DISTRICT HEATING

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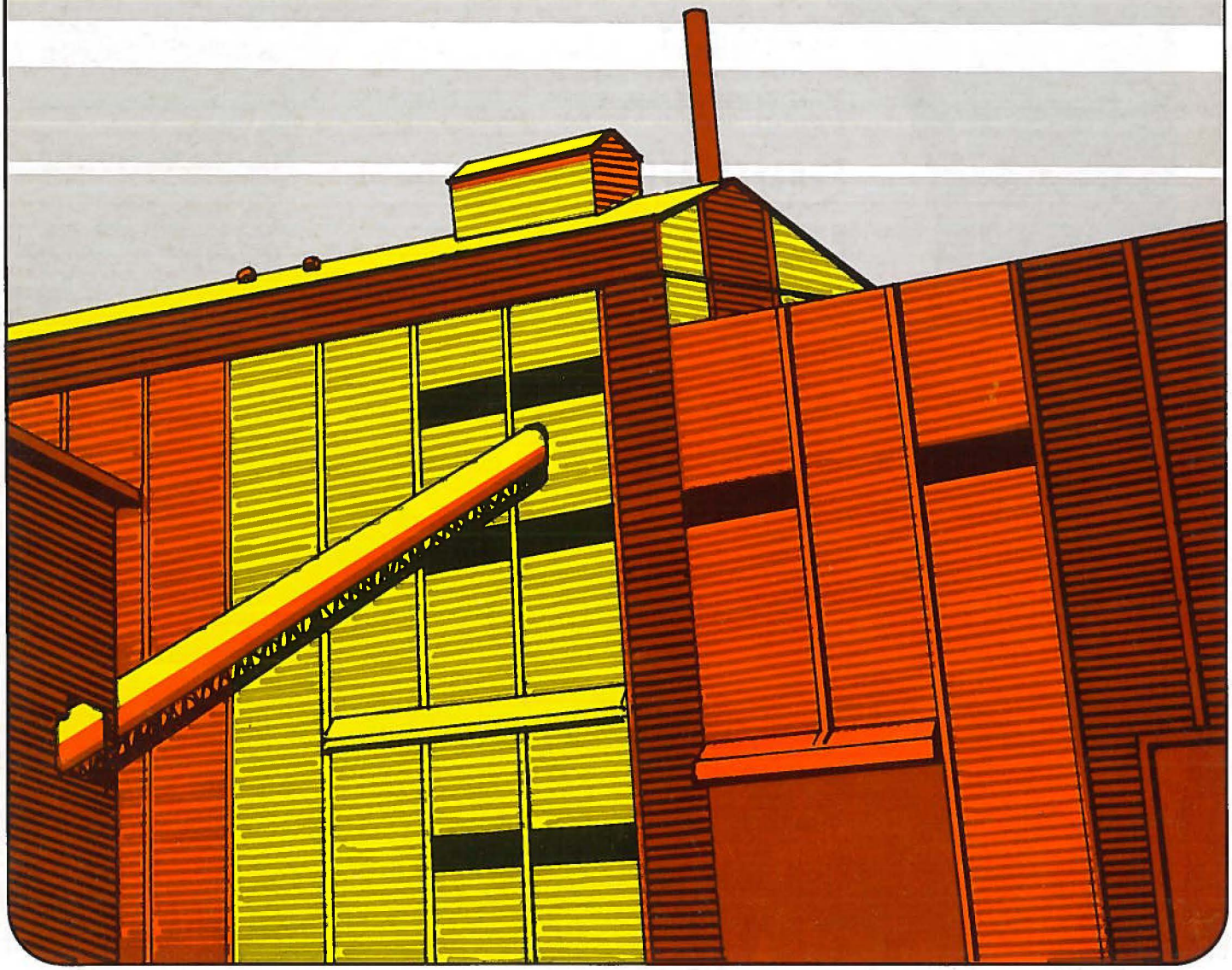
DISTRICT COOLING IN HARTFORD
EUROPEAN STUDY TOUR
DISTRICT HEATING RD&D RESEARCH



European Energy Innovation Study Program

by **Norman R. Taylor,** Executive Director IDHA

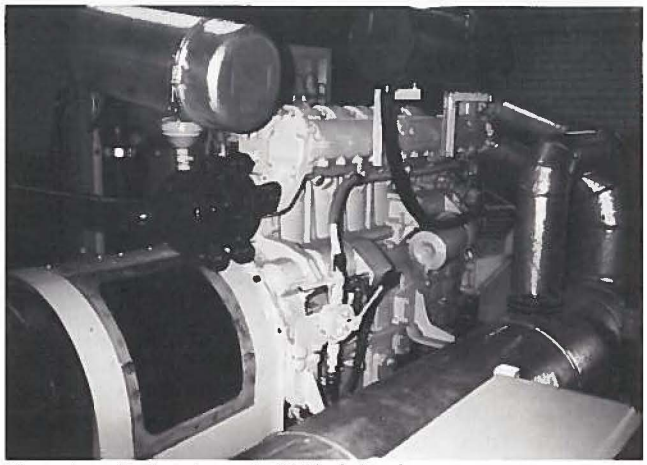
The European Innovation Study Program, held November 1-15, 1982, was arranged to include visits to facilities which offer innovative technologies in power generation, energy storage, recovery and conservation which could be utilized in public and private utility systems in the United States. There were ten participants in the program, with Dr. R. Eric Leber, Director of Energy Research, American Public Power Association, being the group leader. Of the other participants, seven were involved in the management of municiple utility systems, one represented a major consulting firm engaged largely in utility work and N. R. Taylor of IDHA with the objective to study programs and products related to district heating and cogeneration.

The tour was intended to be a basis of continuing contacts for participants interested in future international cooperation. It was designed to include coverage of questions related to commercial contacts, organization-to-organization exchanges, joint ventures, and to provide an ongoing source of information on European products. There was a novel aspect to the organization of this study program, in that each participant was assigned a particular facility that was to be visited and obligated to prepare briefing materials, typical questions and a summary of information expected. This was a very effective technique.

In this report systems and materials that are related to district heating and cogeneration will be given greater emphasis than other observed technologies. However, all phases had strong relationships to the principal objective—reduction of dependence on supplies of imported petroleum products.

In the Federal Republic of Germany the group visited Heidenheim where Karl Hein and his company have been most innovative in the development of combined heat and power facilities. The town is in the region of the Swabian Alps between Ulm and Stuttgart, and has 50,000 inhabitants. The Stadtwerk Heidenheim, a municipal utility, is responsible for the supply of gas, electricity, water and heat. A subsidiary has operated in the field of energy planning since 1976, working with other towns and communities in the Federal Republic of Germany.

The Federal Republic must import 60% of its primary energy requirements and it has determined that conversion losses are around 55%, a figure that is considered alarmingly high. The innovation by Stadtwerk Heidenheim is the development of modular cogeneration plants powered by natural gas, sewer gas, refuse gas, coal and oil gas, petroleum, or, in the future, hydrogen. In general, they utilize stock engines



Natural gas fired engine at the Heidenheim plant

that are manufactured for heavy truck and marine applications. The engines drive generators and the jacket and exhaust system heat are fully captured to provide hot water based district heating. Advantages claimed are primary energy savings of 35 to 45%, 30 to 50% less capital investment than normal district heating supply systems, decentralization that permits use of low temperature heating water, and the multiple plants provide good flexibility in cases of emergency. Our most impressive observation was at BHKW Mittelrain where 1666 living units are heated and supplied power from an installation of 6 engine generator sets. These engines are manufactured by M.A.N. and are a basic heavy truck diesel modified for natural gas operation. The power station is wall to wall with a residence building and is so well isolated that there is no apparent noise, vibration, fumes or landscape intrusion. We could not hear the engines

Power room, on left, adjacent to the living units at BHKW Mittelrain

The air intake at the BHKW Mittelrain project was designed to blend with the landscape.

operating until the service doors were opened. The system is fully automated, units start and stop in accordance with load. As to service, it was reported that one engine was dismantled after five years of operation, measured, and as there was no appreciable wear, was reassembled and put back into service.

In this same location we observed a modern sewerage treatment facility that extracts methane gas for the operation of tandem cogeneration units. This plant and a larger one in the central area are typical of the Stadtwerk AG mode of operation.

The program directed its attention to a compressed air storage facility at Huntorf. Here off-peak electric power drives motor-generators that power air compressors that pressurize an underground cavern. In peak demands, the compressed air is fed to combustion turbines with natural gas and spin the motor-generators as power produces for the electric grid. A clever system of clutches connects either the compressors or the turbine power unit to the motor-generator. This was a large facility producing 290 MW, yet is fully automated and controlled from a station about 80 miles distant. The only personnel are those that visit periodically for maintenance. We witnessed a special start-up from the remote station and it was a most impressive display of automation.

In Stockholm district heating was fully discussed at the offices and plant of Stockholms Energinerk and Svarthalsforsen AB. Among the items explored at the meeting was the mandate of Swedish voters that nuclear power must be phased out fully by the year 2012. This will leave a huge void in availble power and no capacity for electric heating. It is fortunate that about 60% of the major cities are heated by central thermal systems. The Uppsalla Kraftvarme AB was visited where there is being developed a rock cavern water storage facility that is heated by solar collectors. It is expected that this system will strongly supplement the town district heating system that now uses cogeneration plus the utilization of sewer gas.

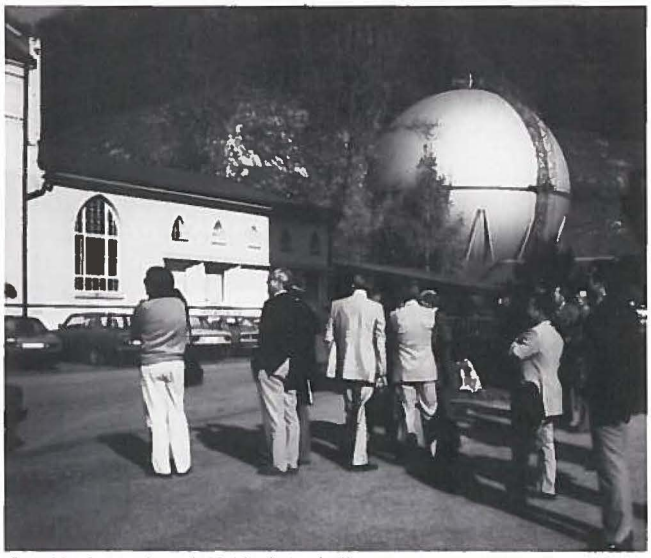
We journeyed to Stora Vika where two projects are underway; one is the production of cleaned pulverized coal and the AB Nynas Petroleum works, where coal liquidification is being considered. It seems that Sweden has a number of cement plants that have been abandoned in the economic slump and the slow down in highway construction. The cleaning and grinding facilities of one plant have been converted to make pulverized coal that is delivered to power plants in the same manner that cement would be handled. The liquidification plant design was very complex, and later in the tour we were advised that the project had been shelved for the present.

The group examined the development of the United States Stirling engine as a power and heat producing device. The engines are now highly developed and are being thoroughly tested. Their fuel flexibility due to their external combustion process make them extremely useful not only as electric power produces but as prime movers in transportation.

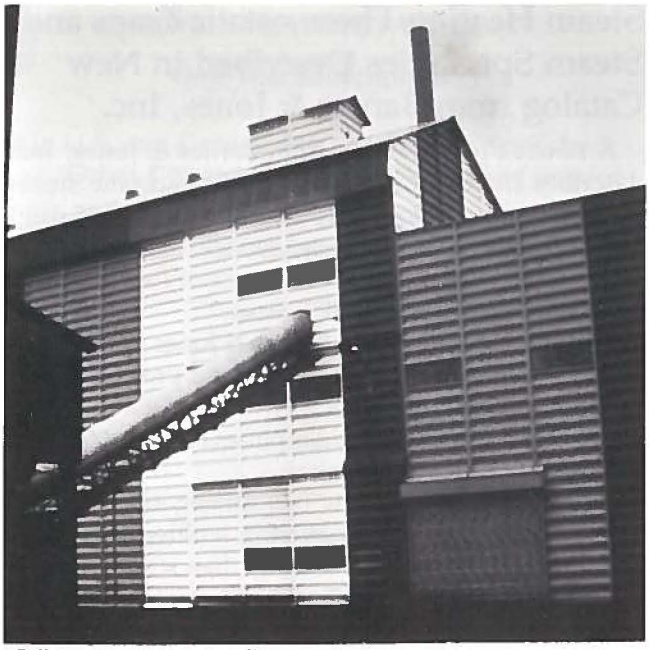
Most modern hot water district heating systems require the installation of a heat exchanger. The group visited the manufacturing plant of a leading producer of thin plate heat exchangers. Innovation in this area is the compact size of the devices together with very high transfer efficiency. We were shown prototype heat exchangers for the residential market that are smaller than the proverbial "breadbox."

The Philips Corporation of Netherlands is the principal supplier of electrical products in Europe. A display in their plant of the reduction in energy consumption through the use of innovative lighting was most impressive. Of importance to municipal managers was Philips program of highway lighting displayed at a fabulous outdoor laboratory. Additional electrical innovation was viewed at the NFK Kabel plant including new developments in optical circuits for control applications.

At the town of Laval, France a very innovative trash to energy plant is in operation. As are many such



Outside the Stadtwerk Heidenheim facility



"Pelletization plant in Laval"

facilities in France, this one is operated by the Compagnie Generale de Chauffe, and we met, once again, an IDHA regular, Mr. Jean Deleport of CGC. This is a pelletization plant where municipal waste is separated into combustible and noncombustible components, and the combustibles processed into pellets. These pellets may be stored and burned as required for heat needs. In Laval, they are the fuel source for the district heating system. The pellets are cylinders of ⅜ inch diameter and approximtely 2 inches long. The material has a density of 87 lbs/cu.ft. The low heating value is 6,620 BTU/lb with a moisture content of 10%, and results in 20% ash. Laval is not a large city, producing about 20,000 tons of refuse yearly. One plant shift processes 80 tons per day and develops 40 tons per day of pellets. Pellets can be stored months without problems. The plant ran smoothly and, typical of European practice, with a minimum of personnel.

In summary, European Energy is a matter of making better use of facilities, utilize materials at hand, and waste less. There was nothing I saw that could not be constructed and operated in the U.S. by average workers using off the shelf materials. In a lot of instances we could do it a lot better. One thing is different, there is a national objective to save energy and to reduce the dependence on imported oil. Every citizen, company, town, city or national institution supports this objective. They support it with human resources and with government money. There is a sincerity in regard to energy use that we do not see in the U.S. We note another important factor, to a large measure energy conservation projects in Europe do not face the regulatory and institutional road blocks that we frequently experience.

IDHA has on file much of the material collected in this study and will be glad to try to answer questions or explain processes in greater depth. ●

Top Caliber Audience Reported at 2nd Annual Energy Management & Facilities Improvement Show

1983 Show Scheduled for October 25 thru 27

The 2nd Annual presentation of the INTERNATIONAL ENERGY MANAGEMENT & FACILITIES IMPROVEMENT SHOW was held November 9 thru 11 at the Expocenter facility of the Merchandise Mart complex, downtown Chicago. Among the more than 160 displays could be seen an impressive variety of products and systems for reducing energy costs through conservation, reclamation and the use of auxiliary support systems. In line with the oft stated aims of this show, the items displayed were all commercially available and ready for application in commercial, industrial and institutional processes and buildings. Some famous names could be seen among the displays as well as those of smaller companies who had fascinating new developments to offer. The event is endorsed by the U.S. Department of Energy.

"We take pride in the caliber of the audience attending this show," proclaimed Milton Bergson, President of Expo Management, Inc. He went on to explain that the 1982 audience was even more heavily weighted with such titles as president, owner, vice president, director, manager, facilities and/or energy manager, than the audience in 1981. "This was an authoritative specifying and buying crowd, exhibitors sensed it and commented about it often," said Bergson. He elaborated that this quality was the result of careful research in recruiting audiences.

IDHA was represented at the 1982 show as it had been in 1981. President Clement Crooks presented a paper in the Public Sector Energy Management Seminar titled "District Heating and Cooling—Something New, Something Old." Reprints of the talk are available on request from the IDHA Office.

Dates for the 1983 show have been changed to October 25 through 27, Tuesday through Thursday. IEMFIS will again be held at the EXPOCENTER in the Apparel Center of the famed Merchandise Mart complex in downtown Chicago.

Complete information is available from Expo Management, Inc., The Apparel Center, Suite S2-132 Arcade, Chicago, Illinois 60654. Telephone (312) 329-1191. ●