

Moving to a Low CO₂-Future on a Local Level

The Experiences of the City of Hannover [Germany]

Hans Mönninghoff



- **1974 – 1986 Consultant Engineer (Water, Energy)**
- **1986 – 1989 Member of the State Parliament for the Green Party**
- **since 1989 Head of the City of Hannover Directorate of Environmental Affairs**
- **since 1997 also Deputy to the Lord Mayor in his function as Chief Executive**
- **since 2005 also Head of Directorate of Economic Affairs**
- **until 2013 re-elected in all three functions**

1,800 employees; 370 Mil. Euro budget p.a.

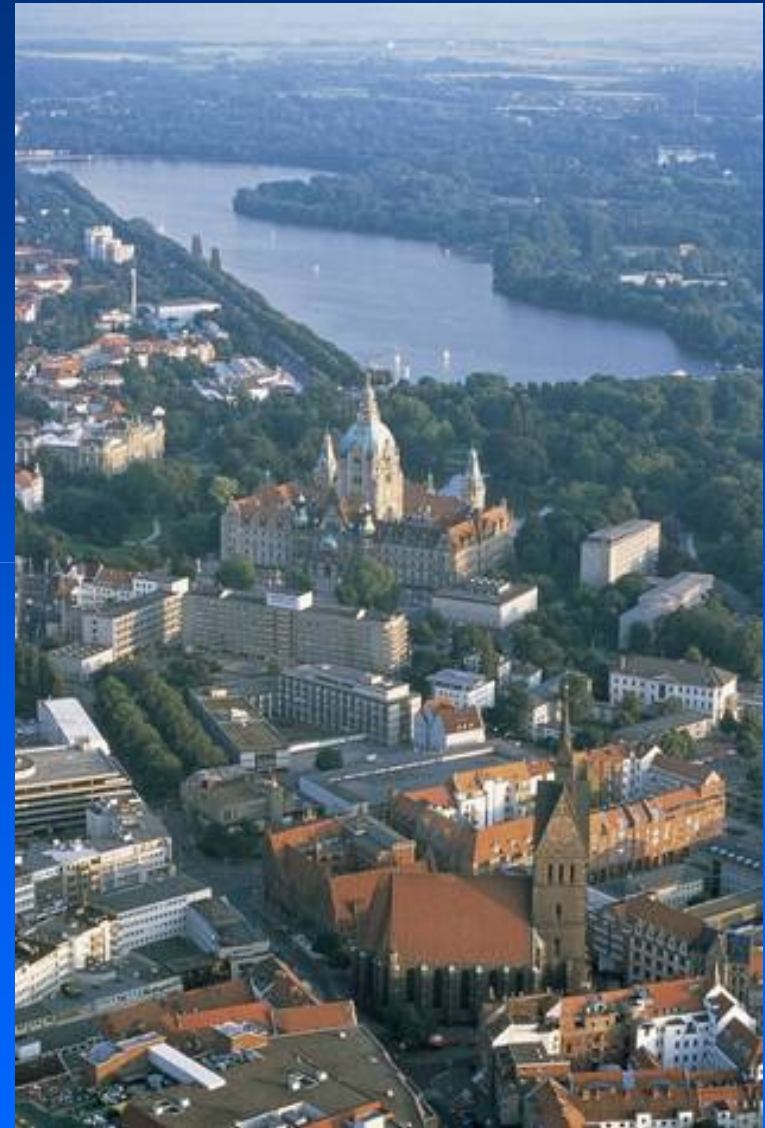
Hannover: A Liveable City at the Heart of Europe

Pop: 520,000
inhabitants
(Region:1.1 Mil.)



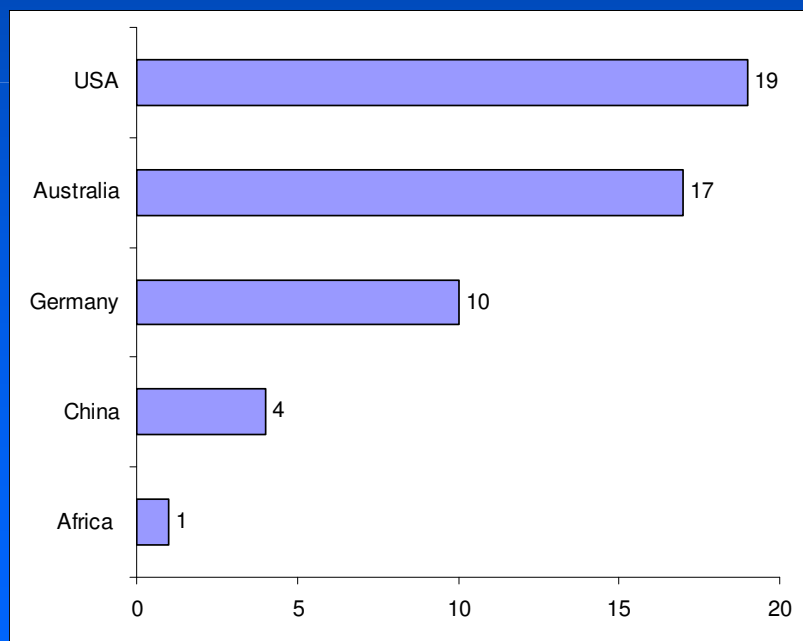
City of Hannover

- 520,000 inhabitants; 204 km²
- Capital and economic centre of Lower Saxony
- the world's largest trade fair location
- 245.000 jobs in service industries (e.g. insurances) and manufacturing and processing industries (e.g. automobile)
- 35.000 students in famous universities
- **Since 21 years, Hannover has a coalition between the social democratic party and the green party with a strong engagement in local sustainability**



Why we speak about low carbon strategies

CO₂ emissions in t per capita today:



The energy consumption in the developing countries will rise!

The necessity is clear:

In order to limit global warming to 2°C, industrial countries have to drastically reduce CO₂ emissions by 2050 to 2 t per capita.

Otherwise we will be confronted with a climate catastrophe.

But it is not too difficult: There is a lot to do in intelligent use of energy !

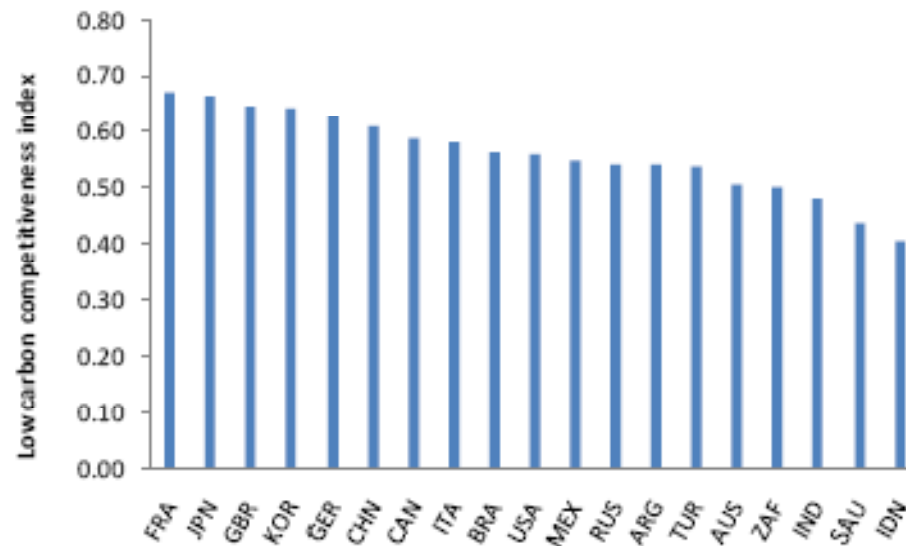
The GDP per tonne
of CO2 is very
different
in the countries.

Australia	0,8
Germany	2,0
Japan	3,6

Australia is ranked 15th out
of 19 industrial countries !

Report of the Climate Institute (Sep.
2009)

Figure 4 European and East Asian countries are ranked highly in the low carbon competitiveness index



Hannover as a interesting local case study for low carbon strategies

Hannover is an interesting example of how much, within existing frameworks and conditions, can be achieved by a local authority.



Hannover has powerful instruments:

- majority municipal holding in a city energy utility; it generates enough electricity to cover Hannover's entire consumption without nuclear power.
- Since 1992 a climate protection unit in the city administration
- a regional climate protection agency involving around 60 institutions and companies
- a professionally-led Agenda 21 process with the broad-based support and involvement of local people
- a climate protection fund, awarding grants totalling 5 million € each year for the last 10 years

Some more information to the 'proKlima' Fund, 5 million € per year in subsidies for: feed of:

- 2 Mio. € additional charge on gas- sale of the utility
- 2 Mio. € from the utility-profit
- 1 Mio. € from the municipality

- house insulation
- construction of Low Energy Houses
- high-efficiency heating systems e.g. decentral CHP plants
- extension of the district heating network
- electricity saving campaigns
- renewable energy use



Where do CO₂ Emissions come from?

about 50% from electricity generation

about 33% from thermal energy
production (space heating,
hot water, process heat)

about 17% from transport

Ambitious Targets set by City Council Resolutions:

- 1992: First Climate Protection Programme, aiming for a 25% cut in CO₂ emissions, 1990-2020
- 2008: a New Target – 40% Reduction from 1990 to 2020
“Klima-Allianz Hannover 2020”

Results so far: 1990 – 2005?

Despite

Positive economic growth;

A growing population (+15,000); and

more electricity use in private households (+32%!)

Greenhouse Gas Emissions declined by about 7.5% between 1990 and 2005!

CO₂ Audit for the City of Hannover, 1990 - 2005

		CO ₂ emissions 1990 in 1000 t *	Change since 1990		
Energy customers 84%	Industry	32%	2,102	-12%	-8.8%
	Small commercial	27%	1,797	-8%	
	Private households	25%	1,625	-5%	
Transport 16%	Motorised Traffic	13%	836	-6%	-0.9%
	Rail	2%	125	-19%	
	Air travel	1%	94	+71%	
Totals:			6,579	-7.5%	

*including upstream emissions e.g., from gas extraction in Russia

What are the Successes?

What are the Challenges?

Where do we go to reach 40% in 2020?

Seven Thematic Areas

- 1. Electricity generation**
- 2. Municipal energy management**
- 3. Waste management**
- 4. Private households**
- 5. Building standards**
- 6. Industry**
- 7. Transport**
- 8. Renewables**

1. Efficient Electricity Generation has achieved so far:

- 30% of electricity generated from gas and coal-fired plants comes from cogeneration (CHP) plants. (national average: 12 %)
- 21% increase in district heating delivery by 1990 - 2005
- About 100 decentralised CHPs making electricity and heating/cooling

1. Efficient Electricity Generation

the next stages:

Commitment by the local utility to reduce the CO₂ factor for electricity generation from 950g/Kw in 1990 to 730g/Kw in 2020 without using nuclear power;

Components of the energy strategy:

- expand CHP capacity by 600 GWh
- modernise coal-fired power stations
- construct highly efficient gas turbine generators
- energy contracting service for customers.

2. City Administration Municipal Energy Management

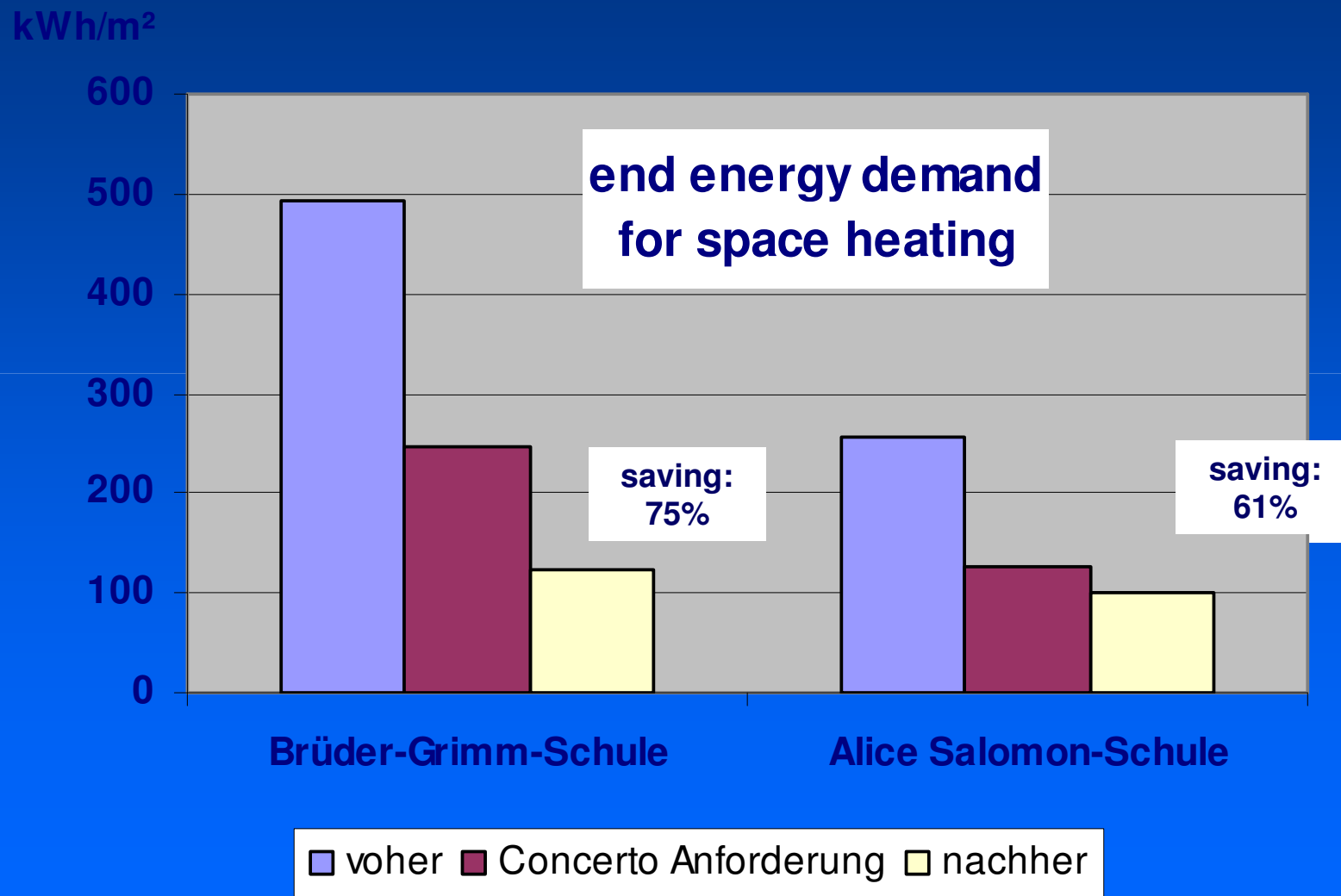
achieved:

- **Between 1997 and 2005, investment and staff training reduced heating energy consumption in the 600 municipal owned buildings (schools and so on) by 24%.**
- **staff training and programmes with children in schools and kindergartens is saving 0.5 Mil. € per year energy-costs**

way to go:

- **ongoing conversion to district heating and decentralised CHP**
- **All City-owned new buildings to be built meeting Passive-House-Standard**
- **optimal energy-efficiency retrofitting in low-energy-standard**

Two school-retrofitting-examples



2. City Administration

Further Possible Interventions by the Municipality

- optimisation of energy efficiency in zoning plans
- preferential sales of land to builders of Passive Houses
- higher standards set for commercial areas e.g., priority for CHP, if the municipality can exert influence through clauses in land sale or planning permission contracts
- energy efficiency the most important criteria for municipal procurement decisions
- conversion of street lighting and traffic signals to low-energy lamps

**3. Waste Management is a part of CO2-reduction strategy
From 1989 to 2005 dramatic reductions in waste quantities
in the Region from 1.3 Mio. tons to 350.00 tons**

**Waste Treatment Concept for
the Hannover Region
(from 2005)**

350,000 tonnes p.a. residual waste
(unavoidable, unrecyclable)

120,000 t fine fraction
> fermentation

Gas used for
electricity generation

230,000 t coarse fraction
(thermal value)
> incineration

Energy used for
electricity generation

The „New Landfill“ – the Regional Waste Treatment Centre

The Waste Management System is nearly optimised



incinerator

mechanical sorting and
composting facility

fermentation

composting from the
fermentation plant

4. Private Households

achieved:

- Calculated on the 1990 housing stock, there was a reduction in heating demand of around 13%.
- But with 15,000 more inhabitants and more living space per person the total area rose by 10%.
- Therefore, the actual reduction in heating demand was only about 4%.
- Private households are consuming 32% more power. There are more one-person households, and more computers and electrical appliances, many of them with stand-by wastage.

way to go:

- voluntary commitment by all housing companies to a 25% reduction in energy consumption by 2020
- intensive advice programme for inhabitants, especially those on low incomes (socio-political aspects!)
- target: an overall reduction of at least 20%, 1990-2020

5. Building standards

Energy-Optimized New Houses in Hannover

from

Low-Energy Houses (60- 80 % less
than normal new houses
3,000 units built in 1998/1999)

via

Lowest Energy Houses
(15 KWh/sqm for Heating)

to

Climate Protection Estate
350 units with Zero Emissions:
To start in 2010.

From Kronsbergstandard



via Passive houses



To a Zero emission estate



**10 years ago
Kronsberg
greenfield
housing area**

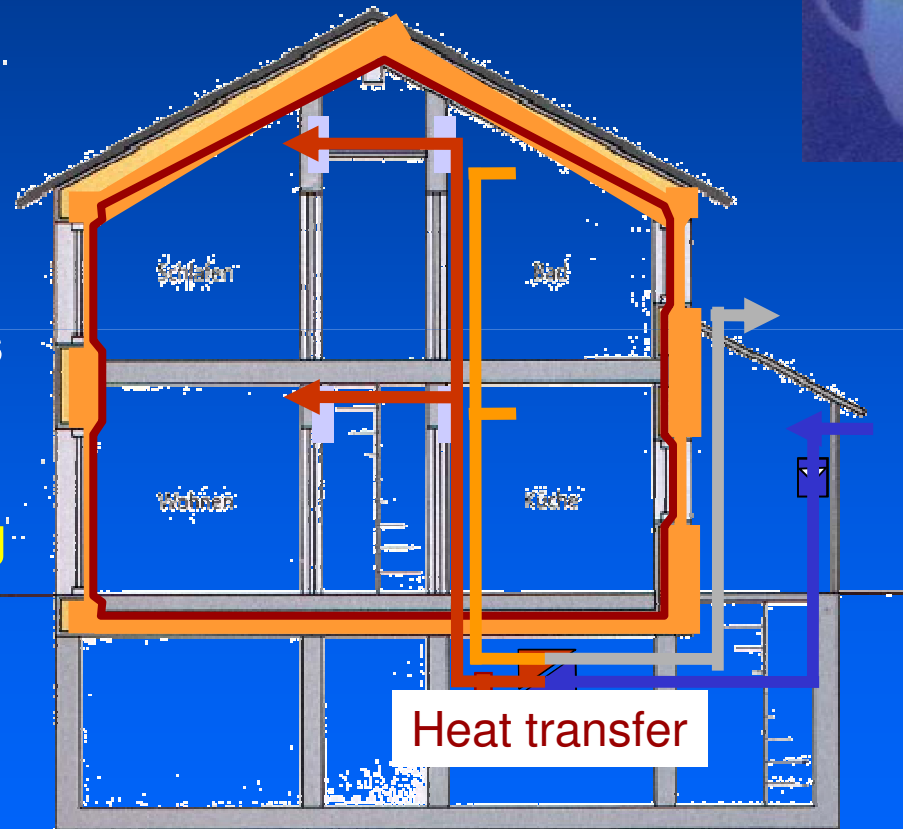
**60-80% less
energy-
consumption
than a new
standard house**

**2,700 units in 3 – 5-storey apartment houses
directly at the Light-Railway-Net**

- **300 2-storey private terraced houses**

Today the new standard: "Passive houses"

- excellent thermal insulation (20-30 cm)
- Houses are oriented to the sun
- Used air is extracted by a ventilation system.
- In the heat transfer it gives 90% of its heat to fresh air.
- On very cold days the fresh air is post-heated additionally – quite normal temperature.
- **Sustainably retrofitted is keeping maintenance costs low, so long-term rentable condition is ensured**
- **Passive House components increase living comfort**



New residential buildings: passive houses



Implemented:

**Approx. 100 housing units,
84 of which on municipal plots of land**

Planned resp. being implemented soon:

Approx. 200 housing units,



The Future: Zero emission houses

Climate protection estate "In der Rehre"



Detached houses, semi-detached
and terraced houses, 330 Units
Start of construction: 2010

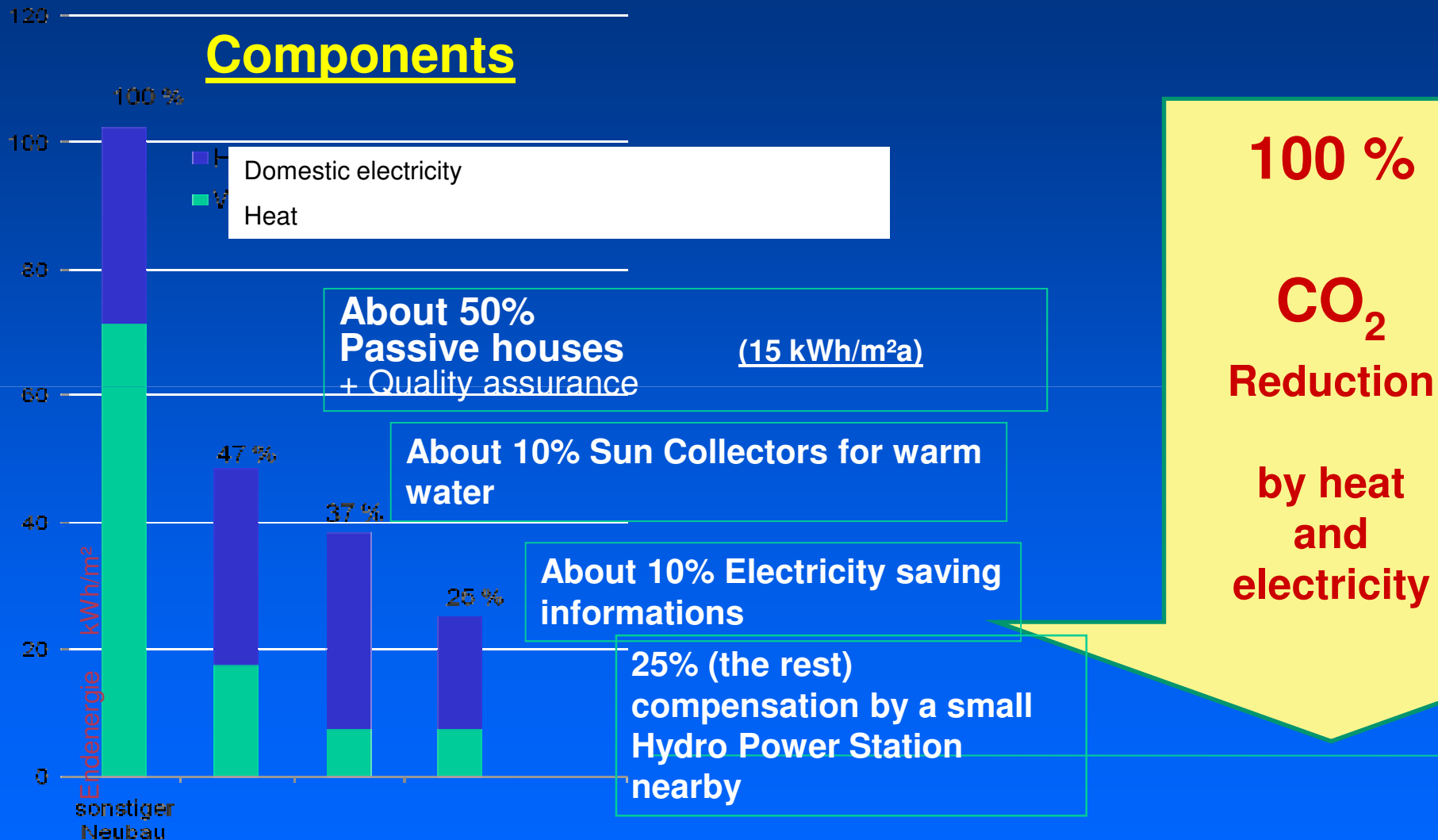


1. Prize, competition 2005:

foundation 5+
landschaftsarchitekten



The Future Standard: Zero Emission



**Most houses are built!
The future is Retrofitting
EU-Model-Project Concerto;
58 buildings with 310 apartements**

Passive-House-Standard

**Centralised heating system,
connection to district heating
network**

**Support and advice
for tenants**

**Electricity saving advice
for all tenants**

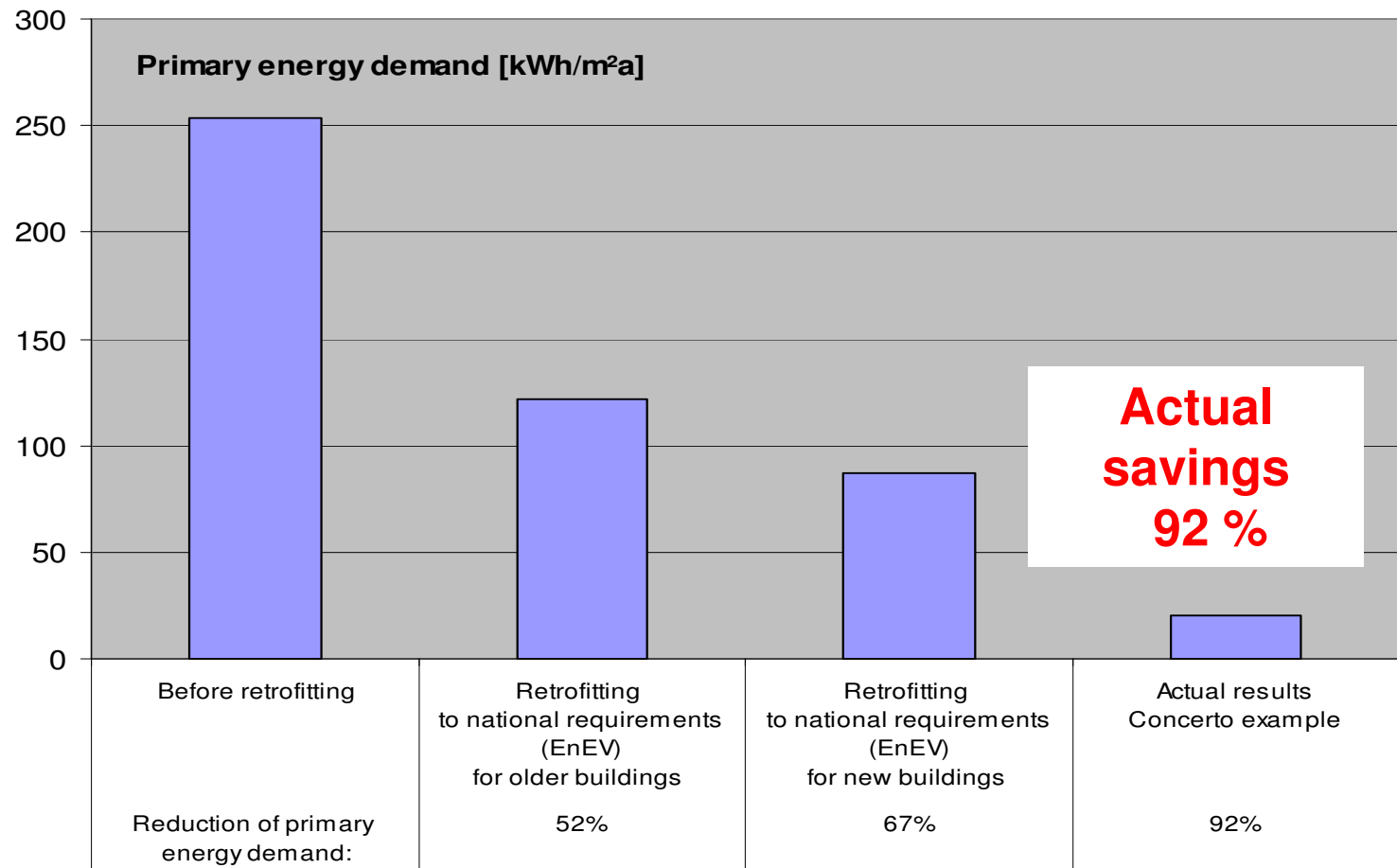
**Training programme for
planners**



The success: 92% Energy saving result in the completed 220 flats !



**Concerto/act2
Energy efficiency retrofitting 2007**



City of Hannover Concerto/act2

6. Industry

achieved:

- savings on heating 1990-2005 of about 16%
- Electricity demand, driven by economic growth, rose by about 12%.

way to go:

- intensive energy efficiency advice campaign
- voluntary commitments by major commercial/industrial energy consumers
- A successful project: Ökoprofit

7. Transport

Hannover has a successful Long-Term Transport Plan with a quite good Modal Split

- **27% on foot**
- **13% by bicycle (530 km of separate cycle-lanes, 180 km are running through parks)**
- **17% by public transport (10% more in the last 5 years by rising fuel-prices)**
- **41% by car (no increase in cars beyond 1995 level 411 per 1,000 inhabitants)**

Cycling



© Gerd Gmu for Hannover 2004



© Gerd Gmu for Hannover 2004

above-average number of cyclists (for German conditions)
530 km of separate cycle paths in the city

Local Public Transport

- 933 km of Public Transport routes in the city
- very good Light Rail/U-Bahn network with 12 routes and 63 Bus routes
- 163 million Passengers per year in the region
- 160 Mil. € subsidies per year
- good connections with the train network



Transport:

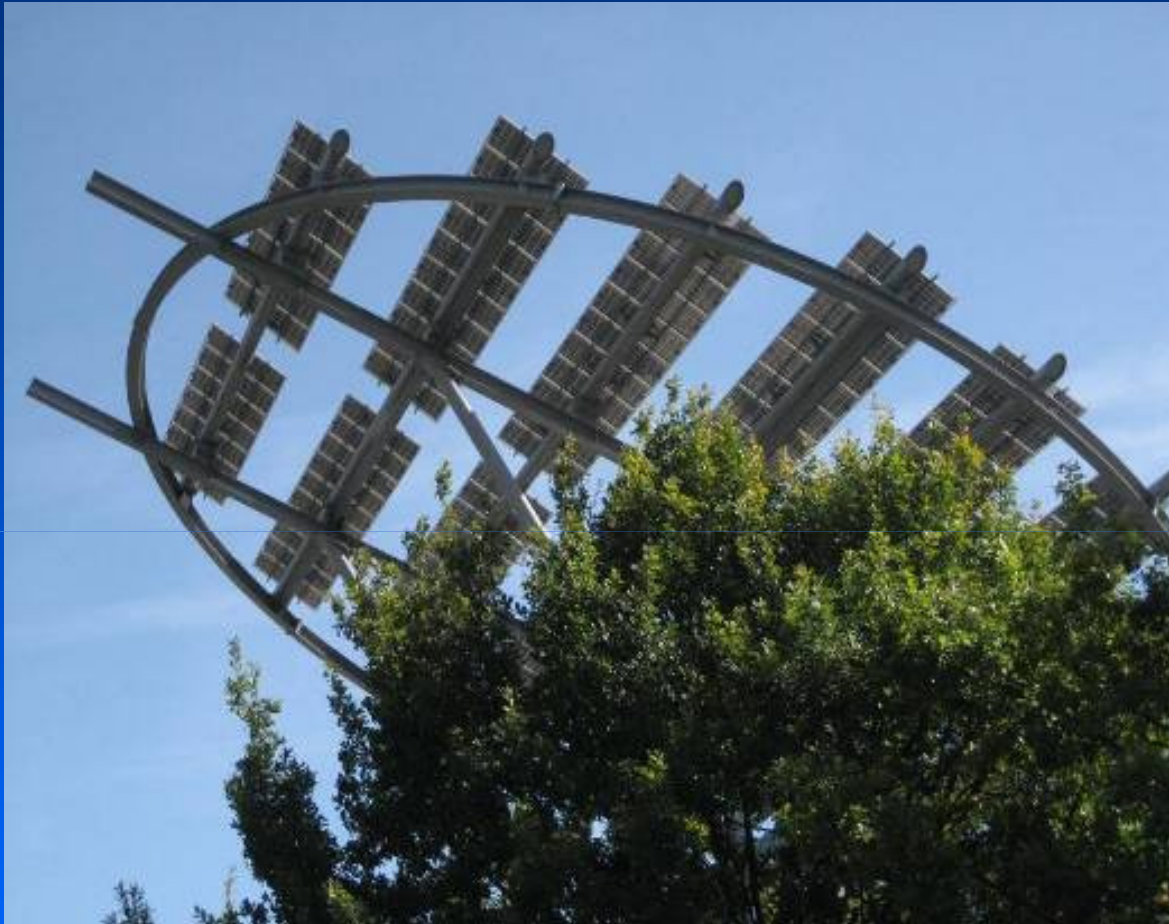
The main successes in Hannover needed, are at the national level:

- In Hannover there is only few more things to do on the local level (more bicycle-lanes, etc.)
- The main successes needed, are at the national level:
 - new Cars with less energy consumption
 - higher prices for fuel

8. Renewable Energy achieved so far:

- Around Hannover, 240 wind turbine generators meet about 8% of the region's electricity demand
- hydroelectric potential almost fully exploited at 16 GWh/a; the last one with 3 GWh/a is in planning

Solar energy in Hannover



A focal highlight in the skyline right from the main station: a photovoltaic installation on a Socio-cultural centre

**In the Hannover Region
(1.1 Mio. inhabitants)**

**3.400 Units Solar Water
Heating (32.000 m²)**

**1.500 Photovoltaik-Units;
approx. 120,000m²**

**This covers the electricity
requirement of approx.
3.500 households**

Renewable Energy

The target:

to meet 30% of Hannover region's electricity demand from renewable sources in the region in 2020.

to achieve this:

- replacement of 100 existing wind turbines with larger models (re-powering)
- construction of another 60 big wind turbines
- 10% of arable land planted with fuel crops
- increase in photovoltaic-plants

'Hannover Climate Alliance 2020' overview - CO₂ reduction in tonnes p.a.

4,640,000	total emissions in 1990 = 9.2 tonnes per resident today*
700,000	supply-side reductions through energy utility measures
700,000	20% demand-side reductions by industry, business and private households
400,000	electricity from renewables in the region
40,000	energy-efficient municipal buildings
1,840,000	total reductions by 2020 = 40% below 1990 baseline = 6,4 tonnes per resident in 2020

* not including traffic

Last but not least: 3 Economic Lessons

Economic Lesson 1: low carbon strategy brings more local purchasing power

- In 2005 Hannover's private households spent around 220 million € on gas and oil, most of which came from abroad.
- Reducing these imports will increase local purchasing power considerably.

Economic Lesson 2: low carbon strategy strengthens regional trades and industries

- Investment in and technologies for climate protection stimulate a dynamic added-value chain for the regional craft trades and businesses - an important motor for the local economy, often for the small and medium companies .

Economic Lesson 3: low carbon strategies brings more jobs !

In the Hannover region there are already 3,000 people working in climate protection.

In Germany jobs in wind energy is rising from 45.000 (in 2004) to 106.000 (in 2009)

Worldwide more than 2 Mio. jobs in the solar-industry in the next 20 years (greenpeace-study)

It is funny to read in THE AUSTRALIAN, Sept.14th 2009, The union-leader Tony Maher says "Green jobs are dopey"

Thank you!

further information:

www.sustainable-hannover.de

www.hans-moenninghoff.de



Section 63 City West



JONES LANG
LASALLE



City West
Property Holdings

