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The next report will be that of the Research Committee, of which Arthur S. Griswold, Staff Engineer of the Central Heating Department of The Detroit Edison Company, is chairman. Mr. Griswold.

...Chairman Griswold then presented his prepared report...

REPORT OF THE RESEARCH COMMITTEE

Arthur S. Griswold, Chairman

Mr. Chairman, members and guests of NDHA, there are two things to take up before I present the paper on my European trip.

W. E. Weese of Fort Wayne has with him here a degree-day meter and you are invited to discuss this instrument with him if it is of interest to you.

The other thing I would like to spend a couple of minutes on is a device for turning on sidewalk snow-melting installations. Walter Wisschusen has information concerning this instrument but he did not want to include this particular item in his Meters and Accessories Committee report. It is something new. For those interested in sidewalk snow melting, Mr. Wisschusen will explain this little gadget.

Walter Wisschusen: I want to tell you about a little machine called a snow detector, developed and made by Mr. Xenis of the Consolidated Edison Company. This device is used in conjunction with equipment installed for snow melting on sidewalks. Mounted on the roof of the building is a round pan in which revolves an arm and blade similar to an automobile windshield wiper. The resistance of the snow in the pan completes an electric circuit which in turn rings an alarm in the engineer's office or puts the snow-melting equipment in operation.

The reason for mentioning this device at this time is that we expect to explain its construction and operation more thoroughly in the Bulletin and make working drawings available for any of our members wishing to construct one or more for their use or for their consumers.

Arthur S. Griswold: Thanks, Mr. Wisschusen very much for mentioning that device. I will now present my paper.

...Chairman Griswold then presented his prepared paper...

PROGRESS OF DISTRICT HEATING IN EUROPE

Arthur S. Griswold

(In this paper the author gives his opinions of the status of both heating generally and district heating in particular in western Europe based on a four-month visit.)

Last summer I was asked by the Economic Cooperation Administration of the United States Government to go to Europe for about six weeks to obtain information concerning the capacity of European manufacturers to produce heavy electric-power equipment, such as turbine-generator sets, boilers, transformers, and switch gear. This seemed to be such an attractive proposition that naturally I accepted it with great pleasure. It was my original thought that I could spend perhaps another two or three weeks visiting some of the European district-heating installations. Actually, my stay in Europe for the Economic Cooperation Administration stretched out to over four months, and during that period, I did not have many opportunities to visit with people interested primarily in district heating. These observations, therefore, do not represent an extensive study.

First, I would like to comment briefly about the general heating of buildings. We have all been told that in Europe the heating of buildings is at a much lower level than here in the United States. Generally, that is probably true, but I believe that we were as thoroughly overheated in the Mt. Royal Hotel in London and the Storken Hotel in Zurich as we have ever been anywhere here at home. Incidentally, in Zurich the hotel bill carried a separate item of approximately $1.00 per day for heating.

We were also as thoroughly underheated in Paris during November as anyone could ever hope to be. At that time the French coal miners' strike was in full force and the French government had prohibited all heating in public buildings. We attended a series of committee meetings during the first half of the month in the Chateau La Mutte, an old Rothschild mansion now converted into government offices. The building was entirely without heating, and the temperature in most of the meeting rooms was close to 40F. It was interesting to me to note that the Frenchmen, as well as the rest of the Europeans bundled up in mufflers, overcoats, and even ear muffs as thoroughly as I did.

November and December, 1948, in Europe apparently were unusually warm, as they were here in the United States. It was impossible, therefore, to get any real knowledge of the heating situation during normal winter weather. On the whole, most of the buildings and hotels which I encountered seemed to be heated almost to the same temperatures as found here in the States. There seems to be a complete lack of control equipment, however, so that the temperatures in heated spaces varied widely from hour to hour. In our Paris hotel, we frequently were uncomfortably cold during the evening, but during the night hours, the heat was so plentiful that we were forced to open the windows.

The most important problem of space heating in Europe seems to be

the cost of energy. Coal in Europe with a heating value of 10 or 11,000 Btu per pound currently costs in excess of $15.00 per ton. The cost of gas, wood, and petroleum, are on a comparable level. It is natural, therefore, that space heating should be on a basis much below ours in the United States. I am quite sure that if heat could be obtained at a cost comparable to that found in the United States, the Europeans would adopt heating standards similar to our own.

One thing surprising to me was the widespread use of electricity for space heating. In Norway, Sweden, and Switzerland, fuel costs are considerably above the $15.00 per ton coal price and nearly all fuels must be imported. Prior to the war electricity was available, and a very large percentage of the homes had installed electric space heaters. The shortage of electricity which these countries are now experiencing has created a very serious situation. Because of the demands of electricity for industry, the power supply is no longer available for the heating of homes. This, of course, has created a very disagreeable living condition. The governments of the countries involved, however, have a very realistic attutude toward the situation. They realize that it would be extremely expensive to install sufficient electric-generating capacity to provide electricity for the adequate heating of all homes. They have issued regulations which they indicate will continue in effect for several years limiting the electricity consumption of residences during the winter months. They have not, as yet, however, been able to supply any adequate alternative method of space heating.

The use of electricity for space heating created a very serious situation in Great Britain during the early months of 1948. The British people had been subjected to very austere living conditions for some eight or nine years. It was thought by some of the government planners that some slight relief might be given by making available comparatively inexpensive electric room heaters, which they call electric stoves. It was argued that only small amounts of critical material would be needed and that the comfort that would be derived would be greatly appreciated. As the result of this thought, between three and four million space heaters having ratings of from one to three thousand watts were manufactured and sold.

During May of 1948, the British electricity authority followed the usual practice of removing the maximum amount of electrical generating capacity from service over the week ends for emergency repairs. On two of these Sundays, unexpected cold waves developed. Apparently, the Britishers feeling in a genial mood, all turned on their electric stoves at the same time. The result was a demand for electricity far in excess of

the available supply. On the first of these Sundays circuit breakers opened in a considerable number of the substations supplied from the British Grid system. Service was restored, however, in a comparatively short time. On the second of these Sundays the overloading was so severe that the entire British Grid system suffered very severe electric failures. It was a matter of four or five hours before service was restored.

Estimates made subsequent to these experiences indicated that there were approximately six million electric space heaters in the area served by the British Electricity Authority. It was further calculated that these space heaters might require 15,000,000 or possibly 20,000,000 kilowatts of capacity if they were all turned on at the same time. The total capability of the generating stations was just over 10,000,000 kilowatts. It probably is needless to say that the manufacture and sale of electric space heaters in Britain was immediately banned and during all of last winter there was a continuous campaign conducted by BEA urging people to avoid using electric heaters.

There are, as we know, a considerable number of district-heating systems in Europe. Our Secretary has a list of about 60 of these Companies. As far as I could discover, nearly all of these are hot-water systems. Further, with the wide-spread nationalization of the utility systems in Europe, nearly all of the district-heating systems either have been nationalized or passed into the hands of local governments. The installation of new district-heating systems seems to be under consideration in a considerable number of places. A few of these involve systems for heating the ordinary city buildings. Most of them, however, come in the class of institutional systems. Some of the nationalized systems seem to be operated on a sound financial basis, while others seem to be rather heavily subsidized. These latter are usually justified on the basis that they eliminate the smoke and dust nuisances which are incident to small isolated heating plants and thus benefit the entire area.

As far as I could discover, there are only three reasonably large steam district-heating systems in Europe. One of these is in Paris and has been described in several NDHA papers. I did not have an opportunity to see any of the facilities of this system, but Mr. Guichmerre, an official of this Company, was in the Economic Cooperation Administration office in Paris on November 10th. He stated that up until that time, his system had not been put into operation because of restrictions in the use of fuel imposed by the French government. I am sure that our customers here in the United States would not be happy with a situation of that sort.

There are two large steam systems in Belgium installed primarily to serve areas having heavy concentrations of textile industries. One of these in Brussels burns in the neighborhood of 140,000 tons of coal per year. This particular system was installed during the late 1930's. There is a rather interesting story concerning its inauguration.

Along the river flowing through Brussels, there were about 45 textile works in 1935, each having its own boilers for the generation of steam required in the textile operations. The suppliers and manufacturers of electric-generating equipment were very active in their efforts to persuade the mill owners to install their own generators. The electric-utility operators could see a substantial and important part of their electric load going off the lines. They studied the situation, therefore, discussed the problem with the textile people, and concluded that it was practical to install a single district-heating plant to supply steam to these 45 textile mills. The proposal to build this heating plant, however, was strongly opposed by the city officials on the basis that it would create an additional smoke and dust nuisance. The district-heating company obtained air photos of the area involved showing the more than 50 stacks serving the existing boiler plants. They then pointed out that with the installation of the one new heating plant with a single stack the smoke emissions from the 50 existing stacks would be completely eliminated. Apparently this was a very effective presentation and permission to build the heating plant was granted.

The installation of an underground steam-distribution system of the size involved apparently was new to the engineers responsible for it. I was told that initially many operating difficulties were encountered due mostly to improper drainage of condensate from the underground pipes. These difficulties were eliminated, however, and the system now performs in a satisfactory manner.

The textile industry, of course, provides a year-round load and the load factor on the system seems to be well over 50 per cent. The rate schedule seems to have been well devised so that a small profit is now being earned. In the last few years the system has been extended to supply steam for space heating a few buildings. The operators indicated that other extensions are anticipated. The steam demand has increased to the point where a new boiler plant is being studied. While no decision has been reached as yet as to the steam conditions of the new boiler plant, it was believed that high-pressure boilers with a back-pressure turbine probably would be selected.

I was told that there is another similar steam-heating system

serving a textile industry in another Belgium city. I did not obtain any information concerning this second installation.

As indicated earlier, most of the district-heating systems in Europe are hot-water ones. I inquired from a number of people as to why hot water was used instead of steam. The universal answer seemed to be that hot water was used because it is more efficient. I could find no one, however, who had any definite data indicating this to be so. I gained the very definite impression that hot water is used simply because it is the method most familiar to Europeans rather than because it has any real technical thermal advantages. I could not find that the high water temperatures which have been widely publicized are commonly used in Europe. In only one instance did I find the temperature of the water leaving the heating plant appreciably above 220F. This one instance is in Nijmegan, Netherlands, where arrangements were being made by a large electric-generating station to supply heat to a nylon plant being built on adjacent property. Here the water was to be heated to approximately 360F.

District heating has become a more or less common subject of discussion in Great Britain where there are large numbers of public housing projects. The British electricity authority has been given the responsibility of supplying heat for 22 such projects, most of which involve from one thousand to two thousand houses, each of which has a floor area of about one thousand square feet. It has been decided that hot-water systems will be used for each of these 22 installations. In some instances the heat will be obtained from electric-generating stations, but in others, new boilers must be installed. Although I was not told so directly, I gained the impression that the British Electricity Authority is not too happy with this new assignment. There is the distinct feeling that in the effort to show economy in the use of heat, considerable will be sacrificed in higher capital cost of the heating installations.

I was quite surprised at some of the discussions concerning the heating of these new housing projects. Some of the people responsible for this phase of the projects advocate that the district-heating installations be sized so as to provide room temperatures of approximately 60F. Additional heat, if desired, then could be supplied by direct-fired units at the occupant's expense. The object, of course, is economy in the use of heat, rather than in the cost of radiator and piping. I surely do not believe that we here in the United States would spend much time in promoting ideas of that kind. Further, I believe that the time is rapidly

approaching when the rank and file of the Britishers will want something better.

This proposal for limited heating seems to be but one of the many ideas now being worked upon by the British government planners. For several years only council houses, that is publicly-owned houses, could be built in Great Britain. Recently the construction of a limited number of homes by private individuals has been permitted. These, however, must all conform to the limit of one thousand square feet of floor area. The British government has adopted strict and detailed regulations concerning the way in which houses may be built. All plumbing and electric fixtures must be of designs approved by the government. Stoves must be designed for at least dual-purpose use; that is, they must be capable of space and water heating, as well as cooking. Special consideration has been given to the stoves for the houses in the mining areas. It seems that the miners like open fires, so the stoves are arranged to produce a fire-place effect, as well as facilities for cooking and heating water.

I talked with several people in France who are studying the installation of district-heating systems in French cities. These installations all involved hot water. These men were extremely interested in American heating control units, but they seemed to have serious doubt as to whether these control units could be made to function effectively under European conditions. Their most serious problem, however, seemed to be just how the heat used by the individual customers can be measured. Perhaps the most appropriate answer I could give would be that many American companies went out of business because they could not find a reasonable answer to this same question.

In summary, while it is true that district heating is used in many European locations, I do not believe that European practices are superior or even equal to ours here in the United States. European practices seem to be designed in the main to furnish the minimum service acceptable to the customer. American practices are designed to give the customer a high-grade service at an appropriate cost. To do this, we need flexible and sensitive systems. We need and use the most modern control equipment to maintain uniform conditions in the heated spaces, regardless of outdoor-weather conditions. We supply these services in a way which our experience indicates to be the most practical.

Director Hyde: Thank you very much, Mr. Griswold.
The meeting is adjourned.

...The meeting thereupon adjourned at 4:50 P. M....