

# **Bavarian Environmental pact Achievements to date: 1995**

## **Energy Management in General**

### **Electric Utilities**

- At approx 200 g/kwh, the CO<sub>2</sub> emissions of Bavarian power stations are less than a third of the federal German average
- Efficiency improvements have been made to existing power stations; additional power plant output without new constructions: 246 MW
- Improvement of combined heat and power generation even in smaller plants; e.g. the output of Bavarian block-type thermal power stations(co-generation): 150 Mw
- For customers, 130 energy advisory bureaus manned by approx.400 experts have been set up; annual costs: almost DM 150 million
- initiatives for pilot energy-saving programs
- Improved heat insulation, heat recovery and energy improvements to buildings through advice on applications
- Despite unfavorable conditions, there are also efforts being made to harness wind-power; e.g., by taking wind-speed measurements at potential sites and specific project planning
- Economic activity is also geared toward providing and using energy on a long-term basis and in an environmentally benign way that conserves resources.
- 15% of Bavarian electricity is generated by hydro-electric power stations, which do not emit CO<sub>2</sub>.

### **Natural Gas industry**

- Improvement of energy use in natural-gas appliances (low temperature and condensing value boilers)
- Research and development in the field of emission reductions and energy savings to lower the amounts of NO<sub>x</sub> emitted by natural gas furnaces; reduction of NO<sub>x</sub> emissions between 1985 and 1980 by 30-36%
- Natural-gas powered vehicles - with designs and initiatives from the German gas industry

### **Electrical industry**

- Reduction of specific energy requirements in the electrical industry, for example, through heat recovery, improved heating, lighting and process & engineering technology
- Reduction of the specific energy consumption of electrical products, for example, through improved efficiency levels, recovery of electrical energy, new methods and techniques
- indirect energy savings through products from the electrical engineering and electronics industry. Only fundamental micro-electronic technology, cutting across all industrial products, systems and processes, can make major advances in energy savings possible.

### **Building industry**

- Active participation in the exploratory project "Intelligent House" (Domotics) by Bavaria's Ministry of Economics, Transport and Technology ; presentation of this project at the Construction '95 Fair.

## **Chemical industry**

- Intensive energy-saving measures in the past, decoupling of growth and energy consumption. Commencement of combined heat and power generation (co-generation)

## **Paper Industry**

### **Energy management**

- To save primary energy, the factories are generating process heat at various levels of production from residual materials and by-products and using this for heating and drying proposes
- Since 1955 specific energy consumption has been reduced by 60%
- Environmentally compatible production, i.e., closed loop, energy recovery, efficient use of raw materials, etc.

### **Waste Management**

- The paper mills in Bavaria are making intensive use of raw materials reprocessing as many of the residual materials as possible as secondary raw materials.
- In 1988 the paper industry offered to use all the waste paper from Bavarian households in its manufacturing processes; this pledge is observed for all waste paper that is supplied
- Consistent expansion of recycling capacity for waste paper in Bavaria since 1980 from approx. 540,000 tons to a probable 1,500,000 tons in 1995. Available capacity by far exceeds the amount of waste paper available in Bavaria.

- Use of wastepaper(199A)

Total	60%
old newspapers	100%
packing paper	100%

- Development of treatment and separation methods for re-processing composites made of cardboard, PE and aluminum

Current capacity is 7,000 tons/yr; all components are reprocessed.

Paper factories reprocess the largest possible amounts of residual materials as secondary raw materials; around 75 % of all the residual and waste materials occurring in the Bavarian paper industry are reprocessed either materially or thermally.

### **Renewable Resources**

- Bavaria already has 2,500 Mw of output using bio-mass as solid fuel in small furnaces and heating stations run on bio-mass.
- During the last 18 months a network has been set up consisting of some 90 filling stations supplying organically based diesel fuel
- In agriculture, forestry and landscaping, oils used in chain saws are virtually all derived from plants
- In the last few years, BMW AG has carried out a great deal of development work on using natural substances in vehicles and manufacturing.
- BayWa AG has assumed a leading role in putting organically based oils and lubricants on the market, as well as

organically based diesel fuel.

- Development of a special short fiber by Fuessener Textil AG as a replacement for the asbestos used in clutch disks
- Creation and launch by the textile group, Hof, of a non-woven made from flax to replace the substrate used in cress farming and in landscaping and horticulture.
- Bavarian rural traders are performing pioneering work in the use of organic diesel fuel and in marketing plant-based hydraulic oils and lubricants.
- The Bavarian Association of Cooperatives has been using bio-mass to fuel its drying plant for staple commodities in Lengenfeld since 1992. Two bio-mass boilers have been installed, each having an output of 7.5 Mw. For this pioneering achievement, the Cooperative was awarded the promotional prize for "Renewable Resources" offered by the Bavarian State Ministry of Food, Agriculture and Forestry.

**Bavarian Environmental Pact  
Commitments (1995-2000)**

**Waste Management in the Paper industry**

- It is planned to further increase the use of waste paper
- It is planned to open up new markets for paper containing recycled paper
- As part of AGRAPA's self-imposed pledge, Bavarian paper manufacturers will help to increase the material recycling rate of waste graphic paper to 60%, to use recycling friendly fibrous materials, paper additives and filler materials, and to promote research and development of measures to increase the material recycling of waste graphic paper. Together with the waste-disposal authorities or third parties acting for them, the industry will ensure that waste paper is collected cost-effectively and with quality-assured principles in the respective regions, in line with product responsibility.
  - Expanding recycling capacity for composite packaging to 50,000 tons/yr.

**Energy Management in General**

**1. Economical use of energy –**

**Energy-saving technologies**

**Electric Utilities:**

- Organizing a competition to promote the economical and efficient use of energy (Eta competition)

**Gas industry:**

- Statement by the German gas industry on the protection of the climate for 1987-2005: reduction of CO<sub>2</sub> emission resulting from the generation of each kWh of usable heat to 0.23 kg by 2005. In the process, the reduction in the old federal states should be approx. 25% compared to 1987, and more than 50% in the new federal states compared to 1989.

**Electrical engineering industry:**

- Lighting: up to 75% energy savings by replacing old lighting equipment with modern louvered mirror lighting + fluorescent lamp ballasts + dimmer switches that react to daylight conditions
- Servo-systems for buildings: combination of operating devices for lighting, heating, shutters and other controls using electric switches and operator control switches using data transfer
- Development of new servo-mechanisms for engine electronics as a prerequisite for the construction of motor vehicles with reduced CO<sub>2</sub> consumption
- Development of energy-saving automatic control techniques for industry, e.g., computer controlled systems, fuzzy logic controls
- ZVEI will continue their efforts to provide information about ways of economizing in the Bavarian electrical engineering industry. Important topics are, for example, analyzing actual status and weak points, optimizing the way various electricity-consuming appliances are used, avoiding peak loads, use of central control technology, use of energy-saving lamps, etc.

**Building Materials:**

- Mass fuel consumption per kg of cement will be reduced from 3,550 kJ (1987) by a good 20% to 2,800 kJ by 2005, e.g., through improved heat recovery systems
- Mass fuel consumption per ton of lime will be reduced by 15 % to 20 % between 1987 and 2005
- Up to 30 % energy savings between 1993 and 2005 through conversion of production in the factories of the Bavarian fireproofing and stoneware industry from conventional tunnel-type furnaces to high-speed/roller-hearth furnaces and the use of heat recovery Systems

**Refineries:**

- Utilization of process energy in catalytic cracking plants of the Neustadt oil refinery (ERN) and the Vohburg/Ingolstadt refinery company (RVI) by means of electricity generating turbo expanders. In all, this means approx. 15 Mw of power is provided practically without any use of primary energy. The electricity generated is used within the refinery.

**Paper industry:**

- Reduction of energy consumption and CO<sub>2</sub> emissions caused by consumption through energy-supply conversion to gas-and-steam plants which use gas and recyclings as fuel
- By 2005 reduction of specific CO<sub>2</sub> emissions by at least 20% compared to 1987 (statement of March '95 by the paper industry on Climate Protection)

**Building industry:**

- Continuation of the "Intelligent House" project which will be divided into three subgroups: building construction, materials, building services.

**HVAC:**

- Companies working in the field of heating, air-conditioning and plumbing are ready and willing to reduce energy consumption by 10% - 25% through the use of new technologies for energy management systems. To achieve this, the member companies of the Bavarian Association of the Heating, Air Conditioning and Plumbing Trade will also offer users alternative financing models in the form of advance financing

**Waste heat recovery – Co-generation:****Electric utilities:**

- Increase in the number of combined heat and power generation systems wherever this is economically viable
- Provision of low-temperature, local power-station heat where it is not feasible to use long-distant heating
- Increased provision of district heating services in the locality, especially in densely built-up areas
- Approximately 25,000 new single-family and two-family homes are built in Bavaria each year. The intention is to convince 10 % of these owners to have heat pumps installed within the decade.
- Several large Bavarian utility companies will subsidize new heat pump systems with DM 400/kW<sub>el</sub>

**Chemical industry:**

- Analysis and implementation of combined heat and power generation from an environmental and economic viewpoint with a view to suitable investment projects

**Refineries:**

- Installation of combined heat and power plants based on gas turbines with an overall output of approx. 120 Mw
- Provision of low-temperature heat from the cooling circuits for energy consumers in the neighborhood

**Gas industry.**

- Intensify efforts to build more gas-fueled block-type power stations, natural gas powered turbines for decentralized combined heat and power plants, the use of natural gas in gas-and-steam power stations for the supply of public electricity and long-distance heating and gas-fueled heat pumps functioning on the principle of absorption and compression

**Improvements in the efficiency levels of power stations****Electric Utilities**

- Increased net efficiency in new power stations with an output of more than 300 MW at their best point: up to 45% for hard coal, 42% for brown coal; the average is currently approx. 38%
- By 2005, improvements in the efficiency levels of power stations by increasing power output by 75 Mw, particularly for Isar I and Isar 2 Nuclear Power plants, without producing any additional emissions

**2. Renewable forms of energy (apart from organic substances)**

The energy industry supports the aims of the Government of Bavaria to substantially increase, over the next few years, the amount contributed by renewable forms of energy to the supply of primary energy, from its current level of approx 7%

**Hydroelectric power****Electric utilities**

- The electric Utility is of the opinion that hydroelectric power will continue as the mainstay in the use of renewable energy. Every opportunity for increasing the supply of hydroelectric power in Bavaria will be thoroughly exploited and measures carried out to increase the efficiency of hydroelectric power stations currently in operation. The Bavarian government will do everything in its power to ensure that these efforts are not aggravated by the imposition of unduly strict discharge water regulations. The use of hydroelectric power will be made part of current deregulation efforts and swifter authorization procedures.

**Solar energy****Electric Utilities:**

- For the new buildings of the electric utility companies, the installation of photovoltaic facades or roof-integrated photovoltaic power-generating systems will be explored and support for customers with such possibilities provided
- The photovoltaic program "Sun at School" will be extended from its current numbership of 200 to a total of 500
- The loan of 100 portable photovoltaic kits for use in Bavarian schools, with appropriate government funding
- Continuation of work at the solar-hydrogen plant in Neunburg v. W. and substantial Co-financing of the newly founded Solar Energy Research Association (FORSOL) by Bayernwerk

**Gas industry:**

Combined use of regenerative energy and natural gas: pilot projects in the areas of solar energy + natural gas and biological fuels (e.g., wood chips) + natural gas

**Building industry:**

- Increased use of roof-integrated solar collectors for hot water supply

**Wind power****Electric utilities:**

- Support for the construction and operation of wind power systems, where technically and economically feasible

**Hydrogen****Electric Utilities:**

- Analysis of the use of current reserves for hydrogen generation through the use of hydrogen electrolyzers - with a view to implementation, wherever feasible in energy terms and economic viability
- Promotion of hydrogen technology through cost-efficient electricity supply in off-peak load periods and installation of appropriate connection systems for hydrogen generator plants

**Gas Utilities:**

- Investigation of the use of hydrogen (H<sub>2</sub>) in order to clarify questions of sourcing, distribution and use.

**3. Energy consultation (customer assistance)****Electric Utilities:**

- Intensification of energy consulting services (low-energy house) as well as development of concepts for including co-generation, solar collectors and heat pumps in housing construction
- Development and distribution of guidelines for energy-saving

**Gas Utilities:**

- Consulting and supply of finance models for household and small industry customers and trades as well as energy management for industrial companies
- Provision of local heating services
- Support for planning, financing, construction and operation of energy-saving heat generating Systems

**4. Miscellaneous****Electric Utilities:**

- Promoting the increased use of electrically powered vehicles
- Forming a consortium for operating a fuel cell bus
- Carrying out an authorization procedure for the EPR (European Pressurized Reactor), without reference to its location
- Scientific study of the construction and maintenance of conduit routes that comply with nature and species conservation requirements; drawing up corresponding principles for utility companies

**Gas Utilities:**

- Development of the natural gas fuel cell:  
active involvement in its development through realization of pilot projects (e.g., in Nuremburg)
- Accelerating the introduction to the market of vehicles powered by natural gas, particularly of fleet vehicle
- Measures:
  - Competitive pricing with regard to market entry

- Support for and promotion of the construction of suitable filling stations throughout the region if the demand is there
- preparing technical regulations

### **Renewable Resources**

- Bavarian industry is prepared to do its utmost to fulfill the objective set by the Bavarian Government of providing 5% of all primary energy consumption from bio-mass in the shortest possible time
- Bavarian industry will provide an innovative approach and unwavering support for setting up product lines:
  - for bio-genic fuels
  - for bio-mass as solid fuel
  - for methane gas and
  - for plants as industrial raw materials
- AUDI AG and BMW AG will further increase their activities in the use of regenerative raw materials for packaging and in cars
- BayWa AG will further extend their bio-diesel filling station network and substantially increase the use of organically based diesel for their own vehicle fleet.
- BayWa AG will upgrade their range of vegetable-based industrial oils, lubricants and paints as well as building materials from natural fibres at their sales outlets and DIY stores, provide blanket-coverage in Bavaria and increase marketing activities for these products.