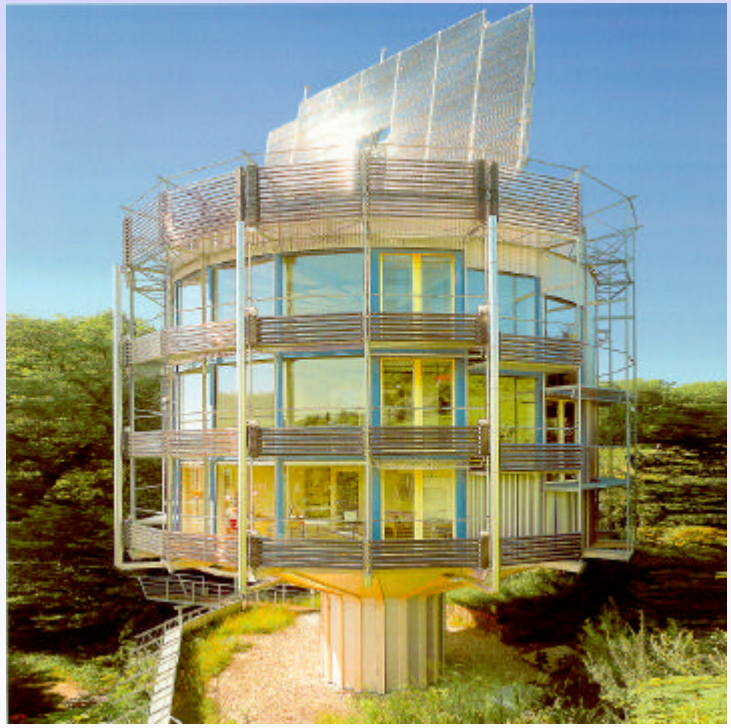
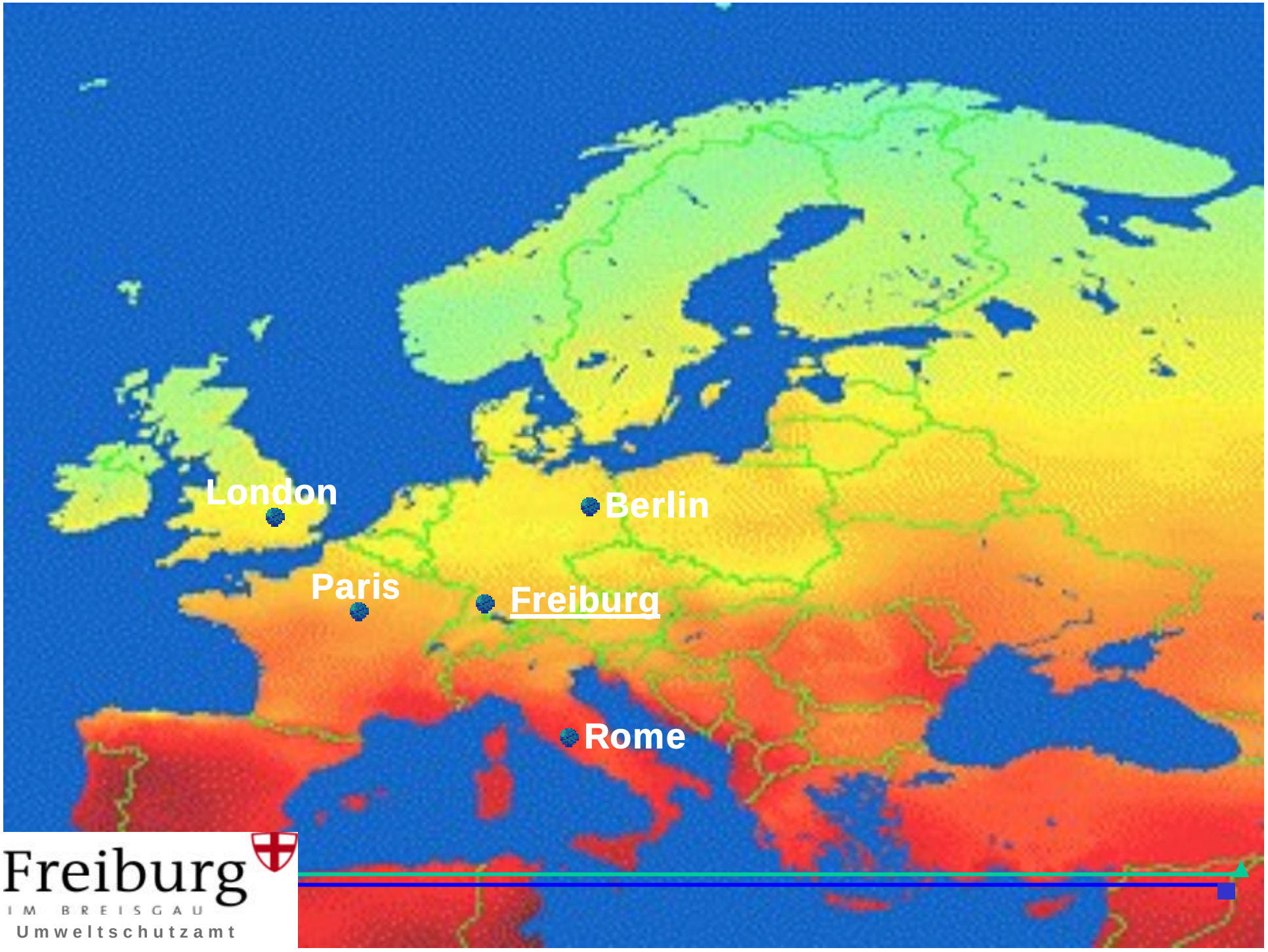
Sustainable energy solutions for cities
- case of Freiburg

Dr. Dieter Wörner
Director of the Environmental Protection Agency
City of Freiburg - Germany





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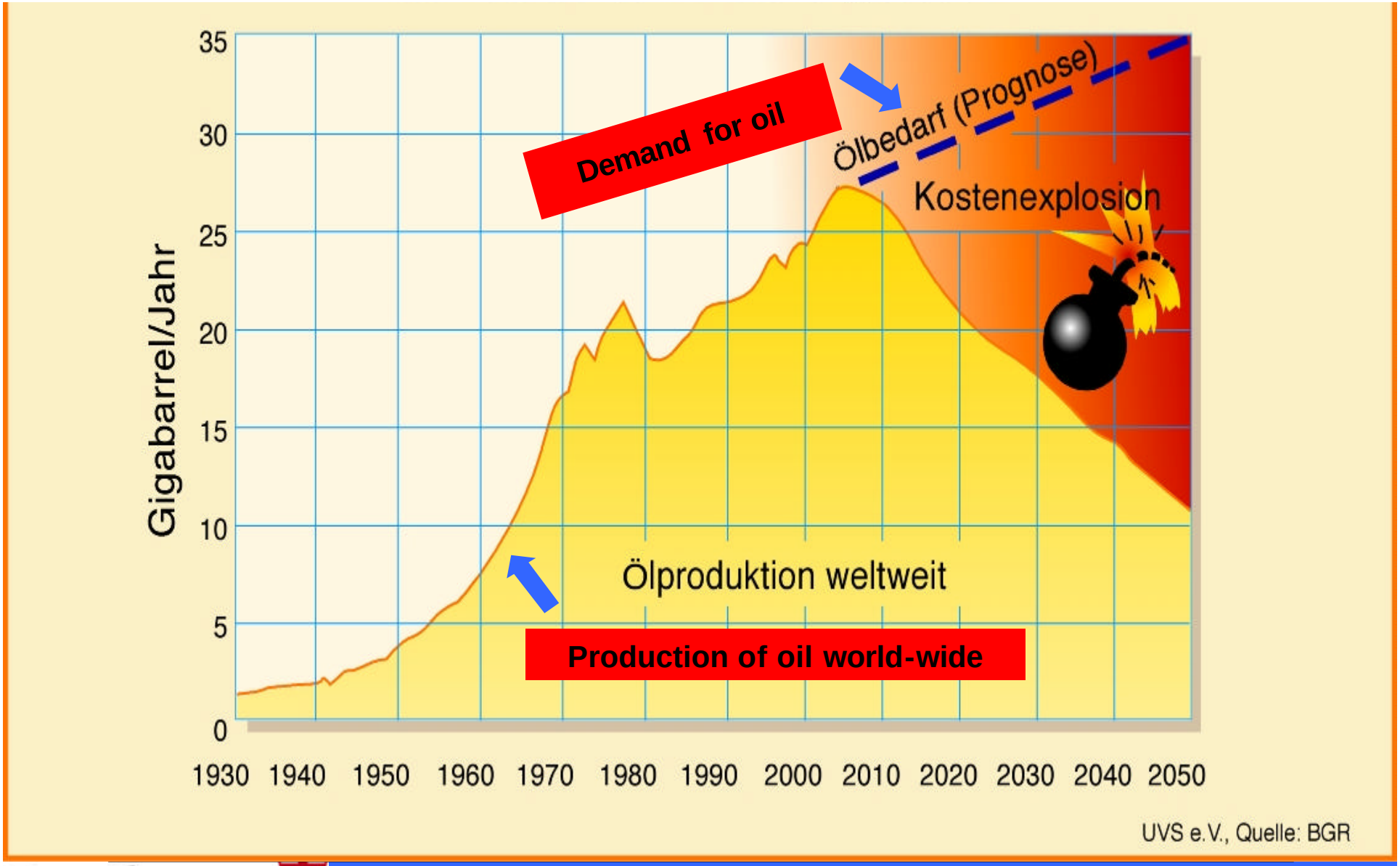
Explosion of Costs caused by limited Oil Resources



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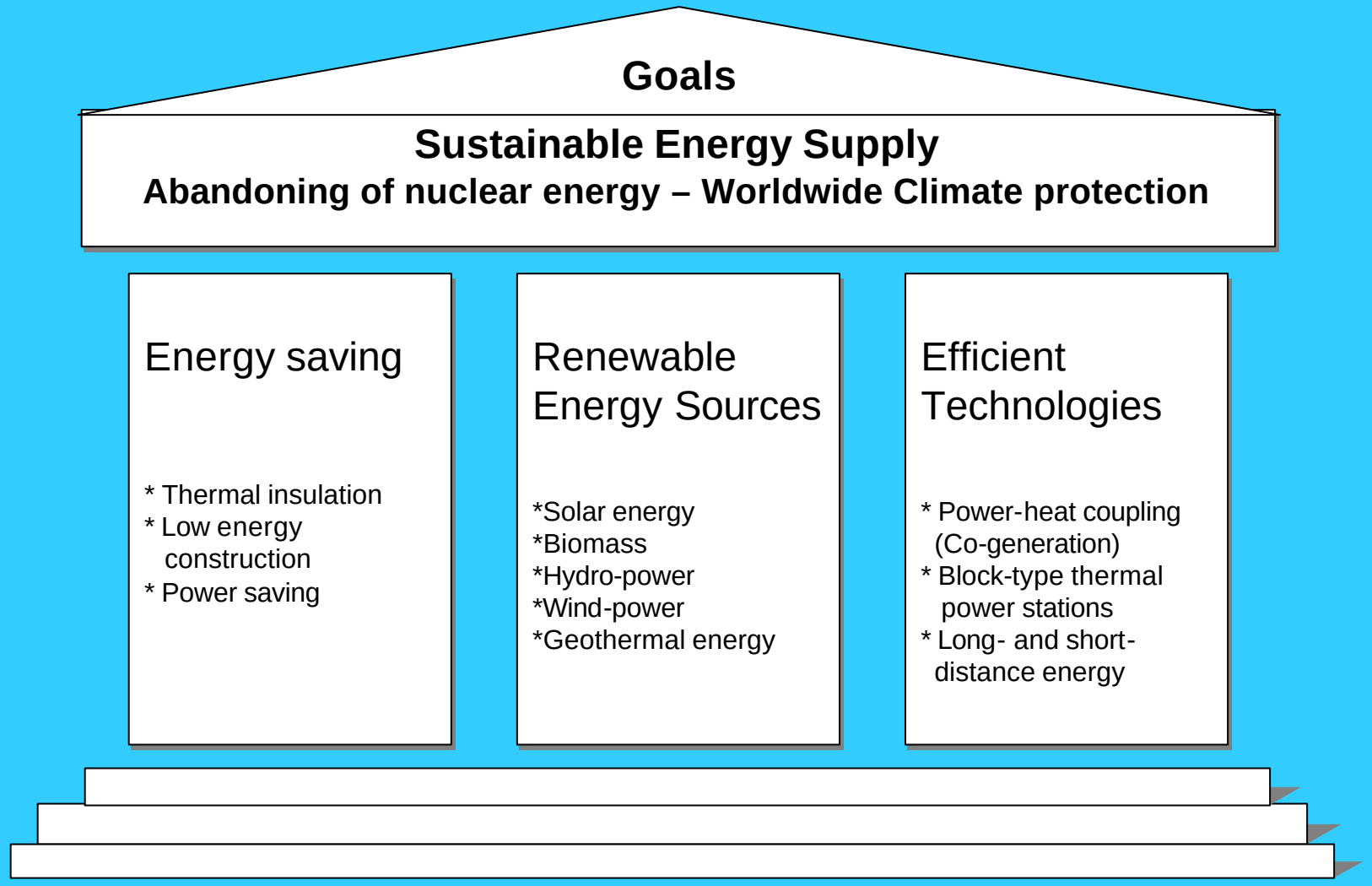
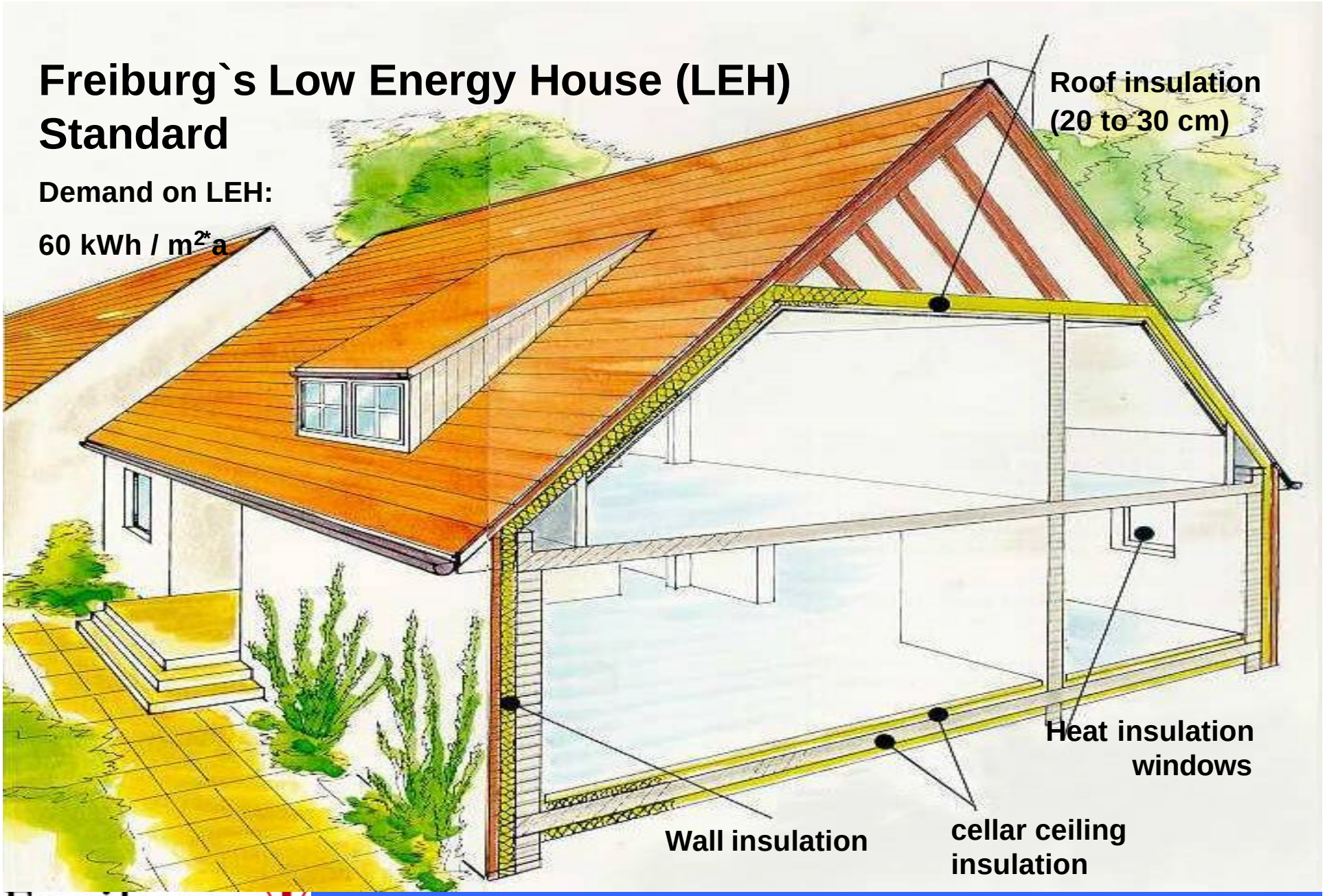
Energy Policy in Freiburg



Freiburg`s Low Energy House (LEH) Standard

Demand on LEH:

60 kWh / $m^{2*}a$



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Sponsoring Program Thermal Protection

2005/2006

Goal: Thermal insulation must be standard at restorations

300.000 € Government subsidies per year

Conveying of insulating roof, wall, window, bonus with solar thermal systems

Report of the first year:

- ca. 90 Applications
- 3,7 Mio € Prompted investments
- ca.1.000 t CO_2 Savings

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research and development

Fraunhofer Institute ISE

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Citizens´ Participation

Photovoltaic on soccer stadium rooftop

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Trade Fair Center

700 kW_p

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Expressway – Tunnel (365 kW_p)

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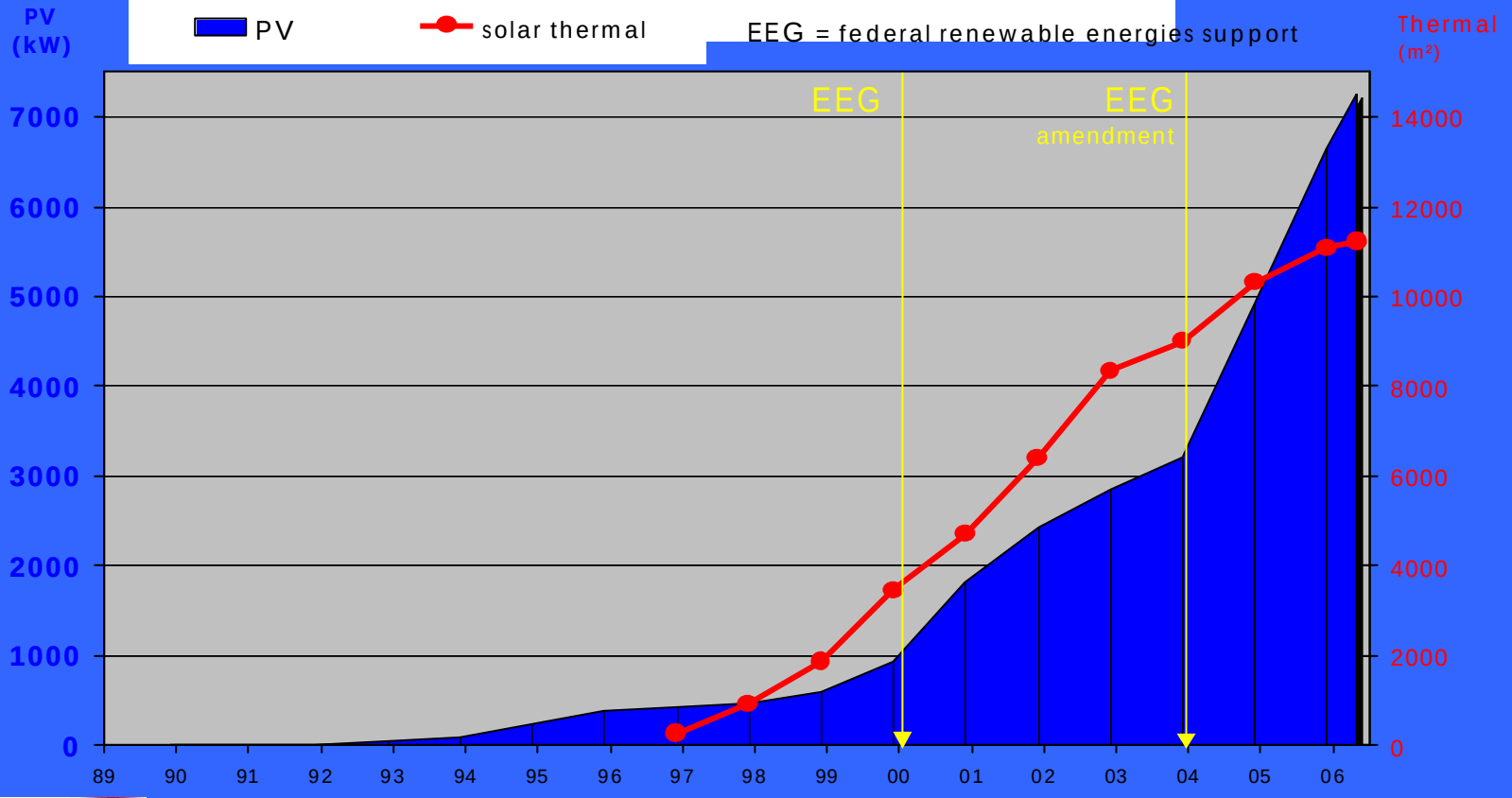
Solar installations in Freiburg

status 31.05.2006
PV: 7.26 MW, output: 6.5 m kWh p.a.
solar thermal: 11,223 m²
data source: badenova power company



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Solar Factory

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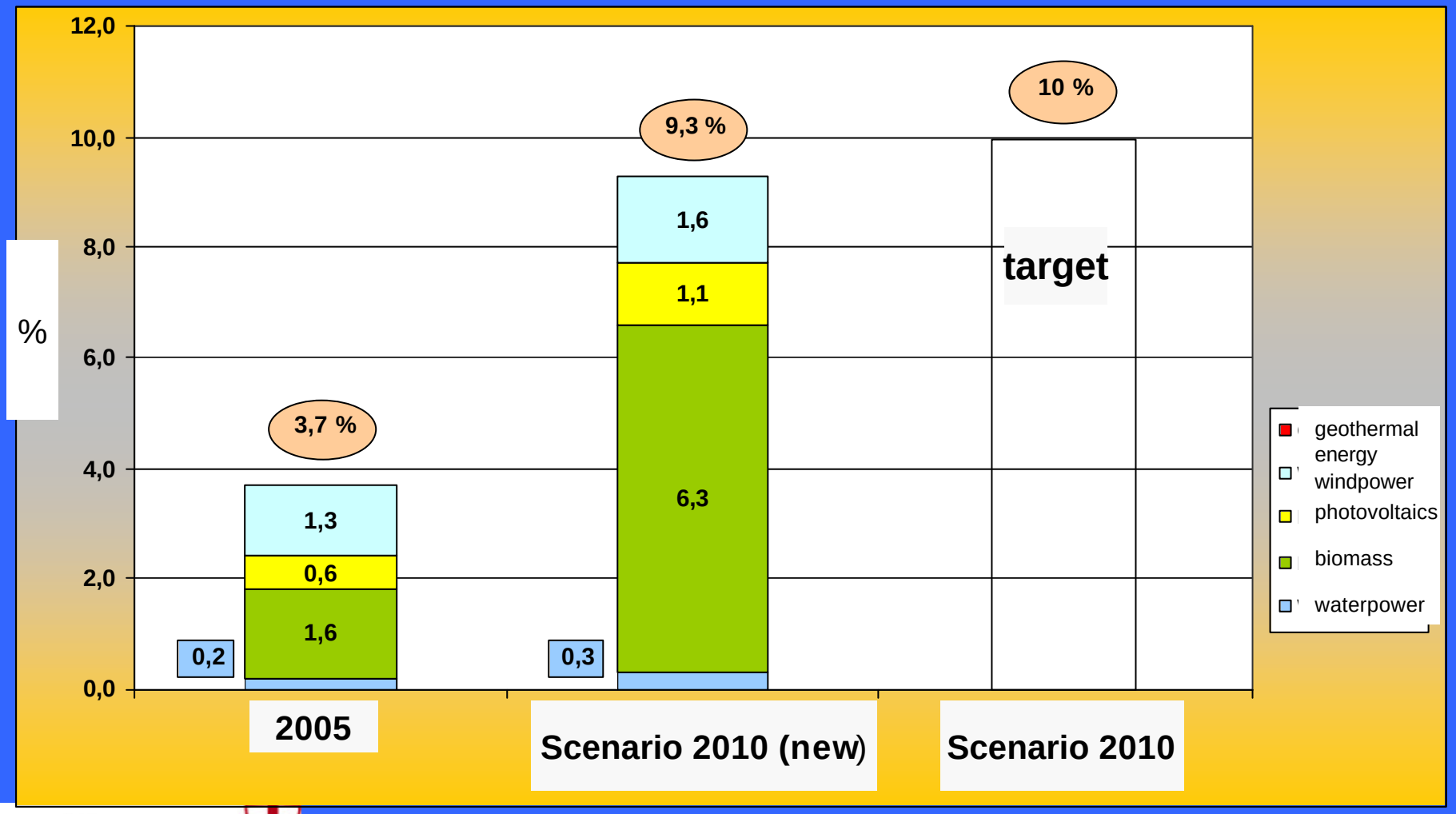
Electr. Power from renewable energy



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Biomass: Wood fired power plant

- City quarter: 5,000 inhabitants
- Co-generation plant

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Geothermal-project

Feasibility study:

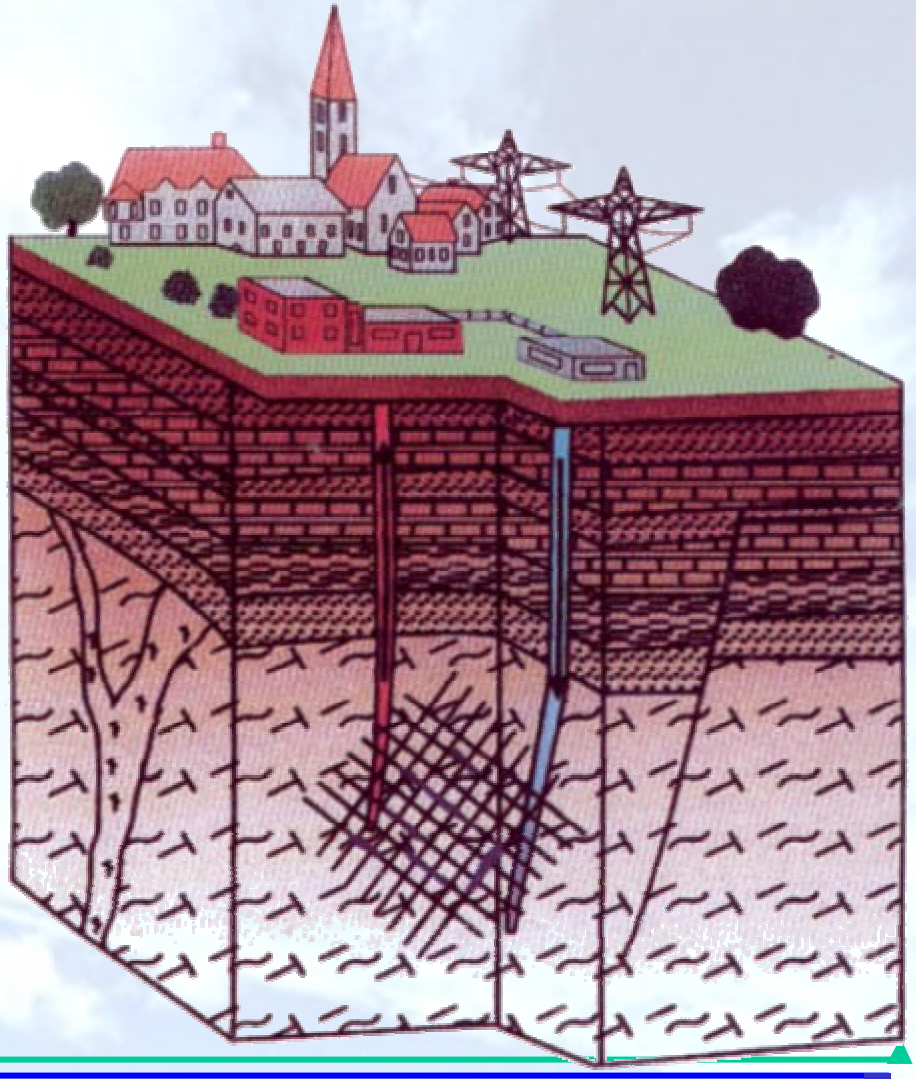
- Electricity 4-10 MW; Heat 23-40 MW

Problems to solve:

- High drilling costs–need for safety assessment
- High invest costs (50 Mio. Euro)

Schedule:

Start of energy production between 2010 and 2012



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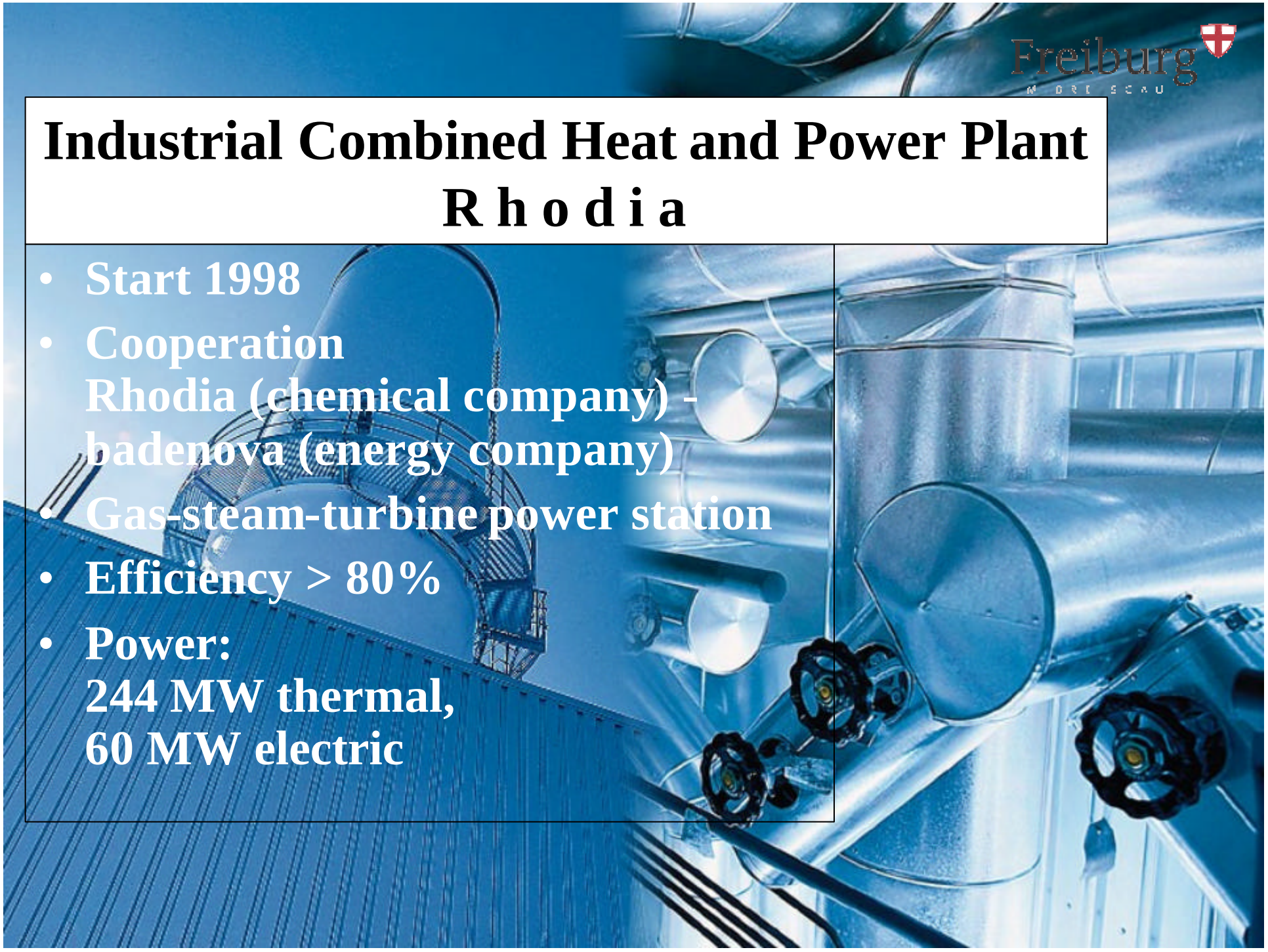
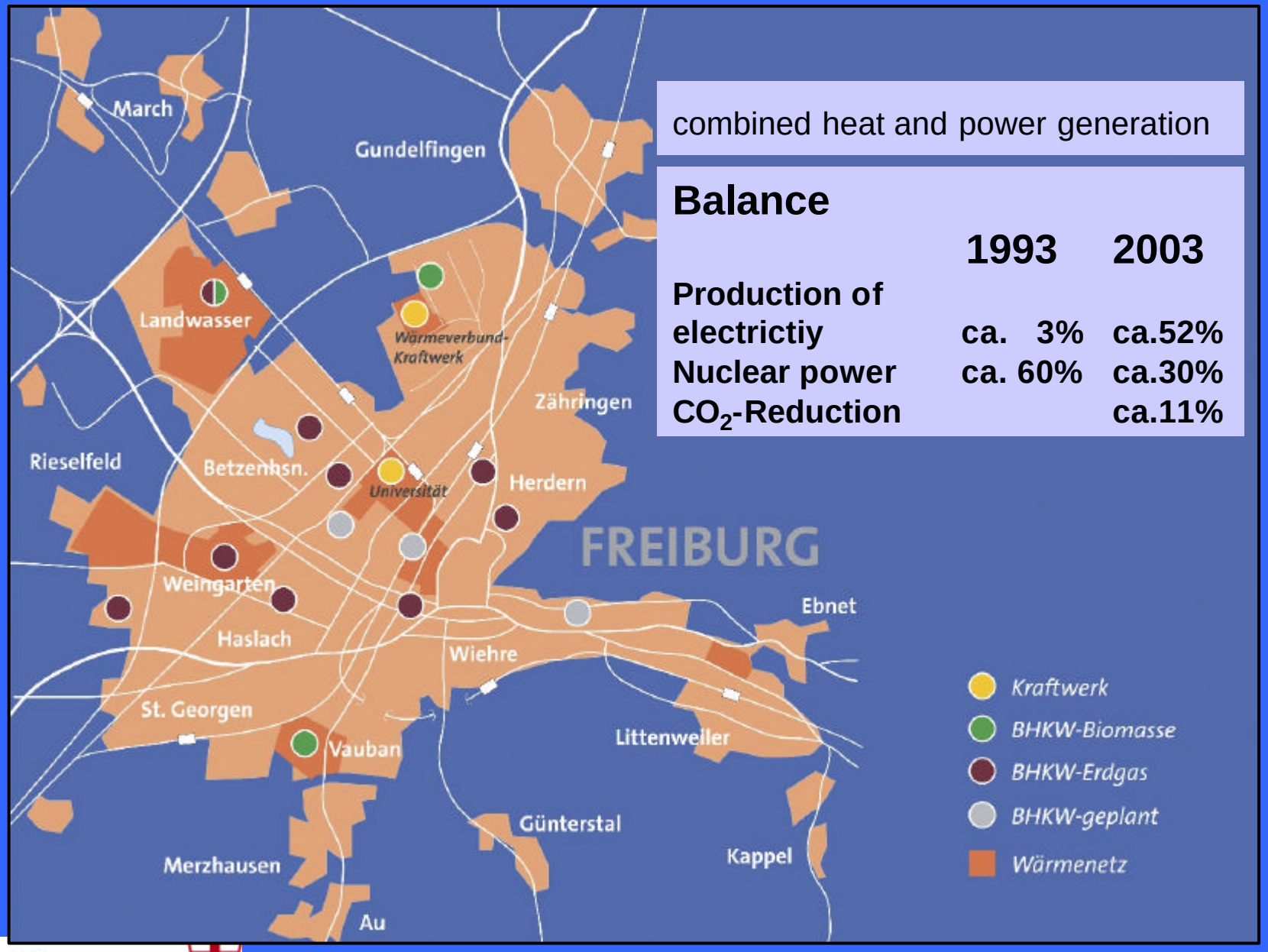


Industrial Combined Heat and Power Plant
R h o d i a

- Start 1998
- Cooperation
  Rhodia (chemical company) -
  badenova (energy company)
- Gas-steam-turbine power station
- Efficiency > 80 %
- Power:
  244 MW thermal,
  60 MW electric



combined heat and power generation

Balance

	1993	2003
Production of electrictiy	ca. 3%	ca.52%
Nuclear power	ca. 60%	ca.30%
CO_2-Reduction		ca.11%

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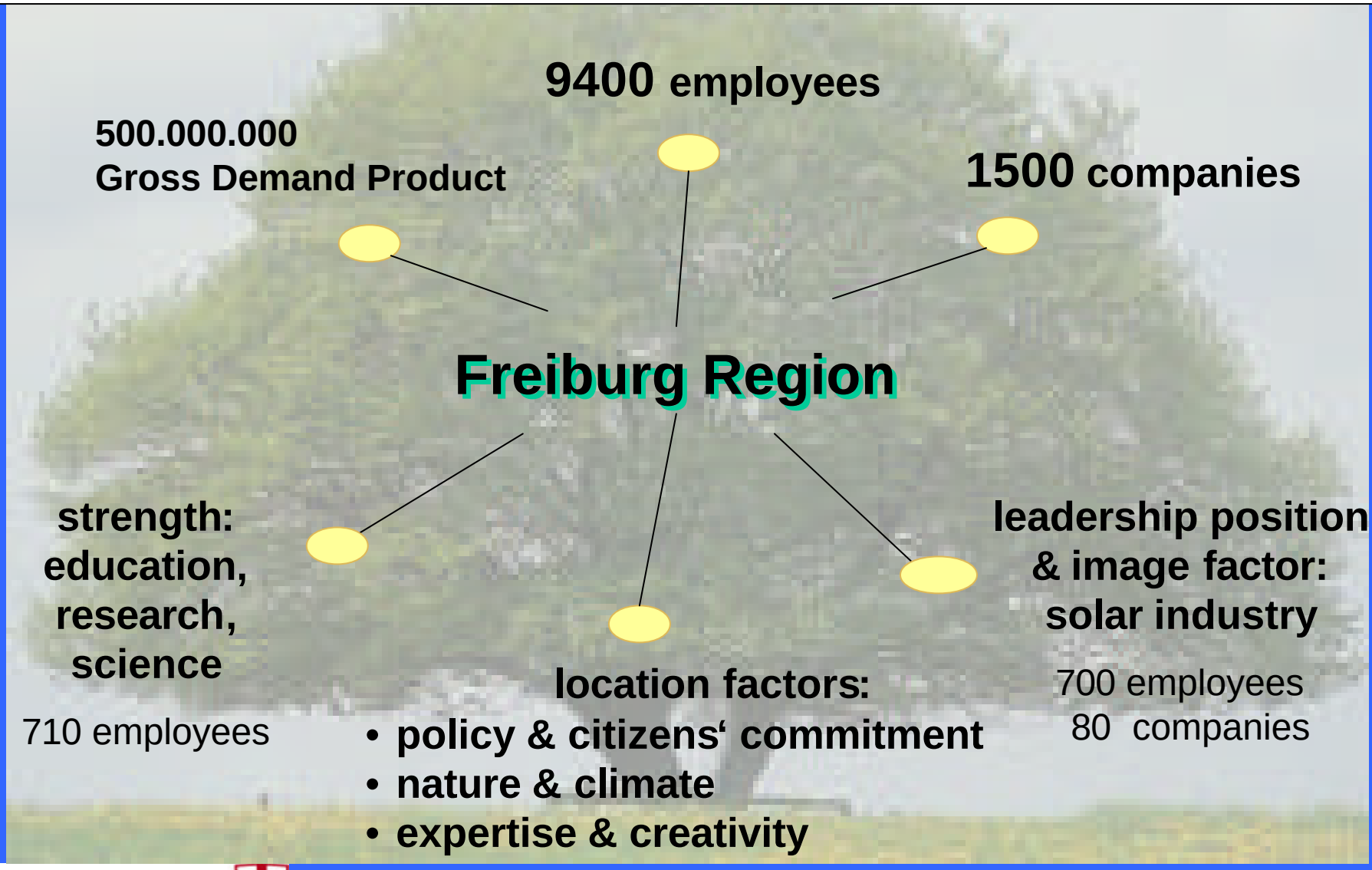
Environmental Businesses in the Freiburg Region



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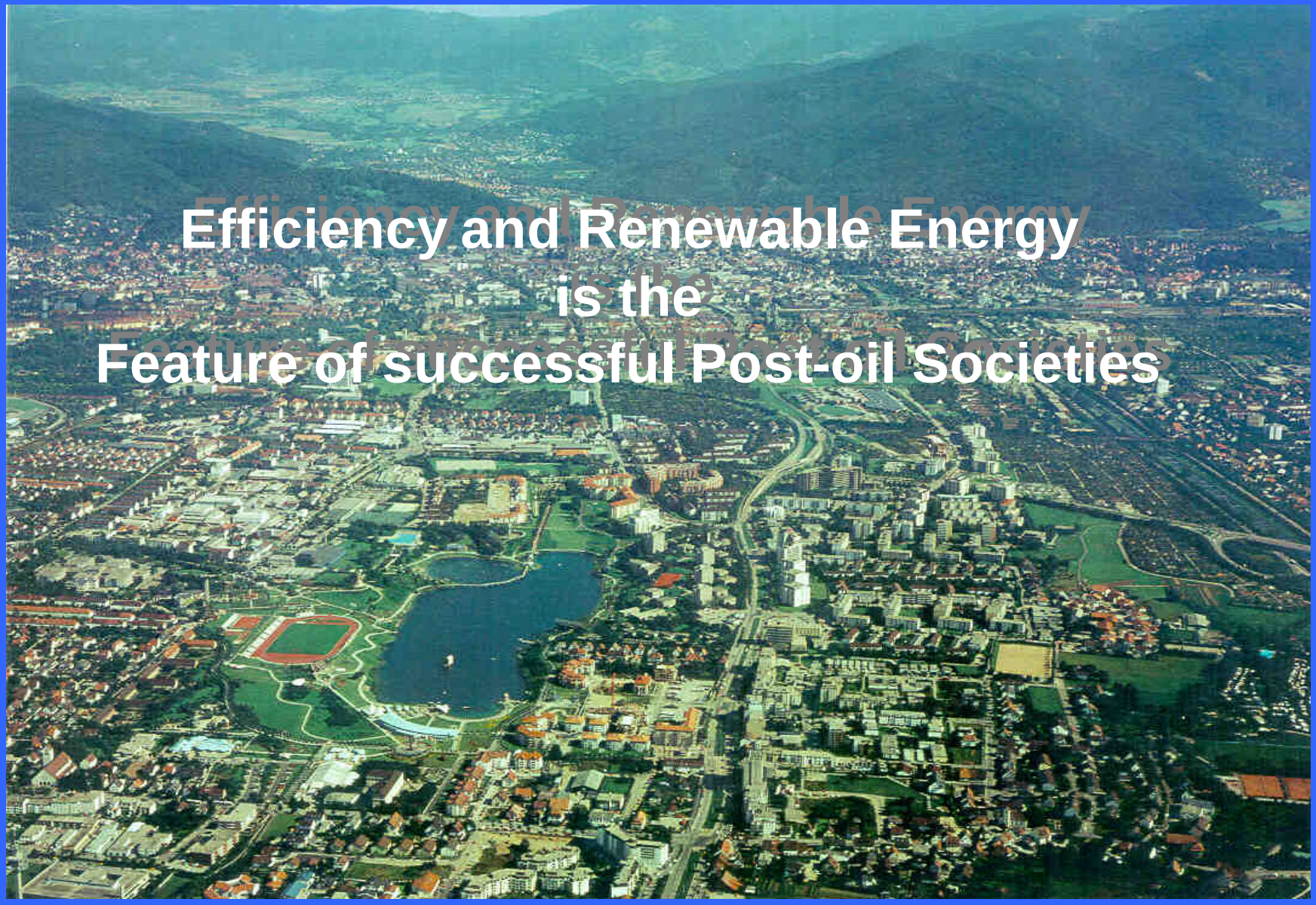

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Thank you very much for your attention.

Dr. Dieter Wörner, City of Freiburg

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