LOW-COST LOW-ENERGY BUILDINGS IN THE CZECH REPUBLIC

Implementing Agency:	SEVEn, The Energy Efficiency Centre
Executing Agency:	The Charles University Environmental Center
Finantial sources:	UNDP/GEF, local investors
Duration of the project:	42 months (from June 1999 to November 2004)
Information:	http:/www.svn.cz

SEVEn, The Energy Efficiency Centre
Středisko pro efektivní využívání energie, o.p.s.

- **non-governmental**
- **non-profit**
- **independent**

founded in Prague in 1990

SEVEn´s mission is to protect the environment and to support economic development by finding more efficient ways to use energy

www.svn.cz

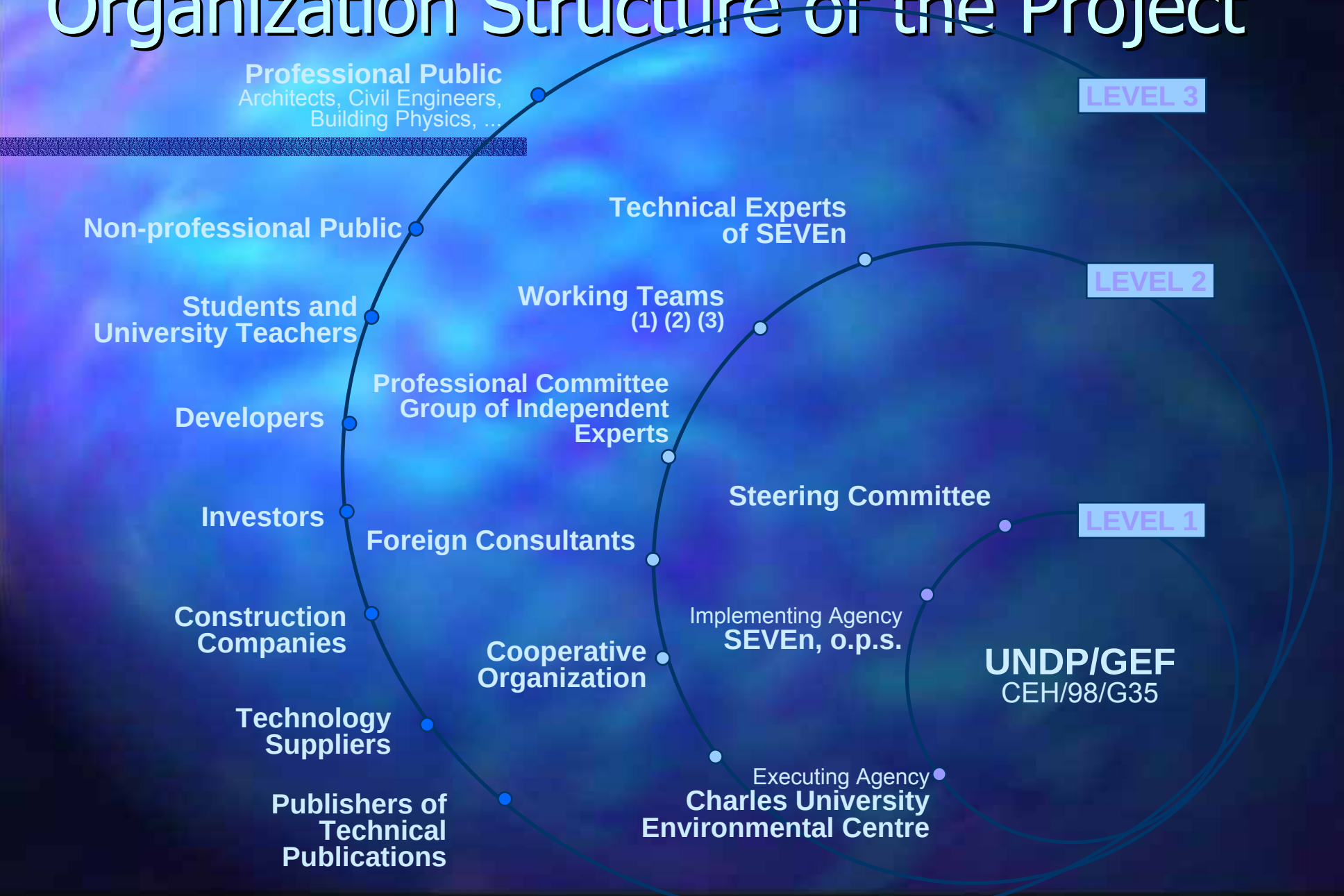
Main Project Goals and Focus

1. To gain and disseminate available experiences with low cost low-energy buildings

2. To adopt hands-on practical local experience with technical design, construction, and operation of LC-LE B (construction of a demonstration LC-LE B in a partnership with a municipality as an investor)

3. Dissemination of adopted hands-on experiences among construction industry proffesionals, investors, users, financial institutions, ...

Organization Structure of the Project



Steering Committee

- Executing Agency
- Ministry of the Environment
- Ministerstvo for Regional Development
- Ministry of Industry and Trade
- The Czech Energy Agency
- The State Environmental Fund
- The Union of Towns and Municipalities
- The Czech Technical University
- The Economical Chamber of the CR
- The Leaque of Energy Alternations

Main Project Outputs

1. Workshops and Seminars
2. Discussion and Working Meetings, Consultations with Foreign Partners ⟺ Working Teams
3. Construction of Low-cost Low-energy Residential Buildings (about 30 b.j.) - Town of Sušice, Town of Humpolec, Town of Železný Brod, Říčany u Prahy
   ⟺ Czech Solution
4. Public Architectural Competition
5. Publication „Atlas of Low-Energy Buildings“
6. Madia Campaign

What is it Low-energy Residential Building?

- Low-energy residential building = "house with very low consumption
  - Specific consumption for heating <55 kWh/m^2, year (2004)
- Passive Low-energy house
  - Specific consumption for heating = 5 - 20 kWh/m^2, year
- „Zero" and „Plus" buildings

- Low-cost low-energy residential building?
  - Investment cost fully comparable with standard construction
  - Energy consumption lower about 40 - 60% in comparison with standard new construction

Low-cost Low-energy Residential Building for the Town of Sušice

Architectural Design

- Complying of principles for low-energy architecture
- Zonal disposition of the desk house
- Using of passive solar energy with outer glazed loggias,
- Optimum rate of internal dimensions and envelope structures

Engineering Construction

- Cross bearing system from concrete with thermal insulation, double-coat roof construction
- Thermal protection x investment cost = optimization model
- Optimized envelope construction and windows corresponding to hygienic requirement

Heating System

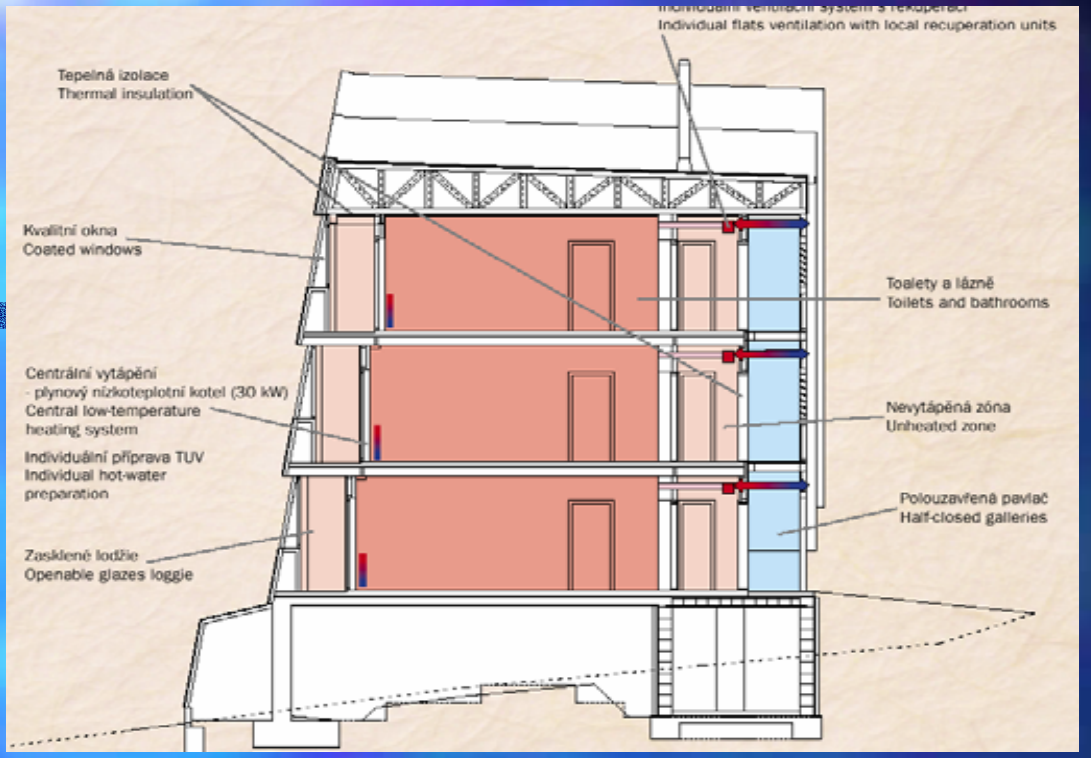
- Central hot-water low-temperature heating system with gas boiler, desk radiators, ekvitherm regulation with thermostatic valves

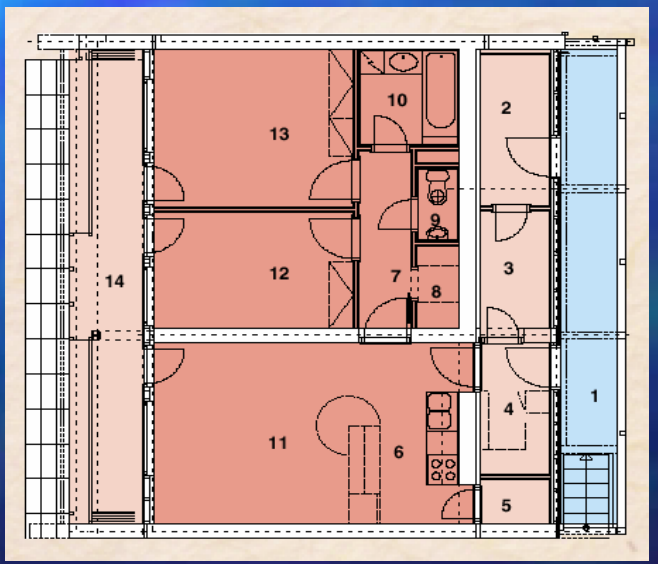
Ventilation System

- Individual ventilation system with recuperation units, kitchen digesters

Alternatives Considered (not implemented)

- Active using of solar energy - "Energy roof"
- Gravel reservoir in construction subsoil for preheating of air ventilation
- These alternations can bring energy saving (60-80% saving of heat for air ventilation), but energy savings cannot balance investment cost


Individuální větrací systém s rekuperací
Individual flats ventilation with local recuperation units
Tepelná izolace
Thermal insulation
Kvalitní okna
Coated windows
Centrální vytápění
- plynový nízkoteplotní kotel (30 kW)
Central low-temperature
heating system
Individuální příprava TUV
Individual hot-water
preparation
Zasklené lodžie
Openable glazes loggie
Toalety a lázně
Toilets and bathrooms
Nevytápěná zóna
Unheated zone
Polouzavřená pavlač
Half-closed galleries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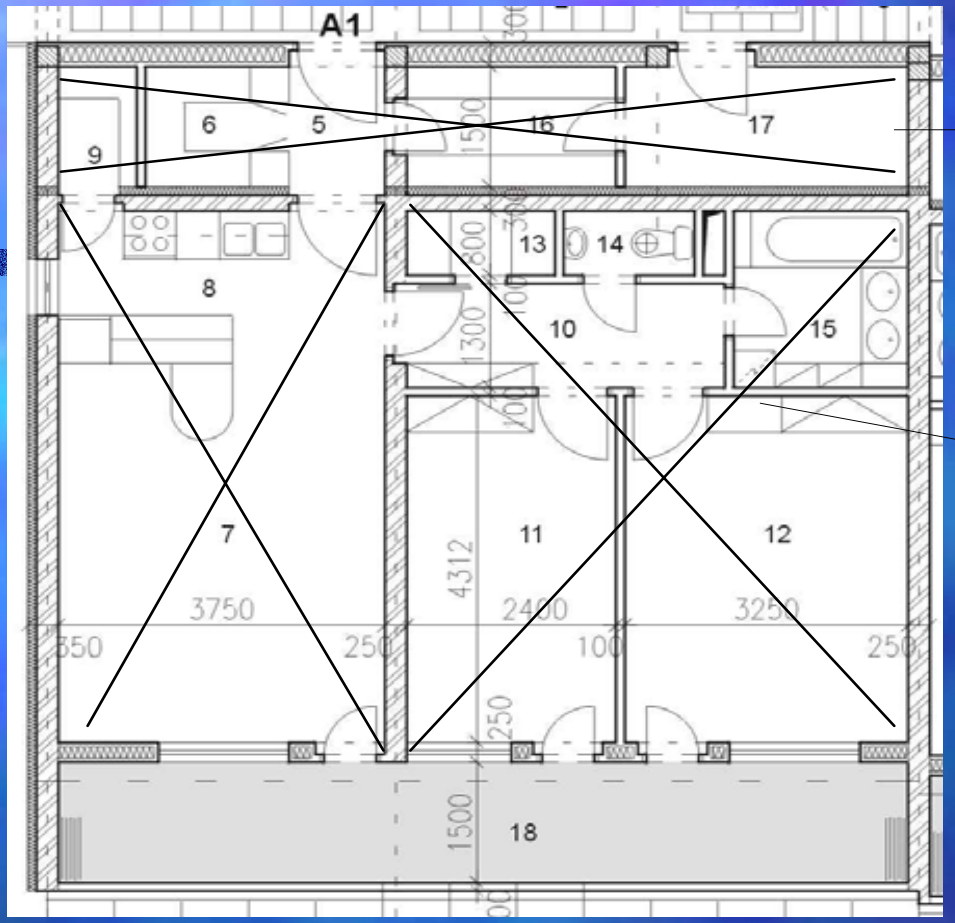


Průměrná nevytápěná plocha bytu: 12,28 m²

Průměrná vytápěná plocha bytu: 55,97 m²

Průměrná užitná plocha bytu:	**68,25 m²**
Průměrná užitná plocha bytu s terasou:	**80,92 m²**
Průměrná vytápěná plocha bytu:	**55,97 m²**
Průměrná nevytápěná plocha bytu:	**12,28 m²**

Residential Building - Sušice

53,7 – 69,1kWh/m2

15 GJ/b.j.

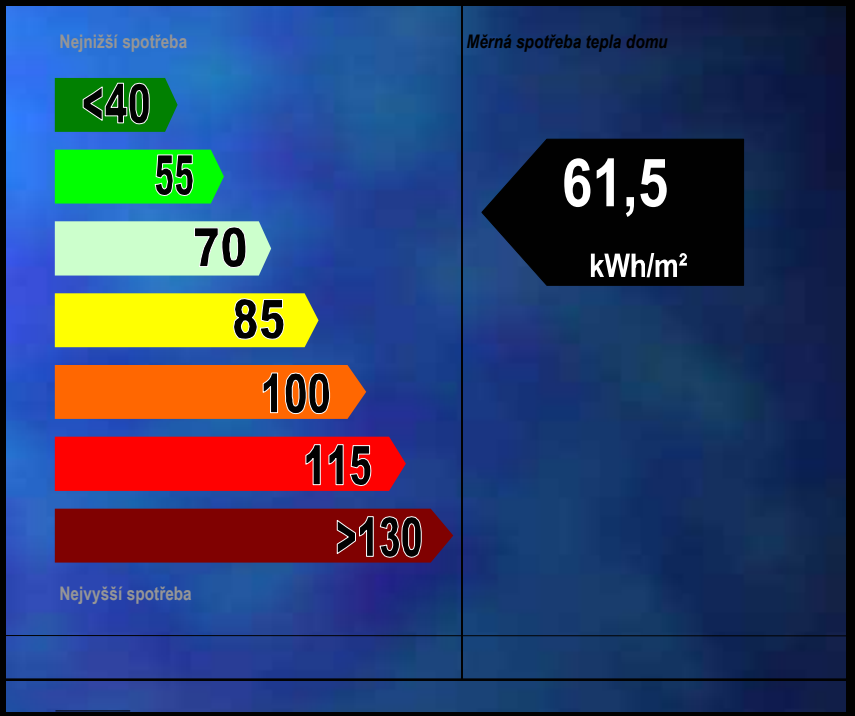
ENERGETICKÝ PRŮKAZ

Typový štítek bytového domu

Adresa: Nízkoenergetický nízkonákladový bytový dům Zahradní čtvr´t Vojtěška č.p. 941/45

Vystavil: SEVEn

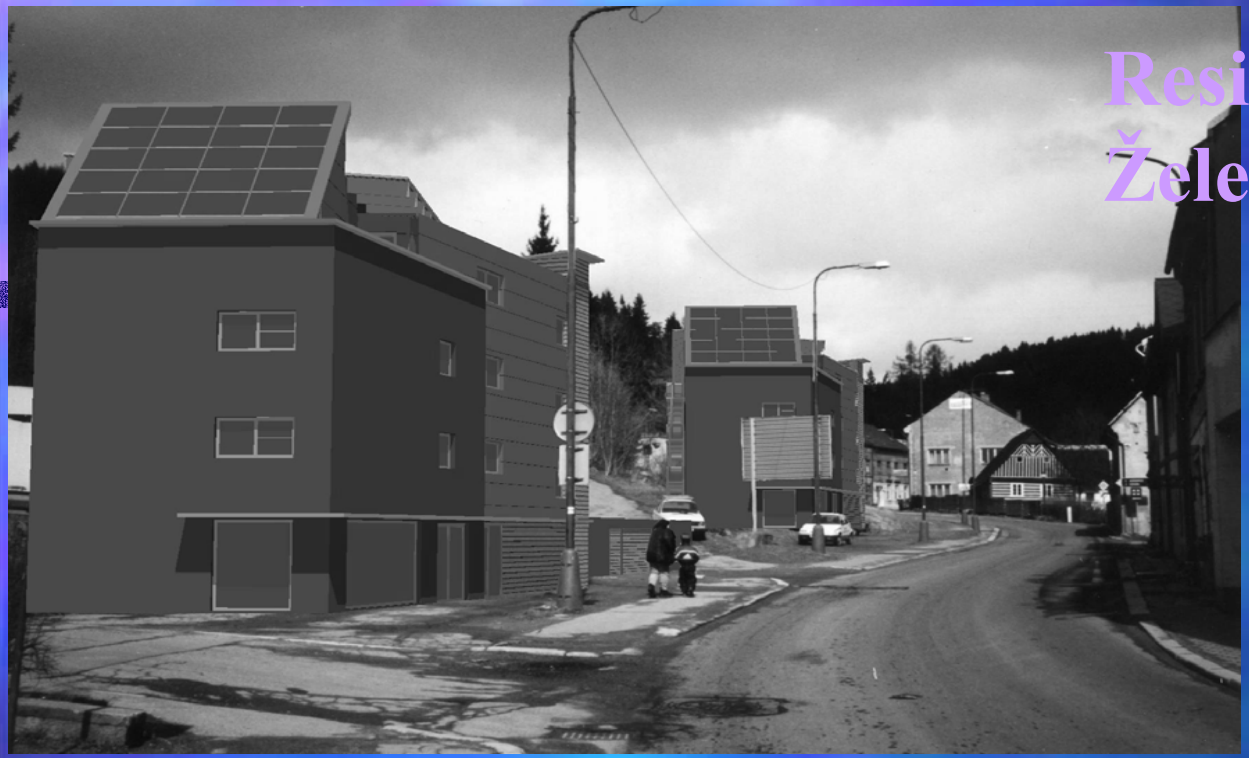
Středisko pro efektivní využívání energie, o.p.s.. Slezská 7, 120 56 Praha 2



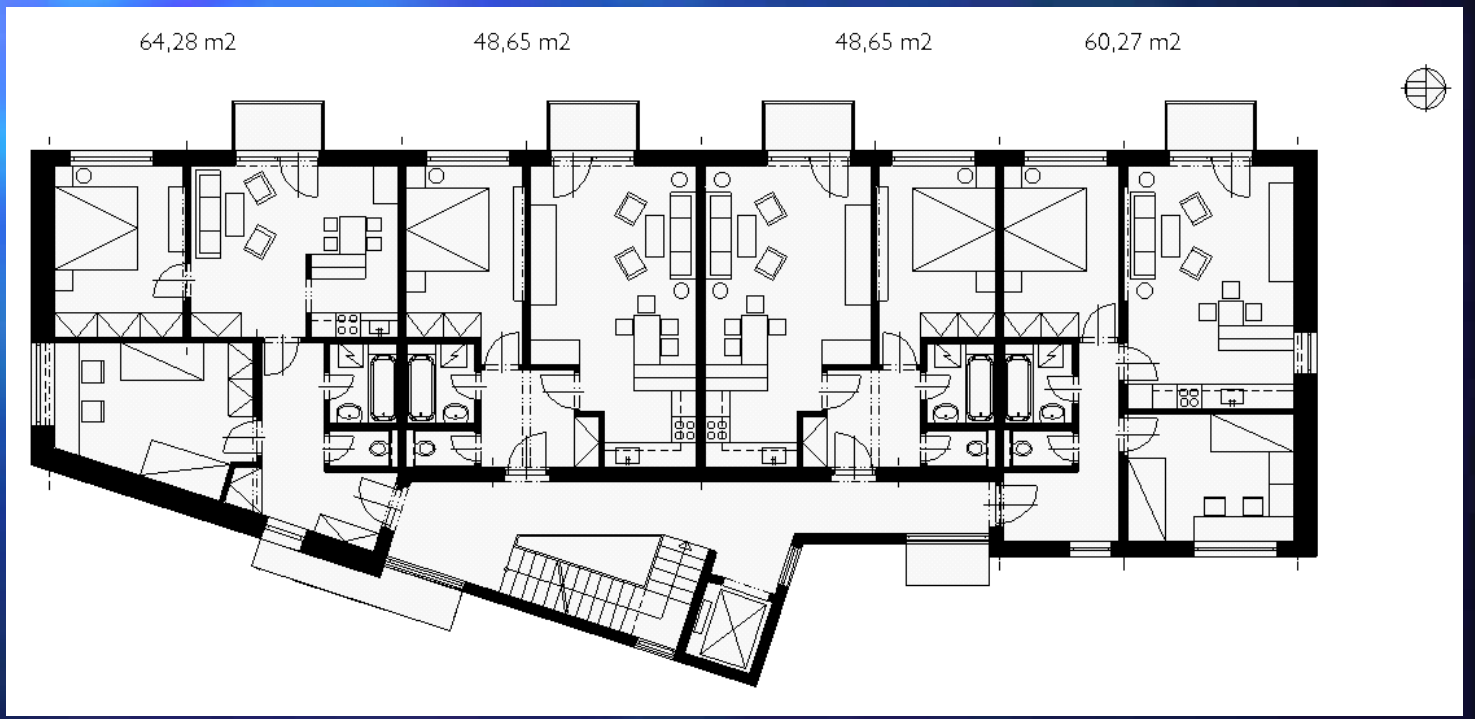
Směrné ukazatele měrné spotřeby potřeby tepla pro vytápění	nízká	velmi nízká	Energetický ukazatel měrné spotřeby tepla daného domu
bytový dům	69 kWh/m2 6,5 MWh/Nbyt	55 kWh/m2 5,0 MWh/Nbyt	53 kWh/m2 3,6 MWh/Nbyt*rok
rodinný dům	75 kWh/m2 7,0 MWh/Nbyt	61 kWh/m2 5,5 MWh/Nbyt	

(Nbyt je normový byt o objemu 200 m³)

Residential Building
Železný Brod



Bytový dům pro město Železný Brod


64,28 m2
48,65 m2
48,65 m2
60,27 m2

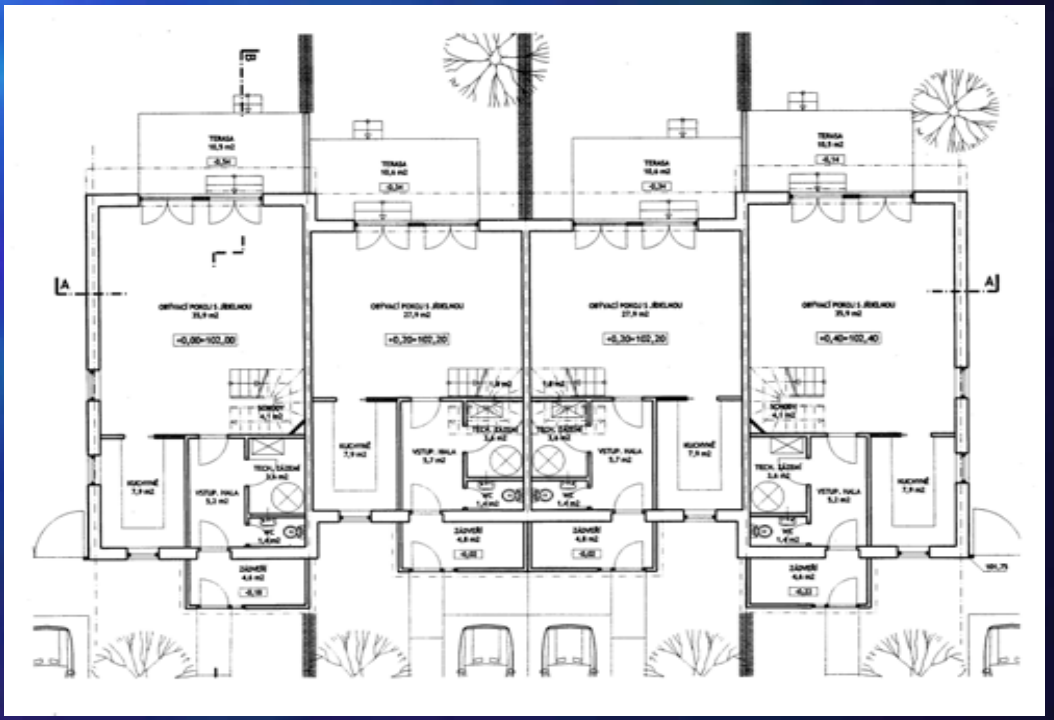
Family Houses

Odolena Voda

Říčany u Prahy

Family Houses

Roztoky u Prahy

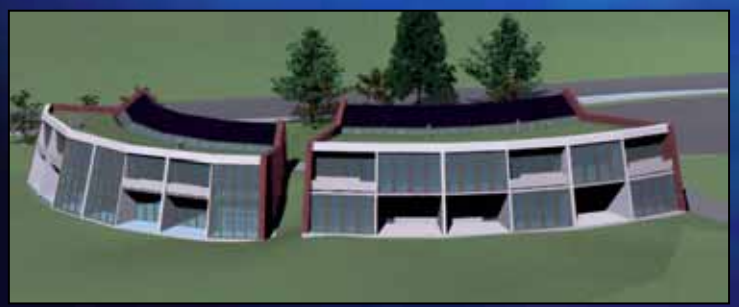


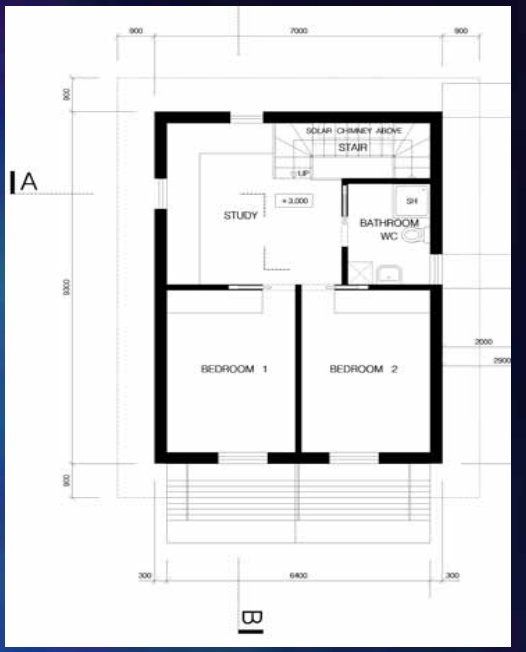
Public Architectural Competition

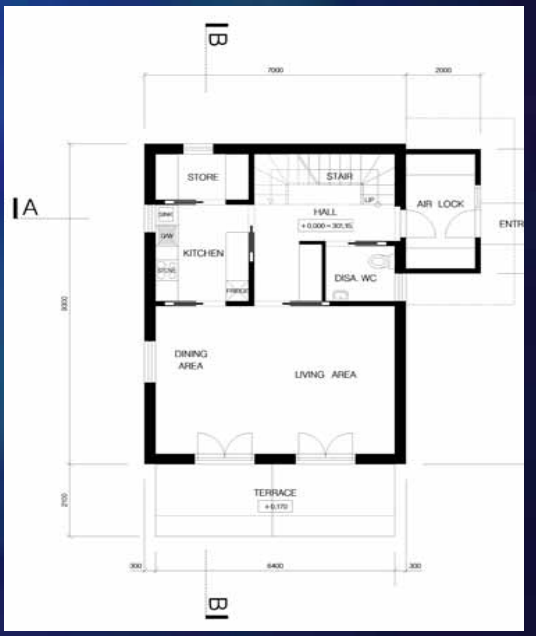
2. price

4.price

3.price







Project RESHYVEMENT

How to develop a successful project?

- It is important to take into consideration interactions of all designed subsystems
- Main requirement:
  - Close cooperation between investors, architects, civil engineers, building physics, … from the beginning of the project
  - Professional skills and enthusiasm of all project participants

Planned Activities for 2004

- Educational Activities at the Czech Technical Universities (lectures, study materials)
- EEBW: Energy Efficiency Business Week 2004
- Strengthening transfer of experience into practice

Evaluation of Introduced Studies

Evaluation Criteria

- Investor´s Criteria
  - Investment cost 1 000 000,- CZK/accommodation unit (35 000,- USD)
- Project Goals
  - Comparable investment cost with standard building-up in the CR
  - Lower energy consumption about 40-50% in comparison with standard residential buildings
  - Low operational cost
  - Conformity with norms and standards in law

Criteria for Verification

- Energy Efficiency
  - Simulation of Energy Efficiency - EN 832 model in comparison with Czech norms in law (static model)
  - 3D simulation - ESP-r (dynamic model)
- Investment and Operational cost
  - Independent computation of investment cost
  - Feasibility study
  - Financial sources