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Production and Consumption of Mineral Fuels in Illinois, 1933-1964

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ABSTRACT

In Illinois, as in other parts of the nation, the consumption of energy and the production of fuels has grown rapidly during recent decades. This study traces the annual production and consumption of mineral fuels within the state. It also shows the source areas for fuels shipped into Illinois and the destination of mineral fuels exported from the state. Despite the fact that Illinois must supply a large share of its petroleum requirements from outside sources, much of the crude oil produced within Illinois is shipped elsewhere. Furthermore, while the state produces coal in excess of its own requirements and exports to other regions, it also imports quantities of coal from other states.

Because a large share of the growth in energy consumption involved petroleum, which Illinois does not produce in sufficient quantities to meet its needs, an increase of 135 percent in energy consumption from 1933 to 1964 was accompanied by a fuel production increase of only 87 percent.

INTRODUCTION

National Trends in Energy Consumption

In 1900, the United States used energy equivalent to 7893 trillion Btu obtained from mineral fuels and water power. By 1964, that total had risen to an estimated 51,676 trillion Btu, and the peak of energy consumption has not yet been approached (U. S. Bureau of Mines, 1964, v. 2, p. 7). In 1900, the average U. S. resident was using about 104 million Btu annually, equivalent to about four tons of coal. By 1964, his grandson was using about 270 million Btu, or the equivalent of more than ten tons of coal annually. These per capita figures do not tell the whole

story, but they are useful in providing a perspective on the over-all change in total energy used within the nation.

Although different types of energy sources have been used to provide this total consumption, coal was the most important until 1952. Coal consumption rose to a peak in the 1920's and then gradually declined. The new and increased uses and the substitution of petroleum products for other fuels had much to do with the relative decline in the importance of coal. In 1900, the national use of petroleum products was hardly significant, but since then their use has grown steadily and strongly. Today, petroleum products and natural gas each account for more energy than does coal. The importance of natural gas as a marketed product parallels the development of pipelines since World War II. In 1965, natural gas accounted for 31.8 percent, crude petroleum 44.6 percent, and coal 22.9 percent of the energy used in the mineral fuels market.

Water power must also be mentioned. Until the early part of the 19th century this energy source did much for Americans. Water wheels were the main power source for our pioneer and colonial manufacturers—the creeks and streams of the northeastern coastal areas provided abundant mechanical power for early millers and textile manufacturers. However, ways of producing power efficiently in mobile units were found, and the importance of the water wheel declined. The perfection of the steam engine made it possible to have stationary power almost anywhere and also gave rise to new forms of transportation. Around 1900, water power was called upon for the development of hydroelectric power.

Great changes occurred in the general use of mineral fuels during the past 50 years. With coal, the long-run trend shows that industrial and utility consumers are the most important, and retail consumers are of declining significance. Railroads no longer use coal. Railroads and retail consumers accounted for 42 percent of coal consumption as late as 1942, but the situation changed significantly after this. Since 1952, utilities have been the primary consumers of coal.

The primary use of petroleum products is for transportation. The automobile and the diesel locomotive gave the petroleum industry the dominant position in transportation. The nation's refineries produce more gasoline than any other product, with production of distillate oils ranking second. These distillate oils are used for heating, transportation, and industrial purposes. Coal lost much of its home heating market to the petroleum industry.

The most important user of natural gas today is industry. The residential consumer, who prefers the cleanliness and convenience of natural gas, ranks second.

In general, the national mineral fuel situation can be summed up as follows: The total use of energy in the nation increased more than six times since 1900. Coal was the major source of this energy until 1952, but in a relative sense it is much less important today. The decline in the relative importance of coal resulted from the phenomenal growth in the total use of energy. Most of the total increase in the use of energy was provided by petroleum products and natural gas. Water power still provides only a very small portion of total energy used, but the absolute amount of energy produced by water is growing. Coal still serves important needs in cement, coke manufacture, and general industrial use and has a growing market in utilities, though it has lost the railroad and much of the retail market. Petroleum products are used mainly for motive power, although they do provide a significant amount of heating and industrial fuel for the nation. Natural gas is used mainly by industrial consumers, but residential consumers are of increasing importance.

PROBLEMS IN ANALYZING STATE ENERGY CONSUMPTION

Analysis of the production and consumption of mineral fuels within a state differs from national analysis because of interstate shipments. In a national analysis, interstate data can be ignored because the aggregate sums needed are automatically provided. However, in the analysis of a single state, interstate shipments greatly affect all aggregate sums and must be carefully accounted for.

A satisfactory analysis must include both production and consumption. However, a simple counting of production and/or receipts does not give a fair evaluation of intrastate consumption. A state with a large number of refineries might receive large shipments and seem to consume great quantities of petroleum, though actually a major portion of the refined products could leave the state, rather than be consumed within it. Also, the quality of local supplies of a mineral fuel may not be the most suitable for use by local consumers, and thus may lie idle while fuel from other sources is imported. In this paper, an attempt is made to present a total view of mineral fuels within Illinois, first discussing production and then consumption. Production is examined to determine not only the quantity of production, but also the markets to which Illinois mineral fuels were sent. Total consumption of mineral fuels within Illinois is examined, and then the sources of this total are analyzed on the basis of geography as well as type of fuel.

Characteristics of the Data

Two specific problems arise in the use of available data: establishment of a suitable basis for comparing the different fuels, and finding or developing adequate data for a long-term comparison of fuel production and uses. To evaluate coal, petroleum products, and natural gas in like terms, the Btu has been chosen as a basis of comparison. Table 1 presents the conversion factors for Btu as used in this study.

There was no shortage of general statistical data for this project, but because of the widespread sources from which data collected over the years had to be gathered, it was difficult to find comparable data series. This is a greater problem with consumption than with production data. No continuous, comparable data series was available over a satisfactory time span for each of the fuels examined. Data collection methods used by various governmental and trade organizations (and in some cases by individual researchers in the same organization) were sufficiently different to make it necessary to choose arbitrarily among the available sources. Data from all these sources were combined and adjusted to provide a series as continuous and uniform as possible.

ILLINOIS PRODUCTION DATA

Coal was, and still is, the major mineral fuel produced in Illinois. Only since 1925 has it accounted for less than 60 percent of the state's total Btu of mineral fuel production. The relative importance of coal declined in spite of a continuing growth in total energy consumption, and this decline continued after 1937. In 1940, coal dropped to 55 percent of the total but rose immediately thereafter to 60 percent; it now accounts for about 75 percent of the total (table 2).

TABLE 1 - CONVERSION FACTORS FOR MINERAL FUELS[1]

Type of fuel	Unit	Btu per unit
Illinois bituminous coal	Ton	22,400,000
Natural gas	Cubic foot	1,000
Crude oil	Barrel	6,000,000
Gasoline	Barrel	5,250,000
Kerosene	Barrel	5,640,000
Distillate oils	Barrel	5,920,000
Residual oils	Barrel	6,270,000
Liquefied petroleum gas	Barrel	4,011,000

[1] Source: Coal—Illinois State Geological Survey estimate of coal produced within Illinois.
Other fuels—U. S. Bureau of Mines, Information Circular 7582, Oct. 1950, table 19, p. 32.

Petroleum production was relatively insignificant compared to coal up to the late 1930's, but with the discovery of oil in the Illinois Basin at that time, it became extremely important. Commercial natural gas production is a mere trace compared to the other two fuels, and little encouragement comes from geologists to suggest any appreciable increase in the future.

Although the data show a relative decline in the share of the fuels market supplied by coal, Illinois mines, in general, have increased production since 1958. More energy is now being used and, therefore, more fuel must be obtained. In some markets, where various fuels can serve a given purpose, there is strong competition; in other markets, however, there is little or no interchangeability of fuels. This is especially true in the use of coal and petroleum products in transportation. These products competed for the rail market, where they could do the same basic job, but in the automotive and air transport markets, there is no competition. Coal could not directly serve these markets, even if the petroleum industry did not exist. Automotive and air transport developments actually increased the use of coal indirectly through increased need for complementary production of steel, aluminum, and electricity.

Data clearly show that though the relative proportions of coal and oil production changed, the absolute quantity of mineral fuel energy increased. Though coal production decreased from 1944 to 1954, a more stable and generally rising level of production has been maintained in recent years.

Distribution of Illinois Coal and Crude Oil

Observations can be made about the geographic consumption pattern for Illinois coal and crude petroleum, but because natural gas production in Illinois is

TABLE 2 – PRODUCTION OF MINERAL FUELS IN ILLINOIS, 1933–1964

Year	Fuel quantities			Energy provided						
				Trillion Btu				Percent of total Btu		
	Coal (thousand tons)[1]	Crude oil (thousand barrels)[2]	Natural gas (million cu ft)[2,3]	Coal	Oil	Gas	Total	Coal	Oil	Gas
1933	38,320	4,244	1,631	858	26	2	886	96.9	2.9	.2
1934	41,724	4,479	1,868	935	27	2	964	97.1	2.8	.1
1935	45,013	4,322	1,448	1,008	26	1	1,035	97.4	2.5	.1
1936	51,476	4,475	865	1,153	27	1	1,181	97.7	2.3	.0
1937	52,432	7,499	1,040	1,175	45	1	1,221	96.2	3.7	.1
1938	42,387	24,075	1,169	950	145	1	1,096	86.7	13.2	.1
1939	46,628	94,912	2,746	1,045	570	3	1,934	64.6	35.2	.2
1940	49,572	147,647	8,359	1,110	886	8	2,004	55.4	44.2	.4
1941	55,368	132,393	10,053	1,240	794	10	2,044	60.7	38.9	.4
1942	65,747	106,391	14,484	1,473	638	15	2,126	69.3	29.9	.8
1943	73,344	82,260	18,120	1,643	494	18	2,155	76.2	22.9	.9
1944	77,401	77,413	18,137	1,734	465	18	2,217	78.3	21.0	.7
1945	73,449	75,094	16,663	1,645	451	17	2,113	77.9	21.3	.8
1946	63,768	75,297	17,166	1,428	452	17	1,897	75.3	23.8	.9
1947	68,326	66,459	17,023	1,531	399	17	1,947	78.7	20.5	.8
1948	66,167	64,808	14,062	1,482	389	14	1,885	78.6	20.6	.8
1949	47,630	64,501	12,391	1,067	387	12	1,466	72.8	26.4	.8
1950	57,282	62,028	13,285	1,283	372	13	1,668	76.9	22.3	.8
1951	54,870	60,243	11,425	1,229	362	11	1,602	76.7	22.6	.7
1952	45,753	60,089	10,183	1,025	361	10	1,396	73.4	25.9	.7
1953	45,966	59,026	9,282	1,030	354	9	1,393	73.9	25.4	.7
1954	41,766	66,798	9,475	936	401	10	1,433	69.5	29.8	.7
1955	45,712	81,423	8,033	1,024	489	8	1,521	67.3	32.2	.5
1956	47,804	82,346	6,177	1,071	494	6	1,571	68.2	31.5	.3
1957	46,683	77,083	9,647	1,046	463	10	1,519	68.9	30.5	.6
1958	43,777	80,275	12,983	981	482	13	1,476	66.5	32.7	.8
1959	45,375	78,435	13,739	1,016	471	14	1,501	67.7	31.4	.9
1960	45,821	77,341	11,666	1,026	464	12	1,502	68.3	30.9	.8
1961	45,133	76,818	9,970	1,011	461	10	1,482	68.2	31.1	.7
1962	48,354	78,796	10,650	1,083	473	11	1,567	69.1	30.2	.7
1963	51,642	74,796	9,459	1,157	449	10	1,616	71.6	27.8	.6
1964	54,835	70,168	7,867	1,228	421	8	1,657	74.1	25.4	.5

[1] Annual Coal Reports, Illinois Dept. Mines and Minerals.
[2] Minerals Yearbooks, 1944–1964, U. S. Bureau of Mines.
[3] Includes natural gas consumed in oil field operations.

extremely small, its distribution is not discussed here. Betweeen 50 and 70 percent of the coal produced annually in Illinois is consumed within the state. The same is true for about 25 to 50 percent of the state's crude petroleum.

Table 3 shows the distribution of Illinois coal to consumers outside the state. The greatest consumer area was the northwest market, the area west of the Mississippi River, including Missouri, Iowa, Minnesota, Kansas, North Dakota, and South Dakota. Missouri and Iowa are the two most important consumers within this region.

The next most important area for Illinois coal is the north-central market, those states north of the Ohio River, west of the Appalachian Mountains, and east of the Mississippi River. The main consumers are Indiana, Wisconsin, and Michigan. Among these states, Wisconsin consumes the most.

Relatively small amounts of Illinois coal were used by the south-central area, those states south of the Ohio River, west of the Appalachians, and bordering the Mississippi River. The main consumers were Arkansas, Tennessee, Louisiana, and Mississippi, but their consumption of Illinois coal stopped after 1956.

During World War II, the Canadian market began using Illinois coal. The absolute amounts taken by Canada were not very large (less than a million tons until 1964), but with the decline of Illinois coal production to 40 to 50 million tons annually during the 1950's, the relative importance of the Canadian market increased.

Whereas the bulk of Illinois coal exports head northwest, most of the Illinois crude petroleum exports head east. The 50 to 75 percent of total crude oil production that is not processed within the state finds its way almost exclusively to eastern markets. The bulk of this production goes to Ohio, Indiana, and Michigan, designated in table 3 as the north-central market. The next largest consuming area is the northeast market, especially New York, Pennsylvania, New Jersey, and Massachusetts. Shipment of crude petroleum to the south-central market, mainly Kentucky, Tennessee, Louisiana, Alabama, and Mississippi, has declined to nearly nothing. Only relatively insignificant amounts have ever been shipped from Illinois to areas of the nation other than these.

In general, then, coal exports from Illinois go almost exclusively northwestward, while crude oil goes eastward. The relative amounts tend to change, but because of the proximity of Illinois producers to their older markets, shipments will probably continue to follow established patterns.

CONSUMPTION OF MINERAL FUELS IN ILLINOIS

The demand for energy within an area is closely related to total population and standard of living, and the over-all demand for fuels within Illinois has increased because of both of these factors. From 1930 to 1960, an increase of approximately 32 percent in the state's population was accompanied by an increase of about 77 percent in per capita energy consumption. As a result, total demand for mineral fuels increased approximately 140 percent during the same period.

Today, we make special demands of the fuels we use. Greater quantities are used for motive power because of the great increase in the number of automobiles. Consumer groups display strong preferences for heating fuels that offer specific advantages. The residential consumer wants a clean, convenient heat, even if it is expensive; his employer, however, clings to considerations of cost and will sacrifice a degree of cleanliness and convenience for monetary savings. Industrial

TABLE 3 - DESTINATION OF REPORTED OUT-OF-STATE SHIPMENTS OF ILLINOIS COAL AND CRUDE OIL, 1933-1964[1]

	Northeast[2]*	North-central*		Northwest[3]*	Southeast[2]*	South-central*		Canada[3]	Undesignated[3]
Year	Crude oil (thousand barrels)	Coal (thousand tons)	Crude oil (thousand barrels)	Coal (thousand tons)	Crude oil (thousand barrels)	Coal (thousand tons)	Crude oil (thousand barrels)	Coal (thousand tons)	Coal (thousand tons)
1933	na[4]	585	na	5,594	na	34	na	0	0
1934	na	920	na	6,096	na	65	na	0	0
1935	na	1,482	na	6,634	na	130	na	0	2
1936	na	1,590	na	8,222	na	117	na	0	1
1937	na	1,644	na	8,263	na	91	na	0	1
1938	na	1,305	na	6,301	na	67	na	0	9
1939	4,010	1,793	32,546	7,299	289	74	4,239	0	33
1940	11,991	1,734	58,101	8,129	906	87	5,679	0	22
1941	17,631	1,948	54,252	7,962	823	70	7,297	0	29
1942	14,437	2,218	42,843	10,653	1,273	133	4,440	0	24
1943	11,071	3,295	33,328	12,279	214	181	2,293	582	50
1944	5,454	4,126	35,648	13,260	11	394	3,337	46	185
1945	5,406	4,088	35,823	12,997	17	297	4,608	361	620
1946	5,007	3,423	34,785	11,390	78	249	2,223	176	320
1947	4,382	3,048	32,280	11,764	40	200	3,207	601	831
1948	3,840	3,197	30,236	10,797	140	164	2,416	235	345
1949	1,898	2,206	34,108	7,736	46	89	2,825	184	26
1950	3,640	3,086	30,184	8,487	142	93	1,357	803	16
1951	5,694	2,724	31,680	8,293	154	106	1,141	612	49
1952	6,451	2,337	36,942	7,263	0	76	749	734	79
1953	5,609	2,336	34,420	7,047	0	49	0	543	47
1954	3,292	2,247	40,707	5,674	0	43	40	566	90
1955	4,939	2,461	48,903	5,772	43	44	102	617	321
1956	5,042	2,343	51,253	5,970	60	37	0	971	333
1957	2,938	1,923	46,128	3,424	0	0	0	320	1,128
1958	3,546	1,787	48,901	3,446	0	0	0	244	1,120
1959	5,301	1,700	51,082	3,482	0	0	0	59	1,306
1960	4,271	1,577	51,886	3,348	0	0	0	1	1,150
1961	4,572	1,490	51,583	3,174	0	0	0	0	1,724
1962	1,618	1,593	49,240	3,808	0	0	0	0	2,330
1963	1,021	1,908	48,539	4,286	0	0	0	103	2,566
1964	2,302	1,974	43,152	4,140	0	0	0	1,013	2,734

[1] Source: Minerals Yearbooks, 1933-1964, U. S. Bureau of Mines.
Bituminous Coal Statistics, 1951 and supplements, Illinois Coal Traffic Bureau.

[2] No Illinois coal is recorded as having been shipped to this region.

[3] No Illinois crude oil is recorded as having been shipped to this region.

[4] na—not available.

* Northeast—the Appalachian Mountain states from Pennsylvania northward.
North-central—those states north of the Ohio River, west of the Appalachian Mountains, and east of the Mississippi River.
Northwest—those states west of the Mississippi River and north of a line parallel to the northern boundary of Arkansas.
Southeast—those states bordering the Atlantic Ocean and south of Pennsylvania.
South-central—those states south of the Ohio River, west of the Appalachian Mountains, and/or bordering on the Mississippi River.

production also has special needs. Industry has kept ahead of the population growth, and many of the processes of production require specific characteristics of fuels. In some industrial processes, ease of temperature control and freedom from contaminants may be equally as important as minimum cost.

Aggregate Consumption of Mineral Fuels Within Illinois

Compilation and use of data on the consumption of petroleum products and coal provide two distinct problems. No single data series gives the total amount of mineral fuels consumed within Illinois. However, the U. S. Bureau of Mines Minerals Yearbooks provide figures for petroleum products and natural gas as well as much of the other data needed for this analysis. Table 4 shows consumption of the various mineral fuels within Illinois.

It would be useless to discuss petroleum consumption in terms of crude oil, as was done for production. Throughout the discussion of petroleum consumption, the analysis is directed at the utilization of a mineral fuel for purposes of providing power or heat for the ultimate consumer. Because crude petroleum is consumed mainly at refineries, this does not tell the final story about the consumption of petroleum products. (Petroleum lubricants are not used for energy content and are excluded from this study.)

The data on coal were the most difficult to collect. No single source was available and, therefore, the method of determining the total coal consumption must be fully explained. The data on the distribution of Illinois coal production were taken from a publication by the Illinois Coal Traffic Bureau (1951 and supplements), which also gave relatively complete information on shipments of coal into the Illinois market. Where gaps existed, the missing information was obtained from other publications and added to the figures provided by the Illinois Coal Traffic Bureau. Thus, the aggregate coal consumption figures presented in this study are the summation of all recorded receipts within the state, plus all production within the state, less all shipments from the state. These computations are shown in table 5. Although these figures may possibly vary to some extent from the tonnages actually consumed, they provide the closest approximation that can be made from available data.

Beginning in 1933, Illinois consumed slightly more than 1.2 trillion Btu of mineral fuel energy. By 1956, consumption approached the 2.5 trillion Btu level. Hence, the annual consumption of energy provided by these mineral fuels more than doubled in 25 years. By 1964, it was 2.9 trillion Btu.

Consumption patterns for specific fuels show that the most important mineral fuel consumed in 1933 was coal, accounting for about 1.0 trillion of the 1.2 trillion Btu consumed. Consumption of all mineral fuels grew rapidly to meet defense and consumer needs throughout World War II, and as late as 1943, coal provided 1.9 trillion of the 2.4 trillion Btu consumed within Illinois.

Coal does not compete with petroleum products for the motive power market in Illinois. The rapid growth in use of motive power, especially in the automobile, has been a major factor in the rise of total Btu consumption within the state. The number of automobiles in the state in 1963 was $2\frac{1}{2}$ times the number in 1933. Thus, it cannot be said that coal has lost this market to petroleum products.

Coal is also at a disadvantage in the residential heating market. Because of the inconvenience connected with coal heat, the domestic consumer prefers nat-

TABLE 4 – AGGREGATE CONSUMPTION OF MINERAL FUELS IN ILLINOIS[1]

Year	Coal		Natural gas		Petroleum products												Total trillion Btu consumed
					Gasoline		Dist. fuel oils		Kerosene		Residual oils		Crude oil as fuel		LPG		
	thousand tons[2]	trillion Btu	million cu ft	trillion Btu	thousand barrels	trillion Btu	thousand barrels	trillion Btu	thousand barrels	trillion Btu	thousand barrels	trillion Btu	thousand barrels	trillion Btu	thousand gallons	trillion Btu	
1933	48,272	1,081	33,341	33	23,119	121	na[3]	na	na	na	na	na	na	na	—	na	1,235
1934	51,340	1,150	45,084	45	24,427	128	5,534	33	na	na	7,672	48	na	na	—	na	1,404
1935	54,929	1,230	57,319	57	25,458	134	6,044	36	na	na	8,993	56	na	na	—	na	1,513
1936	62,942	1,410	72,516	73	28,379	149	8,158	48	na	na	10,193	64	na	na	—	na	1,744
1937	66,312	1,485	78,650	79	30,794	162	10,594	63	2,365	13	10,370	65	75	1	—	na	1,868
1938	50,024	1,121	66,500	67	31,782	166	10,957	65	2,422	14	8,973	56	74	0	—	na	1,489
1939	54,511	1,221	77,134	77	33,802	177	12,921	77	2,851	16	9,640	60	82	1	—	na	1,629
1940	60,605	1,358	88,088	88	35,944	189	15,341	91	3,069	17	10,776	68	65	0	—	na	1,811
1941	70,654	1,583	98,634	99	38,986	205	16,530	98	3,025	17	12,359	78	54	0	—	na	2,080
1942	80,539	1,804	110,941	111	33,707	177	17,641	104	3,408	19	12,956	81	127	1	—	na	2,297
1943	83,941	1,880	122,340	122	27,728	146	16,177	96	3,663	21	14,606	92	88	1	—	na	2,358
1944	83,885	1,879	123,325	123	27,770	146	16,056	95	3,828	22	15,406	97	134	1	—	na	2,363
1945	75,771	1,697	121,366	121	30,315	159	17,174	102	4,045	23	14,980	94	112	1	—	na	2,197
1946	67,712	1,517	124,284	124	39,141	205	16,635	99	4,703	27	15,017	94	113	1	—	na	2,067
1947	80,671	1,807	132,153	132	43,106	226	20,906	124	5,275	30	16,940	106	107	1	—	na	2,426
1948	77,706	1,741	168,796	169	46,926	246	21,622	128	5,618	32	15,157	95	119	1	—	na	2,412
1949	56,915	1,275	202,546	203	49,743	261	19,582	116	4,806	27	15,487	97	83	1	—	na	1,980
1950	70,494	1,579	235,211	235	54,276	285	26,320	156	5,506	31	19,409	122	108	1	139,890	13	2,422
1951	67,318	1,508	250,812	251	56,564	297	28,517	169	5,581	32	20,151	126	106	1	155,310	15	2,399
1952	56,709	1,270	344,705	345	58,219	306	29,061	172	5,179	29	19,964	125	491	3	148,592	14	2,264
1953	55,153	1,235	350,980	351	60,595	318	29,021	172	4,857	27	20,761	130	62	0	158,180	15	2,424
1954	48,441	1,085	391,408	391	62,731	329	30,388	180	4,977	28	20,404	128	95	1	185,907	18	2,251
1955	56,519	1,266	398,718	399	64,753	340	33,371	198	4,763	27	22,131	138	96	1	302,370	29	2,398
1956	58,692	1,315	417,443	417	67,005	352	35,290	209	4,810	27	22,571	142	117	1	355,420	34	2,497
1957	60,979	1,366	422,840	423	69,283	364	35,350	209	4,116	23	21,375	134	118	1	395,337	38	2,558
1958	52,645	1,179	452,006	452	70,261	369	42,869	254	5,423	31	26,926	169	150	1	459,513	44	2,499
1959	54,845	1,229	518,111	518	72,221	379	43,008	255	5,546	31	23,689	149	288	2	491,968	47	2,610
1960	55,910	1,252	536,549	537	73,591	386	42,490	252	5,359	30	25,893	162	217	1	535,770	51	2,671
1961	53,289	1,194	574,346	574	73,835	388	42,255	250	5,007	28	25,750	162	na	na	346,796	33	2,629
1962	52,491	1,176	620,309	620	76,853	404	41,361	245	5,003	28	24,756	155	na	na	375,883	36	2,664
1963	58,561	1,312	658,432	658	81,966	430	41,421	245	5,521	31	25,582	160	na	na	399,397	38	2,874
1964	57,555	1,289	731,921	732	84,671	445	41,580	246	5,042	28	21,411	134	na	na	341,693	33	2,907

[1] Source: Minerals Yearbooks, U. S. Bureau of Mines. See table 5 for computation of coal consumption.
[2] See table 5 for derivation of these quantities.
[3] na—not available.

TABLE 5 – COMPUTATION OF TOTAL CONSUMPTION OF COAL IN ILLINOIS
(IN THOUSAND TONS)

Year	Total production[1]	Imports[2]	Total production plus imports	Exports[2]	Total consumption
1933	38,320	16,572	54,892	6,620	48,272
1934	41,724	17,089	58,813	7,473	51,340
1935	45,013	18,489	63,502	8,573	54,929
1936	51,476	21,709	73,185	10,243	62,942
1937	52,432	23,879	76,311	9,999	66,312
1938	42,387	15,688	58,075	8,051	50,024
1939	46,628	18,292	64,920	10,409	54,511
1940	49,572	22,163	71,735	11,130	60,605
1941	55,368	26,735	82,103	11,449	70,654
1942	65,747	29,408	95,155	14,616	80,539
1943	73,344	28,439	101,783	17,842	83,941
1944	77,401	27,016	104,417	20,523	83,885
1945	73,449	22,901	96,350	20,579	75,771
1946	63,768	21,720	85,488	17,776	67,712
1947	68,326	31,468	99,794	19,123	80,671
1948	66,167	28,816	94,983	17,277	77,706
1949	47,630	21,546	69,176	12,261	56,915
1950	57,282	27,892	85,174	14,640	70,494
1951	54,870	26,403	81,273	13,955	67,318
1952	45,753	23,680	69,433	12,724	56,709
1953	45,966	21,653	67,619	12,466	55,153
1954	41,776	17,311	59,087	10,646	48,441
1955	45,712	21,987	67,699	11,180	56,519
1956	47,804	22,075	69,879	11,187	58,692
1957	46,683	23,001	69,684	8,705	60,979
1958	43,777	17,070	60,847	8,202	52,645
1959	45,375	17,993	63,368	8,523	54,845
1960	45,821	18,364	64,185	8,275	55,910
1961	45,133	17,158	62,291	9,002	53,289
1962	48,354	15,857	64,211	11,720	52,491
1963	51,642	18,390	70,032	11,471	58,561
1964	54,835	16,030	70,865	13,310	57,555

[1] Annual Coal Reports, Illinois Dept. Mines and Minerals.
[2] Bituminous Coal Statistics, 1951 and supplements, Illinois Coal Traffic Bureau.

ural gas and fuel oil for home heating. These fuels burn cleaner and are easier to use from the consumer's point of view. As different heating methods are developed, fuel oil and natural gas some day may feel the same pinch that coal has experienced. Electric residential heating has been introduced to the Illinois consumer now. At present, it is much more expensive than coal, oil, or natural gas, but judging from past behavior and efficiency improvements in electrical production, it seems logical that this price will drop as the number of customers becomes significantly larger. As the electric residential heating market grows, we may expect a growth in coal consumption, for coal continues to be a major fuel for producing electricity. The heat pump may also become an increasingly important factor.

Petroleum products climbed steadily in importance during the period studied. By 1956, coal was taking about 50 percent, natural gas was taking more than 15 percent, and petroleum products were taking about 35 percent of the total energy fuel market in Illinois. This was more than twice the 15 to 20 percent accounted for by petroleum products in the mid 1930's. Most of this growth resulted from a great increase in the use of the automobile as a means of transportation.

Consumption of natural gas in Illinois has increased rapidly, especially since World War II. After the war, the major pipeline expansions occurred in the Illinois area. The growth of natural gas has been much more dramatic and much more extensive during the past 20 years than has the growth of the use of petroleum products.

Sources of Mineral Fuels Consumed in Illinois

Because Illinois consumers use more fuel than the state produces, some fuel is brought into the state. Table 6 shows the origin of the mineral fuels imported for the Illinois market. More than 90 percent of the fuel imported from the north-central, south-central, and northeast areas was coal. On the other hand, all of the fuel imports from the northwest and southwest areas were petroleum and natural gas.

As previously noted, coal exports went mainly northwestward and crude petroleum exports went eastward. It now can be seen that the movement pattern of Illinois production is merely a part of the total national movement pattern, resulting from the major concentrations of coal and petroleum resources in different parts of the nation. That is, Illinois ships coal to the northwest and crude petroleum to the east, though it brings in crude petroleum from the west and coal from the east.

SUMMARY

The movements of mineral fuels within Illinois are of particular interest. The two directional flows are of subtle significance. Illinois coal goes northwestward and Illinois petroleum goes eastward. Illinois, importing coal from the east and petroleum and natural gas from the west, is in the mainstream of a larger national flow of mineral fuels.

The data in this study suggest that the national flow pattern is not made up of tremendous shipments of fuels going from one end of the nation to another, but rather of generally small, localized movements. This pattern, which might be likened to a kind of mineral fuels hop-scotch, indicates that consumers may import

TABLE 6 – SOURCES OF COAL, CRUDE OIL, AND NATURAL GAS CONSUMED WITHIN ILLINOIS, 1933–1964[1]

	Northeast[2]*	North-central*			Northwest[3]*		South-central[4]*		Southwest[3]*	
Year	Coal (thousand tons)	Coal (thousand tons)	Crude oil (thousand barrels)	Natural gas (million cu ft)	Crude oil (thousand barrels)	Natural gas (million cu ft)	Coal (thousand tons)	Natural gas (million cu ft)	Crude oil (thousand barrels)	Natural gas (million cu ft)
1933	11,722	3,697	0	24	0	1,152	1,153	67	0	30,470
1934	12,352	3,775	0	3	0	2,183	962	111	0	40,923
1935	13,646	3,892	0	34	0	2,270	960	110	26,131	53,460
1936	16,624	4,221	0	95	0	2,438	864	89	28,371	69,032
1937	18,869	4,175	0	13	0	3,007	835	185	24,736	78,405
1938	11,555	3,342	0	0	0	2,316	1,774	135	23,356	62,939
1939	13,867	3,613	0	7	9,394	2,495	2,278	0	11,049	72,818
1940	17,201	4,121	0	7	7,522	2,873	2,594	0	15,266	77,878
1941	20,881	4,844	0	53	17,697	2,768	3,157	0	26,584	86,474
1942	23,099	5,173	0	0	24,147	2,775	3,461	0	33,657	94,666
1943	22,457	4,596	0	0	29,408	4,371	3,979	0	32,326	100,519
1944	21,038	4,503	0	4	23,231	4,466	5,128	0	46,518	100,773
1945	16,816	4,443	0	19	22,428	3,734	4,629	0	51,082	101,003
1946	15,386	4,308	0	6	24,859	3,760	4,450	5	51,698	103,374
1947	22,354	5,900	0	19	24,967	5,155	7,205	23	65,147	111,736
1948	21,038	4,705	0	22	26,668	9,008	7,339	34	71,300	151,694
1949	15,641	2,474	0	33	25,247	6,369	6,488	244	72,190	190,549
1950	21,148	2,874	0	529	32,877	8,781	8,106	122	69,356	221,059
1951	20,132	2,756	1,379	515	37,920	9,083	8,904	4	85,823	242,831
1952	18,324	2,268	1,196	493	40,654	12,301	7,289	0	91,673	330,064
1953	16,564	2,237	1,076	356	43,213	12,809	9,587	0	94,635	350,444
1954	12,366	1,995	1,508	312	45,133	23,124	8,495	1	88,268	372,490
1955	16,542	2,063	1,336	222	42,730	30,849	9,395	27	105,303	382,787
1956	15,931	2,523	5	216	42,933	26,981	9,879	65	114,965	402,421
1957	17,334	2,286	0	184	39,719	35,030	9,654	111	113,492	397,312
1958	11,652	2,148	1,415	209	42,874	34,191	9,294	26	117,516	411,069
1959	12,489	2,098	1,618	195	37,930	34,288	9,713	94	128,097	483,391
1960	12,786	2,896	1,458	234	45,802	40,597	9,802	163	125,517	496,774
1961	12,304	2,715	1,213	217	49,831	44,376	9,564	248	124,346	533,000
1962	11,126	2,736	962	149	44,482	59,593	9,806	185	129,249	574,865
1963	14,855	1,851	814	123	44,795	40,848	9,217	133	140,774	646,320
1964	13,119	1,648	774	101	58,574	33,469	9,099	133	130,178	712,769

[1] Source: Minerals Yearbooks, U. S. Bureau of Mines.
Bituminous Coal Statistics, 1951 and supplements, Illinois Coal Traffic Bureau.

[2] No crude oil or natural gas shipped from this area to Illinois.

[3] No coal shipped from this area to Illinois.

[4] No crude oil shipped from this area to Illinois.

* Northeast—the Appalachian Mountain states from Pennsylvania northward.
North-central—those states north of the Ohio River, west of the Appalachian Mountains, and east of the Mississippi River.
Northwest—those states west of the Mississippi River and north of a line parallel to the northern boundary of Arkansas.
South-central—those states south of the Ohio River, west of the Appalachian Mountains, and/or bordering on the Mississippi River.
Southwest—those states west of Arkansas and Louisiana, and south of the northwest grouping.

fuels from outside a region in order to gain quality or other benefits. Any such benefits, however, might be quickly offset by the transportation costs for longer distances.

Between 1933 and 1964, the consumption of mineral fuels more than doubled. However, the fuels to feed this large increase in demand were not provided by Illinois alone. While consumption in Illinois was increasing 135 percent, production increased only 87 percent. Whereas fuel energy produced in Illinois in 1933 was equal to 72 percent of the energy consumed in the state that year, in 1964 it was equal to only 42 percent. This may be attributed primarily to the consumption of large quantities of oil and natural gas imported from outside the state.

REFERENCES

Illinois Coal Traffic Bureau, 1951 (with supplements to 1964), Bituminous coal statistics, Chicago.

Illinois Department of Mines and Minerals, 1933 (annually through 1964), Coal reports of Illinois, Springfield.

U. S. Bureau of Mines, 1933 (through 1964), Minerals yearbook, Washington, D. C.

U. S. Bureau of Mines, 1950, Energy uses and supplies, 1939, 1947, 1965: U. S. Bur. Mines Inf. Circ. 7582, p. 32, table 19, Washington, D. C.

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