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PROJECTING ELECTRICITY REQUIREMENTS FOR ALASKA

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The Alaskan economy is experiencing extremely rapid growth precipitated by the development of petroleum resources within the state and activities related directly and indirectly to that development. This pattern of economic growth which began with the discovery of the Cook Inlet and Kenai Peninsula petroleum fields will in all probability continue through the remainder of this century. Unfortunately, the speed and pattern of growth are by no means certain because of the inherently unpredictable nature of petroleum development with regard to such factors as size of reserves, cost of development, market price, etc.

These two features of expected future Alaskan economic development--speed and uncertainty--make the task of providing economic infrastructure on an orderly basis extremely difficult. The most accurate information is necessary for planning and in some cases, new institutional forms may be required to best respond to this particular type of growth.

The provision of electricity is one of those parts of the economic infrastructure particularly sensitive to the form of Alaskan economic growth because of its capital intensity and general long lead time for capacity additions. The Army Corps of Engineers Devil's Canyon Hydroelectric Project Proposal has a lead time of approximately ten years. The most informed planning possible must underlie decisions on projects of such magnitude.

In this paper, the future electricity requirements for Alaska are projected on a regional basis using an econometric model of the state, the MAP model, developed at the Institute of Social, Economic and Government Research. The model allows for two distinct advantages over alternative piece-meal projections of growth in electricity requirements. First, it bases the projections upon a consistent set of assumptions of economic activity for the whole state; and second, it allows for sensitivity analysis of the projections to the assumptions regarding both economic growth and consumer behavior with respect to electricity consumption.

Future Alaskan Economy

Growth in electricity requirements closely follows growth in the state's economy. Economic growth within Alaska is projected through the use of an econometric model of the state. The model is constructed using multiple linear regression techniques on a historical Alaskan data base from 1961 to the present.

As in any regional economic model, forces outside the economy (exogenous) are important in determining the level of economic activity. In Alaska it is the resource industries which are exogenous in the sense that the level of output and employment in these industries is determined by the size and cost function of the resource, national and international demand, and institutional factors largely determined at the Federal level.

Since statehood petroleum exploration, development, and production have accounted for the overwhelming majority of the increase in the level of activity in the resource sector as measured by real gross product growth. Between 1961 and 1972 the annual growth rate of real gross product in mining, essentially petroleum, was 17.6 percent. The comparable figure for fisheries and forest products was 0.4 percent.[1] The discoveries at Prudhoe Bay, Project Independence, and the large number of potential petroleum provinces yet to be explored within the state indicate that the most important exogenous driving force on the economy over the next quarter century will probably be petroleum. Thus in making the economic projections, it is the development of petroleum which drives the model. This is not to imply that other resource industries are ignored in projecting future growth. Rather the impact of petroleum development on the state through employment and government revenues is expected to exceed that of other resources by an order of magnitude so that detailed analysis of alternative development levels concentrate only on petroleum. New development of other natural resources in the state will have impacts, particularly at the local level where the economic base is small. The probability of such development is enhanced by the passage of legislation establishing, with voter approval, a permanent fund within the state,

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[1]David Kresge, "Alaska Economic Growth, 1961-1972," Alaska Review of Business and Economic Conditions, Vol. XI, No. 2 (Aug. 1974), p. 5.

financed out of 25 percent of recurrent petroleum revenues, for the purpose of providing capital for the development of Alaska's replenishable natural resources. It is impossible at this time to project in a meaningful manner what the impact of the fund will be. The methodology used for projecting petroleum development could be easily adopted if and when it becomes feasible and necessary for model accuracy.

The level of activity of other industries is determined by economic variables within the state (endogenous). The level of income is the most important factor determining the demand for and thus the level of output and employment in the transportation-communications-public utilities, trade, finances, and services sectors.

The contract construction industry is a hybrid. The level of activity is a function of both local demand and the exogenous development of petroleum. Manufacturing is essentially of resource-based commodities and is thus exogenously determined. The government sector forms a larger portion of total output than in most states. Military activities and Federal government are exogenous while state and local expenditures are directly a function of activities in state.

The model also contains government revenue and demographic components. The basic procedure for the determination of the level of all variables annually is as follows. A petroleum development scenario

is constructed consisting of a file which describes the location, timing, and size of development and production activities each year of the projection period. The annual levels of employment and state and local government revenues directly resulting from petroleum activities "drive" the model. Combined with the other exogenous variables, output and income in the resource-based industries is determined. This income creates a demand for the goods and services of the non-basic industries and also government revenues. Demand in the non-basic industries also generates incomes and tax revenues. The levels of output and income are simultaneously determined by the solution of the model equations. The major outputs of the model are gross product, wages and salaries, and employment by industry by region, regional population, statewide personal income, disposable personal income, and state and local government revenues and expenditures.[2]

Three petroleum development scenarios have been constructed covering the period to 1990. Each is composed of a logically consistent set of assumptions regarding the pace and extent of petroleum development over the period. Within each scenario, the price of oil, the variable which determines the level of government revenues, can assume any value. For the purpose of estimation of future electricity requirements for Alaska, a wellhead value of the average barrel of oil produced

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[2]A more detailed description of the model is available in "Alaska's Growth to 1990," Alaska Review of Business and Economic Conditions, Vol. XIII, No. 1 (Jan. 1976).

over the projection period of $5 was chosen. Two of the three petroleum development scenarios were used. The first, limited petroleum development, assumes minimum oil and gas leasing activity within the state beyond what is presently scheduled. Lower Cook Inlet and the Gulf of Alaska are leased by the Federal government. The state and Native corporations lease adjacent areas and areas accessible to the Alyeska pipeline.[3] Significant discoveries occur in all areas leased and development and production follow. Oil production is two million barrels per day (mbd) in 1980 and 3.6 mbd in 1990.

Accelerated petroleum development includes the addition of several other reservoirs to the schedule of those leased and developed in the limited case. The Federal government develops Naval Petroleum Reserve #4 and several OCS provinces are leased. State and Native interests again develop leases in the vicinity of Federal government activity. Development and production proceed much more rapidly in this case after 1980 and reach 7.3 mbd by 1990. A maximum development scenario exists which includes leasing and development of all the Federal OCS provinces as outlined by Project Independence, although leasing is spread out beyond the 1978 deadline envisioned in the original Project Independence proposal. This scenario has not been used because it does not, in the light of recent developments, appear feasible.

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[3]A detailed discussion of the development of the petroleum scenarios is in Tom Morehouse, "The Future of Alaska Petroleum Development," unpublished manuscript, 1975.

Summary statistics are presented in Table I for the projections of the economy using the two scenarios described above. Continued strong growth of the economy is projected under either petroleum development scenario. In the limited development case, annual population growth would be 3.8 percent, employment growth 4.3 percent, and real wages and salaries 6.1 percent. In the accelerated case, annual population growth would be 4.8 percent, employment 5.2 percent, and real wages and salaries 7.1 percent.

The strong growth of the state economy is the major force behind the long-run strong growth of the economy. Expenditures increase annually at 12 percent in the limited development case and over 13 percent in the accelerated case. A modified permanent fund assumption is built into these projections in that 25 percent of recurrent and 50 percent of non-recurrent state revenues are placed in a government savings account which is not spent on operating expenditures. In addition, both scenarios incorporate the construction of the Arctic Gas pipeline through Canada with minimal direct Alaska impact. These factors tend to moderate the growth rate somewhat and in that sense, the projections do not overstate possible economic growth in the state.

Table I

SALIENT STATISTICS OF MAP PROJECTIONS

	Limited Development	Accelerated Development
1974		
Population (thousand persons)	350.659	350.659
Employment	159.886	159.886
Wages and Salaries (real million $)	973.9	973.9
Petroleum Production (thousand b/d)	200	200
State and Local Government Expenditures (nominal million $)	793.2	793.2
1980		
Population (thousand persons)	456.927	471.429
Employment	219.712	229.249
Wages and Salaries (real million $)	1,506.9	1,586.3
Petroleum Production (thousand b/d)	2,066	2,066
State and Local Government Expenditures (nominal million $)	1,973.3	2,058.1
1985		
Population (thousand persons)	547.913	614.811
Employment	265.412	300.916
Wages and Salaries (real million $)	1,970.0	2,260.8
Petroleum Production (thousand b/d)	3,033	4,930
State and Local Government Expenditures (nominal million $)	3,408.8	4,084.4
1990		
Population (thousand persons)	641.344	738.004
Employment	312.677	361.399
Wages and Salaries (real million $)	2,506.2	2,919.2
Petroelum Production (thousand b/d)	3,597	7,299
State and Local Government Expenditures (nominal million $)	5,026.1	6,197.1

Historic Pattern of Electricity Consumption

Electricity consumption within the state falls into four categories by type of supplier. The largest category and the one of most direct concern to policy makers is consumption provided by the utilities of the state. Industrial consumption of in-house generated electricity is a large component of energy use within the state but cannot be accurately projected and is of no direct concern to the utilities within the state. Military requirements are essentially impossible to determine. Finally, privately generated personal electricity use is important in Alaska because of the present incomplete coverage of the state's population by utility service. This segment of electricity requirements also cannot be adequately modeled, and thus only demand through electric utilities is projected in this analysis.

Table II presents the average annual growth rates of electricity consumption in the regions of the state defined by the accompanying map. In all regions except the Southeast, growth has exceeded the long-run national average of 7 percent annually. Individual utilities have grown much more rapidly. Golden Valley Electric Association of Fairbanks grew over 20 percent annually.

Average customer consumption is high in Alaska in the residential sector as a result of latitude and climate, but utility demand by commercial and industrial customers is relatively small on a per customer basis due to the small size of the average establishment in

Table II

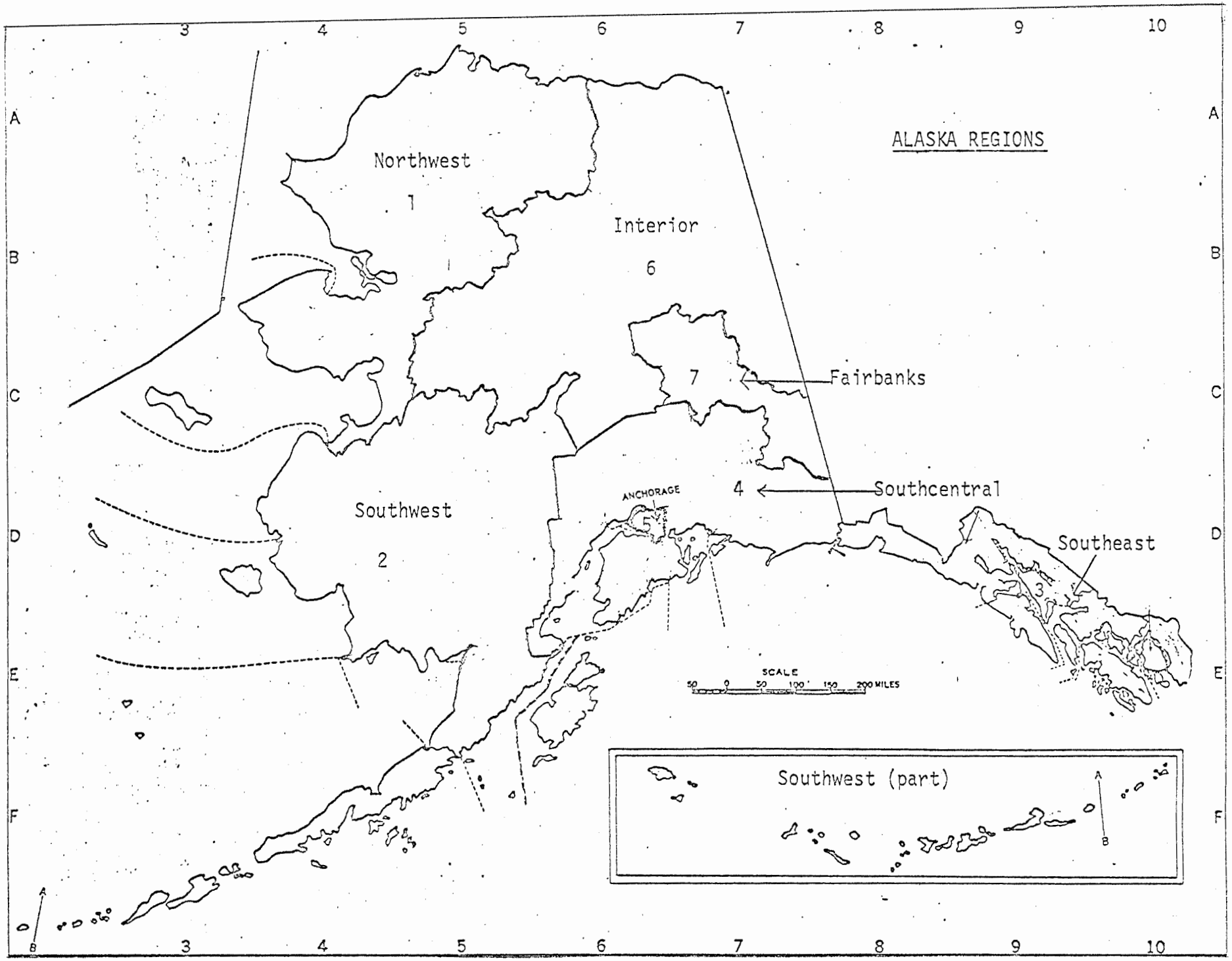
HISTORIC GROWTH RATES IN SALES TO FINAL CONSUMERS

ALASKA ELECTRIC UTILITIES

Northwest	7.86
Southwest	11.49
Southeast	6.54
Southcentral	11.93
Anchorage	12.53
Fairbanks	14.11

Alaska. In 1974, average annual consumption in the residential sector ranged from 7,623 kilowatt hours (kwh) in the Southeast to 11,597 kwh in Fairbanks. Consumption in an all-electric home could easily exceed 40,000 kwh.

Electricity prices until quite recently had been declining in both nominal and real terms for all classes of customer. In 1960



Source: State map in U.S. Bureau of the Census (10) pp. 3-81.

the average residential kwh in the U. S. sold for 2.47¢, while in Alaska it was 4.32¢, a 75 percent premium. By 1972 the U. S. average was 2.29¢, while in Alaska it was 3.33¢, a 45 percent premium. Thus, prices were not only falling, they were falling more rapidly than prices in the lower 48 states. That trend has been dramatically reversed since the advent of the "energy crisis," increased costs of capital, and environmental control requirements on new and existing generating facilities. The projected trend in electricity prices in the future, based upon Alaskan energy resources, is for continuing price increases because even though the state may have relatively inexpensive energy sources available, such as Cook Inlet natural gas, world markets will increasingly dictate price as Alaskans vie with others for the use of supplies.

Projecting Future Requirements

Historically, electricity requirements have grown rapidly within the state. The future economic growth of the state, like that of the recent past, will be strong under various assumptions regarding the pattern of petroleum development in the state. It is possible to infer from these facts that future electricity demand growth will be strong and continue past trends. The primary uncertainty in this regard is consumer reaction to higher relative electricity prices. In a recent paper, I have estimated that the residential price elasticity of demand for electricity in Alaska is .65.[4] The explanation

[4]Scott Goldsmith, "The Demand for Electricity in Alaska," unpublished paper, June 1976.

of elasticity is that a 10 percent increase in the price of electricity will result in the long run in a 6.5 percent reduction in demand which will be partially accounted for by increased consumption of other energy forms and partially by a reduction in income available for purchases. The implication of this is that given the recent reversal in the secular trend in electricity prices, the historic relationship between economic activity and electricity demand may not hold.

Since the evidence is not conclusive regarding future electricity price movements and consumer responses to price, the most reasonable approach to projecting electricity requirements is to develop a set of use intensity scenarios which implicitly allow for different electricity price levels and consumer responsiveness to price change.

Four electricity use intensity scenarios were developed, each based upon explicit assumptions regarding both the number of customers and the average annual consumption level per customer within each consumer category (residential-commercial-industrial) within each region of the state.[5]

The growth as usual case assumes that the observed historical relationships between the demographic and economic variables of

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[5]A detailed description of the methodology to develop the use intensity scenarios may be found in Goldsmith, op. cit.

population and wages and salaries (as a proxy for disposable income) and electricity consumption will continue into the projection period. Implicit in this case is a continuation of a continuing low price for electricity.

At the other extreme, the no-growth case provides a lower bound estimate on the future intensity of electricity use. The ratio of new residential customers to new population is assumed to be equal to the present ratio of averages in each region and the average annual rate of consumption of existing customers is unchanged while new customers consume at the average rate of old customers. In the commercial and industrial sectors, new customers are projected at the same ratio to new population as existing customers, but average consumption is allowed to grow at the national historic annual rate of 5.8 percent for the 1962-1972 period.

Low electrification allows for a gradual increase in the ratio of residential utility customers to population. Present customers will continue to consume at existing average rates while consumption by new customers will be determined by the mix of appliances in the homes of new consumers and the average consumption rate of those appliances. New customers acquire major electric appliances in the same ratio as existing customers in the region where major appliances are defined as space heaters, water heaters, and stoves. Other appliances in new households are all electric. The average consumption

for a new customer will thus vary among regions, based upon differences in the existing ratio of particular electric appliances to consumers in the region; and in the case of most appliances, regional differences in the average consumption rate of electricity in the different appliances. The commercial and industrial sectors are, because of scarcity of data, projected using the same methodology as in the no-growth case.

Moderate electrification differs from low electrification in two aspects. All new consumers in the residential sector acquire electric water heaters and stoves. Projections of commercial and industrial customers, as well as the average consumption level per customer, are the same as in the growth as usual case.

These latter three scenarios are designed to account for a consumer response to more costly electricity supplies in the future, either through direct moderation in demand growth or through government intervention establishing construction standards, proscribing specific uses for electricity, etc. Since the level of future prices, as well as the strength of response to higher prices, are both unknown, a formal model is not possible and an informal approach based upon the outlined "rules of thumb" seems more appropriate and even preferred in the sense that it provides some frame of reference for the projections in terms of existing patterns of consumption, particularly in the residential sector.

Projection Results

Each of the two projections of growth of the economy can be combined with the four different use intensity of electricity assumptions to yield, for each region of the state, eight separate projections of utility electric requirements. Combining the highest and the lowest use intensity results in each region for both the limited and accelerated development cases results in statewide projections of utility electricity requirements presented in Table III.

The most striking result from Table III is that under the most restrictive set of assumptions with respect to the economy and individual use, the long-run growth rate for the state is projected in excess of 8 percent. This implies a doubling of demand in terms of kilowatt hours consumed every nine years. Under accelerated development assumptions combined with historical rates of growth in electricity usage, the long-run rate of growth is nearly 14 percent. This implies a doubling in less than six years. Compared with the long-run secular trend of electricity requirements growth of 7 percent nationally, under plausible assumptions, Alaskan growth will exceed this trend significantly for a long period.

Using an oversimplified rule of thumb to convert thousands of megawatt hours (mwh) demanded into megawatts (mw) of required capacity, the projections imply capacity requirements of from 1,364 to 3,071 mw by 1990. In that year, annual capacity additions would range from

Table III

STATE ELECTRICITY DEMAND

PROJECTIONS SUMMARY

Thousand MWH Demanded

Year	Limited Economic Development		Accelerated Economic Development	
	highest	lowest	highest	lowest
1974	1,715	1,715	1,715	1,715
1980	3,909	2,830	4,286	2,941
1985	6,581	4,147	8,358	4,712
1990	10,158	5,975	13,450	6,961

Annual Growth Rates
Calculated from 1974 (%)

Year	Limited Economic Development		Accelerated Economic Development	
	highest	lowest	highest	lowest
1974	--	--	--	--
1980	14.7	8.7	16.5	9.4
1985	13.0	8.4	15.5	9.6
1990	11.8	8.1	13.7	9.2

100 to 400 mw of capacity under the extreme projections. This compares with total statewide capacity in 1974 of 393 mw. By way of contrast, the largest generating units in the state are in the 70 mw range, while the Corps of Engineers' Susitna project at Watana and Devil's Canyon would have an installed capacity of 1,568 mw.

Interestingly, the larger component of variation among the different projections is in the intensity of use of electricity rather than in the assumptions regarding economic growth. The long-run growth rate varies between 9.2 percent and 13.7 percent among the use intensity scenarios within the accelerated economic development case, but only between 11.8 percent and 13.7 percent between economic development scenarios in the highest use intensity case. The primary reason for this seems to be that economic growth of the state is projected to be largely based on state government expenditures which will grow steadily over the period under either scenario assumption. This underscores the importance of the average use of electricity by the individual in the determination of total demand in a rapidly growing region. Electricity consumption occurs through appliances, the purchase of which are a long-term investment. A rapidly growing population means a rapid growth in appliance stocks not only in the residential but the commercial and industrial sectors as well. Type of appliance (gas, oil, electricity, etc.) decisions by these new customers will strongly influence the rate of growth of electricity use.

The regional breakdown of electricity requirements is presented in Table IV with projections extended to 1995. It is obvious that not only is present electricity consumption concentrated in the railbelt area of the state which includes the Anchorage, Southcentral, and Fairbanks regions, but future growth will further concentrate electricity use in that region of the state. Anchorage growth, based on the most diversified economy in the state, will be most rapid in the long run and relatively insensitive to economic developments. Southcentral growth will be most rapid in the short run and moderate somewhat over the longer period. The range of variability in Fairbanks among projections is larger due to the larger relative impact of direct petroleum related activity in that community than other regions in the railbelt. By contrast, growth in the Southeast is the most stable in the state showing little variation among projections basically due to the lower projected population growth rate in that region. The capital remains in Juneau under the assumptions of all projections. In the other regions of the state, projected growth rates are highly variable but below the statewide average dominated by Anchorage. Data for the utilities in these regions is sparse and communities are still in the process of being electrified so that the largest variation in projections is to be expected in those regions.

Table IV

SUMMARY OF THE RANGE OF ALASKA ELECTRICITY

DEMAND PROJECTIONS, 1985 AND 1995

Region		Peak Demand (MW) 1974 (actual)	1985	1995	Total Energy Sales (Thousand MWH) 1974 (actual)	1985	1995	Average Annual Growth Rates 1975 to 1980	1975 to 1985	1975 to 1995
V. Anchorage	lowest	199	538	1300	867	2347	5679	9.9	9.4	9.4
	highest	199	1104	3515	867	4822	15350	17.5	16.9	14.7
IV. Southcentral (except Anchorage)	lowest	62	164	372	282	748	1325	10.1	9.2	7.6
	highest	62	290	611	282	1701	2791	21.9	17.7	11.5
Anchorage, Southcentral	lowest	261	702	1672	1149	3095	7004	9.9	9.4	9.0
	highest	261	1394	4126	1149	6523	18141	18.7	17.1	14.0
VII. Fairbanks	lowest	76	144	260	319	602	1088	5.8	5.9	6.0
	highest	76	297	677	319	1244	2843	12.8	13.2	11.0
Anchorage, Southcentral, and Fairbanks	lowest	337	846	1932	1468	3697	8092	9.1	8.8	8.5
	highest	337	1691	4803	1468	7787	20984	17.6	16.4	13.5
III. Southeast	lowest	48	93	141	215	417	634	6.7	6.2	5.3
	highest	48	112	184	215	505	827	8.7	8.1	6.6
I & II. Northwest plus Southwest	lowest	8	9	10	31	36	44	2.0	1.3	1.6
	highest	8	21	31	31	86	127	9.7	9.7	6.9
Alaska Statewide	lowest	393	948	2083	1715	4147	8765	8.6	8.4	8.1
	highest	393	1824	5018	1715	8358	21938	16.5	15.5	12.5

Note: There are not significant electric utilities in the Interior Region.

Tables V and VI present the detailed projections of utility electricity requirements for the Fairbanks region in terms of both thousand mwh of consumption and peak demand capacity requirements.[6] Large differences among the intensity of use cases can be observed as well as differences in growth rates over time within cases. Note in particular that during the early 1980's, the growth rate is particularly sensitive to the existence of extensive petroleum development in the northern portion of the state.

Finally in Table VII, the assumptions underlying the growth rates of consumption in the residential sector in Fairbanks are detailed in terms of hookup saturation and average annual kwh consumption. Hookup saturation is the percentage ratio of residential customers to civilian population in the region. The most interesting observation about the table is that under the assumptions of growth as usual and accelerated economic development, average annual consumption in 1990 exceeds 40,000 kwh. At present, the typical all-electric home in the Fairbanks area consumes on the order of 40,000 kwh annually. The implication is that continuation of past growth patterns seems highly unlikely. In addition, the hookup saturation level continues to increase. A 37.3 percent hookup saturation also seems unlikely

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[6] A detailed analysis of all regions is in Electric Power in Alaska, a report to the Alaska State Legislature, Institute of Social, Economic, and Government Research, et al., 1976.

Table V

PROJECTED NET SALES OF ELECTRIC UTILITIES*

TO FINAL CONSUMERS (Thousand MWH)

VII. Fairbanks

Electricity Intensity Scenario	Case 1: Growth As Usual		Case 2: Moderate Residential Electrification Commercial/Industrial Growth As Usual		Case 3: Low Residential Electrification Commercial/Industrial Minimum Electrification		Case 4: Minimum Growth	
Economic Scenario	Limited Growth	Accelerated Growth	Limited Growth	Accelerated Growth	Limited Growth	Accelerated Growth	Limited Growth	Accelerated Growth
1974 (Actual)	318.751	318.751	318.751	318.751	318.751	318.751	318.751	318.751
1980	631	658	598	616	485	495	446	455
1985	1,032	1,244	833	950	650	727	602	669
1990	1,534	1,891	1,090	1,256	861	977	803	907
1995	2,247	2,834	1,410	1,640	1,157	1,334	1,088	1,250
			AVERAGE ANNUAL GROWTH RATES (%)					
1974-80	12.0	12.8	11.1	11.6	7.2	7.9	5.8	6.1
1980-85	10.3	13.6	6.8	9.1	6.0	8.0	6.2	8.0
1985-90	8.3	8.7	5.5	5.7	5.8	6.1	5.9	6.3
1990-95	7.9	8.4	5.3	5.5	6.1	6.4	6.3	6.6

*Includes Fairbanks.

Table VI

PROJECTED ELECTRICITY PEAK DEMAND (MW)

VII. Fairbanks

Electricity Intensity Scenario	Case 1 Growth As Usual		Case 2 Moderate Residential Electrification Commercial/Industrial Growth As Usual		Case 3 Low Residential Electrification Commercial/Industrial Minimum Electrification		Case 4 Minimum Growth	
Economic Scenario	Limited Growth	Accelerated Growth	Limited Growth	Accelerated Growth	Limited Growth	Accelerated Growth	Limited Growth	Accelerated Growth
1974	76.2	76.2	76.2	76.2	76.2	76.2	76.2	76.2
1980	150.8	157.3	142.9	147.2	115.9	118.3	106.6	108.7
1985	246.6	297.3	199.1	227.1	155.4	173.8	143.9	159.9
1990	366.6	451.9	260.5	300.2	205.8	233.5	191.9	216.8
1995	537.0	677.3	337.0	392.0	276.5	318.8	260.0	298.8

Assumptions: load factor = .53
system losses = 11.0%

Table VII

PROJECTED RESIDENTIAL CONSUMPTION PARAMETERS

VII. Fairbanks

Electricity Intensity Scenario	Growth As Usual				Moderate Electrification				Low Electrification			
Economic Scenario	Limited Growth		Accelerated Growth		Limited Growth		Accelerated Growth		Limited Growth		Accelerated Growth	
	hookup saturation	kwh/ consumer	hookup saturation	kwh/ consumer	hookup saturation	kwh/ consumer	hookup saturation	kwh/ consumer	hookup saturation	kwh/ consumer	hookup saturation	kwh/ consumer
1974	28.0%	11,597	28.0%	11,597	28.0%	11,597	28.0%	11,597	28.0%	11,597	28.0%	11,597
1980	31.5	19,112	31.8	19,797	32.0	16,987	32.0	17,235	32.0	12,310	32.0	12,343
1985	34.3	26,816	34.9	30,735	32.0	18,952	32.0	20,278	32.0	12,509	32.0	12,746
1990	36.9	34,801	37.3	40,223	32.0	20,324	32.0	21,723	32.0	12,752	32.0	12,937
1995	39.6	44,585	40.0	52,006	32.0	21,561	32.0	23,002	32.0	12,916	32.0	13,107

Note: The no growth case assumes no change over time in either hookup saturation or average KWH consumption per customer and is, therefore, omitted.

Hookup saturation is defined as residential customers/civilian population.

in light of present living patterns. The larger implication of this is that the growth as usual case may effectively be an upper bound on the possible rate of growth of electric utility capacity requirements for the state.

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