Climate protection projects in Cities

to reach the Kyoto- and beyond targets

side event of **Climate Alliance** at the United Nations Climate Change Conference 05/12/05

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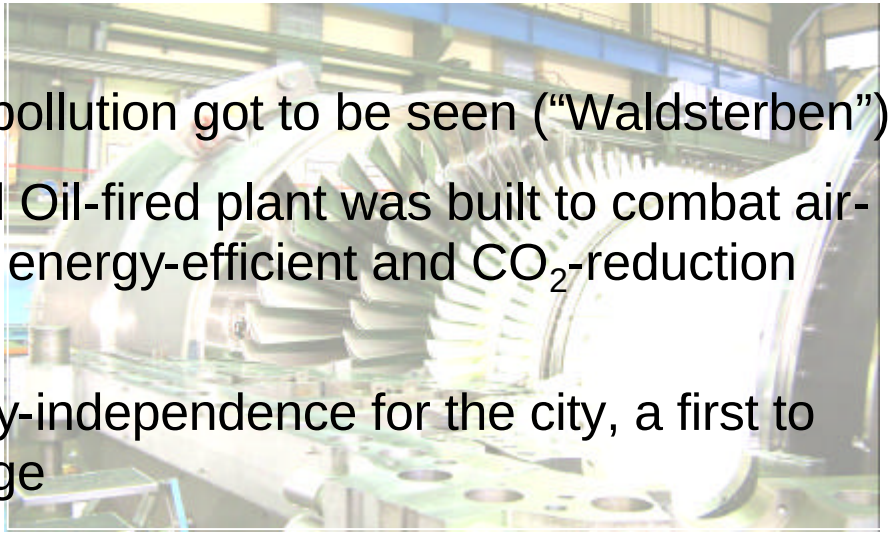
Cologne

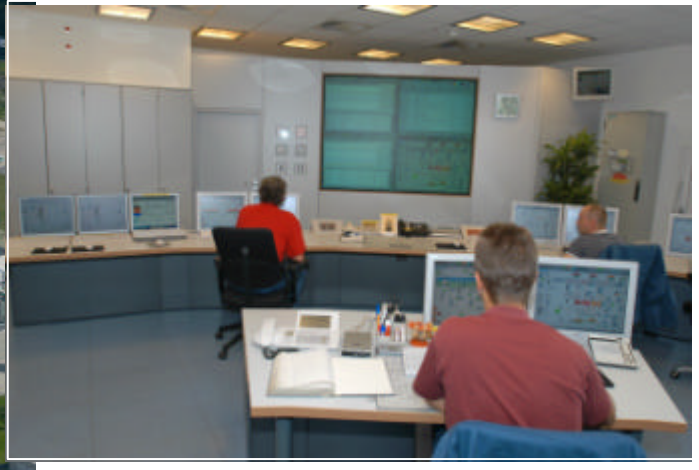
- 1.1 Mio inhabitants, biggest city in Province North Rhine-Westphalia
- 2.5 Mio inhabitants regional (Bonn, Leverkusen etc.)
- active role in Local Agenda 21 projects
- now guideline 2020
- Foundation Member of Climate Alliance
- Example Projects to reduce GHG-emission
  - CHP-plant and emission trading
  - avoid energy use in Solar estates

Energy supply Cologne

- after WW II the energy-supply based on brown-coal-fired power plants and household-heating by coal – less efficient
- The local energy-provider, a municipal company, was only a distributor
- In the late sixties air-pollution got to be seen (“Waldsterben”)
- 1977 a new Gas- and Oil-fired plant was built to combat air-pollution, much more energy-efficient and CO_2-reduction included
- a small step of energy-independence for the city, a first to prevent climate change



CHP-plant “Köln-Niehl II”



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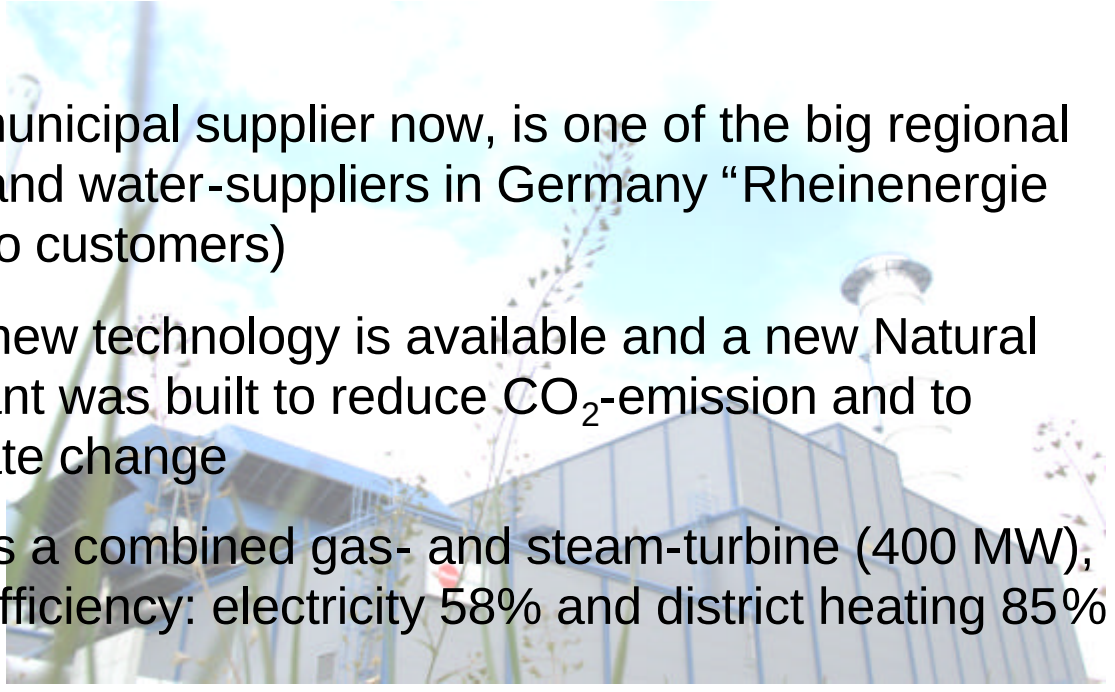
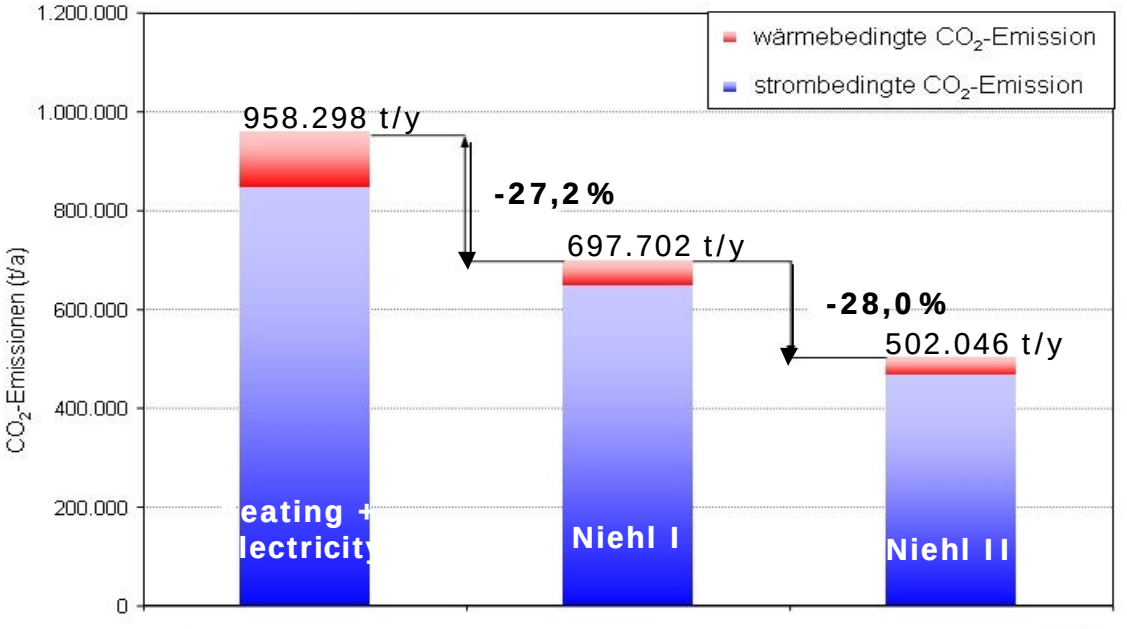


- The former municipal supplier now, is one of the big regional energy, gas and water-suppliers in Germany “Rheinenergie AG” (~2.5 mio customers)
- 2003/ 2004, new technology is available and a new Natural Gas CHP-plant was built to reduce CO_2-emission and to combat climate change
- Technology is a combined gas- and steam-turbine (400 MW), high rate of efficiency: electricity 58% and district heating 85%

Steps of CO_2-reduction

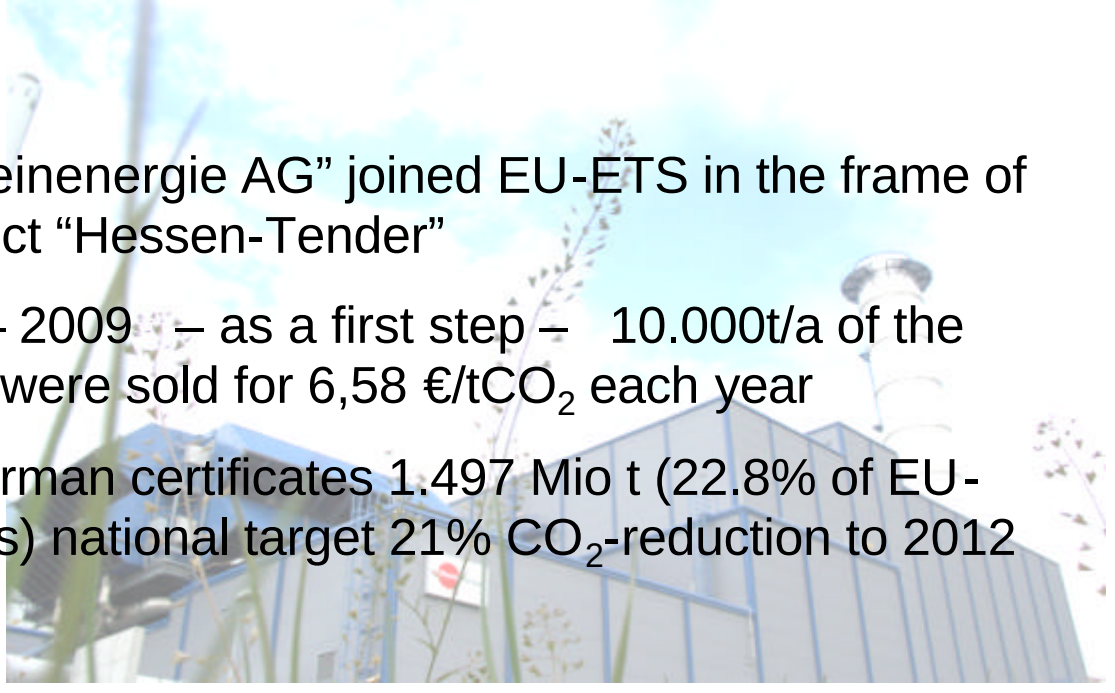


heating

electricity

RheinEnergie

Emission-Trading-Scheme



- 2005 “Rheinenergie AG” joined EU-ETS in the frame of pilot-project “Hessen-Tender”
- for 2005 – 2009 – as a first step – 10.000t/a of the reduction were sold for 6,58 €/tCO_2 each year
- recent German certificates 1.497 Mio t (22.8% of EU-certificates) national target 21% CO_2-reduction to 2012

Energy saving redevelopment

- today in Germany: 1/3 of final energy consumption is used for heating and hot water supply in buildings
- a lot of houses are built before 1949
- most of the buildings are built or rebuilt after the WWII, but before 1977 energy standards for buildings were poor (1. WSV, "Wärmeschutzverordnung")
- update in 1984 (2. WSV) and 1995 (3. WSV)
- 2002 German legislation for Energy-saving-buildings (ENEV) corresponding to EU-directive "energy performance of buildings"

Project targets

- Reach the national compliance of Kyoto (project initiative of the province government North-Rhine Westphalia)
- Set of guidelines:
  - Influence a solar optimized city-planning
  - Reduce energy demand for heating
  - Active and passive use of solar energy and other renewables for space heating and hot water supply.

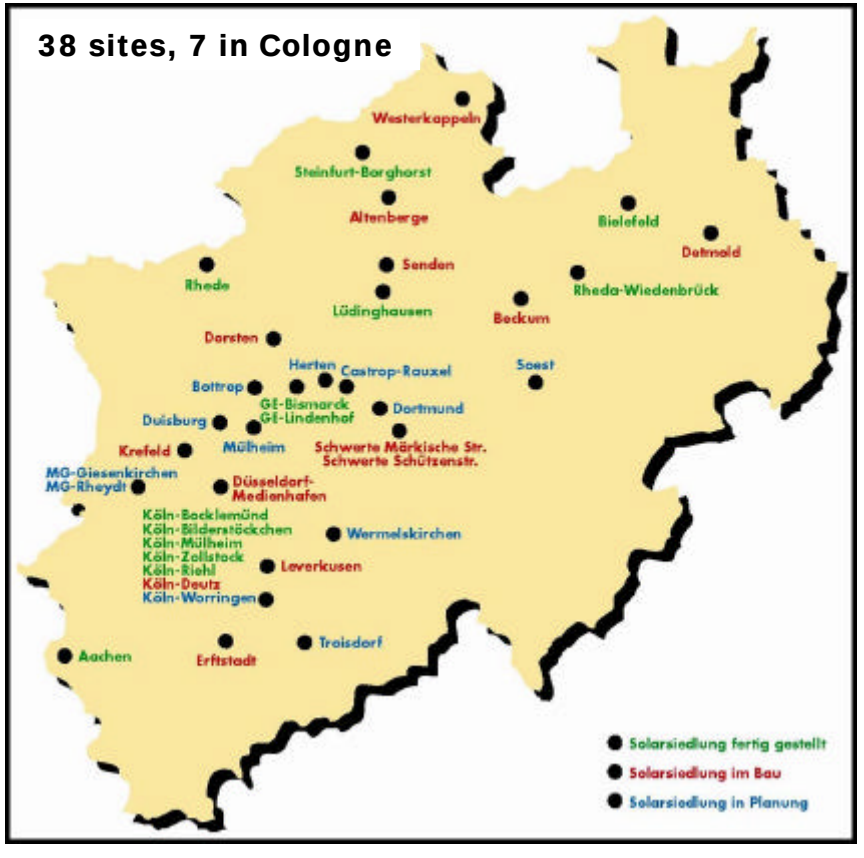
Guidelines to take into account

Focus is on solar optimized city planning and architecture with application of renewable energy supply, e.g.

- South orientation of buildings
- avoid shadow from surrounding buildings and trees
- compact building construction (surface/volume relation)
- integrated sites
- high standard of insulation
- use of renewable energy (PV, solarthermal)

some details

- high standard of thermal insulation ⟹ max. 15 kWh/m²a (passive house standard) or max. 35 kWh/m²a (3-litre-house)
- use of renewables e. g. solarthermal collectors ⟹ more than 60% of hot water demand is covered by passive solar energy
- solar electricity from photovoltaics ⟹ more than 1 kWp/housing unit is from PV-panels
- compact building construction ⟹ A / V relation < 0.65m^{-1}
- Building-specific CO_2 emission-maximum:
  - New buildings ⟹ max. 33 kg CO_2/m²a
  - redevelopment projects ⟹ 40 kgCO_2/m²a



Projects in NRW province

Situation 2005 in Cologne

5 Projects completed
1 Project under construction
1 project in planning

Ideas for a few more!!!

Projects in Cologne

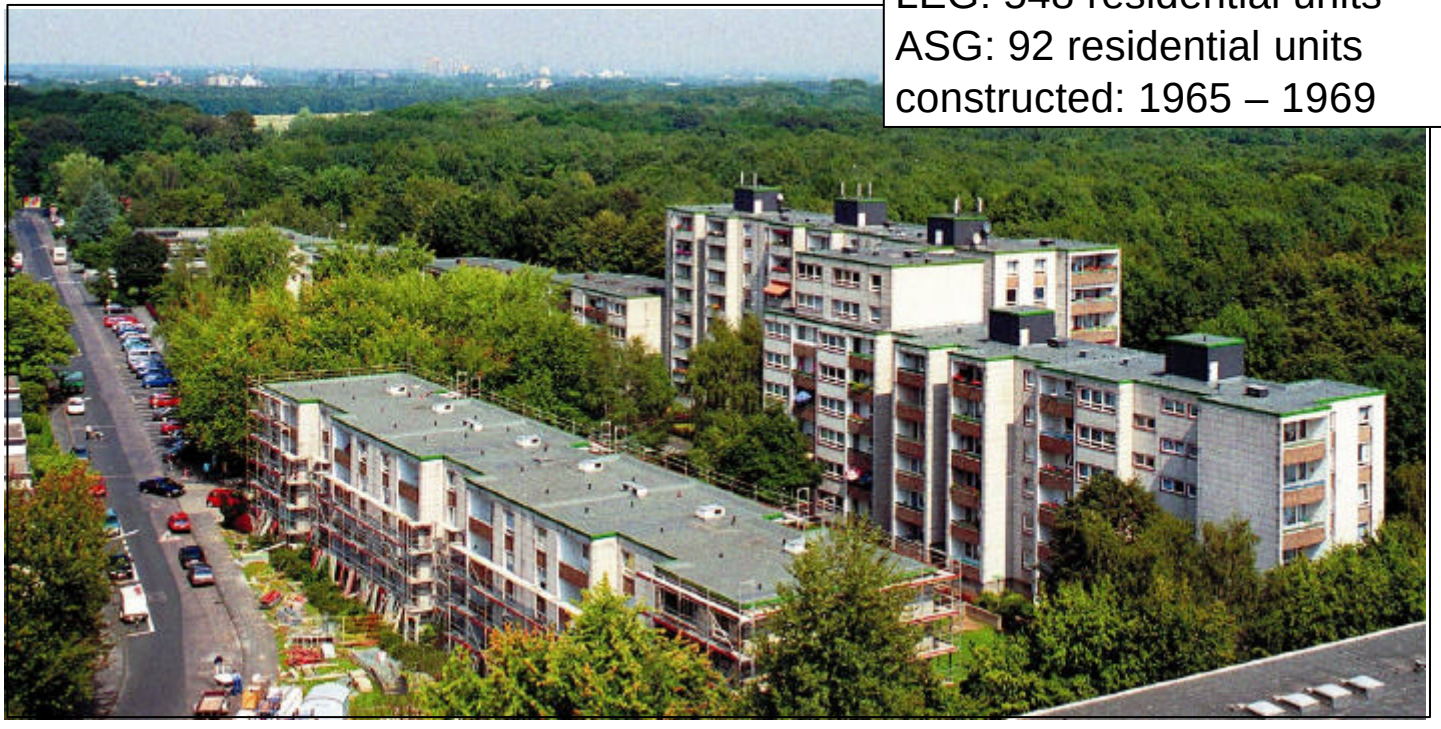
- Most of the sites in NRW are new settlements and good projects

⇨ *but from our point of view, projects in existing buildings are more important*

- Most of the buildings which waste energy are existing buildings in densely built cities!
- Existing buildings have a great potential of CO_2 reduction. An ambitious energy saving redevelopment could save about 40% of the total energy consumption for this sector.
- 7 projects in Cologne, 6 of them are existing building-areas!!!

Solar Energy Housing Estate Köln - Bocklemünd

two housing associations:
LEG: 548 residential units
ASG: 92 residential units
constructed: 1965 – 1969



Quelle: L. Arentz

Quelle: ECOFYS, Köln

redevelopment feature

- Reduction of heating-energy-demand
- LEG: PV-panels 150 kW_p (1.500 m²),
- ASG: PV-panels 9 kW_p, (electricity)
  112 m² Solarthermal (hot water)

→ Reduction of 700 t/a CO_2-emission

Solar Energy Housing Estate Köln-Mülheim

Quelle: **Ing.-Büro Ortjohann, Köln**

Erbbauverein „Köln“ eG
constructed: 1959
44 residential units

Reduction of CO_2-emissions
from 62 t/a ⇒ 20 t/a

Solar Energy Housing Estate Köln-Bilderstöckchen

Gemeinnützige Wohnungsgen. eG
Bilderstöckchen
constructed: 1909, 1937
from 66 to 75 residential units

Quelle: L. Arentz

redevelopment:
October 2000 – July 2002

⇒ reduction of 230 t/a CO_2-emission

Solar Energy Housing Estate Köln-Riehl

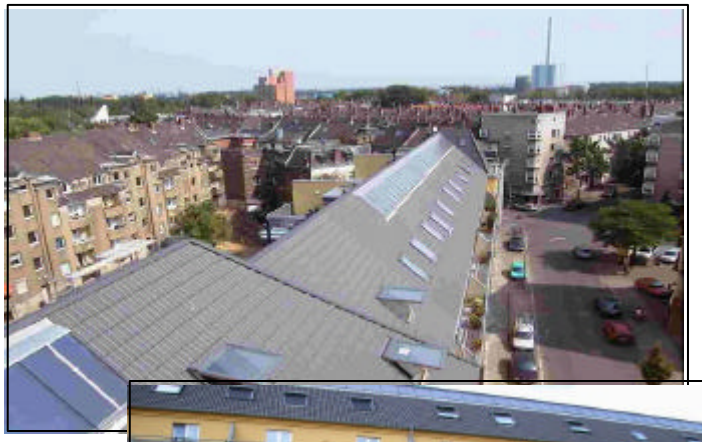
Quelle: Architektei Carsten, Köln

Erbbauverein Köln eG

constructed: 1926-1928

redevelopment:
June 2001 – September 2004

Solar Energy Housing Estate Köln-Riehl



Quelle: Architektei Carsten, Köln

insulation:
Reduction of heating-demand
~160 kWh/m²a ⇨ 48 kWh/m²a

warm-water-supply:
55 % covered by solar-thermal collectors (260 m² collector-area)

Solar Energy Housing Estate Köln-Riehl

Quelle: Architektei Carsten, Köln

before redevelopment:
112 residential units

after redevelopment:
133 residential units

⇒ reduction of 260 t/a CO_2-emission

further information about the Cologne projects and the North-Rhine Westphalia province initiative

„50 Solarsiedlungen in NRW“

http://www.50-solarsiedlungen.de

English language available

also demand for print-version