LOW COST / NO COST MEASURES FOR ENERGY EFFICIENCY IN PUBLIC BUILDINGS

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According to the IPCC in only a few years from now huge global problems will arise in the energy sector and for the environment if no counteractive measures are implemented. These problems will be caused by a shortage of fossil fuels as well as by climate change resulting from anthropogenic green house gas emissions. Sir Nicholas Stern in his „Review on Economics of Climate Change" shows that it is considerably more economic on a global scale to take preventive measures than to remedy climate change induced damages. For this reason the German Government aims at reducing CO_2-emissions by 40 % until 2020.

Heating energy is the most important form of energy in Germany representing nearly 60 % of the total energy demand and therefore influences the total CO_2-emissions considerably. New buildings are already very energy efficient because of the implementation of the new energy efficiency regulation. However, for the oncoming decades new buildings will only play a very marginal role compared to the total number of buildings and consequently to the total energy demand. Therefore special attention has to be paid to existing buildings to reach a noticeable reduction in green house gas emissions and energy bills.

The use of energy efficient systems is of vital importance to overcome energy and environmental problems. Especially public administrations are under an obligation to provide a good example of efficient energy use. As high initial investments are often prohibitive, the introduction of low or no cost measures is essential for the progress of energy efficiency in public buildings.

Two successful projects have been implemented by ZREU in Regensburg (DE) and Geislingen (DE).

Regensburg Eco school project

Applying low and no cost measures, savings of 661.000€ (over 7 years = 10%) in the Regensburg Eco school project have been achieved.

30 schools participated in the Eco-School-project and reached the following aims:

- The ecological objective to save energy and resources and to reduce environmental pollution and CO2 emissions;
- The pedagogic aim of practical experience for the pupils, showing how energy can be economized successfully by conscious acting;
- The economic aim to save money, which was partly reinvested in additional energy saving measures.

Geislingen resource saving project

The Resource saving project in Geislingen is part of the EnerinTown project supported by the IEE Programme of the European Commission. This project was developed for 80 facilities in the City of Geislingen: town halls, administrative buildings, fire-houses, schools, kindergardens, gyms, etc. The implemented EMS builds on an innovative web-based tool for distant reading of electricity, heat, gas and water meters and provides data analyzing capabilites and automated generation of energy consumption reports.

The benefits for the city are

- saving on natural resources
- emissions reduction, climate protection
- additional financial resources
- implementation of a professional energy management
- practical lessons on the responsible use of energy and resources for users/pupils

No cost und low cost measures reduced the energy consumption of public buildings in the city of Geislingen during the first two years by 15% which amounts to cost savings of 340.000€. In the years before the project started the annual cost for heating, electricity, water/waste water and waste collection amounted to 1,700,000 €.

The savings are re-invested mainly in energy efficiency and in consulting and training measures. In this way the project is self-financed by the savings.

The three objectives for the project are:

- **ecological aim**: saving of energy and resources (water, waste water, waste) and thus reduction of environmental damage and green house gas emissions.
- **pedagogic aim**: the building users experience practical knowledge in resource saving through energy conscious behaviour.
- **economic aim**: saving of economic resources: free resources are re-invested for energy efficiency measures.

The core of this bundle of measures is an internet based electronic energy management system (ECS = energy control system) developed by KEVAG, a private ESCO. The ECS automatically collects data on heat, electricity and water consumption. It allows for the continuous monitoring of resource consumption, the calculation of benchmarks and the automated generation of energy consumption reports (monthly and annual). Moreover a faster response to malfunctions of the technical equipment is possible.So after 6 months of operation a leak in the hot water supply of a building was detected after observing high heat consumption during the night.

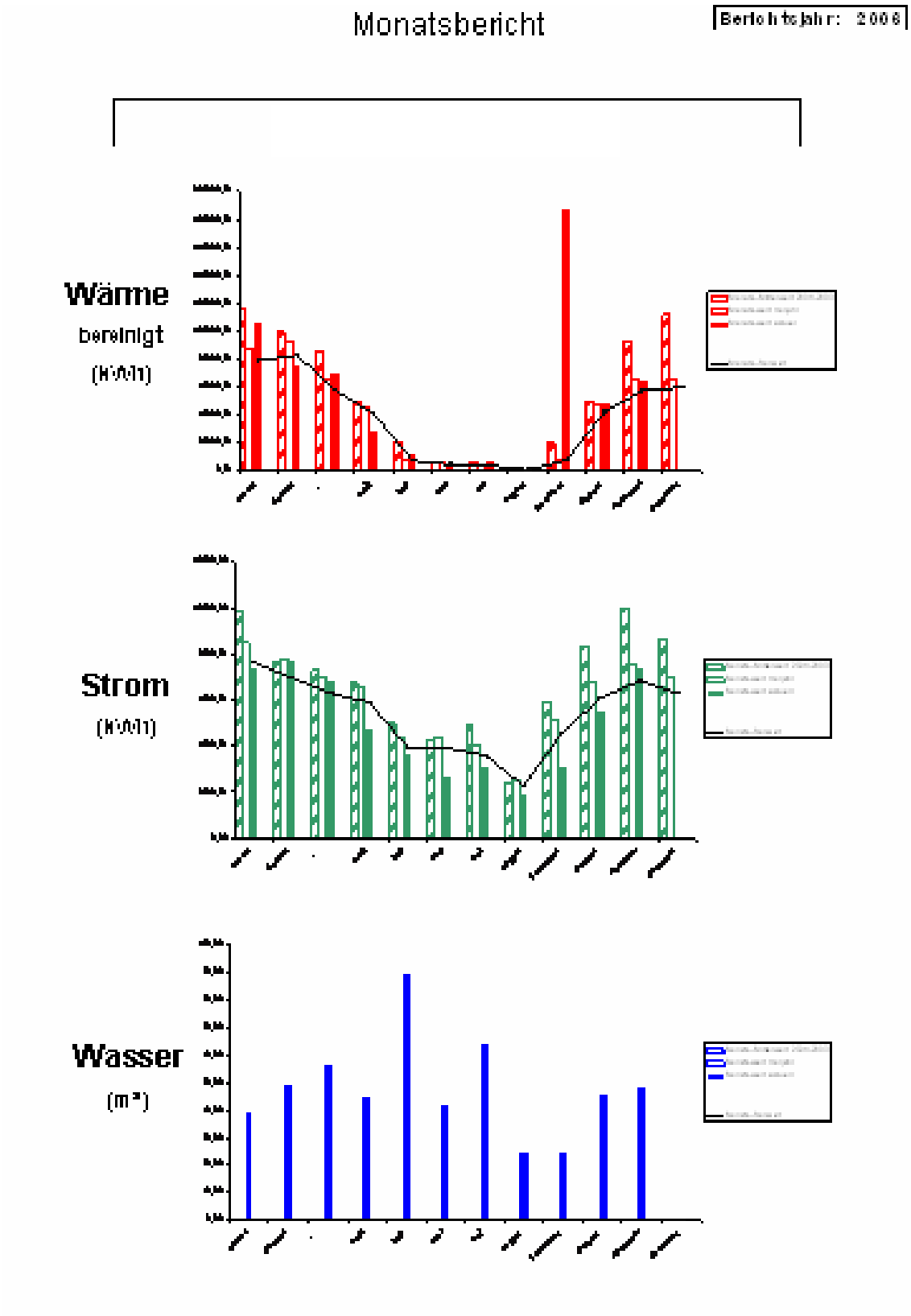
In addition to data monitoring and energy management system a number of training measures for users and caretakers and motivational events are carried out like the formation of energy teams in schools, election of pupil energy managers and a number of energy saving events which include e.g.

- on site inspections together with the building authority, caretakers, heads of buildings (headmaster) energy managers and ZREU
- object specific reports including recommendations (catalogue for priority low-cost and no-cost measures
- instruction and training of energy managers and caretakers by ZREU
- information of users (materials for lessons, checklists, circulars, tips for savings, reports of experience)
- annual saving competitions with press coverage of the award ceremony (best school, best project work, best housekeeping)

The Regensburg project was accompanied by ZREU from 1999 to 2004 and is now carried on by the administration with considerable success. The Geislingen project started in 2004 and the first contract with ZREU will be completed in 2011.

References:
www.zreu.de
www.enerintown.org
www.regensburg.de

Example for the monthly report



Excerpt from the annual report for a school building, page 1

Anlage 13

Standort:	Geislingen an der Steige
Art der Nutzung:	Ganztagesschule: Grund- und Hauptschule
Baujahr:	1950, Anbau 1972
beheizte Brutto-Geschossfläche:	8.218,67 m²
Versorgungsmedien:	Strom, Erdgas, Wasser
Versorgt werden aus der Heizzentrale zusätzlich:	-
Zustand Wärmeerzeuger:	Zuständigkeit RES, Fernwärme
Zustand Wärmeverteiler:	Zuständigkeit Stadt, sanierungsbedürftig
Energetische Beurteilung, Qualität der Wärmedämmung:	gering

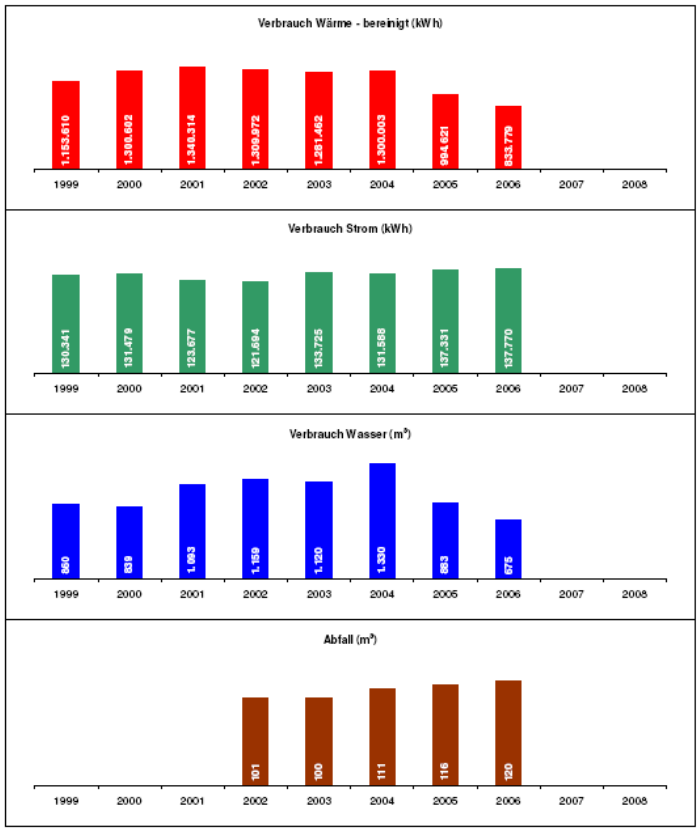
Temperaturbereinigter Wärmeverbrauch pro Jahr

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wärme kWh	1.153.610	1.300.602	1.340.314	1.309.972	1.281.462	1.300.003	994.621	833.779	0	0

Ist-Verbräuche pro Jahr

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wärme kWh	1.032.868	1.079.696	1.020.026	1.133.586	1.098.271	1.061.400	865.716	747.382	0	0
Strom kWh	130.341	131.479	123.677	121.694	133.725	131.588	137.331	137.770	0	0
Wasser m³	860	839	1.093	1.159	1.120	1.330	883	675	0	0
Abfall m³	0	0	0	101	100	111	116	120	0	0

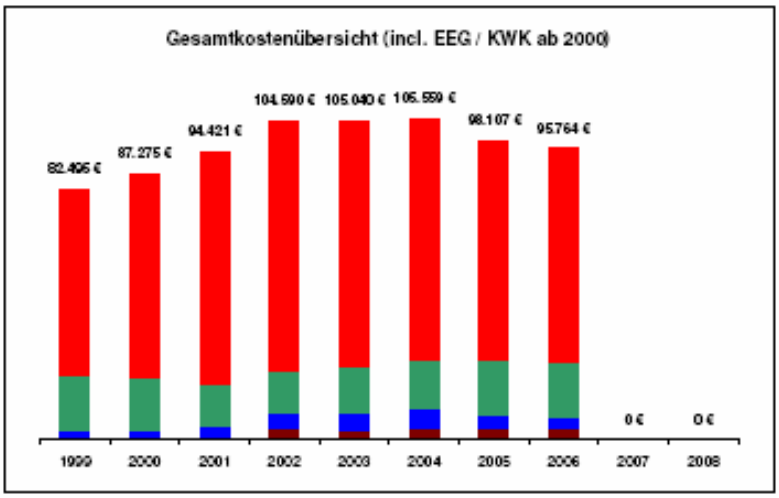
Verbrauchsgrafiken:



page 2 of the annual report excerpt

Kosten pro Jahr

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wärme	61.252 €	67.122 €	75.950 €	82.126 €	81.221 €	79.603 €	72.121 €	70.242 €	0 €	0 €
Strom	18.042 €	17.098 €	13.664 €	13.251 €	15.256 €	15.699 €	17.763 €	18.206 €	0 €	0 €
Wasser	3.202 €	3.055 €	4.807 €	5.144 €	5.437 €	6.742 €	4.621 €	3.635 €	0 €	0 €
Abfall	0 €	0 €	0 €	4.069 €	3.126 €	3.521 €	3.603 €	3.681 €	0 €	0 €
Gesamt	82.495 €	87.275 €	94.421 €	104.590 €	105.040 €	105.559 €	98.107 €	95.764 €	0 €	0 €



Spez. Verbrauchskennwerte

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	*Richtwert*
Wärme in kWh/m²	141,26	150,26	164,13	160,41	156,92	159,19	121,02	101,45	0,00	0,00	*75,00*
Strom in kWh/m²	15,96	16,10	15,14	14,90	16,37	16,11	16,71	16,76	0,00	0,00	*6,00*
Wasser in Liter/Kopf	-	-	-	1903,12	1954,62	2449,36	1662,00	1305,61	0,00	0,00	*2200,00*
Abfall in l/Kopf	-	-	-	1,66	1,75	2,04	2,19	2,32	0,00	0,00	*0,00*