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HUNGARIAN STATE RR PLANS FOR REDUCTION IN CONSUMPTION OF COAL, ELECTRIC POWER

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/Figures referred to are appended./

In compliance with a decree of the Council of Ministers on coal conservation, the Hungarian State Railroads have estimated, for 1951, the consumption of 10.55 kilograms of standard-type coal per ton-kilometer, instead of the 11.04 kilograms of coal used in 1950, with a resultant saving of 4.5 percent. This plan also envisions a saving of 8 percent by the railroad's repair shops.

The recent power conservation decree of the Council of Ministers has specified a 2.1 percent saving in coal, and a 2.1 percent saving in electric power by the State Railroads, taking the plan figures for 1951 as a basis. In addition, the decree included provisions in the following important fields:

1. Organizational development of power conservation and utilization of water power

2. Inauguration of power norms and preparation of quarterly balances on power consumption by 42 enterprises, including the State Railroads

3. Enforcement of quotas for maximum savings

4. Improvement of performance

5. Coordination of motors and machinery

6. Elimination of machine stoppage and waste of power by adequate maintenance

7. Continuous supervision of power production and consumption in shops

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8. Extension of innovation movements to power conservation

9. Training of cadres to deal with questions of power conservation

10. Dissemination of principles of power economy

11. Introduction of bonus system for the workers

12. Preparation of a Ten-Year Plan in power economy.

In accordance with the recently modified quotas, coal consumption of steam engines will have to be further reduced from the previous 10.55 to 10.29 kilograms per ton-kilometer, while the previous 3.15 kilowatt-hours consumption of electric engines per ton-kilometer is to be reduced to 3.08 kilowatt-hours in 1951. As a whole, coal consumption is to be reduced by 2.5 percent and electric power consumption by 2.1 percent as against the 1951 plans. It is evident that extremely great efforts are needed by the State Railroads to meet the conservation requirements. To achieve this goal, the following measures have been introduced for the reduction of coal consumption of locomotives:

1. Increase the average load of freight cars as well as decrease auxiliary operations, such as shunting and time of keeping locomotives under steam

2. Develop the 2,000-ton, 500-kilometers, and other innovation movements

3. Blend carefully different types of coal

4. Reduce storage losses

5. Improve mechanical condition of locomotives

6. Utilize economically locomotive engineers and firemen

7. Improve the condition of railroad cars and dispatch trains properly.

A bonus system for locomotive personnel and other employees was introduced on 1 March 1951. To increase cleanliness of locomotives and consequently the time between boiler washings, a blowing device /blowoff valve?/ was installed on most locomotives. Installation of the Fono-type three-sectional movable grates on certain locomotives was begun. These grates facilitate the tending and reduce the cooling of the firebox and thus conserve coal. Installation of another new device, the driving rod air valve /sic/, which was also designed to save coal, is also under way. Insulation of boilers, pipes, cylinders, and driving rod chambers /sic/ with waste cotton was begun. This resulted in a 50-percent reduction in heat losses due to radiation and thus ensuring an annual saving of 40-50 tons of coal per locomotive.

To reduce the coal consumption of stationary boilers, the following operational procedures were re-examined: (1) storage of coal, (2) draft and solidity of boilers, (3) fire doors, (4) insulation of boilers and pipes, (5) cleanliness of boilers, (6) solidity of steam pipes, (7) hardness of tender water, (8) temperature of exhaust fumes, and (9) utilization of heated condensed water, of exhaust steam, and cooling water of the air compressor.

A guide was published containing instruction for proper stoking, proper handling of boilers, and adequate organization of coal storage. Brigades familiar with stoking procedures were created to supervise the tasks outlined in the guide.

Coal consumption norms will be established relative to stationary boilers, water heaters, and forges. The quantity of coal necessary for the heating of public agencies was reduced by economical measures, by supervision of the

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heating system, and by the elimination of deficiencies. Establishment of new, stricter norms for the next season is under way. Conservation regulations are enforced by coal economy supervisors.

To reduce power consumption of electric locomotives, the new regulations provide for turning off the phase-switches of locomotives when operations cease for more than 30 minutes. Locomotive engineers were instructed to accelerate trains with heavy loads as fast as possible. If the temperature or the cars is satisfactory, the heating apparatus of the train should be shut off 15-30 minutes before the train reaches its final destination.

Elimination of motors, whose nominal performance is greater than required, was begun in cases where the performance potential of the motor was at least 20 percent above actual performance. Replacement of overburdened electric wiring is under way. Measuring excess-voltage conductors as well as grounding resistance of electric installations was also introduced. Large-scale propaganda was begun to direct the attention of innovators to the problems of power conservation. Initial successes in this field are attributed largely to the activities of innovators.

The following is an analysis of savings achieved in coal and electric power consumption:

Coal Conservation

The following table shows coal consumption data for the first 5 months of 1950 and 1951, respectively.

Coal Consumption Data (in kg per ton-km)

	Jan	Feb	Mar	Apr	May
Original quotas, 1951	13.35	12.74	11.13	10.04	9.34
Modified quotas, 1951	13.02	12.43	10.85	9.79	9.11
Actual consumption, 1951	12.82	11.97	11.61	10.57	10.53
Actual consumption, 1950	13.08	13.61	11.09	10.13	9.91

The actual consumption figures for 1950 and 1951 compare favorably with those of the 1930's and 1940's; however, there is only a slight improvement. Due to the fact that since the last war a great number of locomotives capable of better performance have been used, the rate of improvement cannot be accepted as satisfactory.

The table reveals that there is some saving in coal for the months of January and February as compared to the original quotas, but data for March, April, and May show an increase in consumption. Reduction in consumption for January and February may be attributed to the mild weather, therefore it is obvious that the Hungarian State Railroads have not reached the savings specified in the plans. Attention is also called to the fact that, apart from the first 2 months of 1951, the actual coal consumption for March, April, and May was higher than in the corresponding months of 1950.

These unfavorable results cannot be overlooked, and, after a thorough analysis, ought to be eliminated. It should be noted that instead of the original quotas, data for the corresponding months of the previous year were taken as a basis for comparison in regard to actual consumption.

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Actual coal consumption is influenced by the weather. In January and February 1951, the mean temperature was substantially higher than in the corresponding months of 1950:

1950	Deg Centigrade	1951	Deg Centigrade
Jan	- 0.4	Jan	+ 2.1
Feb	- 0.9	Feb	+ 4.3
Mar	7.0	Mar	6.0
Apr	12.1	Apr	11.1
May	17.6	May	15.7

On the basis of computation of data for several years, lower temperature resulted in 0.22 kilograms more consumption in March and 0.20 kilograms more in April. The average train load transported by steam locomotives was 0.8 percent higher in March 1951 than in March 1950, while the average train load in April 1951 exceeded the April 1950 load by 10 percent.

The broken line in Figure 1 shows the curve of coal consumption per ton-kilometer for 100 tons of mixed freight on a 2 percent grade. At present, the average load of all trains is between 50 and 75 percent of normal, being closer to 50 than 75 percent. According to Figure 1, the small fluctuation of the mean train load between such limits would hardly cause any change in actual coal consumption. However, this condition changes when actual technical operations are considered. Long continuous grades are rare in Hungary, and inclines usually alternate with declines and level stretches. In regard to the speed of freight trains, pulling of the cars involves no increase in coal consumption on 2.5-3 percent declines. On declines greater than those mentioned above, the freight cars push the locomotive; therefore, even an increase in freight results in the reduction of actual coal consumption. In addition, the volume of coal used for starting a locomotive is independent of the train load. Considering the foregoing factors, the solid line of Figure 1 signifies the actual coal consumption of locomotives, while the consumption of shunting locomotives is indicated by the broken and dotted line.

According to available statistics, the actual average coal consumption of passenger trains is 40 percent more than that for freight trains. In March 1951, the share of passenger steam locomotives in the combined steam ton-kilometer performance was 3.4 percent more than in the corresponding month of 1950, while in April it decreased by 0.1 percent. Thus, the actual coal consumption in March increased by 0.14 kilogram, while in April it decreased by a negligible quantity. The share of the per-kilometer auxiliary operations (such as shunting, empty and half-capacity load runs, etc.) in the combined ton-kilometer performance was 1.2 percent higher in March 1951 and 1 percent higher in April 1951, while shunting operations per hour had in March 5 percent less and in April 6.6 percent less combined ton-kilometer performance than in the corresponding months of 1950.

In March, a 5 percent increase in shunting operations per hour caused an 0.8 percent increase in actual coal consumption, while a 6.2 percent decrease in other auxiliary operations led to a 0.4 percent reduction in consumption. In the final analysis, the actual coal consumption was increased in March by 0.04, and in April by 0.05 kilogram due to auxiliary operations.

As a result of the increase in the speed of the freight trains to 40 kilometers per hour, the actual coal consumption has risen in comparision with the consumption in 1950. Installation of air brakes on freight cars has also contributed to the higher consumption in 1951. These two factors brought about a 1.5 percent increase in coal consumption, that is, 0.17 kilograms in May and 0.15 kilograms in April.

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The following table summarizes the foregoing analysis:

Amount of Increase in Coal Consumption

	Mar 51 (kg)	Apr 51 (kg)
Due to change in average temperature	0.22	0.20
Due to change in volume of passenger traffic	0.14	--
Due to auxiliary operations	0.04	0.05
Due to increase in base speed and to extension of air brakes to freight trains	0.17	0.15

While locomotives account for 95 percent of the total coal consumption, the share of the workshops of the State Railroads was 3.5 percent. At the end of January 1951, coal allotment for all workshop operations was reduced by 9 percent. Modification of the plans was necessitated by higher productivity of the shops and by introduction of two and three shifts. By the end of April, these shops have reached a 8.75 percent reduction in coal consumption as against the 8 percent specified in the plans. At present, data on savings of coal in other fields are not available due to the lack of reliable central statistical figures.

Electric Power Consumption

Breakdown of the electric power consumption of the Hungarian State Railroads is as follows: traction 70 percent, power transmission 18 percent, lighting 12 percent.

The following table contains data on actual power consumption expressed in kilowatt-hours per 100 combined ton-kilometers for electrical traction:

	Jan	Feb	Mar	Apr	May
Original 1951 plan quotas	3.46	3.36	3.31	3.21	3.07
Figures reduced by a saving of 2.1 percent	3.39	3.29	3.24	3.14	3.01
Actual consumption in 1951	3.67	3.46	3.50	3.25	3.16
Actual consumption in 1950	3.14	3.28	3.10	3.06	3.20

As may be seen from the table, the actual consumption figures for 1951 are, on the average, over 6 percent higher than the plan figures, reduced by a saving of 2.1 percent, and, except for May, they are over 8 percent higher than the actual consumption figures for 1950. These unfavorable actual consumption results were due to two factors. First, the average load of electric locomotives was reduced by 8.5 percent as compared to 1950, despite the fact that at the same time the average load of electrically pulled freight trains was increased by approximately 3 percent. The other factor is that the ratio of passenger train performance in 1951 was increased from the preceding year's ratio of 30 percent to 38 percent, and the actual power consumption increased due to the greater speed and smaller load of the passenger trains. This latter factor was not taken into account by the planners and consequently the planned consumption figures could not be realized.

The electric locomotives account for 70 percent of the electric power consumption of the State Railroads, while the approximately 20 percent consumption of the repair shops should be considered rather high. Central statistical data for the remaining 10-12 percent are unavailable.

Plans for Reduction in Coal and Electric Power Consumption

The foregoing tables and analysis prove that the Hungarian State Railroads were unable to attain the desired savings in coal and electric power consumption during the first 5 months of 1951. This fact necessitates the exploration of possibilities leading to reduction in consumption. The biggest feasible saving is in the coal consumption of locomotives; therefore, attention should be focused on them. Several months ago a work committee was created to study problems in connection with the reduction in coal consumption. The committee has not yet completed its task, but it is possible to reveal some of its important findings.

In the next few months and years, greatest results might undoubtedly be expected in connection with individual and collective saving. Therefore, the different railroad movements, based on Soviet experience, such as "For the profitableness of each trip," the "2,000-tons, 500 kilometers movement," the "From washing to washing movement," and the "Green trip movement" are of great significance.

The 2,000-tons movement can be made even more profitable by increasing the volume of transported goods rather than the number of freight trains. In this respect, the traffic commercial services of the railroad could produce better results than locomotive engineers and firemen. Importance of the 500-kilometers movement manifests itself in the reduction of the time during which locomotives are kept under steam, since 10 percent of the coal used to keep locomotives under steam is lost through radiation. Coal thus wasted amounts to 220,000 tons per year.

To extend the time between boiler washings is an important new movement for the improvement of the condition of locomotive boilers. However, the results are not yet gratifying. Introduction of the above-norm trains should result in the reduction of coal and power consumption; however, contrary to expectations, the combined ton-kilometer performance per shunting hour was 5 percent less this year than in 1950. This decrease indicates that shunting operations are badly organized and the railroad stations use too many shunting locomotives. Since 17 percent of the total coal consumption of locomotives is used by shunting locomotives, reorganization of shunting operations is imperative. The shunting locomotives use 350,000 tons of coal annually, and a 10 percent saving -- 35,000 tons annually -- could be accomplished without any difficulties.

The green-trip movement is designed to reduce the number of freight train stops. Since stopping and starting of a freight train with an average load traveling at 40 kilometers per hour require 50 kilograms of coal, a reduction in stops would result in a substantial saving.

Reduction of empty freight car runs and better utilization of load capacity would also lead to saving per 100 combined ton-kilometers. Continuous progress was achieved in coal and electric power consumption per freight ton-kilometer, and even more gratifying improvement was accomplished in passenger-kilometer performance. While in March 1950, 0.188 kilogram of standard type coal was used per ton-kilometer, in March 1951, consumption was reduced to 0.173 kilogram. The recent installation of air brakes on freight trains has had an important effect on consumption. Faulty brakes may cause an increase in coal consumption of 15,000 tons annually. This amount of coal costs 3 million forints, equivalent to the annual pay of 250 brake mechanics. If a brake mechanic were able to repair the brake equipment of only one freight car per day, 250 mechanics could repair the brakes of all freight cars in 4 months. In other words, part-time employment of 250 brake mechanics would result in the saving of 10,000 tons of coal, equivalent to 2 million forints, a year. [According to this calculation, Hungary has 25,000 freight cars, the State Railroads are paying 200 forints per ton of coal, and a brake mechanic earns 1,000 forints per month.]

Little attention is being paid to the removal of soot from the heat-conducting surfaces of the fireboxes, although it would improve the efficiency of the boilers. Measurements taken in 1950 showed that the degree of efficiency of locomotive boilers is hardly 50 percent. This unfavorable degree of efficiency justifies, after 10 years of neglect, resumption of the study of coal-dust fired locomotives, which, according to Soviet experiments, have the following advantages: very high degree of boiler efficiency, greater boiler load with low-calorie coal, larger periods between firebox cleanings, reduction of time to get up steam, adequate regulation of the firing process, etc.

Figure 2 shows the changes in boiler efficiency of the Soviet FD series locomotives, coal-dust fired and grate fired, using "G" type coal. The graph reveals that, in case of coal-dust firing, the boiler efficiency is extremely good, 77.5-79 percent, and is almost always independent of the boiler load.

The coal-dust-fired locomotive exhibited at the 1951 Dresden Fair indicates that the question of coal-dust firing is in the forefront in the German Democratic Republic.

To increase the efficiency of the engine crews, it would be advisable to install various instruments on the locomotives, such as pyrometers and vacuum gauges. A number of pyrometers, measuring degrees of superheat, were destroyed during the war, and the remaining instruments were dismantled with the excuse that they were not reliable. This attitude cannot be condoned. Pyrometers kept in proper condition accurately indicate degrees of superheat and are a valuable aid to locomotive engineers. The vacuum gauges help locomotive engineers and firemen attain proper air pressure, a factor contributing to the boiler efficiency.

[Appended figures follow.]

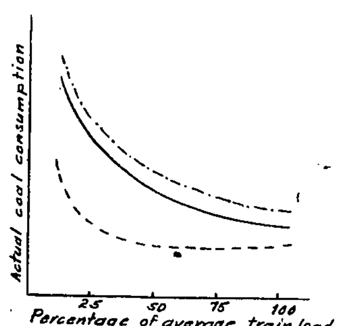

Figure 1.
- - - Coal Consumption per Ton-Kilometer, for 100 Tons Mixed Freight, on a 2-Percent Grade
— Actual Coal Consumption
-·- Consumption of Shunting Locomotives

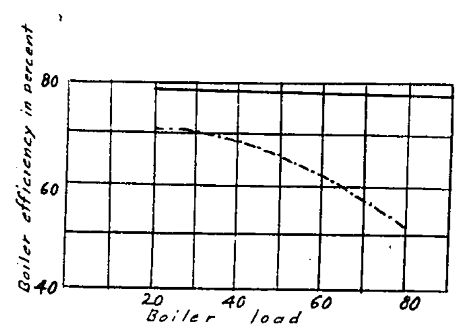

Figure 2. Relation of Boiler Efficiency to Boiler Load
— Coal-Dust Fired
-- Grate Fired

- END -