



DISTRICT HEATING

OCTOBER-NOVEMBER-DECEMBER 1975

VOLUME 61-NUMBER 2

STATEMENT OF POLICY

The International District Heating Association represents those companies and individuals engaged in the concept of supplying thermal energy in the form of steam, hot water, and chilled water for heating, cooling and process use in organized communities. It represents the industry throughout the United States and Canada, and has affiliates throughout the world.

The membership is involved in and greatly concerned with the most efficient use of energy, the planning and development of central cities and other high density areas, the conservation and encouragement of investment in the industry, and the protection of the environment in an intelligent and rational manner.

The IDHA, by the very nature of the industry, supports clean air and protection of the urban sector because these efforts are best achieved by central energy distribution methods. It is opposed to an emotional atmosphere in environmental matters resulting in unnecessarily costly, constrictive or ambiguous governmental controls. It supports safety programs that are proven concepts with economically justified benefits.

The Association's objectives are to collect, coordinate and disseminate ideas and information on efficient methods of producing, distributing, marketing and utilizing central energy systems, and on the accounting and administrative methods employed in the industry; to advance knowledge and learning, and to stimulate invention and research; and to cooperate with other organizations and agencies by interchange of ideas and information.

President Clymer Responds to Energy International Magazine

In the June 1975 issue of Energy International, there was a Comment entitled "Steam or Water: the District Heating Conflict." Mr. Eric Jeffs, Editor, asked IDHA for a reply which could be printed in a future issue of Energy International. The Comment, and President Clymer's reply, follow.

Steam or Water: the District Heating Conflict

There is a growing interest in heating evident in some parts of North America. Last winter, a Canadian study group recommended extension of district heating as part of an overall energy strategy for the city of Toronto. In April, a party of Canadian engineers and government officers visited Swedish district heating plants, and studies are now in progress to determine how heat can be tapped from certain nuclear power stations. It is not the only region of the continent where an interest is evident, but certainly one of the more advanced in its thinking. Encouraging as this may sound to those of us who advocate this route to greater energy economy, it is the technique that counts and here there exists a deep, and at times seemingly unbridgeable, gulf between European and American thinking.

The gulf is partly emotional and partly technical. The more central direction of European society perhaps engenders a greater readiness on the part of the public to accept the concept of the public supply of heat. Yet this is no new principle that comes with district heating: anybody, in Europe or North America, or anywhere else for that matter, who has chosen to heat his home by electricity or gas has already, perhaps unwittingly, embraced the principle of the public supply of not just heat but virtually all his energy needs in the home. Yet even if this argument is acknowledged, there are those who will argue that the physical disruption of digging up streets to lay district heating mains is an operation that nobody will be willing to pay for either in taxes or utility connexion charges. However, this latter protest is hardly credible if we remember that all over North America and Europe streets have been dug up to enable utilities, at public insistence, to put low-voltage distribution lines underground.

District heating as practiced in Europe is almost non-existent in North America where the individual total

energy approach has prevailed—small diesel or gas turbine sets providing electricity and heat and/or air conditioning to specific buildings. There are quite a number of heat distribution systems of limited range and serving specific groups of buildings, but there are no schemes on the scale of Swedish, Danish and German projects covering whole cities and expanding all the time.

Given that the expansion of European district heating is essentially a phenomenon of the last twenty years, we can say that this represents a lead over others which are about to follow the same path to better energy management. However, in spite of the ideas which are being studied, particularly in eastern Canada, there is one fundamental difference in approach which is giving rise to concern in European district heating circles and among some North American experts. All the major European district heating networks utilize high pressure hot water as the heat transporter. Canadian and American practice is to use low-pressure steam and the signs are that this will be the basis on which district heating will be expanded there.

The basis of European concern is energy economy. Steam represents parallel generation of heat and electricity, hot water represents series production, using heat from the turbine tail which would otherwise be rejected to the environment, albeit at a lower temperature than is required for district heating. Of course, not all district heating is associated with electricity production, as apologists for electrical utility attitudes are only too willing to point out. But this overlooks the fact that the build up of a district heating network is a progressive development over several years, and it is only when the network has reached a certain size that the economics of combined power and heat production score over those of the further multiplication of small-scale, local area boiler plants. In some smaller communities, that stage may never be reached and integration will come only with the development of large regional networks supplied from nuclear power plants. But this is no reason to say that combined heat and power production is a special case and not a relevant answer to the energy crisis on a large scale.

The steam system may seem more attractive in terms of conventional electricity generation but it does not represent the fuel economy attainable with a back-pressure system and heat transfer by water. It requires

a higher energy input and in the end must be condensed, either to return to the boiler plant or to be discharged to a water body, a process which entails a substantial energy loss. Bled from the high pressure end of the turbine, it does not change the fact that the lower electricity output is still achieved only at 30 to 35% efficiency.

Steam storage has been suggested as a way of linking large scale utility operations to a district heating regime. Steam generated in a nuclear power plant at night would be used to supply the heating network during daytime peaks, thus enabling the power station to operate as a base load unit on a continuous high-load factor, regardless of system demand level. Attractive in classical utility terms it still evades the basic issue of energy economy. The heat stored will be relatively small compared with the heat rejected during generation, and it is this formula of two units of heat lost for every unit of electricity gained which must be abandoned if, in the long term, we are to come to grips with the problem of curbing the growth of fuel consumption and making better use of the fuel we have. That is why a large-scale application of steam district heating would not be in the best interests of a lasting economy in the use of energy.

President Clymer replies

October 16, 1975

Mr. Eric J. Jeffs, Editor
Energy International Magazine
Chaussée de Charleroi 123a
B1060 Brussels, Belgium

Dear Mr. Jeffs:

Having read your June 1975 Commentary entitled "Steam or Water: the District Heating Conflict," I feel a challenge has been issued and a response is in order. As President of IDHA, and having been involved in district heating for more than two decades, I believe I can speak authoritatively, confident that I am accurately expressing the majority view within the industry as practiced on the North American continent, and even certain other parts of the world.

First, I'm compelled to state flatly that in our minds there is not now, and never has been, any emotional conflict, as you suggest as to steam versus hot water. To be sure, practice seems to favor steam in North America and hot water in Europe, but there are some very valid reasons for this that have absolutely nothing to do with a desire to take sides, as it were, in an argument. Exchange of technological information, yes; but debate, no. Indeed, we recognize that there are many advantages to hot water distribution over steam distribution. In fact, if we were designing a brand new system,

high temperature hot water would be high on the list of alternatives to be studied, and there is a better than average chance that it would be our selection. Evidence shows that the fastest growing sector of the industry here, namely colleges, universities, and other institutional developments, are mostly hot water . . . for that matter combined hot water/chilled water, total energy systems of one type or another. Of even greater significance in choosing HTHW, might well be the development of regional, nuclear powered grid systems under intensive study in Germany and other nations as reported by Dr. Winkens and discussed in your August 1975 issue. One must admit, however, that attractive as the concept appears, there is still considerable work to be done before the huge capital investment required can be justified. It must therefore be considered an important, but still long range facet of our continuing, overall energy effort.

But starting out new is quite a different situation than expanding an existing system. And the latter is exactly the situation in which many of our larger systems find themselves. Though begun well before 1900, district heating in the USA received its real thrust as a result of the electric light and power industry's emergence in the late 1920s and early 1930s. First came non-condensing units from which exhaust steam was piped next door to a few adjacent buildings. Thus, district heating came to the city. As "modern" alternating current replaced direct current, and on-site power generation and private plants were shut down, supply of heat became a necessary adjunct to expansion of the electric business. Since these buildings were using steam equipment, it seemed most convenient to stay with steam rather than change the new customer's entire system. And so the "steam heating business" flourished in those early days, growing literally by leaps and bounds, impelled by the growth of electric power and largely subsidized by the private big city electric companies. As a result, the largest district heating systems in the USA today are these same "steam heating" systems; so expansion will most likely be continued as steam in the larger "downtown" areas. Otherwise hundreds of customers would be unnecessarily burdened by any wholesale switchover to hot water.

At the same time, changes have certainly been taking place on a continuing basis in many of the ways that your article discusses. For instance, combined electric/steam plants have for decades supplied the bulk of the heating requirements in many of our largest systems, so the concept is not new to us. As mentioned earlier, hot water or combined HW/CW systems have been and are continuing to be created, some actually within or adjacent to existing steam distribution networks. Even the previously mentioned nuclear powered and/or regional, interconnected networks are not a new concept to us, although social, economic, and technological factors have not yet combined properly to yield any significant results here. The emerging technology of long distance,

thermal pipelines must, of course, be considered a vital key to such plans. Needless to say, we are watching developments in Germany, Canada, and elsewhere with more than just a passing interest. At the same time, you know, of course, that our national leaders, who control the purse strings, face priorities of far greater human needs than district heating, and we are literally but "one small voice, crying in the wilderness." But cry we shall, you may be assured.

We welcome level headed exchange of technological information. But with strong centralized government existing in most parts of the world, while ours is a democratic society dedicated to the principal of free enterprise, it must be recognized at the outset that certain social, political, and economic differences might well result in different conclusions.

Our aim though, is not to debate ideological issues. Suffice it to say that what works best in one situation is not necessarily the best solution for another. There is certainly no denying that the two for one energy loss ratio you decry is unacceptable in the present world energy crisis. Still, there is more to engineering than thermodynamic efficiency alone, and with the high cost and large losses associated with any long distance distribution system, a regional approach appears difficult indeed for us to justify at this time. Yet, we agree, there is every reason to explore such new approaches, new concepts, new materials, yes, even new frontiers in international cooperation. As engineers, scientists, and, if you will, even profit motivated entrepreneurs, there is nothing we in IDHA would appreciate more than an opportunity to share with others in the district heating industry throughout the world the very latest in knowledge and experience. From such an exchange, I'm sure, we would all benefit immensely. Certainly we can agree that in the short range at least, district heating must be an important influence in the redevelopment of our urban and other high population density areas. More extensive developments have to be considered longer range possibilities.

In conclusion, may I repeat an earlier call to unity of purpose, that which was sounded 200 years ago at the birth of the United States of America. In that same Spirit of '76, we invite you to join with us, not only in celebration, but hopefully to embark on a new era of international cooperation, where technological exchange of information, not emotional debate, might yield a better life for all the inhabitants of this tiny planet.

Sincerely,

Ellwood A. Clymer, Jr.
President of IDHA

(We invite our readers to submit their comments for possible publication in a future issue of District Heating. Editor.)

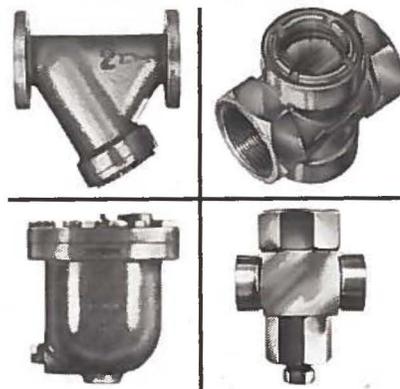


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