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OIL IMPORTS RESTRICTIONS AND THE RISE IN EAST COAST POWER PRODUCTION

An Analysis of Residual Fuel Oil Demand and
Supply for the new Generating Capacity, 1963-1965

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I.

One of the principal elements involved in the definition

However, in the near future a change in the demand pattern of such dimensions can be expected as to completely disprove the above assumption and bring into question the whole rationale of the imports restrictions on residual fuel oil.

The ~~shift~~^{change} will be due to an expected very sharp increase in the consumption of residual fuel oil by steam-electric utilities in District I. The expected increase is not discretionary, neither can it be met to any significant degree from other fuels. Furthermore, as is shown below, the magnitude of the increase is such that it cannot be met by rechanneling supplies from other sectors; neither can it be satisfied by temporary measures, such as the occasional supplementary allocations issued to meet sudden increases in heating oil demand due to unforeseen weather conditions.

III.

Since 1957, the base year for the current import restrictions, East Coast utilities have accounted for the following volumes and shares of residual fuel oil.

Table 1.

	<u>(1000 barrels daily)</u>							
	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>Jan.-June</u> <u>1962</u> <u>1963</u>	
East Coast Utility Demand	138	152	165	148	153	171	171	176
East Coast Total Demand*	725	757	832	825	824	866	914	933
Utility Demand as Share of Total	18.3	20.1	19.8	17.9	18.6	19.7	18.8	18.9

*Exclusive of exports and foreign trade bunkers.

As the above figures show, residual fuel oil consumption by utilities has grown at a somewhat more rapid annual rate than total East Coast residual fuel oil consumption from 1957 to 1962 - at 5.1 per cent vs. 3.6 per cent for the total. The increase has

not been at the expense of other mineral fuels consumed by utilities, since the share of oil has remained remarkably steady during this period, as is shown below.

Table 2.

Shares of Fuel Consumed by East Coast Utilities

	<u>Oil</u>	<u>Coal</u>	<u>Gas</u>
1957	15	77	8
1958	17	74	9
1959	17	72	11
1960	15	74	11
1961	15	75	10
1962	16	74	10
(Jan.-June) 1963	16	75	9

However, over the next several years, fuel oil requirements by utilities will not only continue to grow more rapidly than overall East Coast residual fuel oil consumption but the rate of growth will become sharply accelerated, according to all current indications.

Overall electric power requirements in the seventeen East Coast states are expected to rise at an annual rate of 7.2 per cent for the period 1961-1965, according to the following projections of the Federal Power Commission's National Power Survey*.

Table 3.
(in million Kwh)

	<u>1961</u>	<u>1965</u>	<u>Annual Growth Rate</u>
Power Supply Areas 1 - 5	156,910	202,400	6.6%
Power Supply Areas 18,21,23,24	<u>72,089</u>	<u>100,100</u>	<u>8.5%</u>
Total East Coast States	228,999	302,500	7.2%

* Advisory Report No. 13, June 1963.

The total expected growth rate is slightly higher than the 6.7 per cent rate prevailing for the previous four years (1957-1961). However, during the earlier period, the share of electricity generated by water power increased more rapidly than that generated by steam power, as the following figures show:

	<u>Water Power</u>	<u>Other</u>
1957	23.3	178.6
1961	<u>36.9</u>	<u>224.3</u>
Annual Growth Rate	12.2%	6.9%

Accordingly, the share of water power rose from 12 per cent to 14 per cent of total East Coast utility generation during this period. An inspection of the list of new power projects and expansion of existing plants for the period 1963-1965 shows that during this period the emphasis will again be more on steam-powered capacity, as it was in the five-year period prior to 1957. Hence, over the next several years steam-electric plant capacity is scheduled to increase more rapidly than it has in the recent past.

IV.

According to the National Coal Association's publication Steam-Electric Plant Factors, 1961, and the Edison Electric Institute's 1962 Year-End Summary of Electric Power Plants, total steam-electric plant capacity in the seventeen East Coast states at the end of 1962 amounted to 51,324,000 KW. Additions during the three-year period 1963-1965 will be as follows, according to the Edison Electric Institute's Semi-annual Electric Power Survey of April 1963 (for names and capacity of individual projects see attached Schedule A).

Table 4.

Additions in Steam-Electric Capacity, 1963-1965

	<u>in 000 KW</u>	<u>No. of projects</u>
New England	1,438	7
Middle Atlantic	4,158	12
South Atlantic	<u>5,240</u>	<u>25</u>
Total East Coast	10,836	44

This represents an annual increase of 5.6 per cent over the entire period.

Through direct inquiries and consultations with a number of utility companies we have determined that 4,911,000 KW, or 45 per cent of the above total new and additional capacity will be oil-fueled (with gas as a stand-by, or secondary fuel, in some cases), as per attached Schedule B of projects. Of that total, 51.6 per cent is being built in the states north of New Jersey and the balance is being built in Florida. Altogether, 20 projects will be affected by the expansions and additions of oil-fueled power plants on the East Coast. Nearly one-third (1,548,000 KW) of the total is scheduled to become operative by the end of 1963. The balance is expected to do so by the end of 1965.

In 1961, according to the most recent FPC data, 94 of the 267 steam-electric utilities in the seventeen East Coast states were (a) listed as having oil-burning facilities and (b) used oil for two to hundred per cent of their total fuel requirements. It was estimated that the operative oil-fueled generating capacity of these plants plus that of the plants added in 1962 amounted to about 9 million KW at the end of last year, or slightly more than 17 per cent of the region's total steam-electric generating capacity. Hence, the scheduled additions of 4.9 million KW in the 1963-1965 period would increase total gross oil-fueled plant capacity by about 54 per cent by the end of 1965*.

V.

The new oil-fueled facilities may be expected to use an average of 9.5 bbl. per KW of capacity, based on actual figures supplied by two large plants. This is somewhat higher than the bbl/KW ratio in existing plants. The difference is due to the fact that the new plants will generally operate at a higher load

* It should be pointed out that the increase in the share of oil-fueled plants on the East Coast will not necessarily cause a corresponding decline in the share of electricity available to the East Coast generated by other fuels, since large coal-fueled power plants are currently under construction in West Virginia and the TVA region, part of whose output will go to East Coast states.

factor, i.e. closer to capacity, than older plants. At 9.5 barrels per KW the 4.9 million KW of additional capacity will require 46.8 million bbls. annually, or 128,000 barrels daily, of residual fuel oil by late 1965. This would mean an increase of 75 per cent from total East Coast utilities' residual fuel oil consumption in 1962.

By and large, the amount of this additional requirement is not flexible, since the installations to store and burn the fuel for the new plant capacity are either already in place or are under construction. However, a qualification to this statement exists in the fact that some of the new oil-fueled plants have also equipment to burn interruptible natural gas under their boilers. No information has become available on the share or volume of interruptible natural gas to be used by the new or expanded oil-fueled plants. However, it is known that (a) no unused pipeline capacity exists currently in Florida for this purpose nor are any suitable pipelines under construction there; (b) recent court decisions to enlarge FPC jurisdiction over pipeline permits have discouraged utility interests in this fuel as has pending legislation to give the FPC jurisdiction over direct gas sales for industrial users; (c) no new major gas pipeline projects to northern East Coast states are currently under way; and (d) with the growing development of underground storage facilities, pipeline companies can be expected to become less interested in selling gas at lower than normal prices to industrial users during off-peak seasons. Hence, we may assume that gas' share will be somewhat smaller in the new projects than it is in existing ones.

Since gas in the last few years has accounted for about 12 per cent of all utility fuels used in the areas north of Florida where the new oil-fueled plants are located*, we have arbitrarily assumed that it will supply no more than about 8 per cent in the projects which will become operative there between 1963 and 1965. Thus of the 128,000 b/d total additional requirements needed by late 1965, the equivalent of about 5,000 b/d may come from natural gas.

* Maine, Massachusetts, Connecticut and the New York City area. The new or expanded capacity to be located there accounts for 51.6 per cent of total new oil-fueled projects. (See page 5.) No gas-burning ability is assumed for the power plants scheduled in Florida.

For nearly all the other 123,000 b/d no substitution is possible if the new oil-fueled facilities - whose total cost is estimated at \$615 to \$630 million - are to be fully used without additional and unforeseen capital expenditures.

It should be pointed out that the reason for selecting oil in 20 of the 44 new or expanded utility projects (see attached Schedules A and B) lies in a variety of factors, of which fuel cost consideration per Btu is only one. Others are capital expenditures which for coal-fueled plants have been estimated by various industry sources to be from 10 to 30 per cent above the equivalent cost for oil-fueled plants; the problems of ash disposal in the case of coal-fired plants and the space requirements for storage facilities which are larger for coal than for oil. It is a combination of all these factors which has caused oil to be selected as the principal fuel in about 45 per cent of the new East Coast generating capacity scheduled for the years 1963-1965.

VI.

Obviously, all of the 123,000 b/d of additional utility residual fuel oil requirements must come from abroad, inasmuch as domestic (East and Gulf Coasts) production of residual fuel oil is still continuing its steady annual decline, which it has registered every year since 1956.

However, the record of import allocations over their four-year existence, as set out below, does not suggest that an increase in supplies of that magnitude can be provided under the existing imports restrictions.

Table 5.

Residual Fuel Oil Import Allocations - District I

<u>12-month period starting April 1</u>	<u>(000 b/d)</u>	<u>Percentage Change from Previous Year</u>
1959/60	429	
1960/61	417	-2.8
1961/62	461	10.5
1962/63	525	13.9
1963/64	575	9.5

* The magazine Electrical World reports the total average capital cost of a coal-fired plant at \$162.22 per KW and of an oil-fired plant at \$123.61, a difference of 31 per cent; see Electrical World, October 7, 1963, p.78.

As these figures show, the total increase in imports allocation for all purposes from 1959/60 to 1963/64 amounted to 146,000 b/d. This volume is only slightly higher than the 123,000 barrels daily needed for just the new utility plants for the period 1963-1965. If we assume that the last three years' average annual increase in allocations of 11.3 per cent will continue, the entire increase in imports over the next several years would have to be channeled into the utility sector in order to meet the new demand there.

This would of course be completely impossible, a) because, as pointed out earlier, utilities account for only about one-fifth of total East Coast residual fuel oil consumption so that such a move would leave the great majority of consumers without any increase in imports; and b) because nearly half of the annual increase in imports allocation since 1958 has only offset the decline in the availability of domestic residual fuel oil* so that the net increase in residual fuel oil supplies has invariably been much less than the increase in imports allocation. Furthermore, since demand in the two other major sectors of residual fuel oil consumption - industrial use and space heating** - is also growing fairly rapidly, no possibility exists to channel supplies from other users into the utility sector.

Hence, existing imports restrictions will have to be abolished or, at least, greatly liberalized, or some other means of supplying the new utilities with the required quantities of fuel oil will have to be found, if this essential sector of the East Coast economy is to operate at scheduled capacity and without unforeseen extra costs. The solution to this problem is all the more important since additions to oil-fueled generating capacity on the East Coast will of course continue to be made beyond 1965.

* This decline is not about to level off as the following figures indicate.

	Jan.--June	
	1963	1962
	(000 bbl)	
Gulf Coast to E. Coast Shipments of Residual Fuel Oil	16,650	21,611
East Coast Refinery Production of Residual Fuel Oil	21,237	27,952

** The number of apartment and office buildings in the Northeast Coast has been rising at increasing rates for the past several years. Most of these buildings can be economically heated only with residual fuel oil.

SCHEDULED ADDITIONS TO EAST COAST GENERATING
CAPACITY OF STEAM-ELECTRIC PLANTS, 1963-1965

<u>Utility Companies</u>	<u>Stations</u>	<u>Expected Net Operating Capacity</u>	<u>Scheduled Date of Operations</u>
<u>Middle Atlantic Region</u>			
Atlantic City Elec. Co.	England #2	150,000	1964
Baltimore Gas & Elec. Co.	Crane #2	191,000	1963
Con. Edison Co. of N.Y.	Ravenswood #1	400,000	1963
Con Edison Co. of N.Y.	Ravenswood #2	400,000	1963
Con. Edison Co. of N.Y.	Ravenswood #3	1,000,000	1965
Long Island Lighting Co.	Barrett #2	189,000	1963
Penna. Power & Light Co.	Brunner Is. #2	390,000	1965
Potomac Elec. Power Co.	Chalk Point #1	324,000	1964
Potomac Elec. Power Co.	Chalk Point #2	324,000	1965
Public Service Elec. & Gas	Hudson #1	400,000	1964
Penna. Power Co.	New Castle #5	120,000	1964
West Penn Power Co.	Mitchell #3	270,000	1963
Total Middle Atlantic Region		4,158,000	
<u>New England Region</u>			
Bangor Hydro Elec. Co.	Graham #5	29,000	1964
Boston Edison Co.	Boston #1	395,000	1965
Central Maine Power Co.	Wyman #3	125,000	1965
Conn. Light & Power Co.	Norwalk Harbor 2	154,000	1963
Hartford Elec. Light Co.	Middletown #3	235,000	1964
New England Power Co.	Brayton Pt. #1	245,000	1963
New England Power Co.	Brayton Pt. #2	245,000	1964
Total New England Region		1,438,000	
<u>South Atlantic Region</u>			
Carolina Power & Light Co.	Skyland #1	185,000	1964
Duke Power Co.	Marshall #1	339,000	1965
Florida Power Corp.	Barton #3	200,000	1963
Florida Power & Light Co.	Cape Canaveral #1	404,000	1965
Florida Power & Light Co.	Pt. Everglades #3	404,000	1964
Florida Power & Light Co.	Pt. Everglades #4	404,000	1965
Florida Power & Light Co.	Riviera #4	285,000	1963
Fort Pierce, Florida	Fort Pierce	33,000	1963
Georgia Power Co.	Harlee Branch #1	253,000	1965

<u>Utility Companies</u>	<u>Stations</u>	<u>Expected Net Operating Capacity</u>	<u>Scheduled Date of Operations</u>
Georgia Power Co.	McDonough #1	248,000	1963
Georgia Power Co.	McDonough #2	248,000	1964
Georgia Power Co.	Mitchell #3	146,000	1964
Gulf Power Co.	Lansing Smith #1	146,000	1965
Jacksonville, Florida	Southside #5	148,800	1964
Key West, Florida	Keywest #4	16,500	1963
Lake Worth, Florida	Lake Worth #2	7,500	1963
New Smyrna Beach, Florida	New Smyrna Beach	7,500	1963
Orlando, Florida	Indian River #2	210,000	1964
Savannah Elec. & Power, Co.	Pt. Wentworth #3	98,000	1965
So. Carolina Elec. & Gas	Canadys #2	132,000	1964
Tampa Electric Co.	Gannon #4	192,000	1963
Tampa Electric Co.	Gannon #5	245,000	1965
Vero Beach, Florida	Vero Beach #2	16,500	1963
Va. Elec. & Power Co.	Chesterfield #5	330,000	1964
Va. Elec. & Power Co.	Mount Storm #1	540,000	1965
Total South Atlantic Region		5,240,000	
Total East Coast		10,836,300	

SCHEDULED ADDITIONS TO EAST COAST OIL-FUELED
GENERATING CAPACITY OF STEAM-ELECTRIC PLANTS, 1963-1965

<u>Utility Companies</u>	<u>Stations</u>	<u>Expected Net Operating Capacity</u>	<u>Scheduled Date of Operations</u>
<u>Middle Atlantic Region</u>			
Con Edison Co. of N.Y.	Ravenswood #1	400,000	1963
Con Edison Co. of N.Y.	Ravenswood #2	400,000	1963
Con Edison Co. of N.Y.	Ravenswood #3	1,000,000	1965
Long Island Lighting Co.	Barrett #2	189,000	1963
Total Middle Atlantic Region		1,989,000	
<u>New England Region</u>			
Bangor Hydro Elec. Co.	Graham #5	29,000	1964
Boston Edison Co.	Boston #1	395,000	1965
Central Maine Power Co.	Wyman #3	125,000	1965
Hartford Elec. Light Co.	Middletown #3	235,000	1964
Total New England Region		784,000	
<u>South Atlantic Region</u>			
Florida Power Corp.	Barton #3	200,000	1963
Florida Power & Light Co.	Cape Canaveral #1	404,000	1965
Florida Power & Light Co.	Pt. Everglades #3	404,000	1964
Florida Power & Light Co.	Pt. Everglades #4	404,000	1965
Florida Power & Light Co.	Riviera #4	285,000	1963
Fort Pierce, Florida	Fort Pierce	33,000	1963
Jacksonville, Florida	Southside #5	148,800	1964
Key West, Florida	Keywest #4	16,500	1963
Lake Worth, Florida	Lake Worth #2	7,500	1963
New Smyrna Beach, Florida	New Smyrna Beach	7,500	1963
Orlando, Florida	Indian River #2	210,000	1964
Vero Beach, Florida	Vero Beach #2	16,500	1963
Total South Atlantic Region		2,135,800	
Total East Coast		4,909,800	