



**Kranj  
(Slovenia)**

**49% energy saving**  
**Total living expenses lower than before renovation**  
**Nearly all users have chosen for energy saving measures**

**Project data**

Location, address:	Zoisova ulica 11
Region:	Kranj
Surroundings:	North of the country;
Climate:	Alpine
Heating degree days:	3600
Year of construction and renovation:	1963 (constructed); 2005 (renovated)
Typology:	Apartment building
No of dwellings:	20 dwellings
Total floor area:	1158 m <sup>2</sup>
Owner:	Various private owners
Architect and Builder:	I.S.P., d.o.o., Kokalj&Šparovec, d.n.o., Danfoss, d.o.o. Ljubljana
Costs of energy saving measures:	€ 33.000
Renovation financed by:	The owner; state subsidy



Figure 1: Apartment building Zoisova ulica 11

**Objectives and Results**

Thorough renovations of the heating system were carried out to improve the energy performance of building and to reduce the energy consumption by 49%.

**Renovation concept**

**Key renovation features**

- Central regulation
- Individual thermostats
- Heat consumption meters
- Hydraulic balance

### **State-of-the-art**

#### **Before renovation**

*Installations:*

- No heat consumption meters
- No central regulation
- No thermostat valve control
- Bad hydraulic balance of heating system

#### **After renovation**

*Installations:*

- Heat consumption meters
- Install central regulation
- Install thermostat valves
- Hydraulic balance of heating system

### **Energy saving and monitoring**

*Energy consumption before renovation:*  
KWh/m<sup>2</sup>: 227

*Energy consumption after renovation:*  
KWh/m<sup>2</sup>: 116  
Percentage saving<sup>1</sup>: 49 %

### **Additional information**

- The main reasons for the renovation of installations were insufficient maintenance of the old heating system unit and distribution pipes of the central heating system. The recommended measures were a replacement of the old central heating system with a new modern compact heating system unit (condensation gas boiler), installation of heat consumption meters and a hydraulic balance of heating system.

### **Lessons learned and conclusions**

- The project would not have succeeded without co-operation and of course without financial contribution of the occupants, state subsidy and building management Domplan d.d. The data obtained so far demonstrate noticeable energy savings achieved by refurbishment of a heating system. The benefit for the occupants is manifested through lower heating costs and higher level of thermal comfort.
- Simple pay back of total investment ~3 years.

### **References**

[1] Building management: Domplan, d.d.; contact person: Peter Kern.

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<sup>1</sup> Compared to the situation before renovation