bills** (United Kingdom is an exception) and the billings are mostly perceived as appropriate. Of course, for some tenants energy costs were perceived as being too high or inappropriate.
3) Similar were the results regarding **satisfaction with the property management and the district heating**. Basically the residents had a rather positive view, but also expressed dissatisfaction regarding low service, long response times in the case of property management and high prices, or low temperatures, wishes for more exact metering, in case of the district heating providers.
4) Many residents hoped that the measurements would be a first step towards the **beginning of a renovation process**.
5) Concerning **heating**, the majority had expressed to be satisfied with the average room temperature and heat regulation, but many claimed that the heating system should be improved – draught, too low temperatures in single rooms were considered as dissatisfying.
6) The majority only **heats those rooms which are mostly used**. According to tenants' feedback, their heated rooms have an average temperature between 19-22 degrees and this was also perceived as the most comfortable room temperature by most residents.
   Note: It will be seen in the results of the measurements (see chapter 1.4) that reality has been shown to be different!
7) The majority of residents in all countries had **no blinds to regulate temperature** or didn‵t use them. Those who had them usually kept them closed during the evening and night and opened during the day.
8) More **information on correct user behaviour was claimed to be useful** as the residents seemed to lack appropriate know-how on how to "use" flats properly. However, better and more information on user behaviour is only suitable when the buildings are in a good condition. For most of the surveyed model buildings this is not the case.
9) As mentioned above, the **attitudes towards renovation were favourable**. Disturbing aspects of a renovation like noise and dust were willingly accepted as the benefits outweigh the irritation. However, tenants were afraid that a renovation would raise the rents, while almost

half of the interviewed persons claimed not to be able to pay for any kind of renovation if this would be necessary.

As a major conclusion of the interviews performed in the model buildings, there were good pre-conditions for starting a social dialogue, as residents has a very positive attitude towards renovation and want to be involved in the process, which is a very good basis.

Generally, to motivate residents to improve their user behaviour will hardly be fruitful as long as the user behaviour shows no effect because of the inadequate building structure. Subsequently in these cases activities to raise awareness and to inform about user behaviour can only be a second step after a renovation of the building.

1.4 User behaviour measurement

The following devices were installed in the 5 flats per building being measured:

- one heat meter per flat and one for the whole building,
- heat cost allocators on all radiators in each model apartment,
- window contacts on all windows in 3 apartments out of 5 in each country to measure the ventilation behaviour (opening/closing of windows),
- indoor temperature sensors for the living room and one bedroom in 3 of the 5 model apartments as well as an outdoor thermometer;
- every flat measured was connected to a central PC unit to register the data continuously over the measurement period (one heating period).

Monitoring began in October 2006 and finished in May 2007. The data was recorded over the selected period and saved for later evaluation. ACE Group had an online connection to the PC units in the 5 countries, to allow spot checks and to identify possible problems during measurements.

The installation scheme applied is displayed in the following chart:

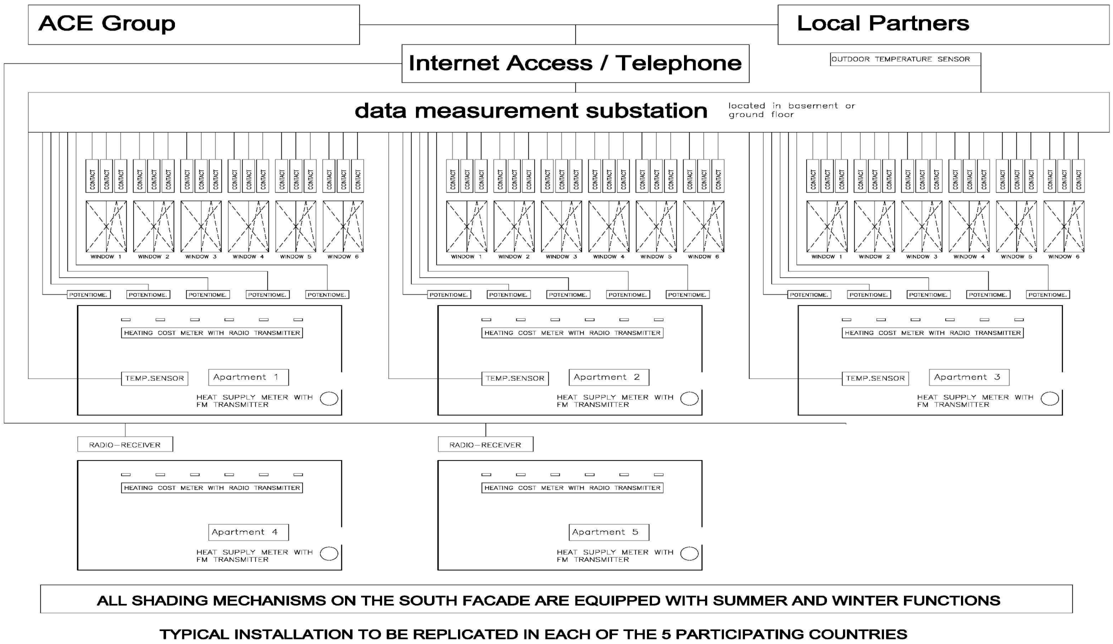


Figure 1: Typical installation scheme for the measurement of user behaviour in mode buildings

In addition, the following aspects were taken into consideration:

- Distribution of an information brochure for the tenants with a seminar where the tenants from all 5 countries were invited. Thus, everyone had the same information level.
- Furthermore, an installation schema for all model buildings was developed based on the specific characteristics of the buildings. In Bulgaria and Lithuania, there was no horizontal heating distribution available and therefore an adaptation of the system was necessary to adapt to the vertical heating distribution system.
- A dry run in each country was made to determine the ventilation rate. The temperature difference between inside and outside was determined before and after window opening.
- A tenants meeting was organised and the tenants invited to see preliminary results, and to discuss optimal user behaviour.

1.4.1 Methodology

The research focused on the following parameters:

1. **Apartment Characteristics**
   Apartments were checked according to their area, orientation, special condition like new windows etc.
2. **Occupancy Characteristics**

The number of occupants (adults and children) was taken into consideration according to the time they generally spent in the apartment (working or retired). In addition to determining appropriate heating patterns over the course of the day, the occupants often represented important alternative heat sources in themselves

3 **Heat Consumption**
Where possible, heat meters were installed on the heat circuit feeding the volunteer apartment.

4 **Zoning**
Heat cost allocators were installed on all radiators in 5 apartments in each country

5 **Comfort temperatures**
Two temperature sensors were installed in each of 3 apartments per country. Temperatures were monitored in the living room and in one bedroom.

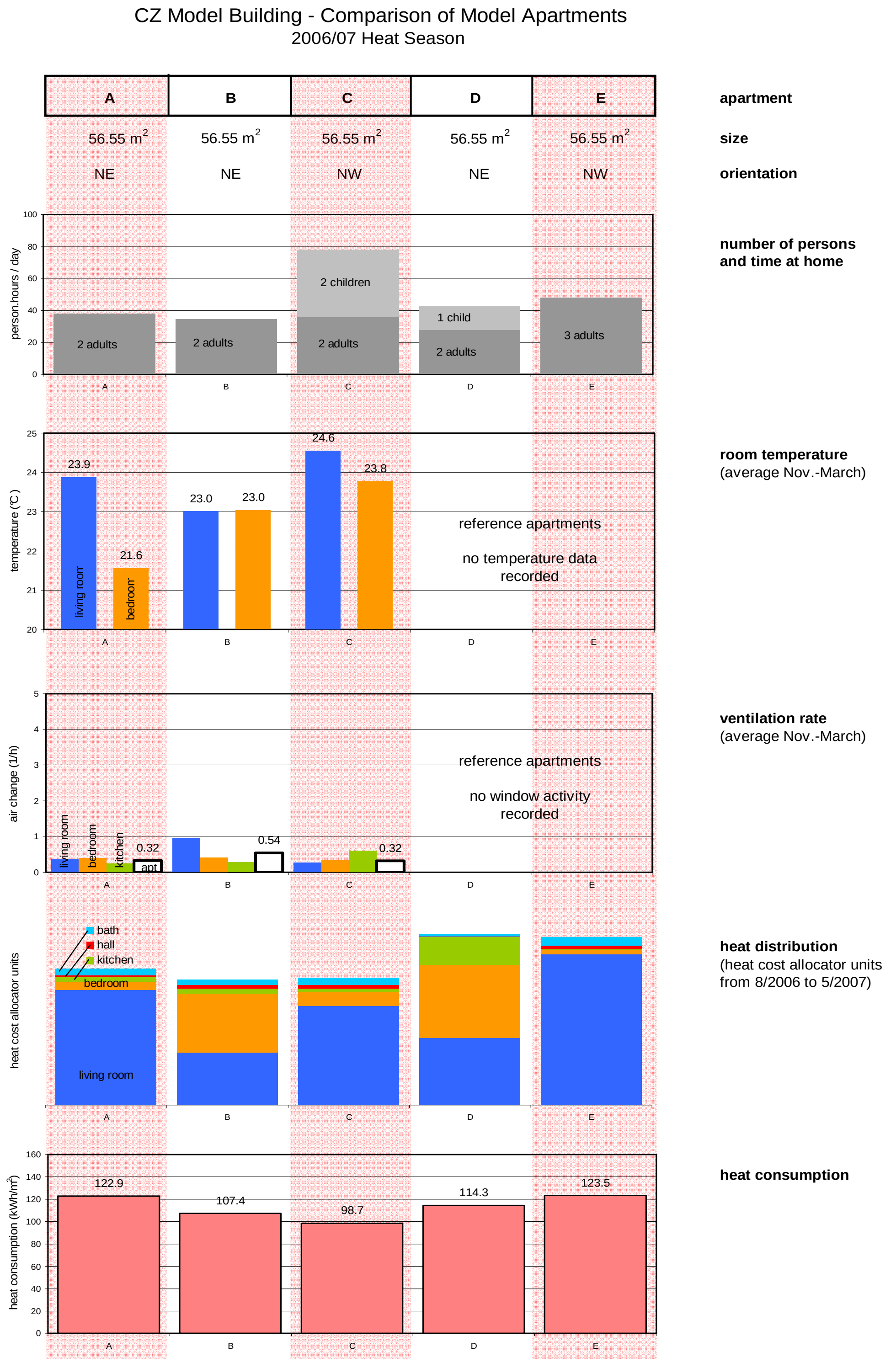
6 **Ventilation**
Window contacts were installed on all operable windows in 3 apartments.

Measurements were taken every 5 sec. with exception of the heat meters.
The data was evaluated over the full heating period. These parameters were researched in detail, land by land and apartment by apartment with the same approach for each country.

The results for each country were presented in 7 graphs:

- first comparison of Apartments ABC over the full heating season
- each of apartment A,B and C monthly results over the entire heating season
- each of apartment A,B and C monitoring details during a peak heating month and typical day.

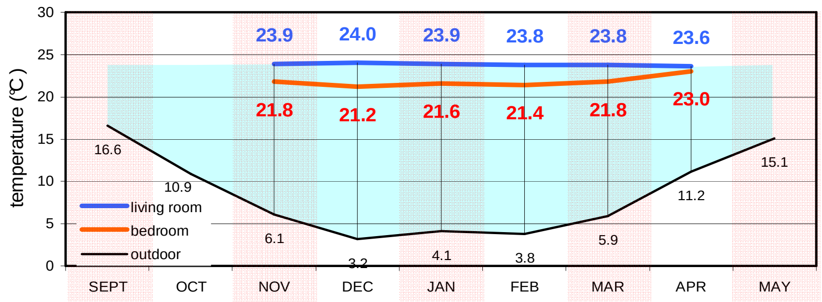
1.4.2 Example: Results of the Measurement in the CZ Model Buildings



Improving the Social Dialogue for Energy Efficient Social Housing

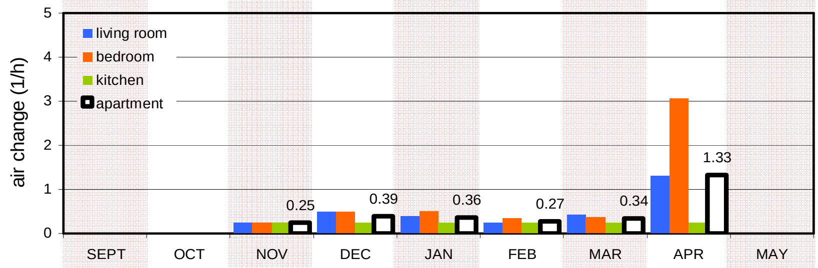
CZ Model Building - Apartment A

2006/07 Heat Season Summary



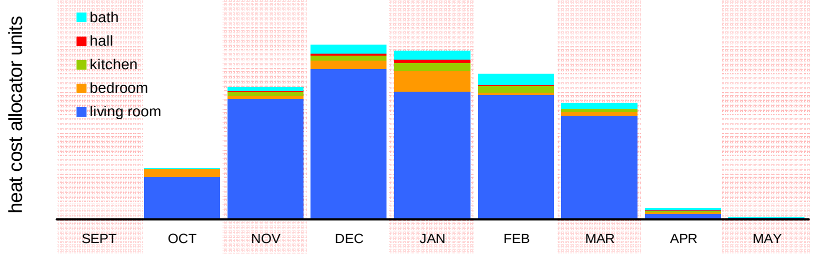
temperatures

average Nov.-March
23.8 ℃ living room
21.8 ℃ bedroom



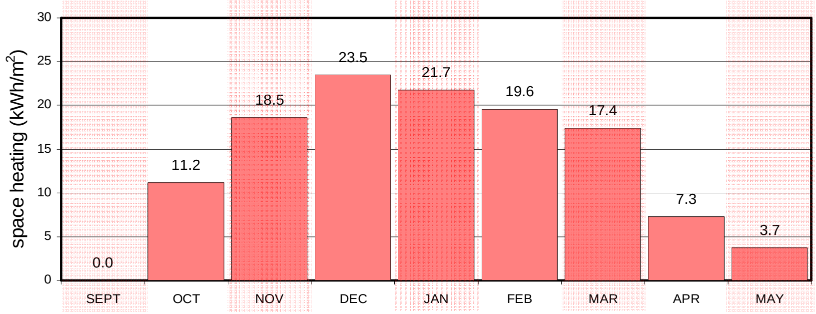
air change

average Nov.-March
0.36 1/h living room
0.39 1/h bedroom
0.25 1/h kitchen
0.32 1/h apartment



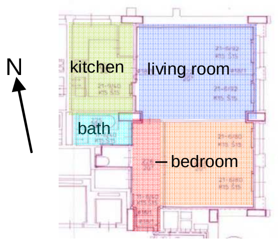
heat distribution

heat season average
5% bath
1% hall
4% kitchen
6% bedroom
84% living room



heat consumption

total for space heating
2006/07 heat season
6950.7 kWh/a
56.55 m^2 apt
=
122.9 kWh/m²a



apartment data

size: 56,55 m^2
orientation: NE
windows: double glazed
wooden frames
poor condition
drafts
heat regulation: programmable

occupant data

	day	night
Adults	1	2
Children	0	0

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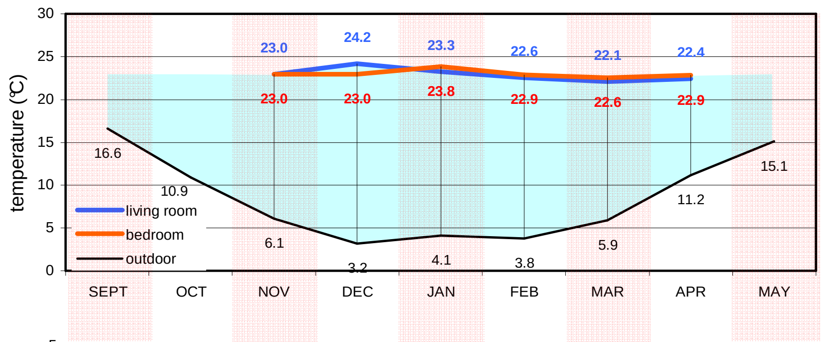
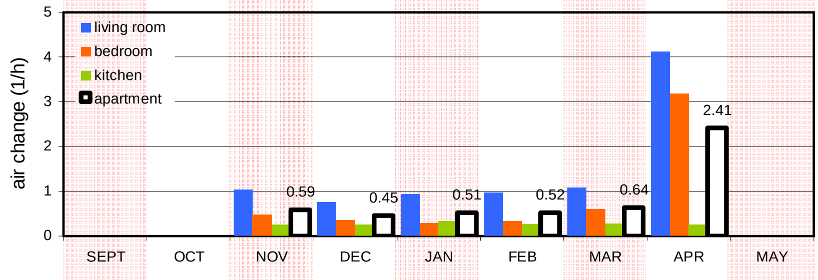
CZ Model Building - Apartment B

2006/07 Heat Season Summary



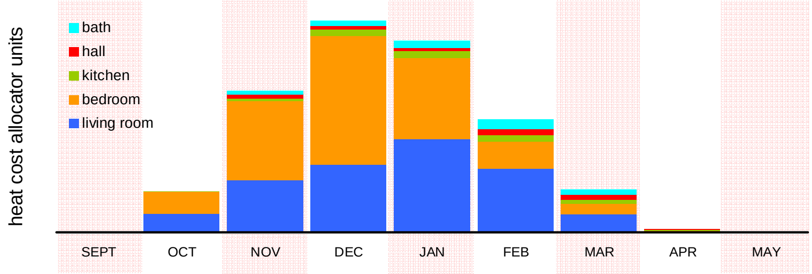
temperatures

average Nov.-March
22.9 °C living room
23.0 °C bedroom



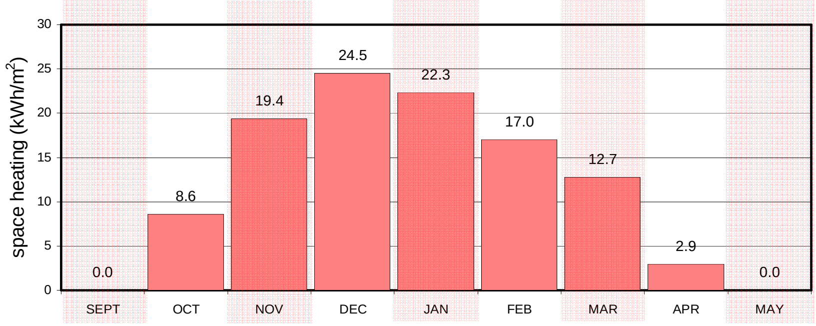
air change

average Nov.-March
0.95 1/h living room
0.41 1/h bedroom
0.27 1/h kitchen
0.54 1/h apartment



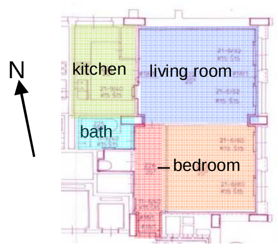
heat distribution

heat season average
4% bath
3% hall
4% kitchen
47% bedroom
42% living room



heat consumption

total for space heating
2006/07 heat season
6075.7 kWh/a
56.55 m² apt
=
107.4 kWh/m²a



apartment data

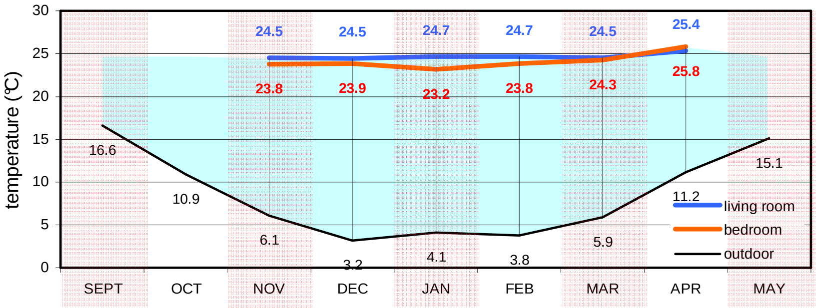
size: 56,55 m²
orientation: NE
windows: double glazed
wooden frames
poor condition
drafts
heat regulation: programmable

occupant data

	day	night
Adults	0	2
Children	0	0

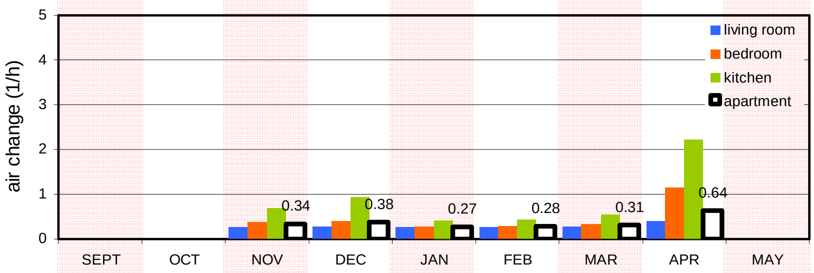
CZ Model Building - Apartment C

2006/07 Heat Season Summary



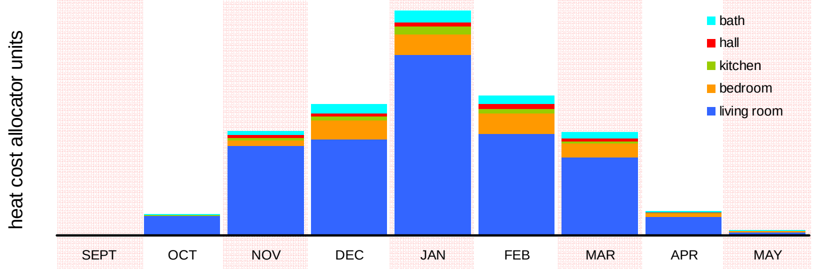
temperatures

average Nov.-March
24.7 °C living room
24.1 °C bedroom



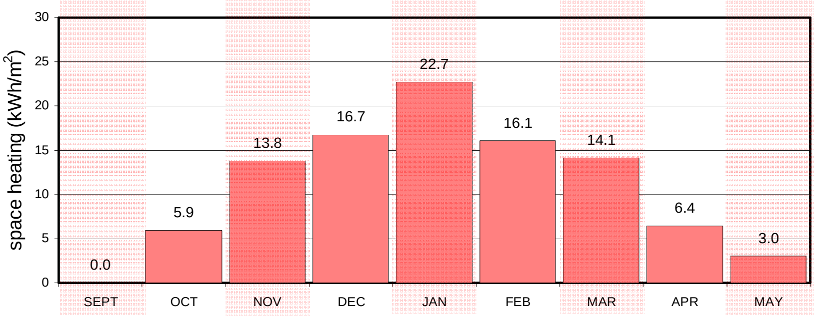
air change

average Nov.-March
0.26 1/h living room
0.34 1/h bedroom
0.60 1/h kitchen
0.32 1/h apartment



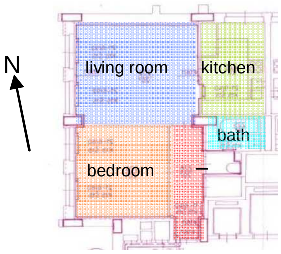
heat distribution

heat season average
6% bath
3% hall
3% kitchen
11% bedroom
78% living room



heat consumption

total for space heating
2006/07 heat season
5583.3 kWh/a
56.55 m^2 apt
=
98.7 kWh/m^2a



apartment data

size: 56,55 m^2
orientation: NW
windows: double glazed
wooden frames
poor condition
drafts
heat regulation: programmable

occupant data

	day	night
Adults	1	2
Children	1	2

Discussion
First of all, CZ partners show a good zoning practise, good average ventilation but there's a continuous potential to save energy in lowering the room temperature. There is a potential to save energy by lowering the room temperature and by reducing draughts because of bad window quality.

Comparison of apartment A, B, C of heat consumption during the peak period (January 1- 31) and additionally one typical day is taken into consideration to analyze alternative heat sources, ventilation, indoor temperature and heat consumptions.

1.) Occupancy

Looking at the diagram all apartments have shown a clear relation between outdoor temperature and daily consumption. Each of the 3 apartments has a different program in their TRASKO, which is the heat management system
In apartment A, the TRASKO comes on at 5 a.m. and goes off at 10 p.m. In all apartments there is no temperature minimum reduction at night. During 24 hours there is heat consumption: even if there is some reduction in consumption at night, heat is still being delivered throughout the night.

2.) Heat consumption

Apartment B turned down heating if no-one is at home, Apartment C left heating on at all times. When the apartment is empty there is no heating at all.

3.) Ventilation

Apartment B shows long-term ventilation which building substances cool down. Thus, this long-term ventilation leads to a loss of stored heat in the apartment and leads to higher energy consumption in afternoon to cover the losses.

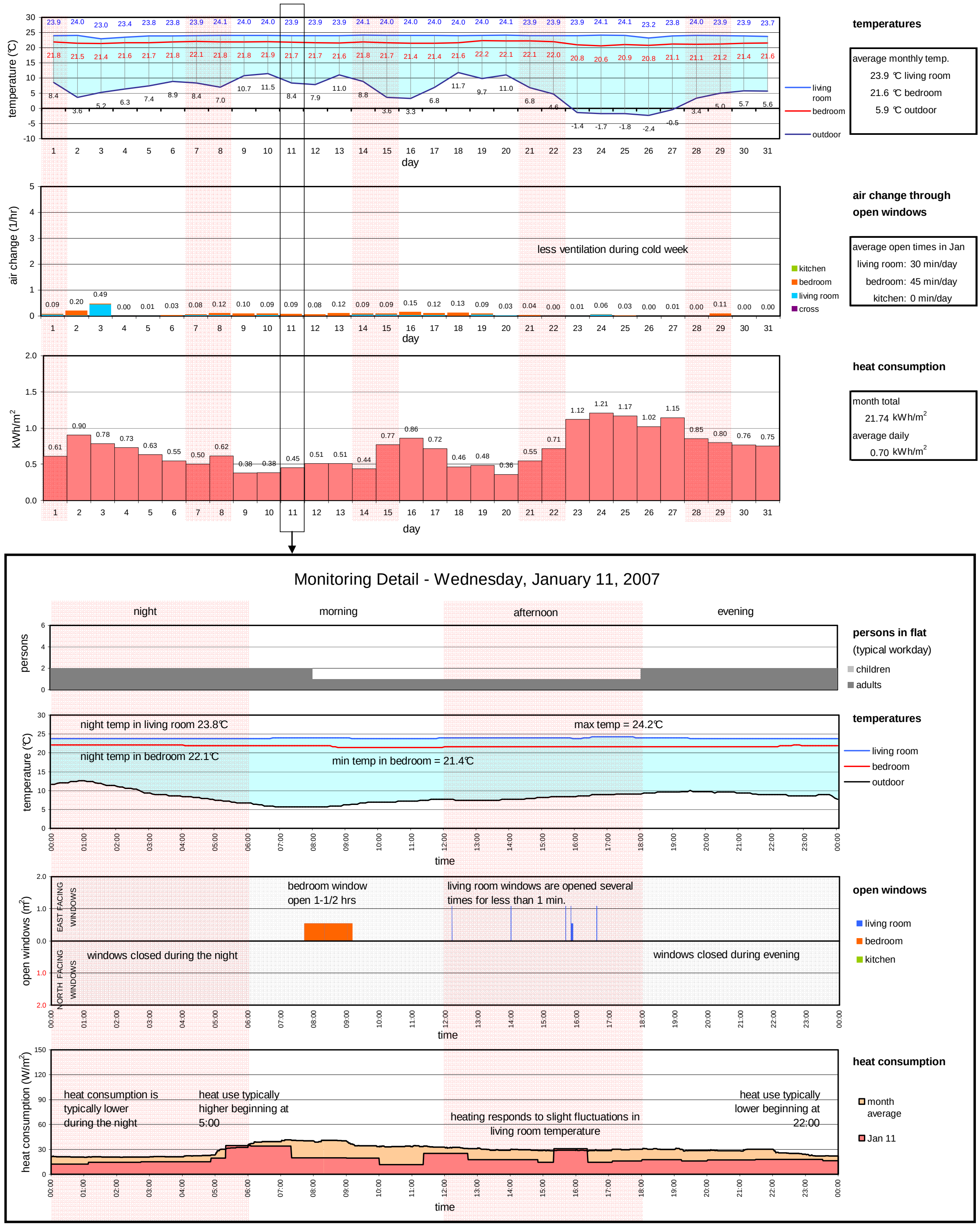
4.) Indoor temperature

The apartments show a high level of indoor temperature, especially in Apt. C, around 25 degrees day and night. No apartment shows the standard sinking of temperature during night. There are no short periods of cross-ventilation.

During the cold week (23-27th of January) there has been little to no window- ventilation, which is under the standard.

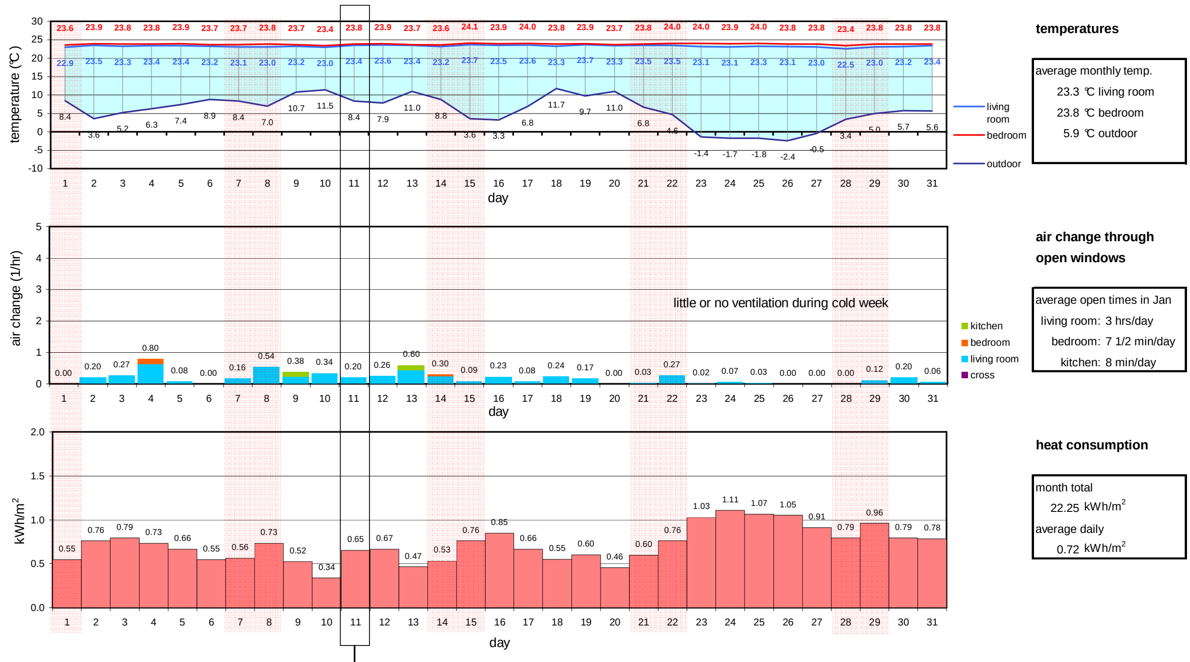
CZ Model Building - Apartment A

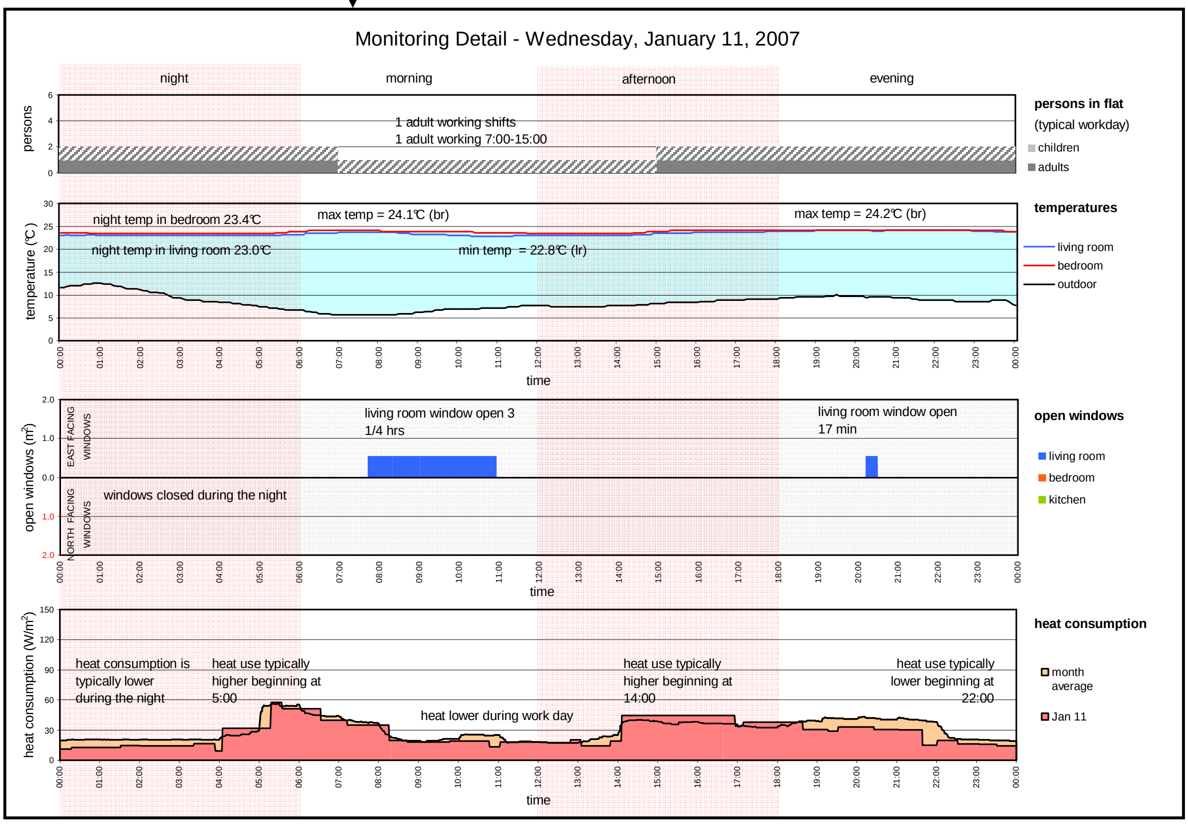
Average Daily Values - January 2007



CZ Model Building - Apartment B

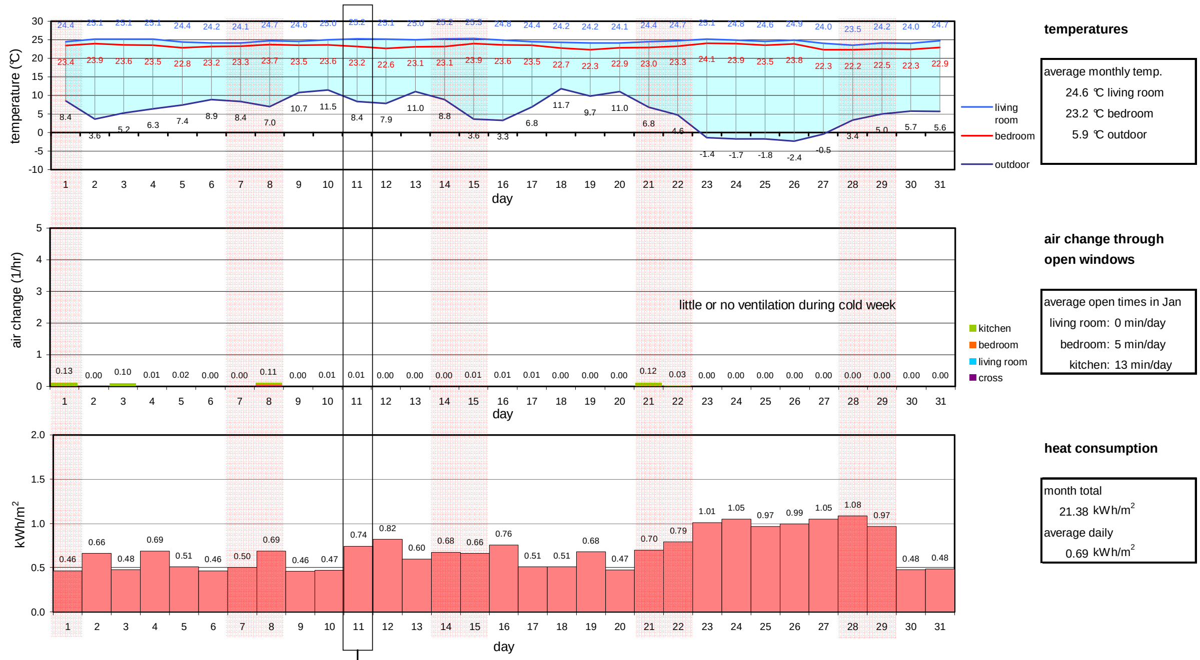
Average Daily Values - January 2007

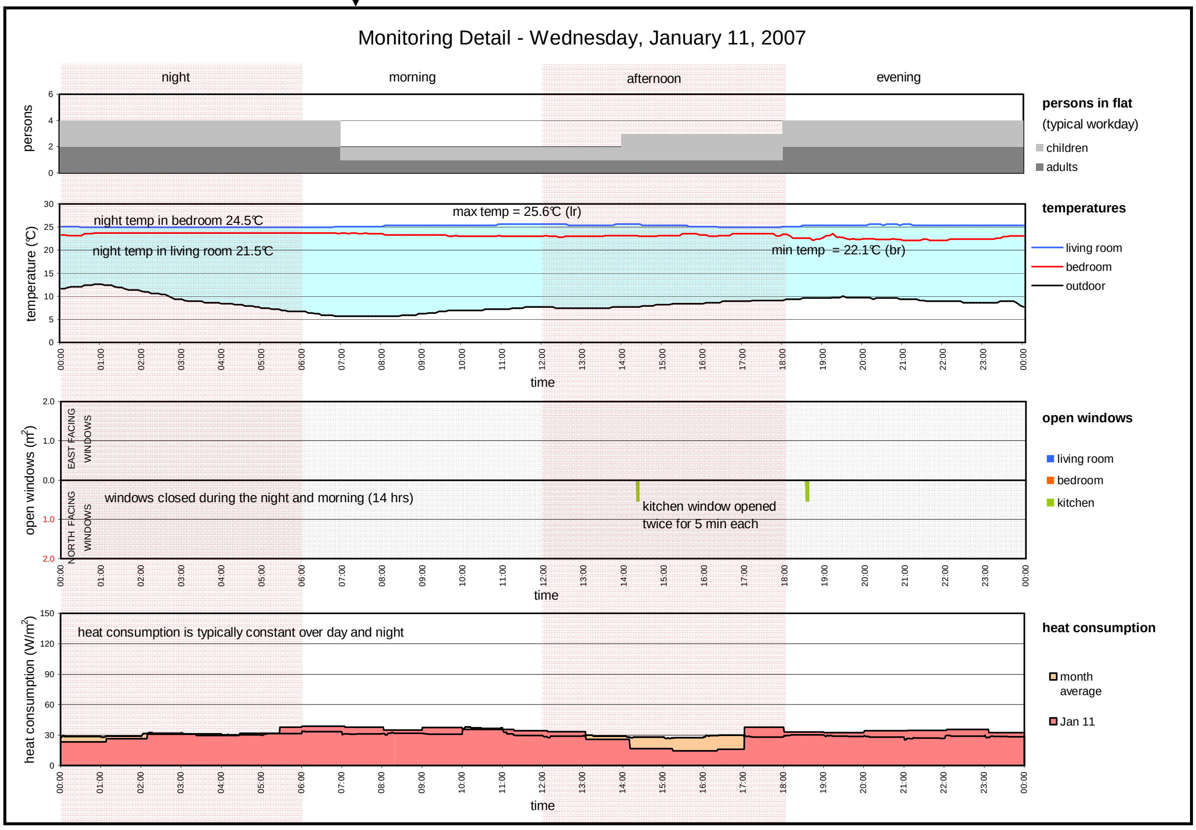




CZ Model Building - Apartment C

Average Daily Values - January 2007





Comparison of 3 social apartment buildings

The winter has been very warm in comparison to the previous 3 winters.

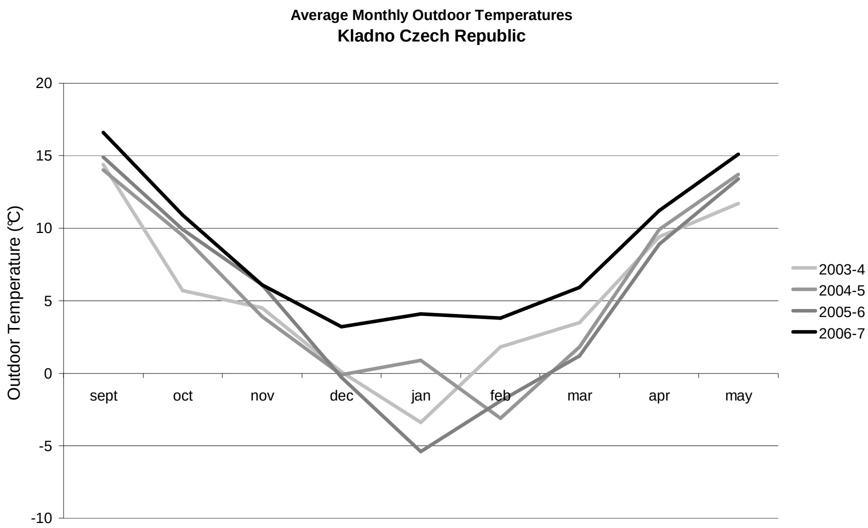


Figure 2: Average Monthly Temperatures at Model Building Sites for 2006/07 Heating Season and Previous 3 Years

The consumption in the 3 model buildings over the past 4 years shows a difference typically fewer than 10% between the monitored building and its two similar neighbours. Consumption is relatively stable over the past 3 years.

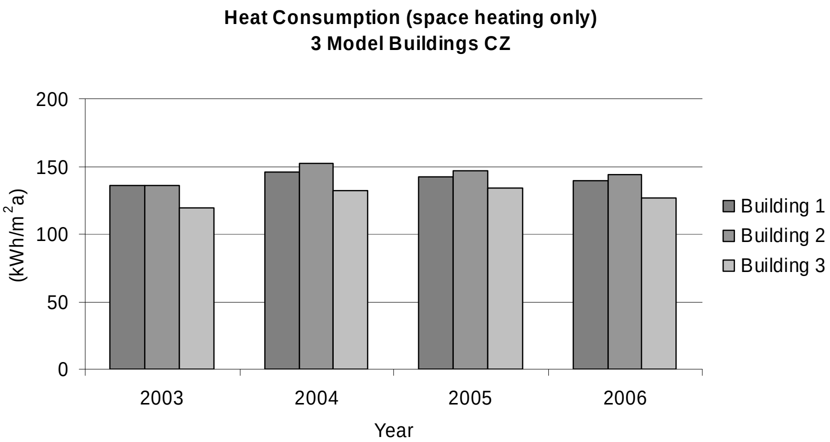


Figure 3: Heat consumption of 3 Czech model buildings from 2003-2006 (in kWh/m²)

Conclusion

Of the 5 model buildings monitored, the 5 apartments in the Czech model building show the narrowest range in terms of the individual heat consumptions. Monthly **heat consumptions** in the 5 model apartments follow a similar trend curve over the heating season, peaking in December or January then sinking steadily towards April and May. The similarity of heat consumption levels between the 5 apartments is in part due to the consistency of apartment quality; none of the model apartments are on the top floor or bottom floor, they are all oriented either North East or North West, no apartments have new windows and they all have central heat regulation (TRASKO) with a choice of pre-programmed heating cycles.

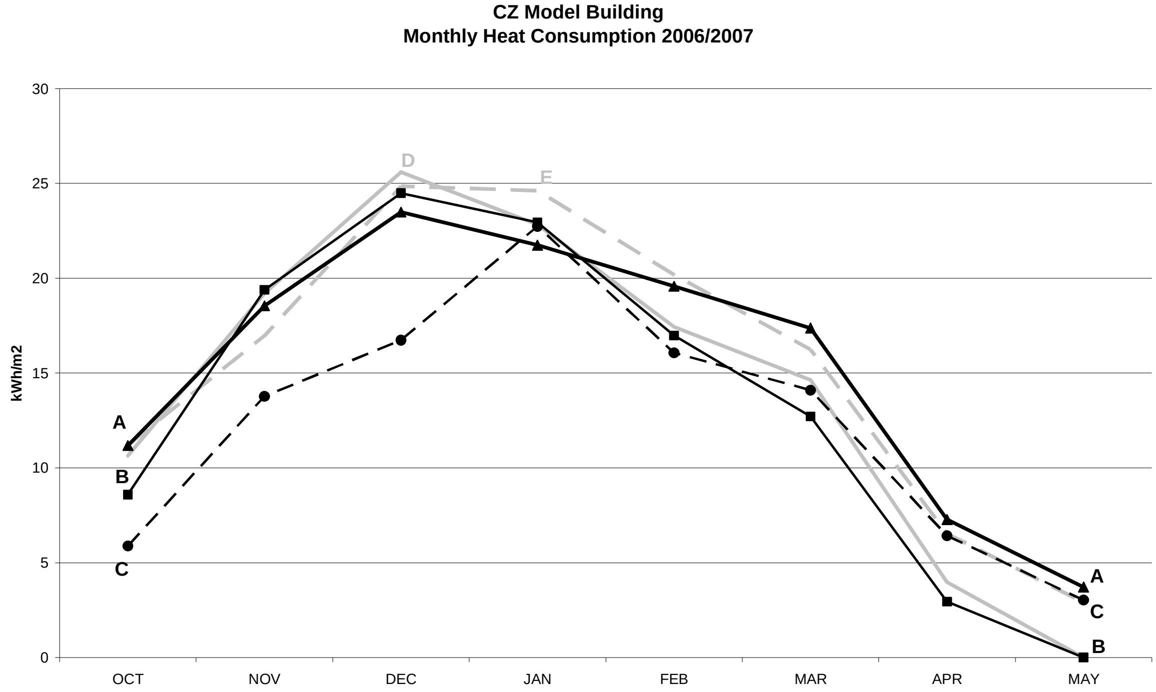


Figure 4: Monthly heat consumption of CZ model building from October 2006 until May 2007 (in kWh/m²)

Window use was moderate in monitored apartments A and B and quite seldom in apartment C. The windows are original in all apartments and poorly sealed so uncontrolled air change was assumed to be substantial – and possibly adequate in terms of general indoor air change needs. Most tenants complained of draughts and in several cases of visible gaps between the frame and wall. Despite the energy saving tips made available to all tenants, none of the volunteers used short bursts of cross ventilation regularly over the course of the day to ensure air change without cooling down the building substance. Tenants in model apartments A and B both regularly opened one particular window once a day for an excessive period (1 hour or more) to 'air out' a single room - in apartment A, the bedroom and in apartment B, the living room. Although these rooms were generally heated less than other rooms, this excessive ventilation would cool down the floor and walls. When outdoor temperatures dropped below 0°C, these windows generally remained shut or the amount of time that they were kept open was shorter. With regards to ventilation, the recommendation to improve energy efficiency is to replace or seal windows to minimize draughts while further promoting healthy and energy efficient ventilation practice among the tenants.

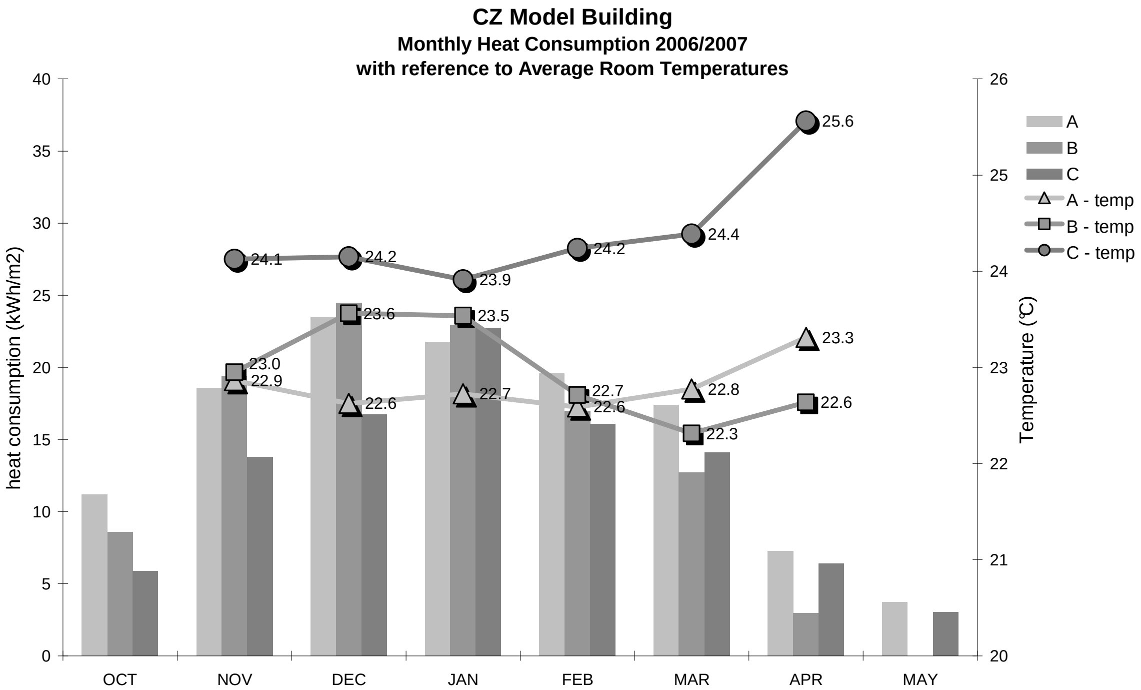


Figure 5: Monthly heat consumption of CZ model building from October 2006 until May 2007 (in kWh/m²), with reference to average room temperatures

Indoor temperatures in the 3 monitored apartments were above recommended levels (20-22°C day and 16-18°C at night) and quite stable despite the use of pre-programmed (TRASKO) heating cycles which reduced but did not halt heat delivery during the night. Apartment A and C followed a similar trend of average monthy indoor temperatures; stable between November and March and rising sharply in April. Both had room temperatures around 24°C but where Apartment A concentrated heating in the living room only, apartment C with small children inside heated the living room and bedroom evenly. In apartment B a sharp decline is evident between January and March although the average indoor temperature remains above recommended levels. In this period the heat consumption of apartment B drops relative to apartments A and C with considerable savings

evident in the transition period of April and May. Air movement, especially cold draughts, increase the sensation of cold with the consequence that tenants typically need higher room temperatures to feel warm. In addition to minimizing the uncontolled heat loss from escaping air, sealing or replacing windows also enables tenants to lower indoor temperatures while maintaining overall comfort levels. These energy benefits would add up.
Heat distribution was generally very good in the 5 model apartments because of the central heat controls (TRASKO) which regulated radiator activity according to different temperature needs for different rooms and times. In apartments A, C and E over 90% of heat was distributed to the living room, while in apartment B and D a large portion of the heat was delivered to the bedroom. These distributions were consistent over the full heating season. Except in apartment D, very little or no heat is delivered to the kitchen. The radiators in the hall and bath of each apartment were also seldom engaged. While the layout and size of rooms restricts swapping uses, there would be energy saving benefits of concentrating daytime activity and comfort temperatures in the central interior room while lowering the temperature requirements of the larger living room which has two exposed outside walls. The feasibility of optimizing zoning would have to be individually assessed against each tenant's requirements.

The 5 model apartments show a difference of 20% in heating levels. Despite the highest indoor temperatures, apartment C had the lowest consumption. The family which occupied this small apartment used it intensely; the mother and 2 children were often at home. Alternative heat sources including the occupants themselves, kitchen appliances and other equipment would have contributed passively to the indoor temperature reducing the need for active heating. Window opening was also seldom and short compared to apartments A and B and concentrated mainly in the kitchen.

Even considering the mild temperatures of the 2006/07 heating season consumption levels are moderate to high for these apartments. There exists a strong saving potential through improvement to the thermal quality and air-tightness of the building shell coupled with further promotion of energy conscious practices among the tenants with respect to ventilation and indoor temperatures.

1.4.3 Conclusions

1) Climate Considerations
The 2006/07 heating season was generally mild throughout Europe. At the model building sites in the 5 countries under consideration, average monthly

temperatures during the heating season were typically higher than corresponding monthly temperatures in the previous 3 years. At the CZ, SK and BG sites average outdoor temperatures in January and February were about 5°C higher than the average over the previous 3 years. In the UK and LT the average monthly temperatures were also typically higher but the differences were less dramatic.

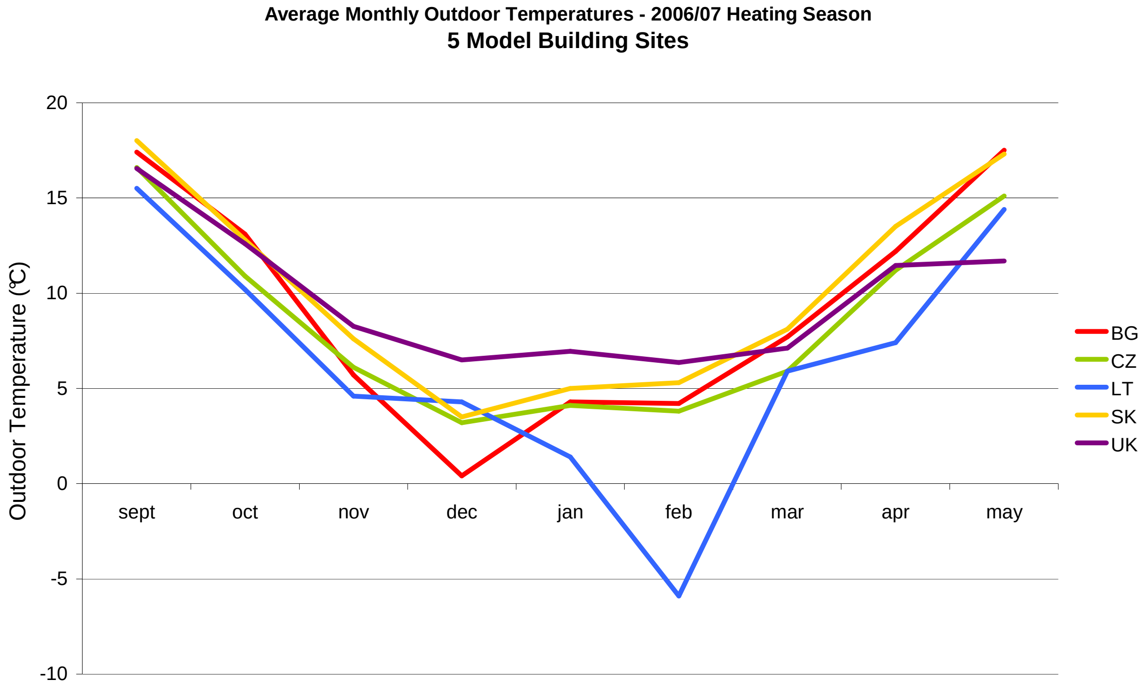


Figure 6: Average monthly outdoor temperatures at the 5 model building sites during 2006/07 heating season

2) Building considerations

The oldest model buildings were the ones in the Czech Republic (53 years) and in the United Kingdom (47 years.) Both these buildings had exterior walls made of block and both had original windows whereby the windows in the UK model building were single paned – in all other model buildings they were double paned. Complaints of draughts were frequent in both buildings among those tenants surveyed in WP2. The Bulgarian and Slovak model buildings - respectively 37 and 23 years old - were built of prefabricated concrete panels with integrated insulation layers. Except for apartment B in the Bulgarian building, all monitored apartments in these buildings also had original windows. The youngest building monitored was the Lithuanian building (15 years old) and all apartments there had new thermal windows, although apartment C had replaced only half of its windows.

3) Heat Consumptions

None of the building shells had been refurbished with extra insulation, and model apartments on the top and bottom floors of buildings (apartment A in the the Lithuanian building, apartment D in the Slovak building and apartment A in the Bulgarian building) typically showed quite high heat consumptions in comparison to the apartments in between. With the exception of model apartment A located on the ground floor, the Lithuanian model apartments had consistently low consumptions (between 45kWh/m2.a and 70kWh/m2.a) in comparison to the other 4 model buildings. Although these apartments were exposed to the coldest outdoor temperatures, all these apartments had new thermal windows. None of the other model apartments in the other countries had new windows except apartment B in Bulgaria which also had very low heat consumption (27kWh/m2.a). With the exception of apartment E, heat consumptions in the rest of the Bulgarian model apartments were also typically low in comparison to the other countries. The Bulgarian model building had the second coldest winter among the 5 building sites, but like the Lithuanian model building, the heating season was limited from October 15 to April 15.

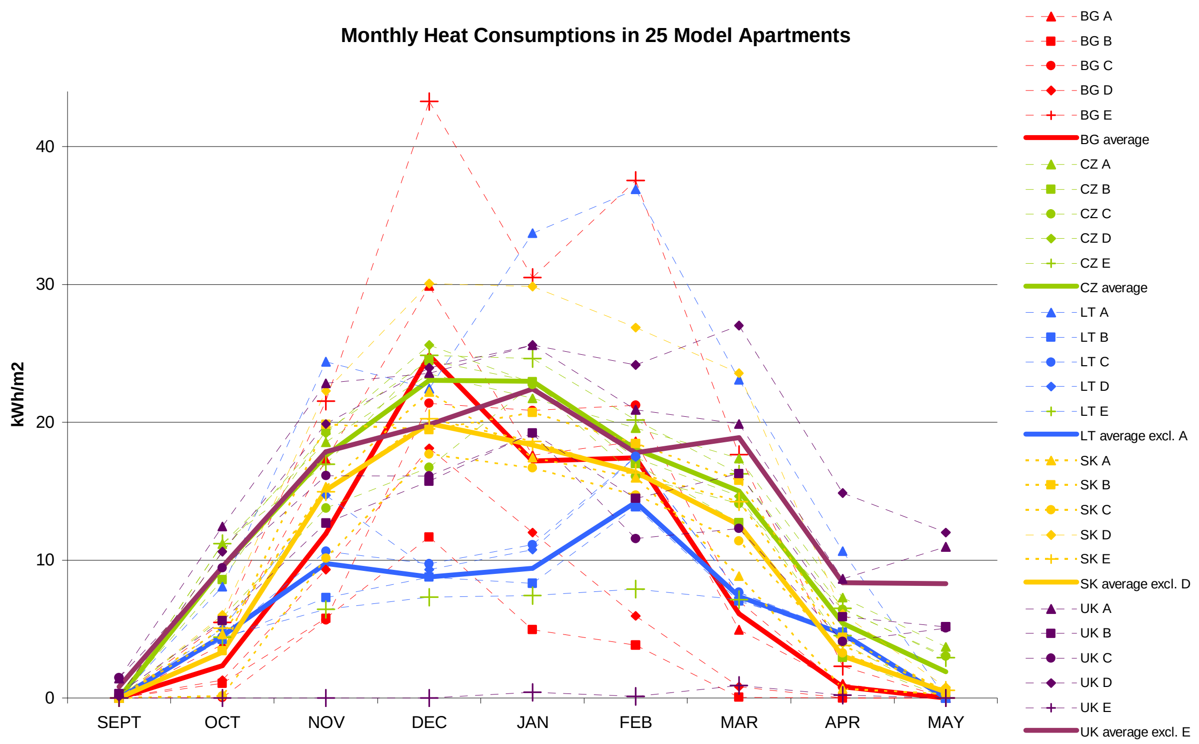


Figure 7: Monthly heat consumption in 25 model apartments in kWh/m²

The Czech model apartments and - with the exception of apartment E - the UK model apartments had quite high heat consumptions (between 95kWh/m2.a and 158kWh/m2.a) compared to the other countries. In both of these buildings windows were old and poorly sealed meaning there were high levels of uncontrolled heat loss.

4) Indoor Temperatures

Model apartments in all countries showed higher than recommended indoor temperatures and, except in the UK, temperatures were not typically lower at night. The highest indoor temperatures were recorded in the Slovak model building where temperatures in all 3 apartments were typically between 24°C and 26°C day and night. The lowest average monthly indoor temperatures were recorded in the Lithuanian model apartments and in the UK model apartments, whereby the room temperatures in the Lithuanian model apartments were generally stable day and night and those in the UK model apartments typically dropped and rose a great deal over the course of the day. Where the indoor temperatures in the Czech and Slovak model buildings were relatively stable over the heating season, those in the Bulgarian, Lithuanian and UK model buildings were affected substantially by outdoor temperature differences.

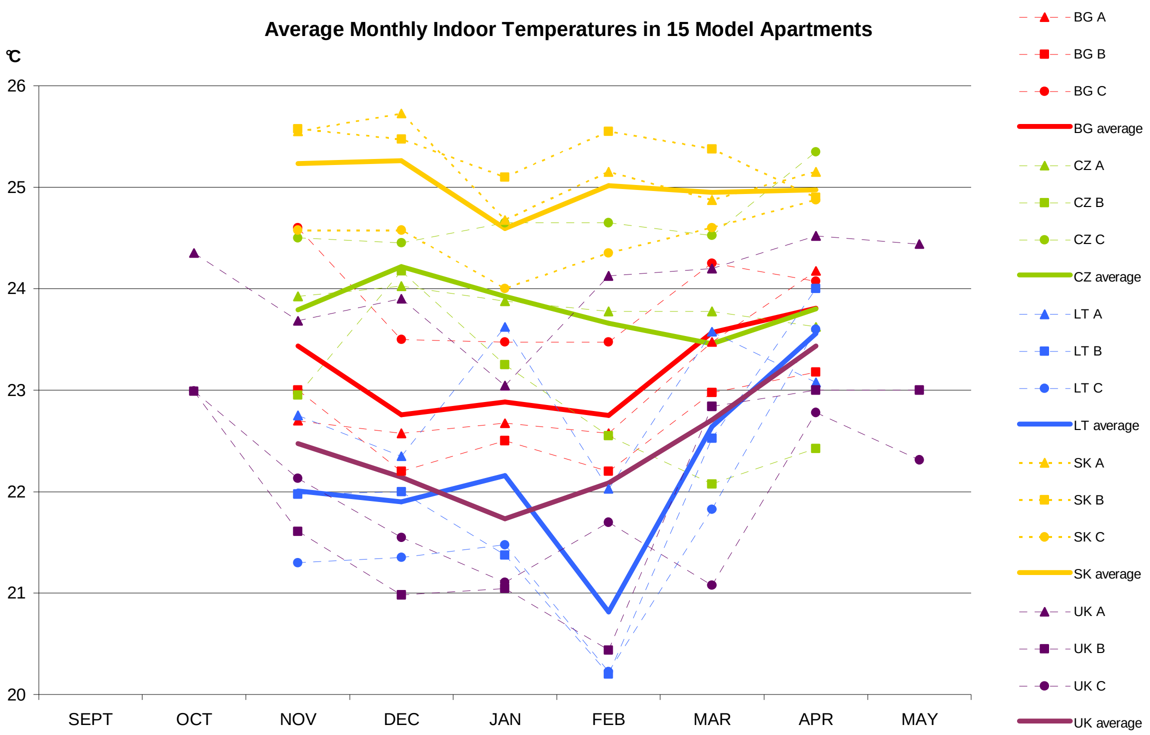


Figure 8: Average monthly indoor temperatures in 15 model apartments

5) Ventilation

Typically between 0.35 and 0.5 air changes per hour is considered necessary for a healthy indoor air quality in apartments. The use of windows for air change varied a great deal among all the model apartments. Several model apartments - notably 2 in Lithuania - ventilated rarely with air change rates well below levels considered healthy. This was due in part to new, well-sealed windows and in part to the extreme outdoor temperatures. In none of the model apartments did the tenants use the recommended method of short bursts of cross ventilation (2-5minutes) every 6 to 8 hours to achieve healthy levels of air change. In many cases, tenants ventilated much once in the morning, by opening the window to one or more rooms for a period between 15minutes and several hours. In a few cases – most notably in 2 Slovak model apartments - windows were left open all day and/or night. Excessive ventilation was typical in the Bulgarian and Slovak model apartments.

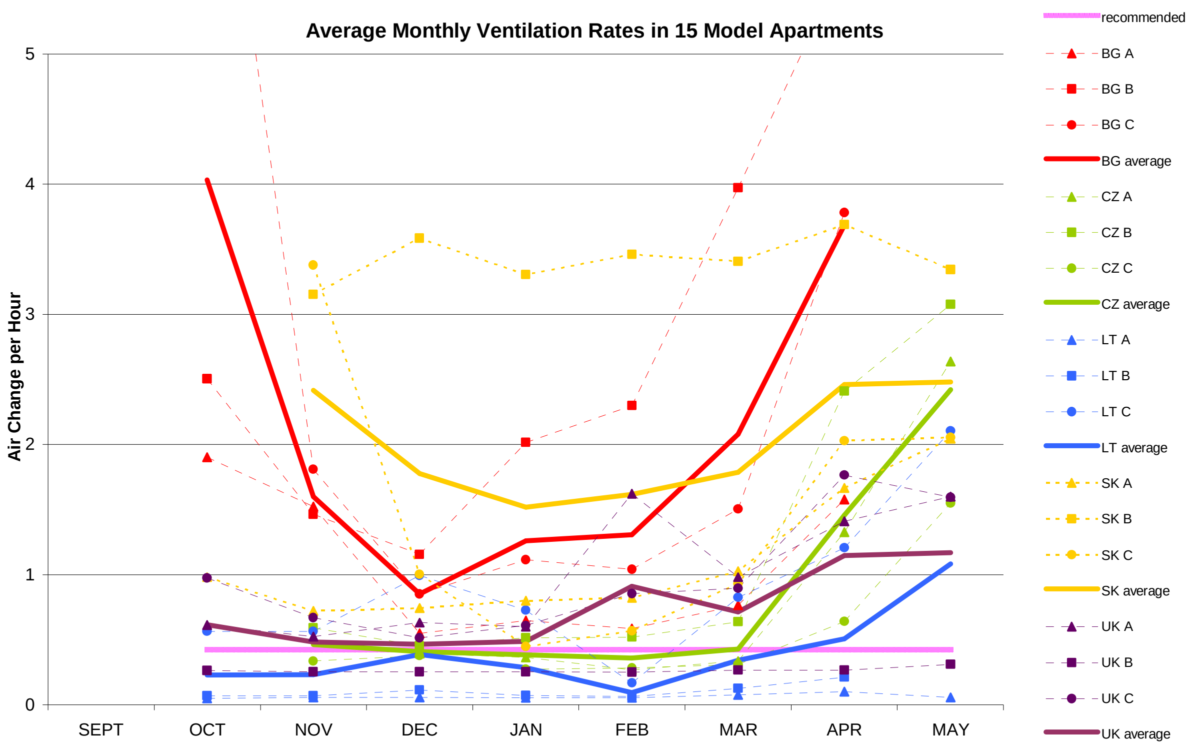


Figure 9: Average monthly ventilation rates in 15 model apartments

6) Heat Distribution

With few exceptions, the model apartments distributed heat evenly throughout the apartment. Suggested practice is concentrating heat in most used rooms while heating less used rooms and the kitchen little or not at all. Best practice in terms of heat distribution was observed in the Czech model apartments, where the heat distribution control (TRASKO) allowed tenants to heat each room according to pre-programmed temperature goals. Unfortunately, the poor condition of Czech building - in particular the poorly sealed windows – inhibited the observation of the savings potential of this behaviour. In almost all of the other model apartments, there is considerable potential for better practice in terms of heat distribution.

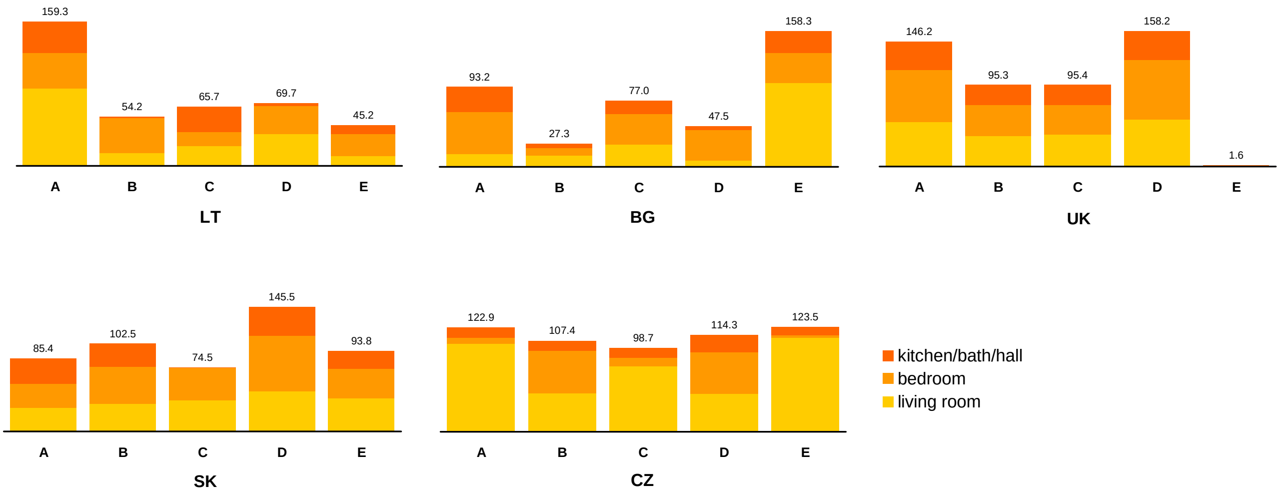


Figure 10: Heat distribution within 25 model apartments

7) Recommendations given to tenants

The quality of the building substance – in particular, the quality and air tightness of the windows and the thermal quality of the building shell - play the key role in terms of defining the energy saving potential from existing residential building stock. This can be illustrated clearly in the ISEES measurements by looking at those apartments with new windows. Although they were exposed to the coldest conditions, the Lithuanian model apartments (with the exception of apartment A on the ground floor) and the single Bulgarian apartment B - all of which had new, air-tight thermal windows - required much less heat energy in relation to the other model apartments. In addition, tenants in these apartments typically lived with lower indoor temperatures and lower rates of air change. The model apartments requiring the most heat energy – particularly those in the UK and in the Czech Republic - also had old, very poorly sealing windows.

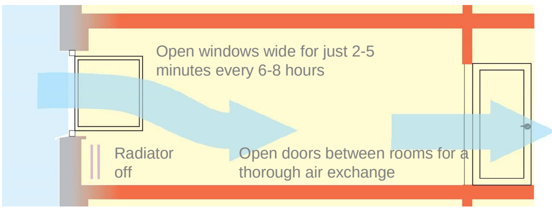
In addition, apartments on the top and bottom floors of the model buildings – apartment A in Lithuania and apartment D in the Slovak Republic - required double and more of the heat energy of their neighbours. These ‘outside’ apartments had double or triple the surface area exposed to the elements and their high heat consumptions illustrate the high heat loss through the poorly insulated building shell.

The potential for improvements in user behaviour alone to save energy is limited in non-refurbished residential buildings. Poorly sealed buildings in particular are responsible for an uncontrolled loss of warm air on one side, and cold draughts on the other. In order to achieve comfort levels, these draughts are typically countered with higher room temperatures resulting in still higher heat consumptions rates and higher losses. A stable comfort level is difficult to accomplish under these conditions and the ISEES measurements observed several cases were intense heating and window opening were used concurrently to regulate indoor comfort. A regimented and energy efficient schedule of heating and ventilation with stable comfort levels is difficult to imagine under these conditions.

With this in mind, opportunities to optimize user behaviour exist in all the countries, and optimally should go hand-in-hand with refurbishment. Particularly, improvements to the quality and air-tightness of the windows and/or building shell cut direct heat loss but also enable tenants to better limit their heat use and optimize regulation of indoor comfort and air quality levels.

In particular, the following practices were identified to be implemented to achieve an optimal balance of heat use, indoor comfort and air quality.

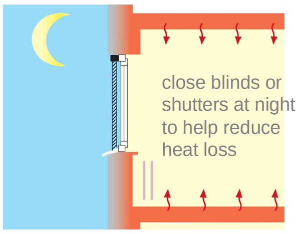
- Rather than keeping windows open a crack the whole day (or night) to ventilate, open the windows wide for just a few minutes every 6-8 hours for a quick but thorough air exchange. Open the doors between rooms as well to allow a thorough air exchange.



  - The thermal mass of a building (the walls, floors, and ceilings) cool down when the windows are open even a crack for a long period of time. The building itself loses its stored warmth. Only after the floors and walls have been warmed up again, does the room comfort return.
  - Optimal ventilation means bringing in fresh air without allowing the building mass to cool down. Opening the windows wide for short, intense bursts of fresh air every few hours allows adequate ventilation without a great loss of heat

- Exterior window shutters and blinds and even interior blind and curtains can help reduce heat losses, so close them after sunset during the winter.

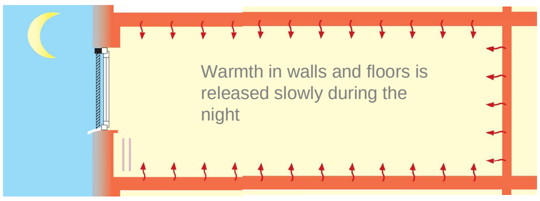
- Exterior shutters and blinds can help to reduce the heat loss around the windows. During the winter, these should be opened at sunrise and closed at sunset. In this way the sun is used to help warm the rooms during the day, while preventing the escape of heat during the night.



- Take the orientation of buildings into consideration - the frequently used rooms should be located where the sun's rays can help most to heat and light them.
  - Where possible, the living room should face south and benefit from the light and warmth of the sun's rays.

- Infrequently used rooms or the kitchen shall not be heated.
  - The living room is generally used the most, and thus needs to be heated more. The bedrooms, on the other hand, usually need less direct heating or even none at all.

- Heat should be turned down a few degrees at night and during the day if no one is at home.
  - Cooler settings at night are generally better for sleeping comfort and can help reduce heat consumption by as much as 20%.
  - Reduce the thermostat setting 3-5° at night and when there is no one at home. This can be done either manually or by using the timer feature available on some heating systems.



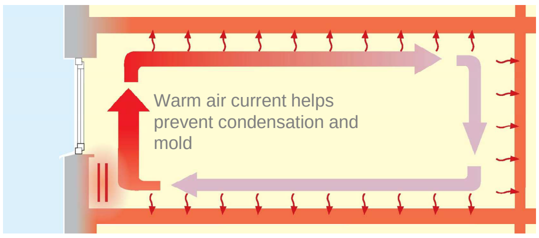
  - Generally, the heating should be turned down an hour before going to bed and turned up a half-hour before rising. In the evening, the heat stored in walls and floors is released slowly preventing any sensed loss in comfort. The return to daytime comfort levels in the morning also requires time - not only for the room temperature to rise but also for the walls and floors to warm up again.
  - 'Lag time' should be kept in mind not only when using the timer feature on the thermostats but also before adjusting the thermostat during the day. Heating should be turned down one hour before leaving the home empty and avoided turning up if one is only dropping in and leaving again. Bringing the room temperature up to a typical daytime comfort level not only

requires time but substantial heat consumption – it should be avoided when it's not necessary.

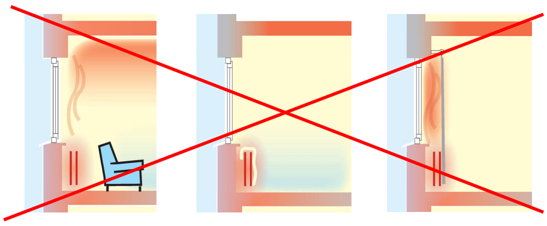
- Heating should be turned down whenever there are many people present in a room.
    - Every person in a room gives off warmth. The more people in a room, the lower you need set the thermostat. With enough people the heating can be turned off completely.

    - Electrical appliances (the stove, refrigerator, television, computer and lamps) also emit heat. Where practical, their normal everyday use can also contribute to a rooms comfort and reduce the need for direct heating. The kitchen, for example, may need no direct heating at all – normally, the heat emitted from the stove, refrigerator and other appliances is enough.

- Radiators should be given room to breath. Curtains or furniture located in front of a radiator or laundry hung on the radiator will impair its effective operation.



    - To work effectively radiators need to generate a warm air current within the room. Air heated by the radiator should rise, move along the ceiling, drop into the room and finally move along the floor back to the radiator. For the radiators to be effective, this room circulation must not be obstructed.
    - Drapes or interior blinds hanging over the radiators shall be avoided. Where desired, these should be located within the window alcove and above the interior window sill.

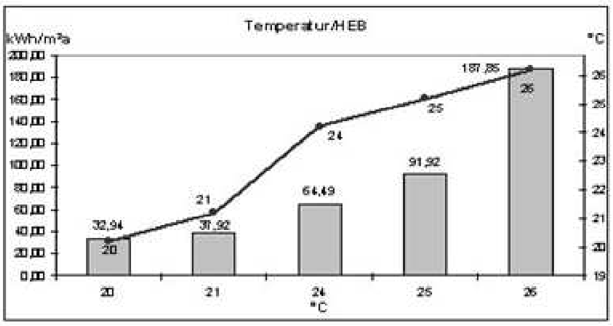


    - Sofas, fauteuils or other bulky furniture should not be placed in front of a radiator. Floor area in front of the radiator should be kept clear.
    - Laundry should not be hanged on the radiators
    - Shelves sitting directly on the radiator should be avoided.
    - In addition to allowing valuable heat energy to escape, windows open a crack for long periods also create air currents which

counter the effective circulation of radiator warmth. Windows should be opened wide for a few minutes every 6-8 hours for a quick but thorough air exchange.

- Excessive room temperatures in any room should be avoided
  - It takes much more heat energy to raise room temperature from 24°C to 25°C than it does to raise the room temperature from 21°C to 22°C.
  - Excessive temperatures can also irritate the nose, throat and lungs. They lead to strong air currents in the apartment which stir up dust further affecting breathing.

Heat requirements for different room temperatures



2 Social Dialogue Theory

The following statements and recommendations for activities of a social dialogue are based on interviews and surveys realised within the ISEES project. The results of the surveys regarding satisfaction with living situation, attitudes and user practices clearly show the willingness and desire of the residents to participate in a social dialogue. They indicate the need for a social dialogue in three aspects, with different emphasis in the respective countries:

- Social dialogue in the context of refurbishment
- Social dialogue in the context of improving the satisfaction level with district heating
- Social dialogue in the context of user behaviour

Social dialogue in the context of refurbishment

The renovation and improvement of existing buildings and apartments plays a major role in all European countries. Renovation processes without the participation of residents are not feasible, as a systematic integration of residents helps to avoid problems during the implementation. The integration of residents at an early stage ensures that they support and accept decisions made during the preparation phase of a renovation. Disagreements and critical aspects can be solved beforehand. As experiences show the satisfaction with a finished renovation is higher, when residents have been involved in the process.

The most important reasons for a social dialogue are:

- Legitimation
  A broad process of opinion-forming guarantees that the interests of occupants are taken into consideration and decisions are democratically authorised.
- Efficiency
  The integration of occupants leads to adequate planning. Changes afterwards are avoided.
- Identification
  If occupants are informed at an early stage, it is more likely that they accept and identify themselves with found solutions.

The property management or the municipality gains practical knowledge through the support and collaboration of residents. The problems in the building and in the surrounding area are best-known to the residents. By using this know-how the property management can avoid a lot of effort for inquiries and planning.

In the selected model buildings of the ISEES project the majority of the residents are elderly people. Currently, in many Member States refurbishments take place in buildings with elderly residents. However, in future refurbishments in buildings with younger residents will increase. They usually have higher expectations regarding cooperation. For property managers it will be then essential to have the respective know-how.

In future also ecological refurbishments will gain importance. Currently, for example the change of the heating system is usually not done simultaneously with the renovation of the building. But combined with a thermal isolation of the building this would make sense. Renovations towards low energy solutions might make the implementation of automatic ventilation necessary. Such technological changes also make changes in information and communication necessary.

Residents usually have the following expectations regarding participation:

- Early information
- Good realization
- Different possibilities of participation
- Contact person on-site
- After-care

Social dialogue in the context of maintaining or improving the satisfaction level with district heating

District heating systems dominate the heat supply market in most CEE countries. In Lithuania, about 60% of residential building blocks are connected to DH systems over the country and about 80% in larger cities. In Slovakia, Czech Republic and Bulgaria the average rate is between 40% and 50%.

According to the survey results the satisfaction level with district heating varies a lot between the surveyed countries. Especially in Bulgaria the satisfaction level is very low and the potential for improvement is very high. Similar is the situation in Slovak Republic and United Kingdom. District heating companies in these countries are strongly recommended to start a social dialogue with their costumers to improve their services and establish client relation management activities.

Social dialogue in the context of user behaviour

According to experiences from studies made in the EU (e.g. Austria), user behaviour can for example lead to an energy consumption 300% higher than the theoretical, calculated value. In non-insulated buildings, user behaviour (temperature in the building, zoning, shading, air ventilation) is of utmost importance to optimise the energy consumption of the building.

According to the survey results individual residents strive to show correct user behaviour, by implementing energy saving measures and adapt their habits. However, the whole picture shows that there is still a lack of awareness and know-how regarding optimised user behaviour. Information and training on user behaviour therefore could and should be a part of a social dialogue.

Information and activities on user behaviour can be a starting point for a social dialogue and a meaningful extension after a refurbishment process. It has to be noted, that in case of the selected model buildings in the participating five countries, where the windows and the building structure are in a very bad state, activities on user behaviour can not replace the actual refurbishment.

2.1 Stakeholders

The following groups are relevant stakeholders for a social dialogue:

- **Occupants (tenants/owners)**

To start a social dialogue the willingness of the residents to engage in such a process is essential. Usually at least a part of the residents shows interest in the topics. The issues of the social dialogue have to match the needs and information level of the residents to be successful. Usually the most difficult part is to find the space and time that all potentially interested residents can be involved. However, it has to be respected, if residents refuse to participate.

- **Housing associations / housing companies**

Housing associations or housing management companies are often the main actors to start a social dialogue. Thus, their readiness to involve residents is important. In case of a refurbishment usually the property management and the technical apartment (responsible for planning and execution of construction work) are involved.

- **Local authorities**

Depending on the respective regulatory framework conditions local authorities will be involved in different stages of the refurbishment process and should be included in the social dialogue activities. In case of refurbishment of municipality owned buildings the competent agency can also be the main actor of a social dialogue.

- **District heating companies**

District heating companies may play a major role in a refurbishment process, in case of reconstruction of heating system and should be included in the social dialogue. Besides refurbishment activities, district heating companies are well advised to start a social dialogue with residents to improve their customer relationship (e.g. service offering, customer information), at least in some of the participating countries.

- **Sponsoring institutions**

The financial means are a major issue regarding refurbishment and often depend on available subsidies and sponsoring. Thus it might make sense to include sponsoring institutions early in the process.

- **Building enterprises**

In case of a refurbishment building enterprises play a crucial role during the social dialogue. With the beginning of the construction phase the social dialogue is not finished. Residents often communicate directly with the building enterprises during the implementation phase. Important is that the building enterprise has a professional attitude and takes requests seriously.

- **Surroundings**

In case of a refurbishment, the surroundings have to be considered as well, as disturbances for the neighbouring residents have to be minimised. To inform them about the on-going process might be useful to ensure a smooth implementation.

2.2 Different levels of co-operation

There is no „ideal" participation process. It is not necessary to involve occupants in all phases of a dialogue or participation process, but it is possible to offer methods for participation for all phases and levels. Elements and methods for a dialogue are often overlapping and can be used for different purpose. These elements and methods must be in accordance with the occupants, the „style" of the care-takers, the building and the components of the participation process. The challenge for the person in charge of a social dialogue process is to select the appropriate methods.

Basic guidelines for a social dialogue are:

- The residents must be able to gain all relevant information.
- All residents, who are interested, must be able to participate in the process.
- At the beginning it has to be decided how to deal with the results of the social dialogue.
- The residents have to be taken seriously in expressing their needs and proposals.
- A social dialogue must not be misused to manipulate or to enforce respective interests.

Figure 11: Levels of co-operation within a social dialogue process

Cooperation can start at different levels and can be differentiated according to the levels of information, consultation, co-design and co-decision. A comprehensive social dialogue can compromise all four levels. Information about the refurbishment is the basis for all further collaboration activities.

Information

Information is the basis for each form of participation. It is a one way-communication (e.g. housing association informs residents). Information can be provided about planned procedures, realised votes, opinions, facts etc. This kind of communication limits the possibilities of feedback, but it is possible for residents to ask for more information.

Examples are:

- Personal letters
- Circular letters
- Invitations
- Protocols of resident meetings
- Notice in staircases
- Internal journals
- Information brochures
- E-mails
- Information on websites

Consultation

Consultation is a two-way-communication and assumes direct contact between e.g. residents and representatives of housing association, district heating company, and municipality. Here, a dialogue between the involved persons takes place.

Examples are:
- Personal conversation
- Interviews (personal, written, by phone)
- Information meeting
- Inspection
- Excursion

Co-design

Co-design means active participation of occupants. They have the possibility to deal with certain questions concerning the process and if suitable develop concrete ideas and solutions. In this scenario, occupants are viewed as experts for their flats. The question remains, in which way results and expectations of the co-design process are considered at the concrete planning stage.

A disadvantage of this method is that residents who are less committed are segregated, as usually a manageable and stable group of persons are established for co-designing.

Examples are:
- Small groups
- Round tables
- Workshops
- Focus groups

Co-decision

Co-decision means that occupants take responsibility and bring in their competences and experiences. On the one hand, surveys or votes (e.g. to fulfil legal rules) are important, on the other hand there is the possibility to decide between alternatives. Collective co-decision compromises issues regarding the whole building, whereas individual co-decision focus on changes in the own flat (e.g. change of windows).

Examples are:
- Surveys
- Voting
- Assignment of services

3 Social Dialogue Actions undertaken under ISEES project

Within each of the Member States with demonstration / "model" buildings involved in the ISEES project (BG, LT, UK, SK, CZ) a series of **core social dialogue actions** were undertaken in response to delivering the main objectives of the project:

- identifying and monitoring model buildings,
- reviewing the status quo with key stakeholders (building owners/housing associations, tenants, district heating operators and municipalities), and,
- reviewing challenges and opportunities for stakeholders if they were to engage in social dialogue.

In addition, each member state partners undertook to carry out a series of **pilot social dialogue actions** designed to support the process of resolving the principal objectives identified for each "model building" (such as reducing domestic energy demand, refurbishment of accommodation or improving district heating systems). The nature of the challenges and opportunities identified, the nature of stakeholders involved and the nature of the constraints that existed was very different in each case and required a variety of responses.

The following ***Table 1*** summarises the key social dialogue actions undertaken in each member state.

	LT	CZ	BG	SK	UK
Core SD actions					
1	Issue ISEES information leaflet				
2	Tenant attitude surveys				
3	Issue user manuals to tenants				
4	Discussion sessions with tenants and tenant groups				
5	Review meetings with DH operators / Housing Association / Municipalities				
6	Distribution of SD guides to district heating operators and Housing Associations				
Pilot SD Actions					
1	Information Sharing event for professional Stakeholders	Information Sharing event tenants, DH operator and housing association	Information sharing event (tenants, DH operator and billing company)	Information sharing event (tenants, DH operator and building owner)	No further SD actions possible*

2	1st Information Sharing event for tenants / housing association	Conference presentation – professional audience (utilities and DH operators)	Conference presentation – Energy Forum 2007	2nd Information sharing event (tenants, DH operator and building owner)	
3	2nd Information Sharing event for tenants / housing association	Information sharing event – tenants, HA and municipality	Workshop on refurbishment of multi-family dwellings		

Table 1: Key social dialogue actions undertaken by member state partner

*(*Note) In the UK it was not possible to complete meaningful SD pilot actions since during the course of the ISEES project, the owners of the model buildings (municipality) and the Housing Management company developed a plan for major refurbishment which would resolve the key challenges identified in the building by tenants and other stakeholders. By way the biggest challenge for the building (and the associated energy consumption / thermal comfort) was the very poor thermal standard of the building fabric – the lack of wall insulation very poor single pane glazing with ineffective window frames. In addition, the owners have an established approach to tenant engagement, which is considered 'good practice' and therefore did not require additional facilitation from the ISEES partners.*

Further detail of each of the pilot actions undertaken is given in the following table. It gives a description of the actions and discusses their impact/benefits.

Information dissemination (one way)

Method	Description	Participants	Advantages	Disadvantages
Information leaflet	A simple form of communication to provide simple information and referral to other sources / project contacts	Property management/district heating company provide for residents	- Low cost - Significant reach	- May not be reach many - No feedback possible
Energy saving tip of the month	Simple, practical and positive information distributed through existing media route. For the property management or the district heating company this could be a method of keeping regularly in touch and could help build a positive image. Recommendations could be general and varied in line with season (e.g. turn down thermostats in the summer) or based on specific issues, e.g. ventilated for short periods only. Could be e-mail, published on an information board in a communal area, included in bills and / or other typical communication.	Property management/district heating company provide for residents	- Keeps in touch regularly with residents - Unobtrusive method of communication - Low effort to produce - positive communication	- Information may not be noticed - No feedback or questions are possible
Newspaper / Broadcast media	Opportunity to make a general feature of energy related issues: e.g. ‚How to save money in the home', comparison of one flat to another, plans for energy efficiency	Municipality, Housing Association	- significant reach - promotes overall project	- costly? - time-consuming - difficult to organise

Method	Description	Participants	Advantages	Disadvantages
	improvements.			- limited feedback
Energy exhibition display	The aim would be to inform users about energy and energy saving. Although it is dependant on whether such an exhibition exists and can be rented. Often NGOs which work with schools have appropriate material. The display could be placed in the entrance hall together with an information point where a representative of the housing association is available to issue advice and discuss relevant issues with residents.	Housing Association/ residents	- Attracts attention - Involves users - Positive image for housing association	- can be expensive - prone to damage - impact reduced over time - limited feedback

Table 2: Examples of information dissemination through ISEES social dialogue activities

Two-way consultation methods

Method	Description	Participants	Advantages	Disadvantages
Series of workshops	A starting point for a social dialogue between energy providers and residents could be a workshop/meeting to discuss possibilities for improvement and to gather key issues from the residents' perspective. These issues should be discussed in follow-up meetings, where improvements should be presented.	Residents and district heating companies	- Face-to-face contact - Generation of new ideas - Immediate feedback possible - fosters relationships and helps build trust	- Not all residents would be included - strong personalities can dominate
Contact by internet	Increasingly an important channel local information and communication. Utilities, housing association and municipalities have the chance to install an interactive forum on their websites to discuss future services with their customers. However, limited access to the internet by some residents may mean that the information is needs to be provided in alternative formats.	All parties and residents	- Independent - Cost-effective - reasonable reach	- Only residents with internet access can participate
Surveys (questionnaires, personal interviews, phone	Ideas for innovative services can be collected via surveys or in personal or phone interviews. Guidelines for questions:	All parties and residents	- Possibility to reach many residents - Structured	- Preparation is time-consuming - High human-resource

Method	Description	Participants	Advantages	Disadvantages
interviews)	- short and comprehensible - no double negation - provide suitable categories of answers - avoid controversial concepts - avoid multidimensional questions - avoid indirect questions - avoid leading questions		instrument - Good data basis - closed will lead to more open views	allocation - Expert knowledge to develop and evaluate questionnaires is required
Focus group with residents	A focus group offers the opportunity to discuss issues in more detail. Usually six to twelve persons participate in a focus group. The focus group should be moderated by a person designated by the group. The different perspectives of residents regarding the services of energy service providers can be focused and discussed in a short meeting lasting no more than 2 hours. The participants interact during the discussion process, which makes it possible to gain new perspectives and ideas. Result of a focus group is a pattern of opinions.	Residents, property management, district heating company	- Small group makes a discussion more fruitful - Provides good possibilities for reflection - Facilitation helps to avoid domination by strong personalities	- Good preparation is required - Moderation is necessary - Only the opinion of selected residents is considered
Competition for ideas	The aim of the competition would be to involve users more actively in the project. They are asked to develop ideas as to how energy can be saved for the whole building	Residents, energy utility company and housing association	- Attracts attention - Positive image building for energy	- Ideas might be creative, but not useful - Cost-intensive - Often low level

Method	Description	Participants	Advantages	Disadvantages
	or for single apartments. This may lead to unorthodox solutions and ideas. Ideas gained by this method maybe more readily accepted by the residents than those provided by third party, external contributors. The entry forms could also include some set questions around appropriate energy behaviour before giving the opportunity for entrants to write down their own ideas. The energy saving ideas would be evaluated separately and can be implemented in the monthly energy tip. Those who participated in the second part might also be interested to join an energy saving team.		utility/housing association - Involves users	of participation
Introducing the issue of refurbishment during owner meetings	The aim would be to inform and discuss general issues of the building. Such meetings are handled differently in various buildings. Sometimes they take place on a regular and formal	Owners and property managers	- Residents can be reached directly - Good opportunity	- Good preparation necessary (structure, content, venue, time)

Method	Description	Participants	Advantages	Disadvantages
	basis, sometimes only a group of residents meet in an informal way. If possible, existing meetings should be used to introduce the topic of refurbishment/social dialogue. Otherwise such a meeting can be introduced by or in cooperation with the property management. Good preparation is essential for a successful meeting. It may be necessary to moderate the discussion, depending on the number of participants.		for communication and exchange of ideas - Feedback is possible	- Big gathering makes discussion difficult - Single opinions sometimes dominate
Establish an advisory board with owners	To start a refurbishment process the owners have to agree on the proposed measures. Not all owners will be interested in the issue or have the relevant know-how to make decisions. Therefore it makes sense to establish an advisory board with selected residents who represent different interests and groups. This advisory board also represents the interest of the remaining residents towards the property management. Their task should be to develop ideas for refurbishment.	Owners and property managers.	- Residents can be reached directly - Good opportunity for communication and exchange of ideas - Feedback is possible	- Time-consuming – Requires organisation - Single opinions can dominate - Legitimacy of self-appointed representatives?
Checklist for residents	To involve further residents, the advisory board could distribute	Residents, residents	- Residents become	- Advisory board may need

Method	Description	Participants	Advantages	Disadvantages
	check lists in the building to collect ideas and requests.	advisory board	experts on their building - Results are collected on the spot - Cheap to carry out	training to handle checklists - Support is required - Results may not be valid
Inspection of the building	An inspection of the building with people responsible for the refurbishment and interested residents can be useful to learn about the desires and needs of the residents.	Residents, property managers	- Direct contact with residents - Two-way discussions allows for clarity	- Time consuming

Table 3: Examples of two-way consulting methods through ISEES social dialogue activities

4 Conclusions drawn from Social Dialogue Actions undertaken

The ISEES project has dealt with a wide range of parameters when implementing social dialogue in the context of improving energy services. There is great variety across Member States with respect to the how energy is provided, the arrangements for housing management and cultural attitudes to energy use (and energy efficiency). There are even very basic differences in the understanding of the fundamental terms used, such as "social housing" which refers to managed housing for lower income tenants in the UK, and as mixed-tenure, high-density accommodation in the other members states within the project. In addition, the model building and the associated pilot actions are designed for different purposes. They are either tackling tenant energy consumption through user behaviour, building refurbishment or improving district heating services.

This large number of parameters makes it difficult to draw out specific conclusions regarding the impact of social dialogue and how to design better social dialogue processes. However, there are a number of concrete lessons that can be taken for the ISEES project:

4.1 Social dialogue needs tenant motivation and organisation

Social dialogue is often informal, sporadic and unorganised. However, for it to be successful, i.e. to achieve the original aims, it needs to be both planned and effectively resourced (time, people and money).

The actors in the dialogue process need to be motivated to effectively take part since it requires information to be shared between the parties, and, as we move towards co-design the parties need to be prepared to negotiate and compromise. In many cases in the ISEES pilot actions it is clear that parties involved were not significantly motivated to part of the process. Key reasons identified for this were:

Tenants

- Limited specific interest in energy as a single issue. Whilst tenants are partially interested in 'energy' it is not a major household concern, or rather there are many other more important concerns. Also energy is associated to a number of other primary issues such as concerns over thermal comfort, reliability of heating systems and better living

environment, making it difficult to bring a specific focus on reducing energy consumption.
- Common perceptions that tenants are unable to significantly influence DH companies or building owners/Housing Associations

Housing Associations / Building Owners / DH companies
- Housing Associations may not exist (Bulgaria) or have no authority to influence energy related issues
- Concerns over commercial confidentiality, which may lead to attempts to avoid meaningful dialogue to avoid quarries over financial issues
- Existing business models / investment constraints limiting the opportunity to meet the requests of tenants even though this may provide better service (better services may have capital and overhead implications)

4.2 Social dialogue needs to be developed that is appropriately for the purpose and stakeholders

Wherever social dialogue is being considered it is important to develop a clear set of objectives, to consider the needs of the various stakeholders and the constraints to dialogue. As the ISEES project clearly demonstrates that are a significant range of parameters to consider. This means that it is impossible to have a few generic social dialogue responses. The social dialogue process needs to be specifically designed to each situation and then a flexible approach needs to be taken to ensure the process adapts to the outcomes of each stage.

The process of design and implementation should take the following steps:

- Review objectives (expected outcomes and timescales)
- Gain understanding of parties and their motivation for dialogue and the constraints they may impose, e.g. a DH company may not wish tenants to be involved in co-decision on their investment plans
- Review constraints (time, money, people)
- Develop programme of SD actions
- Initiate process
- Review outcomes
- Refine SD process

4.3 Depth of Social Dialogue significantly influences the perception of risk

The depth of the Social Dialogue process will significantly influence how the stakeholders will feel about the process. Most stakeholders will happily accept simple information about a process or project, but as we move from basic information provision, through the information-consultation-co-design-co-decision continuum, then stakeholders will perceive greater risk in the process and will be more cautious about taking part.

The risk to stakeholders does rise as participants agree to increase their co-dependency but often the perception of this risk will be greater than reality, particularly where participants have limited experience of co-dependency, as was typically the case in the scenarios considered under ISEES. This lack of experience is an important factor and often will require an experienced third party to facilitate the consultation process – this may be a communications/advocacy organisation or an expert partner (as is in the case of the ISEES project partners).

In addition, it is common for partners not to balance the risk posed with the potential rewards available. For the tenants the reward is generally intuitive: the expectation would be that they would reduce energy costs, have improved energy services and/or a better living environment. For the DH Company, building owner or municipality rewards are less obvious, but may include:

- A greater understand of issues associated to the their service and improvements that could be made
- Improved customer satisfaction
- Increase in customer base.
- Better investment decisions (building refurbishment)
- Greater support from tenants for other initiatives and increased participation leading to better relations overall

Taking a coherent view of the risks and rewards and considering the long-term impact of effective social dialogue would suggest that it would add value to all participants.

4.4 There are significant constraints to SD

In addition to the motivational and risk perception constraints discussed above, it was clear in all Member States, that there are significant practical constraints to effective social dialogue. Principal of these is the availability of time, which in itself is linked to the motivation of participants. Essentially, social dialogue is not seen as a normal activity when considering the refurbishment of buildings, reducing domestic energy consumption (except through one-way communications and improving district heating). As such it presents an extra burden: to complete a questionnaire, to meet with tenants, to create information leaflets, to organise workshops, and so on.

This is exacerbated with the need for financial resources to support social dialogue actions. Whilst costs are generally not high, some resources are required, which generally means that tenants, on their own, are unlikely to organise social dialogue actions, and that input from other stakeholders is necessary.

4.5 Social dialogue needs to be accountable and transparent

For social dialogue to be effective it is important that it is organised such that the partners are accountable for the process and for the outcomes that may occur. This requires the process to be transparent. One of the constraints for the ISEES project was that project partners attempted to establish pilot social dialogue actions to influence tenant behaviour, to facilitate the improvement of building standards and the improvement of district heating services. By definition the ISEES partners were not responsible for the model buildings, the services provided nor the welfare of tenants and this lack of accountability made it difficult to establish legitimate social dialogue processes. This leads to the conclusion that outside parties can only effectively **facilitate and support** the social dialogue process. It ostensibly needs to be "owned" by key stakeholders in the process or it fail.

4.6 User behaviour can be influenced by good information exchange

The ISEES project has shown that it is possible to influence tenants' behaviour with respect to the energy consumption through direct two-way social dialogue. During ISEES tenants or representatives of tenants were interviewed, where given advice on how to reduce energy consumption (through user manuals and other means) and actual consumption was monitored. This lead to a good understanding by ISEES partners of how tenants use energy, what was good practice, what was bad and enter into a useful dialogue with tenants. Whilst it has not been impossible within the ISEES project timescales to evaluate energy savings achieved it is anticipated that these will be significant as many tenants reported that they would change their behaviour.

5 Supporting material

The following specific material was elaborated to support energy users in residential buildings to optimise their energy consumption:

1) **Country-specific guidelines for realising social dialogue**, based on individual results of interviews
2) **User manual** as a supporting document for occupants and energy representatives in buildings: it reflects the users' needs and provides concrete advice to optimise the energy user behaviour.
3) **Guideline for district heating operators**: providing proposals for utilities (and particularly DH operators) on how to improve their customer services, their cost effectiveness through efficiency in supply, to become a competitive and safe supplier of energy.

All material is available in the languages: Czech, Slovak, Bulgarian, Lithuanian and English and is available from the ISEES website under http://www.isees.info.