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THE RELATION OF POWER AND FUEL TO PROCUREMENT PLANNING

LECTURE BY

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The most recent statistics show that we have forty-five electric slaves working for each wage earner in the United States. With an estimated output of eighty billion kilowatt-hours of electric energy in the United States in 1927, we are very largely using electrical energy to replace the man power energy of former days.

In the solution of one of the problems last year it was pointed out that the productive capacity of the average American, due to the use of electrical and mechanical power, is thirty times as much as that of the average Chinaman, about twelve times that of the Russian, and two to three times that of the European. Every kilowatt of power installed in our central stations, every auto truck and tractor, even every mule, enables the United States to meet a war emergency with greater efficacy. Power is behind them all. It releases men for the fighting line by reducing the number of men required to produce our munitions, our food, and our ordinary necessities of life.

Relation of Power to other Industrial Mobilization.

On the other hand, the relative position of power with respect to a procurement program must not be lost sight of. Power is only one of the elements entering into the problem. To show the interrelation of those various elements I have included two charts, which were used in a previous lecture. The first of these shows the broad interrelation of industry. In this chart, in the first column, are shown eight occupational groups, as given by the Bureau of the Census. These groups include all persons in

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the United States gainfully employed. In the other columns are indicated:

- (1) The number of establishments.
- (2) Persons employed.
- (3) Domestic materials required.
- (4) Foreign materials required.
- (5) Materials produced or work accomplished.
- (6) Installed horsepower.
- (7) Transportation.
- (8) Capital invested.
- (9) Communications.

Other columns, such as fuel, might be added.

By drawing the lines between the columns for each of the eight groups we have rectangles formed, each of which could represent a major problem of each of the major occupational groups. For example, under Agriculture we could have the number of farms in the country, the number of persons employed, the materials of foreign or domestic origin required to carry on the agriculture of the country, etc. Under engineering we could make a study of the number of establishments, their size, importance and class of work accomplished. The problem in any one block alone would require years of study for complete solution.

Goal of our Industrial Planning.

In general, we might say that the purpose of industrial mobilization is to solve the problems of each of these blocks and to plan so that in making any necessary adjustment in one block others will not be adversely affected. In a second chart (Chart 2) the details which particularly concern war time pro-

curement are considered. For many years Colonel Ferguson had the feeling that all of the supplies of each of the branches could be classified into, say, ten groups each. This classification could be in accordance with any arbitrary grouping, as desired by the branch, but would include somewhere within one of the groups every finished article required by the branch. An administrative plan also will be required for each branch.

It will be noted that the chart has columns for:

- (1) Elements entering the problem and resources.
- (2) Each of the supply branches of the Army.
- (3) The Assistant Secretary of War.
- (4) The Navy Department.
- (5) Other Government Departments.
- (6) Civilian needs.

and at the right two columns headed:

- (1) Plans for Federal control of industry.
- (2) Plans for private control of industry.

Example - Shoes.

Let us now assume one item or group of items required by the Quartermaster Corps. Let us take shoes, for example. In order to obtain shoes, the Quartermaster Corps must first of all have an organization trained and equipped to procure the item. In other words, personnel. He must have specifications, must know his requirements, should have determined the raw materials entering into the manufacture of shoes, for, strange as it may seem, some eleven thousand pounds of copper per week are required to make the eyelets for the six-hundred and twenty-five thousand Army shoes required per week. He must know the faci-

lities capable of producing the Army shoe and must know, in general, that the transportation, power, labor and funds are available to meet the program. In order to avoid complication with other Government departments he must have the facility allocated to him. In other words, under one cover, an inexperienced procurement officer will find sufficient information to enable him to immediately enter into negotiations for the procurement of the proper number of the thirty-six million pairs of shoes required.

However, even if the work of the Quartermaster General has been completed and every element within his control considered, still he is not, nor is the Assistant Secretary of War, assured that the shoe program will move along without a hitch. The reason for this is evident by a glance at the chart. For example, under power, we realize immediately that this vital element enters into the plans of all of the other Government departments and of the civilian population. The plans of these other agencies must be so drawn that each will obtain its fair proportion of the power and other indirect elements essential to the plan. In general, the duty of considering the plans in a vertical direction falls upon the Chiefs of the Supply Branches, while the duty of making plans and studies of the indirect elements rests, by law, with the Assistant Secretary of War. The execution of any such plans as may be drawn by the Assistant Secretary, or by the supply branches, rests with the agency designated in the plan, but only after specific approval and designation by the President of the United States and existing or contemplated law. This, I believe, gives a perspective, which places power in its proper relation to the other elements of procurement planning.

Let us now see what the Assistant Secretary of War has done in preparing plans and making studies which will assure adequate provision for the

mobilization of power in time of war. In other words, to consider power along the horizontal line on the chart. A little history might be of assistance.

Power Situation during the World War.

During the World War shortages of power occurred in various sections of the country, particularly at Niagara Falls, Pittsburgh, New York, Philadelphia and Birmingham. As a result of these shortages, which first became acute around Niagara Falls, President Wilson asked Mr. R. J. Bulkley to investigate the situation and report to him. In gathering information on the subject Mr. Bulkley consulted with Colonel Charles Keller of the Corps of Engineers, who, for years, had been District Engineer at Buffalo, New York, and had been engaged in supervising the terms of the treaty with Canada pertaining to the diversion of water from the Niagara River. Mr. Bulkley and Colonel Keller went to Niagara Falls and held public hearings, at which were represented the large producers and consumers of power. Ultimately, the entire output of the power companies in the region was taken over by the Government and apportioned in the best interests of the United States. Industries, whether working upon primary or secondary contracts for the Government, or manufacturing supplies essential to the winning of the war, were given first consideration. Further steps were taken to increase the output of the Niagara Falls plants. This was promptly accomplished, due to the detailed information that Colonel Keller and the power companies had as to the situation in that vicinity.

Following this experience a Power Section of the War Industries Board was set up and headed by Mr. Frederick Darlington. Surveys were made of the power situation in various sections of the country where shortages were threatened. Voluntary measures were adopted, power conserved by appealing to the patriotism of consumers, greater utilization made of existing power by means of interconnection and of utilizing off peak loads. Also, new units were

installed where the same could be done in a reasonable length of time.

Power Survey by Corps of Engineers.

At the end of the war Colonel Keller wrote a report of these activities to the Secretary of War, which was published under the title of "The Power Situation during the War". In this report he recommended that a continuing survey be made of the power resources of the country in order that in any future emergency data would be on hand which would enable a power director to efficiently and promptly take measures to utilize our power resources to their maximum.

In 1920, prior to the creation of the Office of the Assistant Secretary of War, the General Staff assigned this duty to the Corps of Engineers. The supervision of that survey has been carried on by this office for the past six years.

In brief, the power survey consists of an investigation of all central electrical generating stations and systems with a capacity of five thousand kilowatts or over. The survey is made by the District Engineers in charge of River and Harbor Districts. There are some forty-two of these located in the principal cities of the United States. The reports of the District Engineers, with maps, showing the location of the generating plants, the capacity, the annual production of electrical energy, the transmission lines and principal substations, together with information as to the phase, voltage, frequency and capacity of the transmission lines, are submitted to one of eleven officers, each placed in charge of one of the power zones into which the United States has been divided. These zones were made up to conform as closely as possible to our War Department Procurement Districts and still be of a size permitting easy administration. The boundaries were laid out so that a minimum of power

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crossed the boundary. The complete reports by each of the officers in charge of the zone surveys are submitted annually to the Chief of Engineers and there consolidated and filed for use of the Assistant Secretary of War.

Determination of Demand.

Through the medium of the power survey the Assistant Secretary learns of the power resources of the country. His second task is that of balancing the power load against these resources in a manner to assure adequate power for the essential industries. Upon this second part of the problem progress has not been as satisfactory as upon the first part. The reason for this lies in the fact that the power required by the various facilities at which accepted schedules of production are to be placed cannot and should not be determined until or at the time those schedules are being placed. In the summer of 1927 a study was made of one of the power zones. At that time only fifty-five per cent of the money value of the expected war load in that district had been placed. It is evident, therefore, that the total power requirements in any zone are not yet available. However, as the direct load placed upon any district by the War Department bears a small ratio to the total manufacturing load in the district, it is apparent that we will never obtain the total war load in a district by merely adding the power required to carry out our primary contracts, or even our subcontracts. We can, however, determine in time of peace the amounts of power required by each facility to carry out its accepted schedule of production.

This problem, in itself, is one of some magnitude. However, it may be approached in a reasonable manner much in the way it was tackled in the World War. The Power Section in the War, in Priority Circular No. 45, is-

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sued instructions that consumers having a connected load of one hundred horsepower or less would not have their demand curtailed except under very exceptional circumstances. The saving of electrical energy through a curtailment of these small consumers would not justify the loss, damage, inconvenience and industrial disturbance that would follow. In the same way our supply branches will soon be called upon to submit statements showing the connected electric load (in kilowatts) and the monthly consumption (in kilowatt-hours) required to meet the accepted schedules of production placed with each facility. From this requirement will be exempted all those facilities having a connected load of less than one-hundred kilowatts or a consumption of electrical energy of less than ten-thousand kilowatt-hours per month. These reports will be consolidated in the Office of the Assistant Secretary of War by cities and power zones and furnished to the officers in charge of the power zones. These requirements can then be matched against the actual resources by localities in each of the power zones. In the great majority of the cases it will be found that the supply is quite adequate to meet the expected demand, as shown by these figures. In certain cases, however, an excess will be indicated, which will require detailed study in the power zones to assure that the facilities receive the amount of power required.

Balancing Resources and Demand.

N. This detailed information really represents the goal we are striving for. With information as to resources and as to demand in usable form, generally plans will be altered if any shortage is indicated. On the other hand, if it is impossible to place orders elsewhere then the situation is clear as to what action must be taken in time of war. It is the basic data upon which any control of power must depend. Months of time will be saved

and, in general, shortages of power will be eliminated before they occur. It is possible that no drastic control will be required. However, the indirect demand and the unknown elements in the problem are so great that a plan for a control agency is deemed necessary.

Plan for Control of Power.

With this in mind a plan for the control of the power industry in time of war was prepared in 1926. It was submitted to the central station industry for comment. After the comments had been carefully considered and incorporated it was presented to the National Electric Light Association, which Association represents almost one-hundred per cent of the central station industry, - by the Secretary of War in an address on June 9, 1927. Definite action approving this plan has not yet been taken by the National Electric Light Association, but its early action is expected.

This plan is based on five general principles, as follows:-

"(1) The Government should not take over any plant or power system unless necessary to insure the efficient prosecution of the war.

"(2) No additional control should be exercised in regions where power is adequate for present and immediate future needs, both civil and military.

"(3) When shortage of power for essential needs exists or is threatened, the Government should take over the entire output of the plant or plants in the locality and apportion the power output to users in the best interests of the United States.

This action should set aside all existing contracts for the supply of power with which such action conflicts.

"(4) If the preceding methods fail to obtain sufficient amounts of power, the Government should undertake actual operation of such plant or plants.

"(5) The existing organizations of any companies taken over should be utilized in their operation, in order to make full use of the experience, training and skill of their personnel."

Emergency Power Director.

"With these principles in mind the plan calls for the selection by the President of an Executive Assistant, to be known as 'The Emergency Power Director', who would be responsible for the effective utilization of the power facilities of the country. The Emergency Power Director would be assisted by an Executive Committee, the majority of the members of which would be nominated by the National Electric Light Association, and approved by the Emergency Power Director. These men would serve in a civilian or military capacity. The Committee would serve under the direction of the Emergency Power Director and would be the medium through which the mobilization and coordination of the power systems would be carried out and effective cooperation secured.

"The functions of the Emergency Power Director would be carried out through the Executive Committee and a small field force in the several power zones into which the country would be divided. At present the country, for the purposes of carrying on the power survey which I mentioned above, has been divided into eleven power zones. These zones might be used as the basis for the power control zones in case of an emergency. Each zone director,

under the direction of the Emergency Power Director, would be responsible within his zone for the better utilization of existing sources of electrical and mechanical power, the inter-connection of existing systems, and the development of new sources of power, particularly for shipyards, munition plants and industrial facilities engaged in the manufacture of commodities necessary and essential in the prosecution of the war, and for the ascertaining by inspections that priority policies formulated by proper authority were obeyed.

"The plan further provides that the Emergency Power Director, or his duly authorized representative, would normally leave the management of the plants in the hands of the Executive Staff or organizations of the companies, even in the case the output has been taken over. In this case the compensation to the companies will be at rates established for similar services by the Utility Commission of the State or District in which the plant is located, or in the absence of such fixed rates, at the same rate as paid by private consumers for similar services.

"The plan further states that no physical property of the power companies will be taken over unless absolutely necessary. In these rare cases where this action is taken, the property will be all property used in the generation, transmission and distribution of power, the materials and supplies on hand at the time possession is assumed, all balances in the account or accounts representing the total or accounts receivable as of

that time, and a working fund, if in the treasury of the company, not in excess of an amount necessary ordinarily to cover one month's operating expenses. All these would be credited to the company. The United States would pay out of the funds coming into its hands from the operation of the plants, or otherwise, the expenses of operation of the company unpaid at the time the possession was assumed, and charge same to the company. It would likewise pay just compensation for the use of the property during Federal control, as provided later, and would also pay all taxes accruing during Federal control, except such additional war taxes as might be levied in connection with the then existing war. All revenues from operation during Federal control would belong to the United States, and all expenses of operation during Federal control would be paid by the United States."

Compensation.

"Compensation to be paid the company would be a sum equivalent to the average net operating income of that particular company during the preceding three fiscal years, except that if exceptional or abnormal conditions were found by the President to exist during all or a substantial portion of such period of three years, which would justify a larger or smaller compensation, provision would be made for such larger or smaller compensation as might be found to be just and equitable. Due allowance in the compensation would be made for the use of additions, improvements, or equipment, the use of which was not fully re-

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flected in the operating income of the said three years, or a substantial portion thereof. Compensation would be paid to each company in quarter-annual payments. In taking over the company, a contract would be entered into, stating and defining the rights and obligations of the parties."

The legislative plans of the office include provision for the creation of a power director, with duties as outlined above. In case of the creation of a War Industries Board he would be subject to the decisions of the Chairman of that Board in the matter of priorities.

Fuel Industry.

We now come to the relation of fuel to procurement planning. Plans for the control of this industry are not as far advanced as in the case of the power industry. There are many reasons for this. Primarily, it is due to the fact that the fuel industry is divided into several large groups which are more or less independent of each other and which do not work well together even within the groups themselves. These may be given as the bituminous industry, the anthracite industry, the coke industry, the oil industry, and the gas industry. Each one has been having its troubles in recent years and for various reasons it has seemed inexpedient to attempt to obtain the approval of plans for their control in time of war.

I will take up each of these briefly:

Bituminous Coal.

In the bituminous industry, which produces some five-hundred million tons of coal per year, the situation has been particularly bad of recent years. Labor troubles, Government interference, and general disorganization, have been the outstanding features. In 1924, at the time of the Jacksonville agreement, fixing fairly high wages for union miners, over two-thirds of the

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bituminous coal of the country was mined by union labor. The Jacksonville agreement placed the wages of the miners so high that the union mines were unable to compete with the non-union mines. Within six months many of the union mines were shut down and remained so. Gradually, the production in the non-union fields of Kentucky and West Virginia crept up, while that in the union fields of Pennsylvania, Ohio and Indiana decreased. In the union fields of Illinois production held its own, due to its strategic position near the great Chicago market. One skirmish between the union and non-union fields has just been won by the union fields in the Interstate Commerce Commission decision denying the reduction in freight rates from Kentucky, etc., to the lower lake ports.

Last April a general strike in the union fields was declared. Production in those fields dropped to zero and remained so for several months. In general, this strike has continued, although agreements have been reached in certain fields and partial production has followed. Meanwhile, the production of the non-union fields has increased and no shortage and no rise in prices have taken place as a result of the strike. Production is limited only by demand and even now, ten months after the declaration of the strike, the stocks on hand are far above normal. It would thus appear that one of the major problems of the bituminous industry has more or less worked itself out in favor of the employers, although we are right now in the midst of another investigation by Congress of the bituminous industry.

Perhaps sixty per cent of the bituminous production is now represented directly or indirectly by the National Coal Association. The headquarters of this Association is in Washington and contact has been made with it by this office. In 1922, at the time of the bituminous strike and the

threatened railroad strike, plans were worked out for the distribution of coal. A complete organization was set up with coal distributors at crucial points, so that if the railroad strike had occurred, fairly efficient control could have been exercised very promptly. This Association stands ready and willing to assist in our plans for distribution and control. Nothing definite has been put down as yet in the nature of an agreement between the War Department and the coal industry. I believe that some steps along this line could very properly be taken during the next year.

Anthracite Industry.

Turning to the anthracite industry we find an entirely different situation. In place of the competing and hostile groups that are found in the bituminous industry we find a strongly entrenched and thoroughly coordinated association of anthracite operators in full control of the business. The labor situation is more clearly defined. Two years of a five year agreement on wages have passed. Both miners and operators have learned their lesson from the strike of 1925-1926 and realize that anthracite is not essential to the people of the country, - that oil furnaces, coke and low volatile bituminous coal are satisfactory substitutes for anthracite and that any undue disturbance of the anthracite industry will merely force a further loss of consumers. No action has been taken to obtain the cooperation of the anthracite operators in war planning, as it is believed that prompt action could be obtained from them in time of war.

The Oil Industry.

The exposures some three years ago in the oil industry have made it inopportune to approach the oil industry with respect to control in time of war. Production has increased by leaps and bounds. The flush production

of 1923 very seriously affected the oil industry. It recovered somewhat in 1924 and 1925 but overproduction again occurred in 1927, in which year some nine-hundred and fifteen-million barrels of crude petroleum were produced. This production - some seventy-two per cent of the total world's production - was far above the normal consumption. Prices were forced down and are still at a low point. As a consequence of overproduction and agitation by certain oil magnates for conservation, President Coolidge appointed the Federal Oil Conservation Board in 1926 to consider the ways and means of conserving our rapidly diminishing oil resources, --this Board consisting of the Secretaries of Interior, Commerce, War, and Navy, under the Chairmanship of Secretary Work, and has gathered a vast amount of information concerning the oil industry. Various pamphlets and books have been published. The concrete results, however, have not been very great. Elimination of waste in some of the producing and refining methods has resulted. Any reduction in actual production of crude oil has not been visible. The reasons for this are manifold. To begin with, unless the National Defense Clause of the Constitution is invoked, the Federal Government has no constitutional authority for controlling the production of petroleum. That is a subject which falls within the jurisdiction of the states and the states have been loathe to exercise their authority. Limitation of production, as recommended by some of the big oil companies, is, of course, for the purpose of raising prices. Our whole economic theory has been contrary to such control, so that at the present time we have an absurd picture of the oil industry endeavoring to lift itself up by its boot straps in a vain effort to control production without admitting that they are endeavoring to control prices and, further, throwing up their hands in horror at the idea

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of Governmental control of the industry. It seems reasonable, however, that if the companies are given authority to combine, for the purpose of limiting production, that they must fall under the jurisdiction of some control agency of the states or the Federal Government. At present, the committee of nine appointed, with three members from the American Petroleum Institute, three from the Government, and three from the American Bar Association, are endeavoring to decide these complex legal questions. Meanwhile, the law of supply and demand is at work and, finally, after twelve months of overproduction low prices have forced the curtailment of well drilling to a point where consumption is about equal to production.

Navy to take Lead.

In the matter of the control of petroleum in time of war, it has been agreed that the Navy shall take the lead. Their demand for fuel oil is far in excess of that of the Army. The requirements of both services have been computed and are known to each other. In the matter of control, no plans have been put down in black and white. However, control could be obtained very promptly through the efforts of Captain Paul Foley, who retired from the Navy about three years ago and is now employed by the Standard Oil Company of New Jersey. In brief, the plan consists of the formation of a war service committee, consisting of the Presidents of the Standard Oil of New Jersey, the Texas Company, the Gulf Refining Company, and, perhaps, several others, to deal directly with the War and Navy Departments, or an oil division of a Fuel Administration, in assuring the delivery of adequate petroleum products to the services at prices to be agreed upon at the proper time. The control is so centralized in the oil industry that it is felt that no difficulty would be encountered in any of the four branches of the

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industry - production, refining, distribution or marketing.

The only real problem arises in the transportation of petroleum products, and, gradually, the situation is being alleviated by the construction of more pipe lines, tank steamers, and tank cars. The present planning with respect to petroleum is being done by the Petroleum Commodity Committee, but in case of an emergency and the appointment of a Fuel Administrator, as outlined in the Legislative Plan of the office, all petroleum products would fall under his jurisdiction.

Gas Industry.

No action has been taken with respect to gas, which is another of the main branches of the fuel industry. At the present there is a representative in Washington of the American Gas Association, the American Electric Railway Association, and the National Electric Light Association, who is attempting to cooperate with the War Department in furnishing full information with respect to public utilities required by the Army, both in peace and in time of war. No plans have been taken up with him as yet because he has been quite busy in a vain endeavor to keep Congress from investigating the public utilities of the country.

In closing, it might be added that we find all of the large industries willing and ready to cooperate in giving service in time of war. They are ready to accept any reasonable control measures that are deemed necessary by the Government at that time. Any detailed work placed upon them in time of peace soon becomes a burden, and, hence, only the most essential information which would enable any control agency to start to function has been, or should be, asked of the industry. Gradually, not only through our own efforts, but those of the Department of Commerce and Department of Agriculture,

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statistics are being gathered and kept up-to-date in such a way that effective control can be exercised much more rapidly and intelligently than was the case in the World War.

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