



Stuttgart



Stuttgart

- inhabitants city: 590 000 (Oct. 2004)
- inhabitants region: 2.6 mio
- density of population: 2661 inh / km²
- density of buildings: 679 appartm / km²
- space for traffic: 29,2 %
- space for recreation: 10,3 %
- urban green
(including forest): 28 %





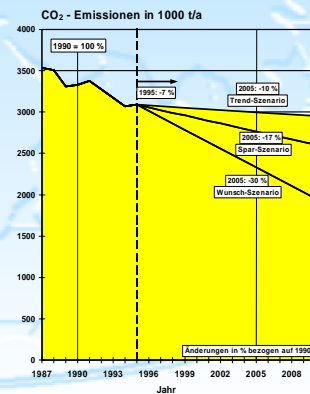
Global climate protection

objectives

- Stuttgart's climate protection concept (KLIKS)



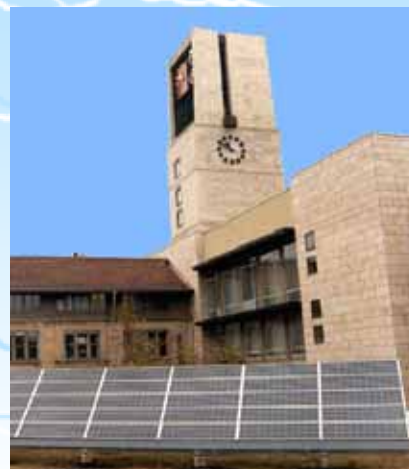
- climate protection is a task for everybody
- more climate protection - less risks for the future
- reducing CO₂-emissions in Stuttgart by 30% from 1990 to 2005

CO₂ emissions 1987 to 2010

Global climate protection

measurements

- realisation of measurements described in KLIKS
- reduction of energy demand
- increase the efficiency of energy supply
- substitute CO₂-intense fuels
- CO₂ reduction in the transport sector

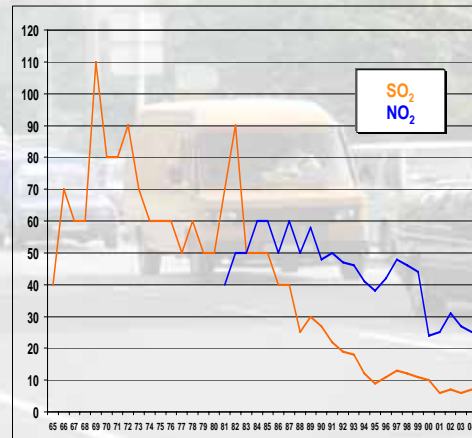




air quality control

objectives

- The problem: traffic
 - 261.000 commuters per day
 - 365.000 cars (619 cars/ 1000 inhabitants)
 - modal split: 23 % public traffic,
 - 34 % pedestrians/ bicycles,
 - 43 % private cars
- Further reduction of emissions as a preventive measurement for the citizens:
 - nitrogen oxides
 - PM₁₀
- Comply with EU - target values
 - max. 35 days with mean above 50 µg/m³ (PM₁₀)
 - max. 175 hours with mean above 200 µg/m³ (NO₂)
- Comply with air quality targets decided upon by the city council
- Important measures
 - no passage for trucks (except delivery)
 - prohibition of old cars (diff. steps 2007/ 08/ 10/ 12)
 - constant traffic with low speed

sulphur dioxide and nitrogen dioxide in Stuttgart-centre (µg/m³) 1965 - 2004

Noise reduction plan Stuttgart

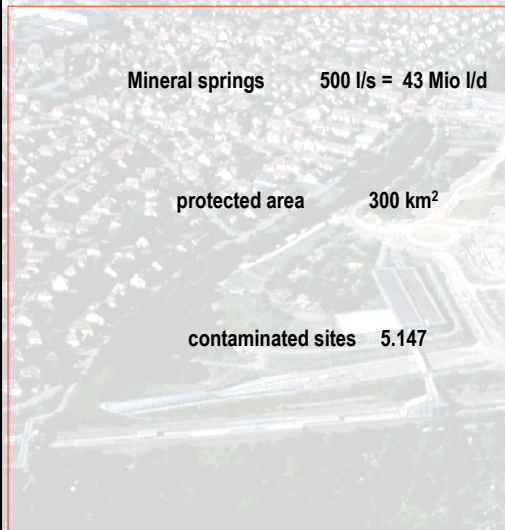
measures

- Direct the traffic to calm down residential areas:
 - direct the traffic to less sensible roads
 - reduce the speed
 - smooth the driving
 - prohibit driving in certain times and/or for certain vehicles
- strengthen public transportation
- promote cycling and walking
- build noise control devices (walls, dams, lids) Wälle, Überdeckelungen) und low noise pavement
- consider noise in urban planning



Ground water protection

measures



Area to protect mineral water sources 2001



Protected landscape in Stuttgart

- protect open space close to settlements
- save recreation areas which are easy to reach
- help to improve the city climate
- protect the diversity, particularity and beauty of nature and its animals
- 31 % of Stuttgart ist protected landscape
- our aim is to have 35 % of Stuttgart protected

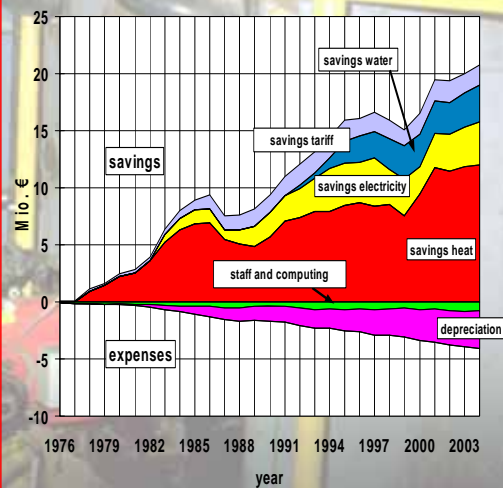




Energy management

objectives

- reduction of electricity, heat and water consumption of municipal facilities
- reduction of CO₂ - emissions
- reduction of pollutants
- reduction of energy costs (in 2004: 20,8 Mio. €)
- conservation of resources
- application of renewable energies



energy management

measures

- survey the energy consumption of municipal facilities
- rate the consumption using the Stuttgart-Energy-Control-System
- optimise the operation
- consult caretakers and technicians
- energy diagnosis
- develop guidelines and standards
- motivate energy consumers
- purchase energy





energy management

- principle of the revolving fund
- allows to implement economical projects to conserve energy
- small projects and financing of additional cost (i.e. condensing boiler) possible
- money appears in the budget only during start-up
- eases the budget of the departments involved
- 1995 to 2004 more than 200 projects with an investment of 7.1 Mio. €
- savings achieved:
 - 1,1 Mio €/a cost savings
 - 14.000 MWh heat savings/a
 - 1.810 MWh electricity/a
 - 31.000 m³ water/a
 - 5.000 t CO₂/a

financing: Intracting



thermal insulation

- since 1998 the city of Stuttgart sells building lots only to those who accept to built with better insulation compared to national standards (EnEV-20%)
- the same target is included in other treaties
- since 1997 municipal buildings are 25 % better insulated compared to federal standards.
- Stuttgarts local energy agency, the informs citizens since June 1999 about the retrofiting of residential buildings.

measures

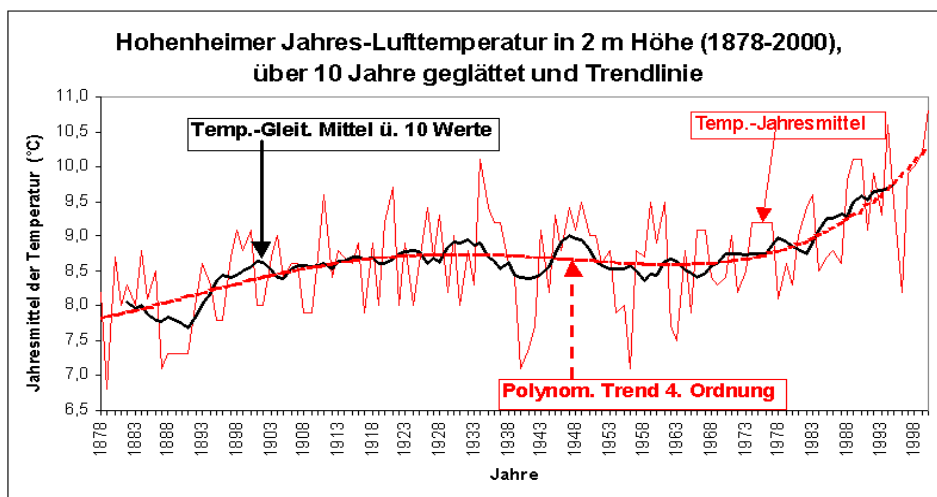




wh



Hohenheimer Jahres-Lufttemperatur in 2 m Höhe (1878-2000),
über 10 Jahre geglättet und Trendlinie





Energy Management for the Municipality of Stuttgart

- requirements
- results
- operation
- investments saving energy
- intracting
- local energy agency: EBZ

Why saving energy?

- climate protection
- reducing emissions
- saving resources
- saving energy costs
- investing in labor, not in energy



Stuttgart's energy management

- **key figures:**
 - 2000 facilities, 2 Mio. m²
 - 40 Mio € annual energy bill
 - 28 years experience in EM
- surveying the energy consumption
- consulting caretakers, technicians and departments
- purchasing energy
- research projects
- developing guidelines (city + DST)
- internal contracting company

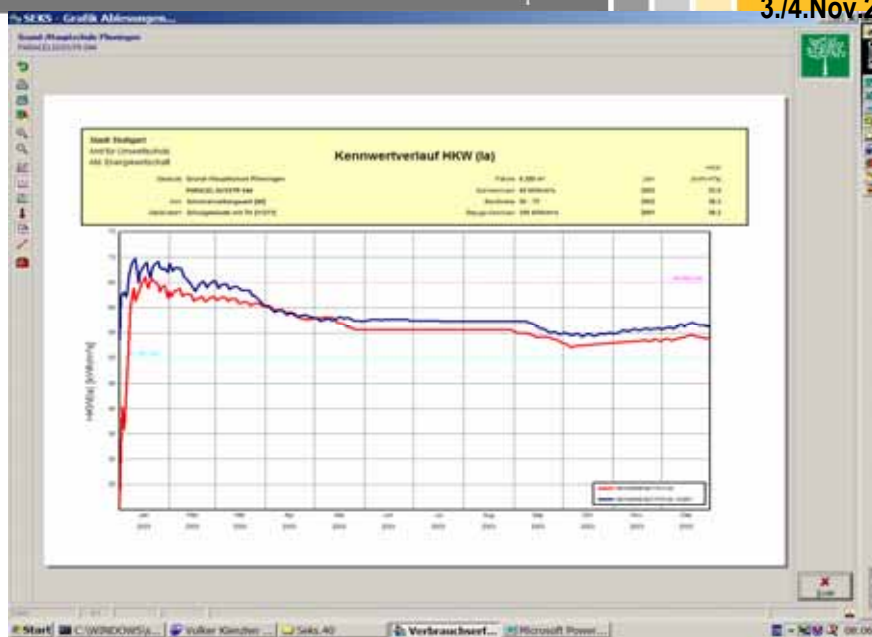
operation of buildings is one key element



Optimising the operation
yields savings of 10% + !

Temperatures?
Flow rates?
Timer?

Train the caretakers on site



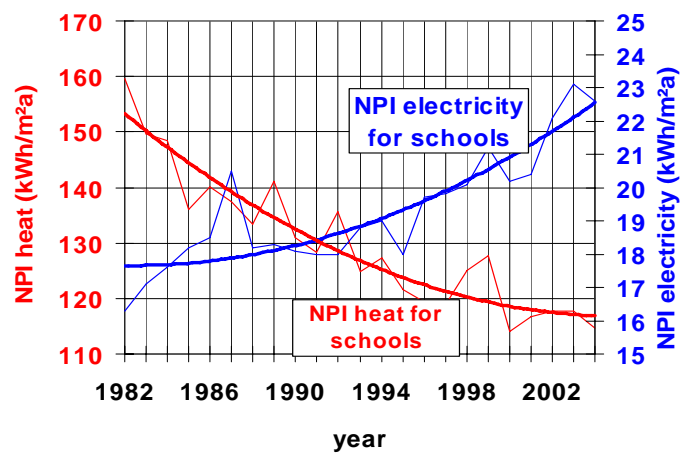


Priorities for Action

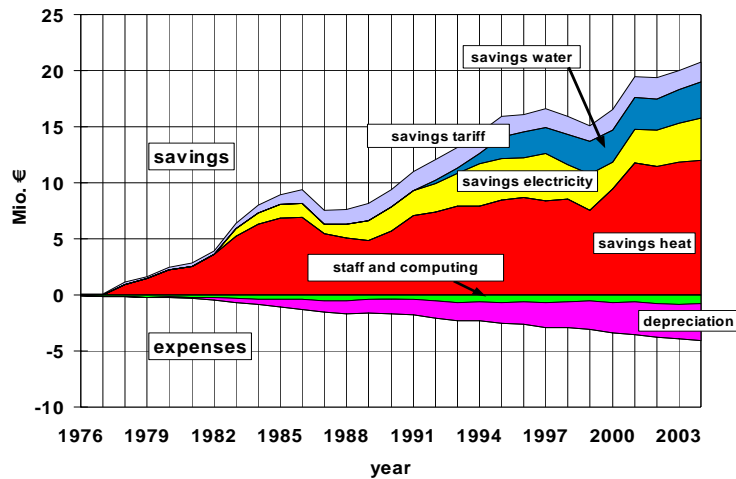
- building projects
- high characteristic value (NPI)
- high energy costs
- rising energy consumption



Trend of the characteristic values in Stuttgart's schools



energy report 2004 cost savings



How can you reduce the energy consumption?

- optimizing operation
 - optimal use of technology installed
- investments
 - technical improvements
- changing the user behaviour
 - information, motivation, sharing the savings



Investive Means to Reduce Energy Consumption

- HVAC
- thermal insulation (building envelope new and old buildings)
- electricity (lighting, drives)



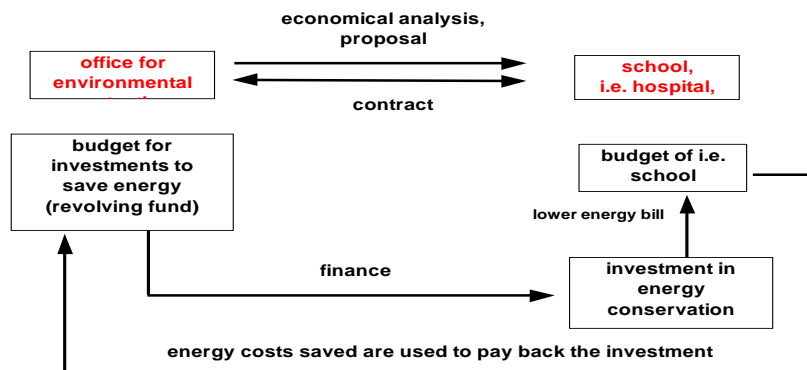
Recommendations for Municipal Energy management



Let the city council decide upon it !



Principle of Internal Contracting (Intracting)



thermal insulation of roofs

- Ideal for unheated attics:
 - often big space
 - technically simple
 - no problems with building physics
 - cheap
 - schools can do it themselves
- goal: $U < 0,2 \text{ W/m}^2\text{K}$
- old: $2,5 \dots 1 \text{ W/m}^2\text{K}$
- --> pay back time in schools: 4 to 10 years
-





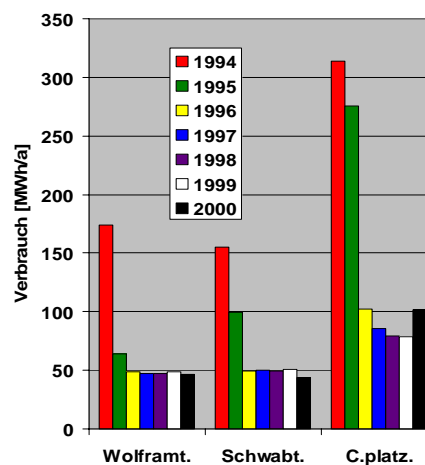
chpp for indoor pool in Sonnenberg

- 35 - 52 kW electrical power
- 70 - 101 kW thermal power
- 91 % efficiency
- 254.000 kWh power production/a
- 495.000kWh heat production/a
- 108.000 kg CO₂ - savings/a
- 16.000 Euro savings/a
- 90.000 Euro investment



Renewal of lighting systems in tunnels and underpasses

- lighting works 8760h per year
- old systems often use fluorescent lamps
- sodium lamps have a very high output due to good reflector
- less maintenance



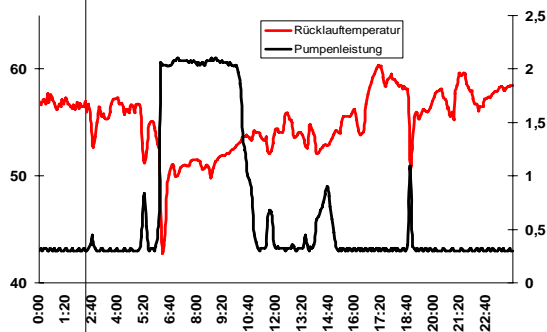


frequency control for drives

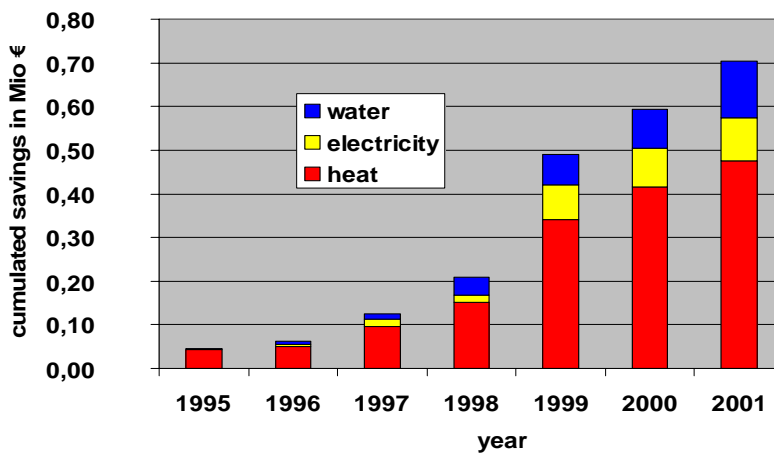
• Frequency controllers are applicable to:

- big heating pumps
- pressure stations
- instead of throttles
- controller can work on:
 - pressure
 - pressure difference
 - temperature
- here:

• pump for school, savings: 70 %

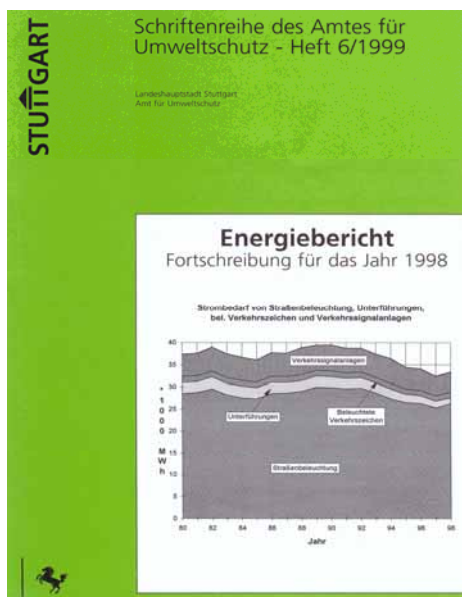
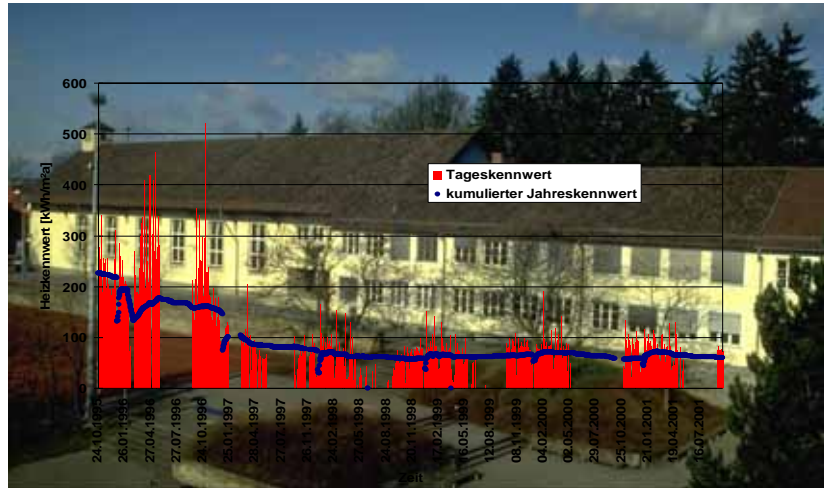


cost savings by Intracting





EROS - Exemplary retrofitting of an old school



- proof of our work
- target group:
 - head of municipality
 - city council
 - public

STUTTGART  Johannesburg 3./4. Nov. 2005




**ENERGIE
BERATUNGS
ZENTRUM**
Stuttgart e. V.



save · agentur

v. Zimmermann Office for environmental protection

STUTTGART  Johannesburg 3./4. Nov. 2005

Who is the EBZ?

- legal entity: non-profit, registered society, since 3/1999
- members:
 - city of Stuttgart
 - chamber of handycrafts
 - trade guilds (glazier, electrician, ...)
 - association of the landlords
 - several more
- staff:
 - manager (Dipl.-Ing.)
 - building physicist
 - secretary (part-time)
 - freelancer
- building: former craftsshop in Stuttgart West
- financing: members, city of Stuttgart, SAVE II, reconstruction certificate

v. Zimmermann Office for environmental protection



Tasks of the EBZ

- personal consulting
- reconstruction certificate
- events, fairs
- lectures
- public relation



Who gets the benefit of the EBZ?

- the environment:
 - - less air pollution
 - - less CO₂-emissions
 - - lower consumption of resources
- the local handicraft: - more orders for retrofitting
- the industry: - increased turnover with energy efficient products
- the city: - positive image
- - due to partners relatively low costs



Projects of the round table for energy issues in Stuttgart



- mobility information
- energy saving lessons for drivers
- (energy consulting for companies)
- Energy Agency

