Hence I would suggest a revision, or rather amplification of Mr. Schulze's plan somewhat as follows:

SCHULZE	*REVISED*
	Direction
Administration	Administration
Management	Management
	Planning
Execution	Execution

The word *direction* (a function to be performed by directors) has little more to recommend it than the fact that it is used now to describe what is nominally the highest functions in the typical enterprises.

Of course I am here only recommending that a place be reserved for this function of *direction* "above" that of *administration* which latter function it seems to me Mr. Schulze has defined too broadly. I have quoted the word "above" to suggest that I have in mind a type of rank quite dissimilar to that used in military affairs.

Now in addition to the super-function of ideas it will be the duty of the directors—perhaps not constituted as they are today on a board—to outline in broad fashion the objectives of the concern. Under our present system the administrative officers not only lay down the objects but really direct the campaign for their accomplishment. Under this system too frequently whatever is accomplished—be it little or great—is made to appear as the whole of what was sought after. More and more we must demand that at every level in the organization the task be pre-determined so that the outcome—whether it be complete failure, partial failure, partial success or complete success—can be known of all men.

Therefore having in mind the scheme of organization, not only which is but which is to be, I believe that *Administration is the force which governs the object for which an organization is to strive, provides that type of management best adapted to the work in hand, and sets the broad policies under which it is to operate.*

Of course in smaller concerns it may be necessary to combine the functions of *direction* and *administration* and to entrust them to the same personnel just as sometimes happens in the case of functional foremen where the same man will perform the duties of more than one job. It is well in any such case, however, constantly to recognize the essential difference in the character of the several functions performed though they may be by the same individual.

The industrial world has been so intent for a generation past in searching out the technique connected with the tasks assigned to those we have called the "workers" that comparatively little attention has been paid to the technique of the jobs of the "higher ups." There are reasons for believing that part of the pressure for this inquiry into the nature of the jobs of directors, administrators and managers will come from the ranks of the "workers" themselves. It will be profitable if our Society can continue actively this discussion which Mr. Schulze has inaugurated.

Morris Llewellyn Cooke[1]

FUEL AND PRODUCTIVITY

An Open Letter

New York, July 28, 1919.

The Honorable Franklin K. Lane, Secretary of the Interior:

Under pressure of the war requirements for an increased national productivity, one of the chief handicaps encountered was the shortage of fuel, and that shortage of generating capacity was seen to jeopardize the uninterrupted power supply, means for securing which became of utmost importance.

Under stress of the urgency a bill was prepared giving to the President the authority to acquire control and operate the power industry of the country. The bill was based on the assumption that the private interests, in control of this industry, were short of adequate resources and saw no inducements sufficient to move them to undertake the successful mastering of the problem on a national scale. The authors of that bill were obviously influenced by the "Interim Report on Electric Power Supply in Great Britain" advocating super-power stations located at the collieries and producing simultaneously with electricity various by-products of coal.

While the exigencies of war time have now passed, the tasks of industrial development of the country and of sound solution of the labor problem are no less grave and pressing, and both in an increasing degree depend upon ample supply of cheap power. The production in the United States of coal, the source of power supply, is at present 144 million tons short of the domestic demand.

In this connection three factors deserve fullest consideration:

(1) Supply of ample and cheap power stimulates enterprise, and consequently provides employment and reduces in a measure the cost of production of goods.

(2) The best cure for low wages is more motive power.

(3) Under the conditions prevailing in the power industry the waste of fuel is not only appalling, but what is worse, is made profitable at the expense of the people.

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Whether the adoption in the main of the British plan of super-power stations at the collieries would produce equal satisfaction under American conditions—such as location of coal fields, water-power and industrial centers—is a question comparatively easy to verify by an impartial engineering research.

Private ownership is obviously incapable of producing electricity (simultaneously with coal by-products at the collieries) after the super-power station plan, and is not interested to do so as long as adequate profits may be secured in a cruder way involving relatively small investment, and the coal output bought at the mine in its raw state.

On the other hand it would be entirely feasible and most advantageous for the government to undertake such a super-power station enterprise. However, a number of years would have to be devoted to investigation, study, and preliminary work. Still further time would be required to put into operation such a system for the economic conversion of the main output of the country's coal into its various forms and uses.

How are the industries of this country to face the coal output shortage of 144 million tons (hard and soft coal), and a still further decrease in available fuel through demands from abroad for hundreds of millions of tons of coal?

Obviously the output must be increased to meet both domestic and foreign demand, or, at least, in order to avoid a grave industrial crisis, means must be found forthwith to make good the present domestic fuel deficit.

It has been variously estimated by power production engineers and the Fuel Administration that between 10 per cent and 25 per cent of steam coal is wasted under the boilers. It is the experience of this firm in power production work, that in no case has less than 12 per cent of coal been saved by more intelligent use of it, while in some instances the saving exceeded 40 per cent, without the use of any additional or improved equipment.

About 420 million tons of the 632 million tons annual requirement of hard and soft coal in the United States are used to generate power. Reckoning on the basis of a 12 per cent avoidable wastage, shown by experience in the boiler rooms to be the lowest average, gives a total minimum annual wastage of 50 million tons of steam coal.

This avoidable wastage of 50 million tons represents about 36 per cent of the present coal shortage.

Otherwise said, recorded actual experience shows that the enormous amount of 36 per cent of the present coal shortage is due to entirely avoidable waste and can be made good by the simple process of employing proper methods of using the coal in the production of power with existing equipment.

Some idea of the loss which this avoidable wastage imposes on the Nation—in addition to the power supply loss—can be gathered when it is remembered that the mining of this 50 million tons of wastage employs uselessly the labor of about 170,000 coal miners, and the haulage five million car-miles, in addition to a large amount of other labor and material required in connection with the mining, transportation, maintenance and replacement of equipment employed in this unproductive production.

The further great values to the nation which go up in smoke with this wanton waste are seen from a computation of all the useful elements that are extractable from bituminous coal:

In 1918 a ton of bituminous coal was sold at the mine for $1.32, yet the multiple products of the same ton of coal would have had a collective value of at least $16.

In terms of cash, the price value of the 50 million tons of coal wasted yearly in power production alone—not taking into account large tonnages wasted in connection with other uses—was 65 million dollars at the colliery, while the value of the multiple products of this coal would have been over 800 million dollars.

In terms of social value, the same coal wastage represents a loss of 500,000 tons of ammonium sulphate, 100 million gallons of benzol, 400 million of tar. Transferring these amounts into other value, we find the nitrogen contained in 500,000 tons of ammonium sulphate is capable of raising the production of wheat 45,316,000 bushels, based on 115 lbs. of nitrogen to the acre. Benzol is an equivalent to gasoline and the above amount is valued at about 30 million dollars, capable of accomplishing an enormous amount of mileage of trucking and travelling. The 400 million gallons of tar would make possible the extension of rural highways and keep the present roads in good condition. The above three examples concern only