

# GAS UTILITIES IN THE PRESENT EMERGENCY

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Utilities play an important and unique part in war as well as in peace. Mr. Hough has outlined the role of gas utilities in this first of a series of articles on utilities in the war.

The gas industry is displaying again in this emergency the stability that characterized it during the depression. Compared to the tremendous changes wrought by the war in the steel, rubber, and aluminum production industries, in the aircraft and automobile manufacturing industries, and in the home construction and home appliance industries, the gas utilities are doing business as usual. However, it is only when viewed in the light of changes that have occurred in other industries that those occurring in the gas industry seem small. Actually the impact of the war on the industry has been great. Some of the problems encountered in this emergency are peculiar to the gas industry itself, others are common to all business.

## NATURAL GAS SUPPLY PROBLEMS

Those natural gas utilities that depend entirely upon dry-gas fields for their gas supply, have had relatively few gas supply problems attributable to the war. However, those utilities that use casing-head gas find that they are affected indirectly by many of the changes occurring in the petroleum industry, because their commodity is a by-product of petroleum production and is therefore available in quantities proportional to the amount of crude produced.

Continuous vigilance must be employed so that government agencies which control petroleum production are fully informed as to the effect of their plans on the utilities' gas supply. The production of abnormally large quantities of gas in a field not adequately equipped with gas transmission facilities would simply result in gas wastage, and the curtailment of production in fields in which such facilities are located results in an inadequate supply for the utilities.

The Petroleum Coordinator (OPC), now has a Production committee in each of the five petroleum producing regions of the country. One of the functions of these committees is to set up production quotas each month for each of the fields in their jurisdiction. These quotas are based on estimates of requirements for each product produced, including natural gas. If the demand for fuel oil increases, production is shifted to those fields that produce relatively heavy oil. If the demand for natural gas or butane increases, production is shifted to those light oil fields that produce relatively large quantities of these products. The relative amount of different products can also be varied by producing high or low ratio wells within a field.

This plan results in the gas utilities' requirements getting full consideration in the production planning, and makes possible the most efficient use of petroleum production facilities. However, there are many variables involved in the problems that these committees must solve and some of them, such as the weather, are not predictable with accuracy. Consequently,

the committee's problems are difficult and their solutions are subject to error. All of which tends to jeopardize the gas supply to utilities that depend largely on casing-head gas.

## NEW LOADS

The war has added many large loads to gas utility systems and has in many cases created demands for gas that the utilities have been unable to supply. Airplane plants, shipyards, and many other defense industries use natural gas in large quantities. In normal times loads of this character have been supplied in part at least on surplus gas schedules that permit the curtailment of service during periods of peak demand.

In California and in other regions where gas is used extensively for space heating, the gas transmission and distribution systems have a large excess capacity available to supply industrial loads during seasons when the space heating load is small or non-existent. However, during cold weather the gas systems are loaded to the limit to supply the firm load only. In the Los Angeles Basin, for example, the estimated firm load for July and August, 1942, is 153,000 Mcf of 1100 B.t.u. gas/day, while the estimated firm load for a peak winter day next winter is 518,000 Mcf of 1100 B.t.u. gas/day. The difference between the extreme peak day firm load, for which the gas system must be designed and built, and an average summer day firm load represents the surplus capacity normally available for industrial users who can either shut down or use a substitute fuel during periods of peak domestic demand.

The large shifts of population to defense industrial areas has created new loads more difficult for some utilities to handle than the loads of the defense industries themselves. During 1942, 50,000 new gas consumers were connected to the utilities lines in Southern California (excluding San Diego). This represents an increase in peak day demand for firm gas of approximately 25,000 Mcf/day and an increase in population of 165,000.

In New Orleans a shipyard is now under construction that will, when completed and operating, employ 50,000 men. To house these workers, a single housing project is underway, designed to house 100,000 people. The gas load created by this project will easily equal that of a city of 100,000 inhabitants. There are many problems involved in providing such loads in these times.

The firm peak day gas load in the City of San Diego has increased, largely as a result of war activities in that city, from 14,700 Mcf/day in 1937 to 32,400 Mcf per day in 1942.

The War Production Board has generally found it inexpedient to allocate to the gas industry the large quantities of steel and other critical materials that would be required to increase the capacity of existing gas systems to meet all of the demands that are made on them during this emergency. Instead, WPB has issued a Limitation Order (L-31), which limits the use of natural gas in those areas where the supply

is inadequate to meet war needs. This order provides that after the effective date of the order (March 1, 1942):

- (1) Natural gas cannot be used for major space heating in new houses, and
- (2) No new non-residential consumer can use natural gas unless adequate standby fuel facilities have been provided, or special approval is obtained from WPB.

The order was one of the "Sunday punches" that brought most of the home construction in Southern California to a grinding stop. Permits for new single dwellings issued in Southern California during February 1942, totaled 2860, while in the same area in March, the month immediately following the effective date of the order, the total was 970. However, considerable home construction having Defense Housing status is still being done in Southern California. In most cases, kerosene or oil heat is being provided. Several large housing projects in the vicinity of defense industries are under construction, and they will use oil for space heating.

#### PRECAUTION AGAINST SABOTAGE AND AIR RAIDS

In common with other owners of large industrial plants, the gas utilities have given much thought and taken many steps to protect their property from sabotage. In addition to protecting themselves from losses due to damage to their property, the utilities have the added responsibility of protecting the continuity of their service. In the case of gas utilities this latter problem is of paramount importance. If electric or water service is interrupted, it can be resumed again as soon as the cause of the trouble has been eliminated and the necessary repairs have been made. However, if service is interrupted to a gas distribution system, it cannot be safely resumed after the necessary repairs have been made, until every gas burning appliance on the system has been shut off. In normal times the usual practice in such cases involves sending a gas utility employee to each consumer's premises to turn off the gas service cock. After this operation has been completed, and the cause of the interruption has been eliminated, gas is turned back into the distribution system and then an employee again visits each consumer's premises and checks all appliances and turns on the gas. Such an operation in a city of even moderate size would take a large force of men several days under the most favorable conditions.

It is evident that such an occurrence would cause much inconvenience and even suffering, especially in those natural gas territories where gas is used extensively for all domestic fuel requirements and is also used in hospitals, restaurants, etc. Under these circumstances it is also easy to understand why the major anti-sabotage and air raid protection activities of the gas utilities have been devoted to insuring, insofar as it is possible, the continuity of their service.

Those gas utilities that operate in areas where there are many defense industries and where air raids are most likely to occur are taking extensive precautions.

Important plants and compressor stations have been placed under armed guard.

Improved fences and yard lighting have been provided and a pass system set up to limit admittance to stations to those

who can identify themselves and who are there on legitimate business.

Precautions against sabotage from within have been taken.

By-passes are being installed around major supply stations, and supplementary sources of supply are being provided, so that the knocking-out of one station will not necessarily result in an interruption to service.

Spare parts and emergency repair facilities have been provided to minimize the seriousness of any given damage.

Increased fire-fighting facilities have been provided, and special fire-fighting training is being given to employees.

Valves have been installed in distribution systems that will make it possible to localize the effect of damage resulting from air raids.

Emergency crews have been organized to function during air raids. They will isolate damaged portions of distribution systems, and make emergency repairs to mains and holders. They are being trained to meet the emergencies to be encountered during a raid.

Key supervisors and dispatchers have been provided with special records and maps necessary for the efficient handling of emergencies. They have been drilled in the proper handling of situations that might occur during a raid.

Emergency rations for repair crews have been provided at strategic points.

Air raid shelters are being built to protect emergency crews waiting to be called to active duty.

Emergency communication facilities have been provided.

Blackout facilities have been provided for those plants that must operate during a raid.

In all of this work the experience of the gas companies in England has served as a guide. The gas utilities are endeavoring in every way possible to cooperate with the Office of Civilian Defense and have received much valuable assistance from that organization. They are closely tied in with the Civilian Defense Control Centers, so that their work will be properly coordinated with the efforts of other agencies operating during an air raid.

So much for problems that are more or less peculiar to the gas industry. We also, of course, have the problems common to all business operating during wartimes.

The rubber shortage has made it necessary to curtail service in some cases and to radically change some of our operating procedures.

Many knotty personnel problems have arisen. The complete stoppage of appliance merchandising has left our sales organizations with nothing to do. We stand to lose these carefully trained and experienced organizations. Our engineers and trained technicians, most of whom have families, are getting commissions in the armed forces, or, to insure an adequate income for their families, are taking jobs in defense industries where they feel less likely to be drafted.

We have so far been able to obtain deferment by the draft boards for men in key positions and hope to be able to continue to do this.

All of our purchases of materials and supplies are controlled by the War Production Board Order P-46. This Order assigns us an A-5 rating for operating supplies and for materials re-

quired for maintenance and repair and for minor capital betterments. These latter are limited to a material cost for any one job of \$1500 for underground construction and \$500 for above ground construction. Extensions to supply new consumers are limited to a total length of pipe (including that on the consumer's premises) of 250 feet.

Special approval must be obtained from the Power Branch of WPB for all jobs that do not fall within these limits set by P-46. Many such jobs arise because of requests to supply new defense industries, increase in number of domestic consumers, etc. Consequently, a tremendous amount of detail must be referred to Washington.

Enough has been said, I believe, to make clear the meaning of the statement made at the beginning of this article. When compared with some other industries, the gas industry is doing business as usual, but nevertheless the impact of the war on the industry has been great.

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renderings for current problems; and even the guest lectures are, if possible, more or less directly concerned with some theme that is of interest in connection with the particular problem which the students are solving at the time. The subject of Professor Macarthur's classes is history of art is the evolution of formal expression in relation to cultural and social development.

### CONCLUSION

Summarizing the experiences of the first year of the activities of the Industrial Design Section at the California Institute of Technology, it may be said that the soundness of the chosen directives has been proved by the results of students' work and by the approval of critical experts from outside. Much of the desirable development, particularly in regard to closer contacts with industry, can be expected only after a longer period of time. The fact alone that the California Institute has opened its doors to students of industrial design is of principal and promising importance for the development of this young profession.

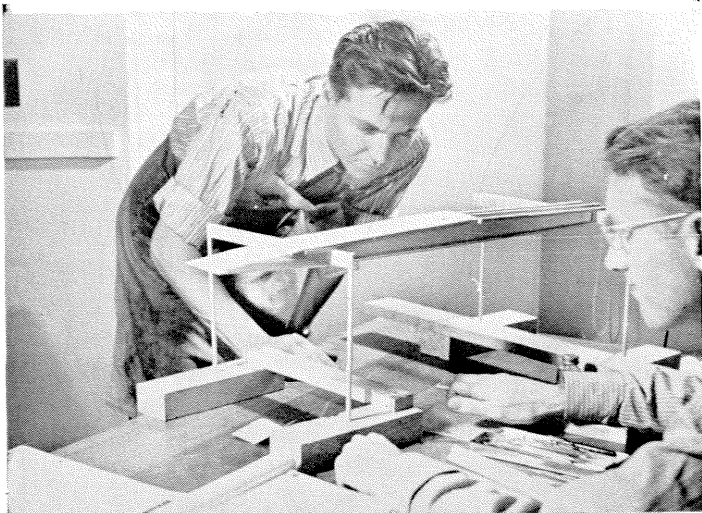


Fig. 21. Work on model of prefabricated house. (Second year thesis work) Photograph by B. Morant

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power of the West and the great land power of the East. This Germany has not yet done and the difficulty of doing it increases with the passage of time.

The opening of the shooting war in the Far East has not fundamentally altered Germany's position. Some troops and supplies had already been diverted by the Allies from European fronts in anticipation of Japan's belligerency; more would have had to be sent in any event once hostilities commenced; but the unexpected rapidity of Japan's advances introduced into the Allied need for stronger opposition to Japan an urgency which had the indirect result of easing somewhat Allied pressure on Germany. But the basic Allied strategy still holds; it is to keep Germany locked up in Europe until her military strength can be ground to pieces between the jaws of a two-front offensive. To this end there is an increasing flow to Russia and Britain of supplies which will one day make possible this grinding-up process.

It should not be overlooked that Japan's belligerency has had its counterpart in the belligerency of the United States and in the enhanced anti-axis co-operation of Latin America. The resulting intensification of the war effort in America is even now going far to offset any advantage accruing to Germany from Japan's entry into active warfare. Furthermore, Russia has not yet been obliged to meet a Japanese attack on her Far Eastern provinces, and so has escaped the difficulties of an active war on two fronts. This happy circumstance has been one of the factors enabling Russia to sustain an undiminished

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