DISTRICT HEATING AND COOLING

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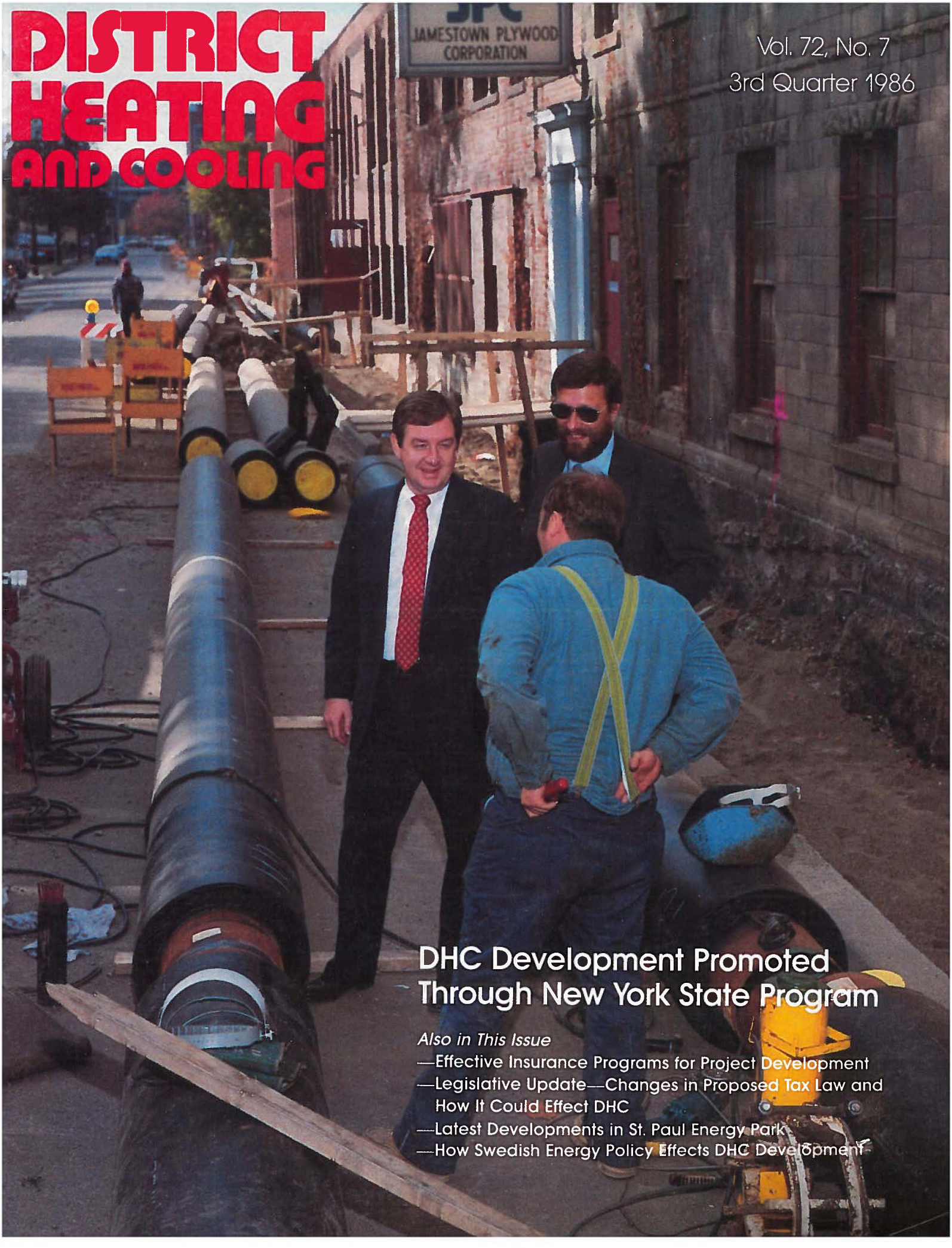


DHC Development Promoted Through New York State Program

Also in This Issue

—Effective Insurance Programs for Project Development
—Legislative Update—Changes in Proposed Tax Law and How It Could Effect DHC
—Latest Developments in St. Paul Energy Park
—How Swedish Energy Policy Effects DHC Development

District Heating and Energy Policy in Sweden

K. Dorothea Stierhoff, IDHCA Director of Communications
with technical assistance from Bonnie Mitchell, HDR/Techserv

Several members of IDHCA recently toured district heating systems in Sweden. During the IDHCA conference this group met to review their trip and discuss differences in the U.S. and Swedish industries that made an impact on them.

The Swedish Trade Council and the American Public Power Association sponsored a study tour of energy systems throughout Sweden. The purpose of the tour was to introduce the participants to Swedish energy technology that could be applicable to systems operating or being developed in the U.S. The 30-member group toured facilities that utilize a variety of technologies, including circulating fluidized bed boilers, new pollution control systems and solid waste boilers. The week was filled with presentations, facility tours, food, more food and a great display of Swedish hospitality.

Swedish Energy Policy

The week started with a presentation by the National Energy Administration giving a general overview of Swedish production and use of energy. David Hobson, Administrative Director for IDHCA commented, "I was surprised to learn that Sweden has a national policy to get rid of all its nuclear facilities by the year 2010." It is one of the four objectives of Swedish National Energy Policy. The others are: to conserve and make efficient use of energy; to reduce the use of oil and to increase use of primarily indigenous and renewable energy sources. It is these policies that have led to national promotion of district heating and resource recovery.

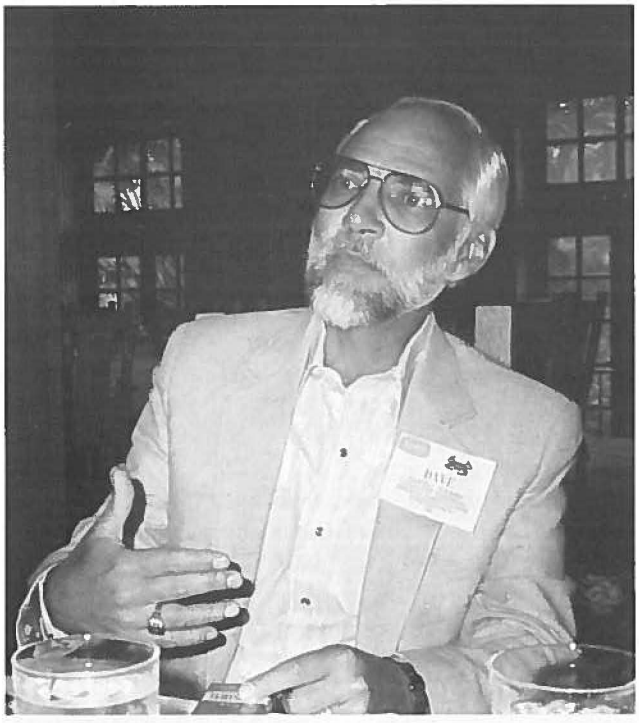
In the U.S. the driving force in the development of any industry usually is economic. In Sweden, the government will work with industry to develop certain technologies that will help meet established policies—such as reduced energy consumption and air emissions.

This point is reinforced by David Toombs of Catalyst Thermal Energy Corporation. "The government in Sweden is involved in everything. They set the policy. Whereas in the U.S. the government tries to stay out of a lot of it and leave it up to individual cities and states and private enterprise. In the U.S. today things have to be economically feasible, whereas in Sweden the government, even though it may cost extra money, will invest in new technology, whether the economics are initially there or not. This has a big effect on whether you get a project built or not and how much research money you can put into it."

Stockholm District Heating System

After spending the morning with government officials, the group visited two of the plants serving the Stockholm district heating system: the Vartan Cogeneration plant and the Hogdalen waste-to-energy facility.

The Vartan Plant was originally built in 1903 as an electrical generating plant. In 1959 the decision was made to start supplying hot water districting heating to several neighborhoods of Stockholm. In its current operations the Vartan plant utilizes several methods of conserving fuel. Most of its electricity is cogenerated using the waste heat for district heating. During low periods of use the plant has an accumulator for short term storage of hot water for peak periods of the day. The accumulator can hold up to 40 million litres of water at 95°C. The plant also makes use of heat pumps to augment the waste heat from a purifying plant. It is a pilot project on heat pump technology for the



David Toombs of Catalyst Thermal Energy Corp. makes a point during discussions of the trip to Sweden.

Turbine cogenerator inside the Vartan Plant.

Stockholm Energy Authority. Presently the heat output of the plant is produced from oil (76%), heat pumps (8%) and electric (16%). By 1990, it is expected this facility will use heat pumps for 65% of the load, coal for 25% and oil for only 10%.

The Hogdalen Plant tour was next on the itinerary. This facility has a mass burn waste incinerator which burns approximately 200,000 tons of domestic waste per year. This is supplemented by an oil boiler and an electric boiler. This facility is the pilot plant for a new flue gas cleaning process.

The second day of the tour, the Swedish District Heating Association made a presentation to the group and then they were off to the southern part of Sweden to visit the Parca Manufacturing facility of EURO Heat AB and Ronneby. Mr. Lars Hallberg of EURO Heat then took the group on a trip to his home to show how district heat is connected and used in a typical Swedish residence.

Mr. Toombs found the Swedish emphasis and method of connecting residential loads to be especially impressive. "When a developer builds a community-type subdivision, he puts in the pipes for district heating at the same time as the water lines. It's just part of building a subdivision. They start with small satellite boilers and as the system is expanded out they hook the subdivision up to the central plant."

Osby Wood Fired Plant

The next day the group traveled to Osby and attended a presentation by the Osby Municipal Energy Authority. The wood-fired Osby facility was down for the summer, but the group had a chance to see the storage and wood-handling capabilities of the facility. In Jonkoping, the group had a chance to view an all-electric district heating system.

Benefits of Fuel Flexibility

Kent Jonnson of the Swedish Trade Office noted how this variety in district heating systems is helping to meet the national policies. "Many district heating systems are designed to utilize indigenous fuels such as peat and wood chips as well as coal or other fossil fuels. This provides flexibility in the systems so that changes in prices will not have a major impact on the cost of heat."

David Toombs pointed out that many plants in the U.S. also have this flexibility. "The idea of having a central plant that has the capability to burn three or four different fuels gives you the flexibility from a market standpoint to burn whatever is cheapest that year or month. If you have a one-fuel plant you are hooked to that particular market. If you have three or four types of fuel to burn, which is economically feasible with a central plant, you can provide to the individual customer or householder the flexibility he can't provide for himself."

Kent Johnson of the Swedish Trade Office explains Swedish energy policy.

Combined Steam and Hot Water in Sweden

On Thursday the group travelled to Karlskoga to view a combined steam and hot water generating plant. This plant is a Gotaverken Energy Systems facility and was the most colorful plant of any the group had visited. From lilacs to blues and greens the plant was painted in warm colors throughout and offered the study tour a fully visual experience.

The fuels burned in this facility are coal and peat in a fluidized bed and mass burn solid waste system. The plant has a total capacity of 175 megawatt thermal.

David Toombs pointed out the importance of having both a steam and hot water system. "Both steam and

Gotaverken Energy Systems plant in Karlskoga

hot water are useful. Hot water is great for public housing and other buildings that have strictly heating types of loads. Steam is needed for process loads. When you are developing a system in a large community, you have to look at what is going to provide you with the most load. Hot water is great, but it is used mostly in the winter time. Steam for process provides a year round load and that is what you need to make your system economically viable. You can put in high temperature hot water and convert it to steam, but there is not much of that. If you are going to go into this business, you have to go at it with what the customer requires. Every central station, whether it is in Sweden or the U.S. is looking for that year-round load. In order to do that you have to serve the industrial load."

"At the same time, you don't need to serve steam to a housing project. But if your steam line runs close by you can build a small building, put a heat exchanger in there and serve hot water, and have the main continue on to serve the next customer."

This plant was also a good working example of several turn-key operations that are currently in use in Sweden. A question came up about the use of turn-key operations in the U.S.

Mr. Toombs stated "Turn-key operations have been around in the U.S. for a long time. They are good for small communities that don't have the expertise on staff to understand all the facets of building a major power plant and distribution system. A company can come in and develop a complete project for a set price. If they go over that price it's the manufacturer that suffers."

Hazardous Waste Disposal and DHC

The final day of the tour the group had the opportunity to tour Sweden's hazardous waste disposal facility SAKAB near Stockholm. This is Sweden's central plant for treatment of hazardous waste. A total of 250 million Swedish kronor or approximately 32 million dollars has been invested in SAKAB, which also provides the Kumla, a local authority with district heating. The different types of hazardous wastes which SAKAB is able to accept includes the following: oil, solvent, paint or varnish, adhesive, acidic or alkaline, waste containing cadmium, waste containing mercury, waste contaminated by substances containing heavy metals, waste containing cyanide, waste containing PCBs, waste containing pesticides, and laboratory waste. The treatment of the various hazardous waste varies. Approximately 33,000 tons of waste are incinerated per year. These are the oil, solvent, paint or varnish, adhesive, waste containing PCBs, pesticides and hazardous chemical remains.

Benefits of Central Energy Policy

One point surfaced many times in the review of the study tour—the Swedes are very centrally organized to deal with the energy situation in a cohesive, effective way. They are in a position to move much more rapidly to develop district heating systems. In the U.S., projects take much longer to develop. The cause, according to Mr. Toombs, comes from "doing one feasibility study after another. Whereas in Sweden, they see a problem, make a decision and go in and solve it without studying it to death. I think studies are great and for anything new they are necessary, but I think today we have been studying solid waste and district heating long enough so there are enough experts around to do the job and get it done."

Bonnie Mitchell of HDR concurred with this problem. She stated that "HDR is working on a refuse energy plant that finally has permission to be built, but it took six years to get to that point." She went on to say that in Sweden they are able more easily to put

continued on page 34

Bonnie Mitchell (r) of HDR/Techserv reviews technical aspects of Swedish Study Tour with Mats Nivehede of the Swedish Trade Office and Peter Ahlström of Aktiebolaget Hydrometer.

Future developments that could improve deployment and maintenance include:

- acoustic emission systems that monitor for leaks by structural borne sound
- fiber-optic acoustic sensors
- more sophisticated signal processing.

During the remainder of the study, researchers will accumulate more data and determine specific economic benefits of using the systems.

NCPWB Publishes B31.9 Brochure

The **National Certified Pipe Welding Bureau (NCPWB)** has published a new three-page fold-out brochure entitled *Quality & Economy in Building Services Construction* based on ANSI/ASME (American National Standards Institute/American Society of Mechanical Engineers) B31.9 *Building Services Piping*. The brochure explains B31.9 which sets forth the requirements for the design and construction of low pressure piping systems in a variety of structures.

NCPWB is a department of the Mechanical Contractors Association of America (MCAA) which has programs to assist its members in providing quality welding in the pipefitting industry at reduced costs.

All piping contractors are affected by the use of B31.9. The standard provides a clear understanding of requirements for the installation of piping, including the use of qualified Welding Procedure Specifications and welders qualified to those Welding Procedure Specifications. Contractor members of the NCPWB will be better able to meet the requirements set forth in B31.9, which calls for certified welding, because of their ability to interchange welders without retesting. This interchange makes it possible for them to provide owners and the general public with quality welding at an economical price.

Previously, there had been no clear cut standard for the construction of piping systems for structures such as commercial establishments, public buildings, institutional buildings, multi-unit residential buildings and industrial facilities. As a result, engineers, building developers and owners had to improvise, arbitrarily select, or apply inappropriate standards. The new B31.9 standard will fill this void for building service piping.

In addition to the brochure, a new eight-minute videotape provides a clear, interesting and visually appealing introduction to the B31.9 standard for contractors, engineers, and building owners and developers. The response to this videotape has been universally positive.

Single copies of the brochure are available free of charge. The accompanying videotape is available in either VHS or Beta for $35. To order contact: Beth Miller, NCPWB, 5410 Grosvenor Lane, Suite 120, Bethesda, Md. 20814, telephone (301)897-0770.

EJMA Standards Fifth Edition, 1985 Addenda and New Practical Guide Available

Accepted worldwide as the authority on metallic bellows type expansion joints, the Expansion Joint Manufacturers Association (EJMA) has published an Addenda to the 5th Edition EJMA Standards and a 61 page booklet, "A Practical Guide to Expansion Joints." The 27 page Addenda published in 1985 includes significant updating of definitions, methods and calculations, and design criteria to the 5th Edition Standards. All owners of the 5th Edition Standards should have this important addenda.

The "Practical Guide to Expansion Joints," published in pocket size, is based on the EJMA Standards but is presented in a less technical, easy to understand, manner. The Guide is intended to provide a basic understanding of expansion joints which will assist the user in communicating design requirements to the manufacturer and to properly install and maintain expansion joints in service. The Guide is available free with the purchase of the Addenda. The price of the Addenda and the free copy of the Guide is $15.00 domestic, $20.00 foreign. The complete package, which includes the 5th Edition of the EJMA Standards, the Addenda, and the free copy of "A Practical Guide to Expansion Joints" is available for $65.00 domestic and $80.00 foreign. Payment must accompany order. Mail to Expansion Joint Manufacturers Association, 25 North Broadway, Tarrytown, NY 10591.

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continued from page 24

together a marketable project and they will develop a lot faster than projects in the U.S.

Although one of the main purposes of the study tour was to demonstrate the latest technological developments of interest to the DHC industry, the theme of the tour would have to be integration of public needs, with policy development which leads to the development of technology. The combination of discussions, facility tours and site visits clearly showed that the interest of the Swedish population in energy efficiency with a clean environment led to the development of the National Energy Policy. And it is that policy that governs national support for technology development.