DISTRICT HEATING

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DISTRICT HEATING IN HELSINKI, FINLAND

The heating season in Helsinki averages about 270 days per year. Because of the city's proximity to the sea, it does not have as low temperatures as the inland part of the country. The lowest temperature ever recorded in the city was −27.3 F, but the mean temperature of the coldest day of the year, using an average of the years 1930 to 1963, was −1.7 F.

Residences heated by district heat use heat during cold rainy days even in summer, so that for them the heating period actually runs throughout the year. Such houses are well-insulated and all have double-glazed windows, making the heat consumption lower on the coldest day in Finland than in similar structures in Central Europe where the climate is much milder.

All of the possible sources of water power in Finland have been utilized, except those in the far north, and in the future, thermal power stations must be built. Because fuel must be imported, the most natural location for power plants is on the coast in southern Finland, and Helsinki, therefore, is in an advantageous position. After seven years of investigations and preparations, in 1906 it was decided to build a municipal power plant to supply Helsinki with electricity, and in 1909 the Suvilahti condensing power station began operation. From 1910 to 1919 the city's needs were supplied only by steam power, but later hydro-electric power was added. During the Second World War it was necessary to ration the consumption of electricity and because of the severe lack of fuel, the steam power plants were forced to burn wood.

Although as early as 1936 steam was being sold for heating to several industrial plants located near the power plant, enormous quantities of heat from the condensers were still being disposed of into the sea. In 1953 it was decided to use this waste heat more extensively for heating purposes, as was done in Denmark—similar also to the advent of the steam district heating industry in the United States in the late 1800's. At the same time, it was also decided to utilize for district heating, the heat produced by the refuse incinerator plant which was to be built.

District Heating by circulating hot water was instituted in Helsinki in 1957, when the Salmisaari plant went into operation. In 1960, the third station, Hanasaari, was completed and not only produced power, but also steam for district heating. In 1964 a second steam boiler was ordered for the plant. Two additional heating plants are being planned for the near future, and a large back-pressure system is to be added to Suvilahti to produce a greater supply of power and heat.

The refuse incinerator plant completed in 1961 has two furnaces and two boilers, and is connected by pipeline to the district heating system.

At the beginning of the district heating activity, there was spare boiler capacity and no peak-load boilers were needed. The connected heat load increased so rapidly, however, that more capacity was soon in demand. Since the sites of the power stations are overcrowded, it was decided to place the necessary peak-load boilers in the vicinity of the consumption area. This would also increase the transfer capacity of the heating system. In the future, the auxiliary stations will handle about 40 per cent of the peak load, and their heat supply, in a normal year, will be approximately three to four per cent of the total annual heat supply.

Alppila, the first peak-load heating plant, began operation in 1964 and is an auxiliary for the hot-water district-heating system. Uniquely built entirely inside a rock cave, it consists of an entrance tunnel, air fans, oil burners, hot-water boiler, fly-ash and soot separators, induced draft fan, and flue gas duct. At a later date another peak-load station is planned for the southern part of the city. An apartment project for tenancy of 4,000 persons which was begun in 1963 and is scheduled for completion in 1968, will be heated by the hot-water system.

The hot-water system chiefly serves residences, schools, hospitals, hotels, churches, indoor swimming pools, and some offices and industries.

The steam heat customers are principally industrial—food processing plants, garment factories, laundries, dye-works, etc., some offices, and a few residences in the area.

The steam pressure, when leaving the station, is 185 psia max. and the temperature about 392F. The lowest guaranteed pressure is 71 psia. Because some industries do not return all condensate, only about ⅔ of it is returned.

Work for underground mains (both steam and hot water) is sublet to four main contractors:

1. Road construction contractor, who takes care of digging, blasting, concrete work, filling and paving.

2. Pipe laying contractor, who takes care of the actual laying down and welding of the pipes.

3. Prefabricating contractor, who manufactures and lays down the concrete prefabricated conduit.

4. Cellular concrete contractor, who casts the insulation for the pipeline.

Underground surfaces are mostly solid rock, and usually blasting is necessary before pipelines can be installed. A semi-prefabricated conduit is used, when the ground is hard and the ground water will not touch it. A rectangular conduit is used in places where numerous turns are involved, when the ground is muddy, or where ground water might be a hazard—connecting lines from the street to the customers' premises are also so constructed. Prefabricated conduit has been used only experimentally—in the apartment project mentioned previously. Insulation is usually cellular concrete; asbestos cement jackets have been in use only experimentally so far. Angular bellows expansion joints, and laminated stainless steel axial expansion joints are used in the proper places.

At the present time, one quarter of central Helsinki is connected to the two district-heating systems. There are nine other towns in Finland with district heating systems, with rapid development going on in each one.

DISCONTINUANCE OF STEAM-HEATING SERVICE

Abandonments 1960-1963

Danville, Ill. (Illinois Power Company) June 1, 1960

Vinton, Iowa (Iowa Electric Light & Power Company) 1961

Adrian, Mich. (Consumers Power Company) July 1, 1962

Iowa Falls, Iowa (Iowa Electric Light & Power Company) 1962

Missouri Valley, Iowa (Iowa Power & Light Company) 1962

Glendive, Mont. (Montana-Dakota Utilities Company) January 1, 1963

Boone, Iowa (Iowa Electric Light & Power Company) 1963

Hudson, Wis. (Northern States Power Company) June 1, 1963

Springfield, Mass. (Springfield Gas Light Company) 1963

Waukesha, Wis. (Wisconsin Natural Gas Company) June 30, 1963

Scheduled For Abandonment

Des Moines, Iowa (Iowa Power & Light Company) 1965

Reported reason: In recent years the utility has withdrawn from its district-heating activities, and at present has approximately 80 customers in only one community; this last remaining steam system was a carry-over from the days of small electric-generating stations.

Lockport, N. Y. (New York State Electric & Gas Corporation) June 15, 1966

Reported reason: The operation has been unprofitable for years, despite all efforts to reduce costs through changes in operations and facilities; and although steam rates have been raised several times, the plant is still operating at a loss and even another substantial increase would not make retention of the plant feasible.

Muncie, Ind. (Indiana and Michigan Electric Company) August 1, 1966

Reported reason: The 1902 plant is obsolete and would cost $1,100,000 or more to replace, and rates would have to be doubled to pay for such an improvement.

Cumberland, Md. (Potomac Edison Company) Application before Commission

Ellendale, N. D. (Montana- Dakota Utilities) Application before Commission

Headquarters would appreciate being advised if you know of any other abandonments of service, either accomplished or contemplated.

American Blower Forced Draft Fans Shipped For Use On Power Industry's First 1,000-MW Turbine-Generator Unit

Housings and wheels for four 112¾-in. diameter American Blower airfoil-bladed forced draft fans have been shipped by American-Standard Industrial Division, Detroit, for installation on the power industry's first 1,000-MW turbine-generator unit, the Ravenswood 30 station of Consolidated Edison Company of New York.

The fans are for a 6,500,000-lb steam/hr boiler being constructed by Combustion Engineering Company. The fans are rated for 650,000 cfm at 100 F, 42-in. static pressure and 890 rpm. They were specified complete with inlet boxes, inlet silencers and inlet vane control.

A prototype fan for this installation was witness-tested two years ago, at which time it was found to exceed the guaranteed performance.

Eight other American Blower forced draft fans are in operation on present Ravenswood 10 and 20 units.

Central Station Units and Coils Among Equipment Lines Affected in Price Increase

A 6 per cent price increase affecting selected product lines has been announced by Mr. E. W. Forth, president of American-Standard Industrial Division. "Labor and material cost increases have brought the need for such action," Mr. Forth explained.

"When material prices go up," he continued, "a corresponding rise in the price of those products making use of the materials involved must be expected in a highly competitive market. The products involved use large amounts of copper alloys."

Products affected by the price change are propeller type Venturafin unit heaters, spray coil dehumidifiers and air washers, central station air handling equipment, and air conditioning and heavy-duty industrial coils of all kinds. The price increase was effective November 2, 1964.