

BUILDING MATERIALS – QUALITY CRITERIA OF ECOLOGICAL SCHOOL BUILDING

Helmut Strasser

**SIR - Salzburg Institute for regional
planning and housing**



European Green Cities Network for





Success story - residential buildings

- Financial support for new buildings and renovation
- Higher financial support for energy-efficient buildings
- Higher financial support for using renewables

New (1.3.2003)

- Higher financial support for using ecological materials

Development of LEK-value

65

60

55

50

45

40

35

30

25

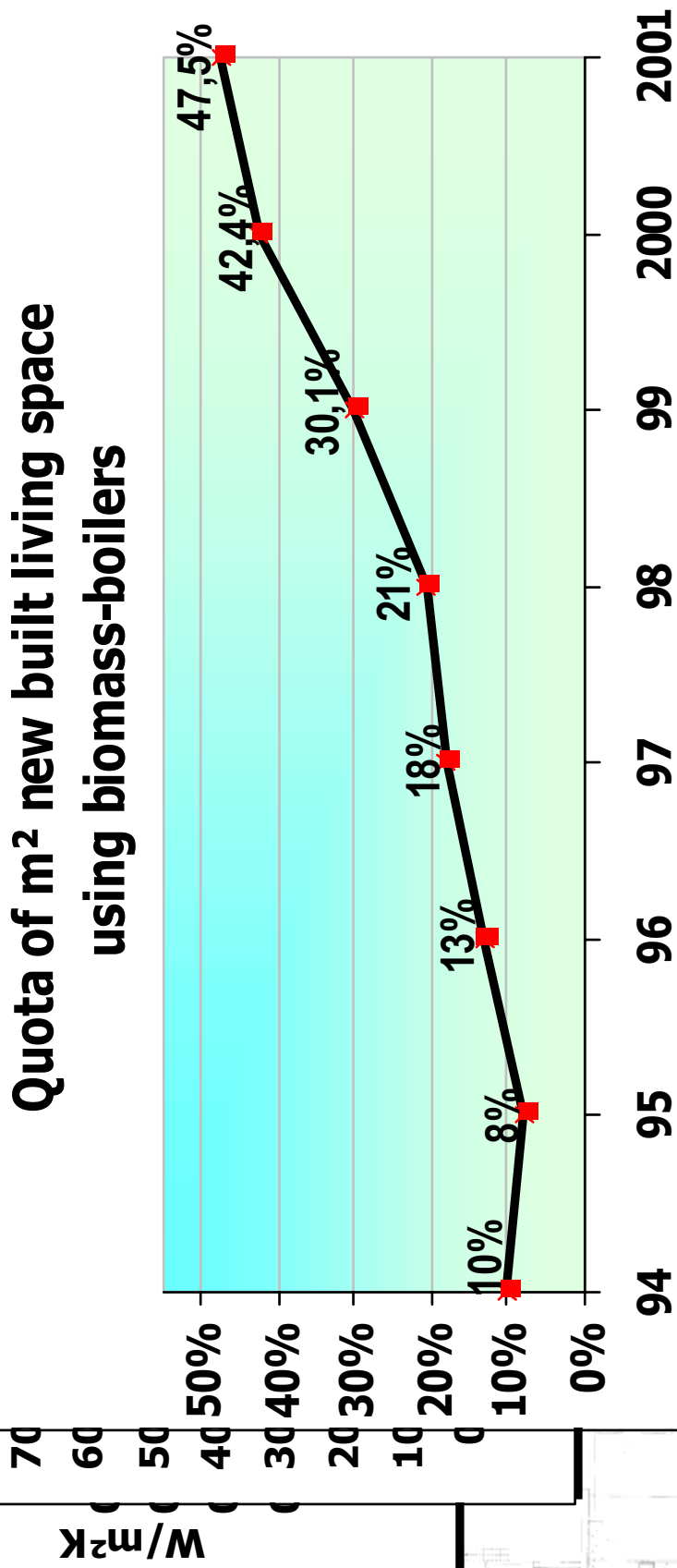
20

91

Development of average U-value

Quota of m² new built living space
using solar energy systems

Quota of m² new built living space
using biomass-boilers



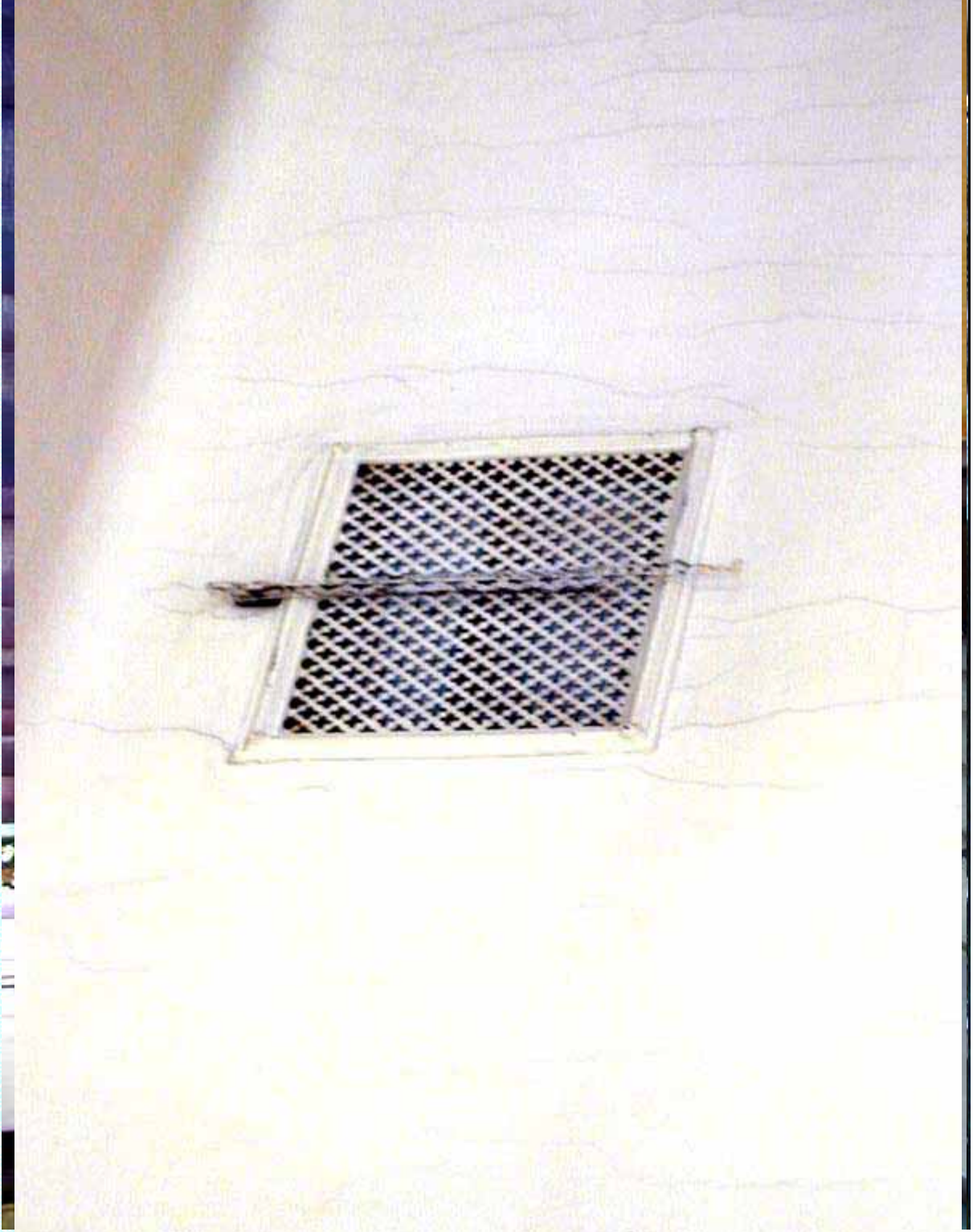


- **Comprehensive beginning to the calculation of power demand**
- **Energetic minimum standards**
- **Alternative energy supply**
- **Renovation minimum standards**
- **Energy identity card**
- **Inspection of boilers**
 - Option A
 - Option B
- **Inspection of air-conditionings**
- **Independent certified staff**



Communal buildings - Little improvement

- Financial support without any ecological criterias
- Less information about ecological standards (experiences in the housing sector) in municipalities
- Urgend repair instead of long-tearm planning of whole building („state of the art“)





Answers

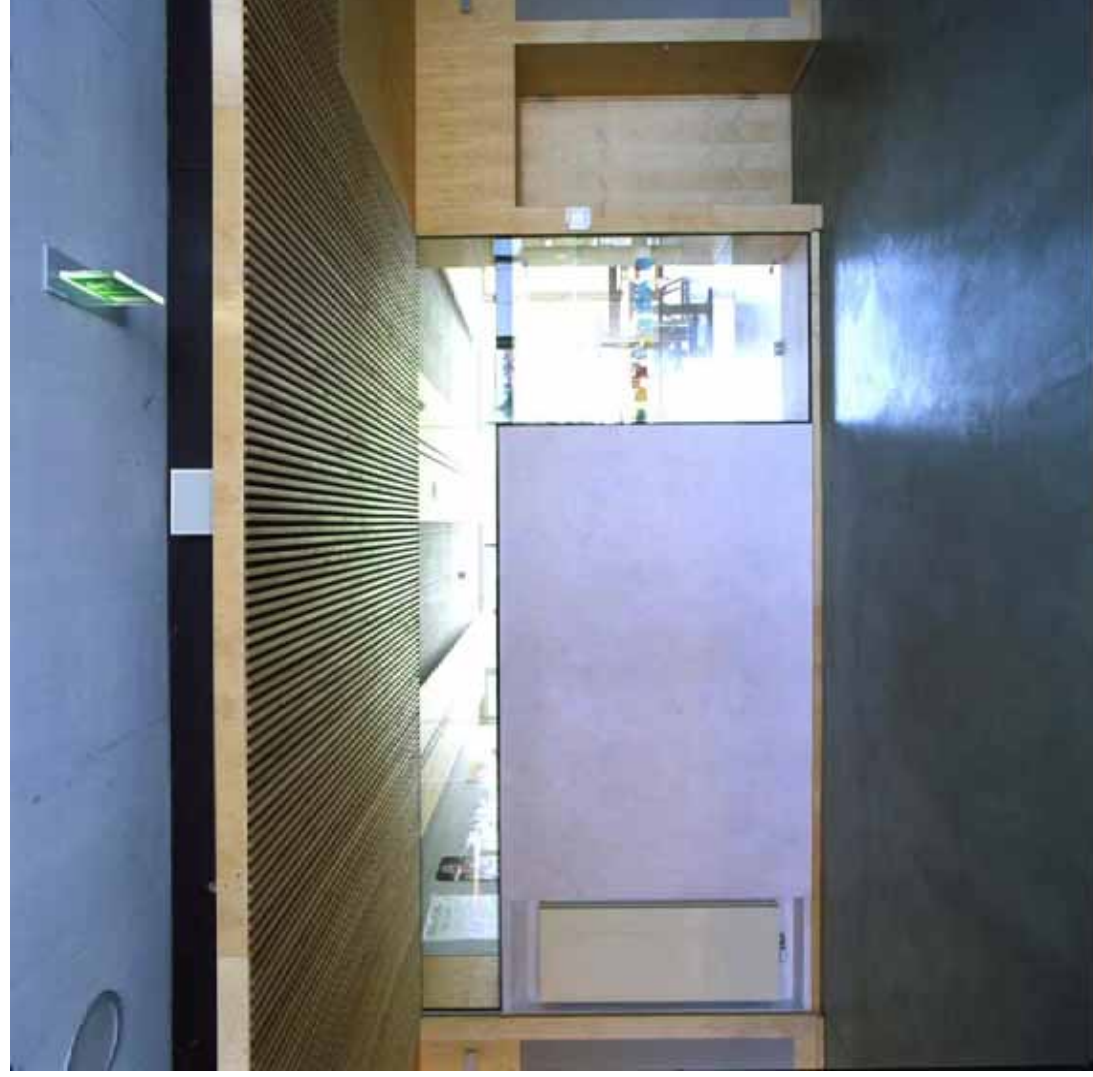
- Pilot Projects „Eco- school Straßwalchen“
- „SAQ – Quality criterias of communal buildings“
- Ecological specification standard for „advertised bidding“
- Change of criterias for financial support



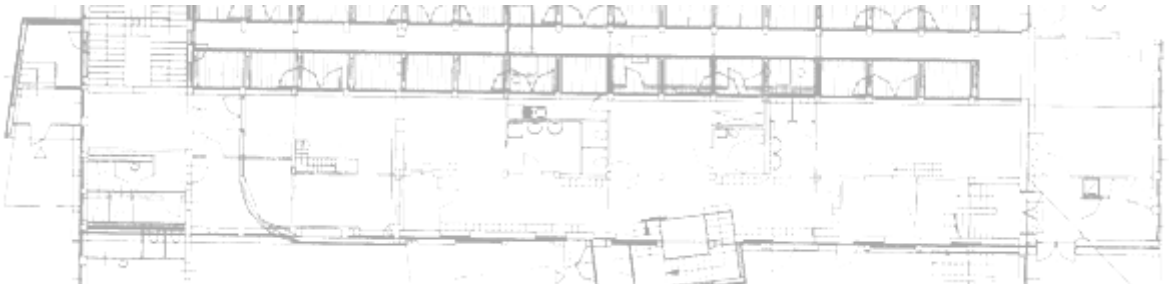
- General decision: ecological standard for the new building
- Low-energy standard building
- Ecological building materials for construction: wood, glas, mineral wool, foam glass, ...
- Ecological energy supply: biomasse, PV- modules
- High air quality: Ecological interior decoration (wooden floors, wooden furniture, clay-plaster, refined colouring), controlled air ventilation system with heat recovery

→ Standard for new school buildings

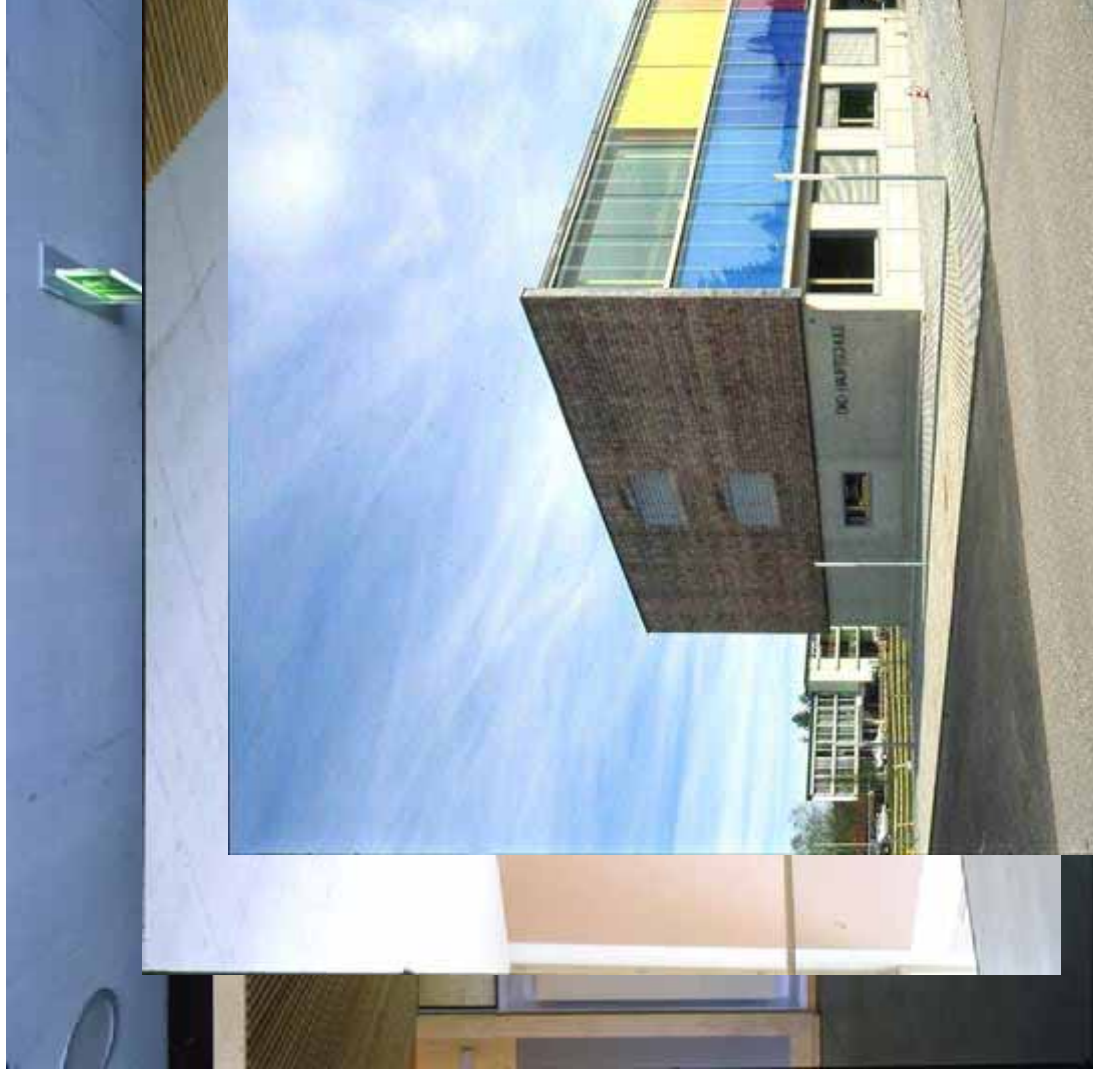
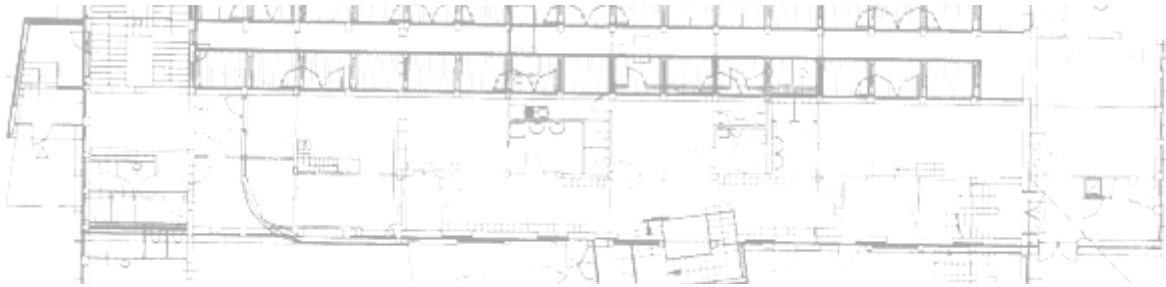
Eco-School Straßwalchen



Eco-School Straßwalchen



Eco-School Straßwalchen





Should help to get higher ecological standards of
renovation accepted for communal buildings


Plan of procedures:

- Acquisition of renovation potential of communal buildings in Salzburg
- Identification of typical communal buildings
- Choice of suitable buildings
- Development of quality criteria
- Creation of renovation concepts
- Summary of the results

With financial support of:



First Results

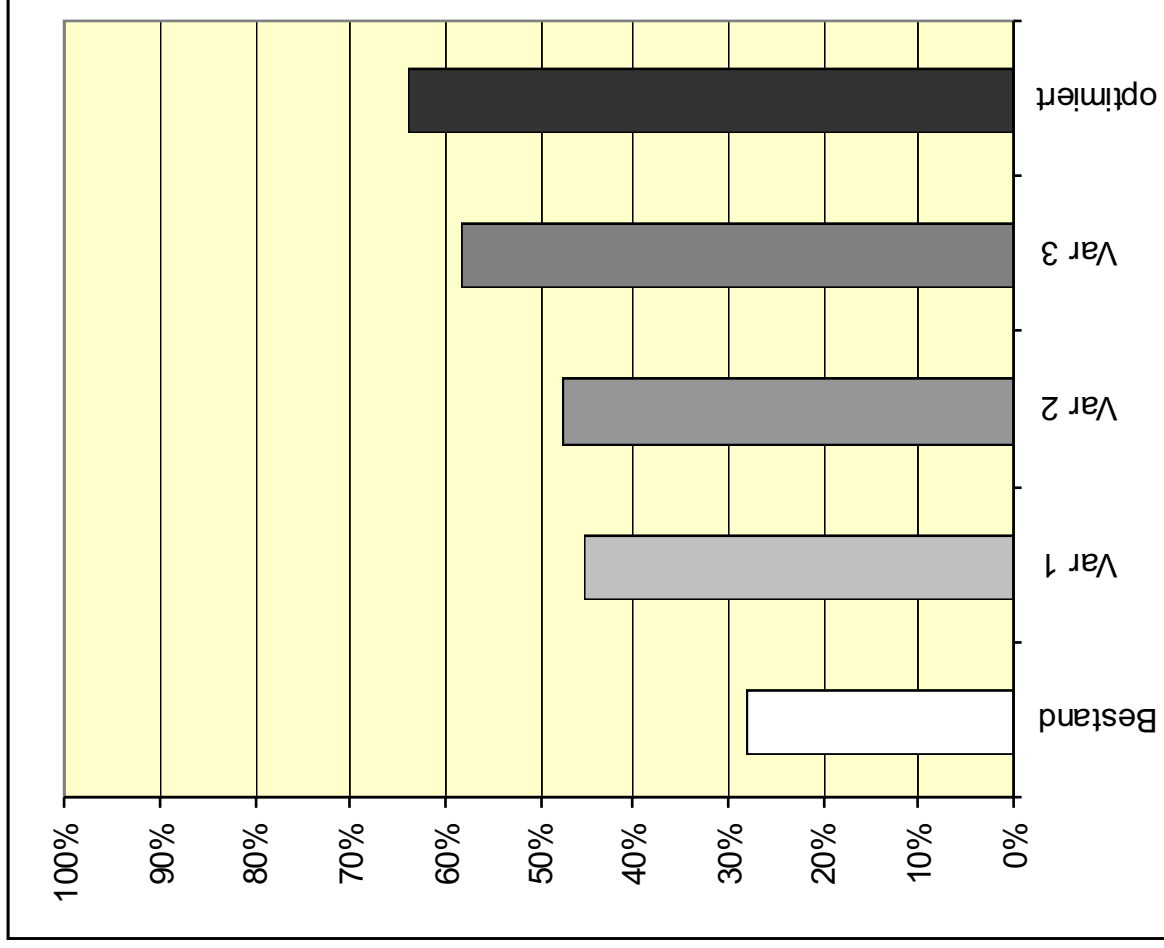
- 
- Great potential for renovation, especially of school buildings
 - Detailed renovation concepts for 8 buildings
 - Renovation to „State of the art“ means:
 - Low-energy figures: high insulation, high-quality windows, elimination of cold-bridges; energy supply based on renewables
 - Healthy air quality inside: emission free materials, controlled air ventilation system
 - Improvement of ecological standards: Use of ecological insulation materials
 - Further aspects: sufficient daylighting / avoiding overheating; redesign of parts of the buildings to fit the needs of the disabled, ...
 - Implementation of the concepts in 3 municipalities



Existing building: 408.468 kWh / a ; 63,07 W/m²

	Var 1	Var 2	Var 3	Var 4
Außenwand	10 cm	16 cm	16 cm	20 cm
Dach			24 cm	24 cm
Fenster	U=0,85 W/m ² .K	U=0,85 W/m ² .K	U=0,85 W/m ² .K	U=0,85 W/m ² .K
Heizung	Anschluss GSWB	Anschluss GSWB	Anschluss GSWB	Anschluss GSWB
Lüftung	-	-	-	Zentralgeräte
Sanitär	Spararmaturen	Spararmaturen	Spararmaturen	Spararmaturen
Kosten	733.445 €	785.170 €	835.803 €	1.031.946 €
Heizwärmebedarf kWh	208.343	206.866	174.549	71.712
Einsparung gegenüber Bestand	- 49 %	- 49 %	- 57 %	- 82 %
Spezif. Kosten der Einsparung	13.839 € / %	14.276 € / %	13.939 € / %	12.740 € / %

Example: school building / Kindergarten Schwarzach



Excellent

Very good

Good

Conventional

Improve urgent

Eco-deficit



... is an approach to support municipalities to realize the high standards of renovation draft

Criteria in the temporal process

- Tendering procedure
- Detailed planning
- Execution

Delivery of the offer within the bidding has to accept the specification standards !

Content

- **Main criteria** which are obligatory
- **Side criteria** as references to fulfill the main criteria
- **Limiting values** have to be fulfilled
- **Target values** are to be aimed as purpose figures as far as possible



Main criteria	Side criteria	Evidence	Examination
H1		Final power demand	Calculative from the single identification numbers for heating, warm water and electricity
H2		LEK- value	Calculative from ÖNORM B8110-1
	N1	U-value	Calculative
	N4	Non - overheating	Calculative from ÖNORM B8110-3
H6		Solar panel	Evaluation whole power demand - collector yield
H7		Ecologically optimized choice of construction and building materials	Calculation

Specification-detailed planning

Main criteria	Side criteria	Evidence	Examination
	N5	Warm water supply	Optimisation of withdrawal places
	N6	Warm water need	Consuming assumptions
	N7	Storage water heater and circulation losses	Calculated
	N8	Lighting , Power	Indication of installed power
	N10	Ventilator power units	Test reports
	N11	Ventilator power units, sound protection	Test reports
H5		Counter, subcounter	Planning, Execution
	N12	Requirements to the thermal solar arrangement	Simulation, installation of a counter
H8		Avoidance of environmental-incriminating materials	Material choice
	N13	Minimization of space air load	Material choice

Main criteria	Side criteria	Evidence	Examination
H3		Thermal heat demand	Energy identity card
	N2	Aerial density	Blower-Door test
	N3	Non thermal bridges	Thermography
	N9	Power demand for heating- and warm water aggregates	Electricity counter, Energy accounting
H4		Space, sound protection	Measurement

Ecological building materials

- Ecological Index OI3-Ic for main components:
 - **Primary energy content (non renewables) PEI**
 - **Global Warming Potential GWP**
 - **Acidification Potential AP**

$$OI3-Ic = 3 \cdot (PEI/3 + GWP/3 + AP/3) / (2+Ic)$$

- HFKW- free materials
- SF6- free glazing for windows
- No tropical wood
- No halogens for surface-materials, installation materials, seals,
- Low-emission adhesives (EMICODE Kl. 1)



Conclusions



- Eco School Straßwalchen as a new standard for school buildings: for some technologies as air ventilation systems fulfilled, but not in general
- Quality criterias / renovation concept for renovation of communal buildings as groundwork for further development of criterias for financial support
- Specification standard is tested in 2 communities

Final part



European Green Cities Network for



Thank you for your attention!



European Green Cities Network

**SIR - Salzburger Institute for regional
planning and housing**

Dipl. Ing. Helmut Strasser

Alpenstrasse 47, A-5020 Salzburg

Tel: +43/662/623455

email: helmut.strasser@salzburg.gv.at

Homepage: www.sir.at