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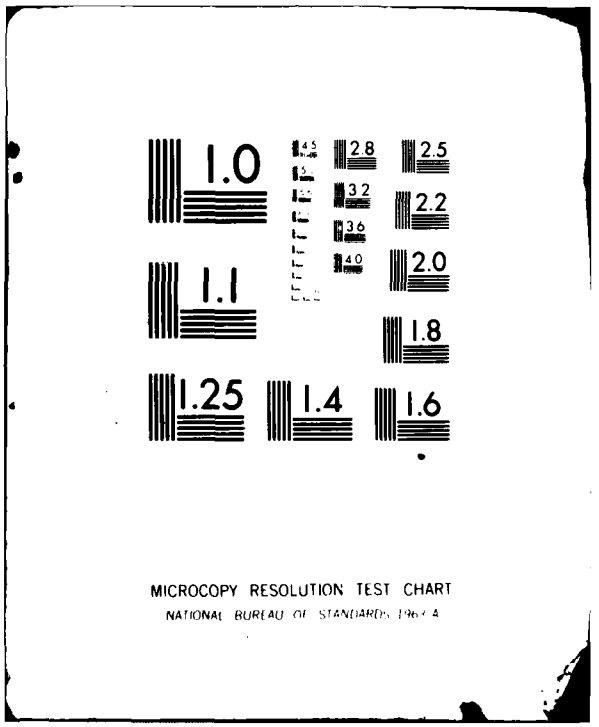
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Peter A. Morrison

August 1981

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Morrison

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THE ENERGY SITUATION AND THE WORLD OF CALIFORNIANS[1]

by

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My assignment this morning is to discuss the links between the energy situation in the West Coast states (primarily California) and our population and how we live: the jobs we hold, how we commute to work, the housing we occupy, and how we spend our leisure time--in other words, how the energy situation will affect the world of Californians and vice versa.

In the brief time available to me, I can't hope to offer definitive answers to these questions--such answers probably don't exist anyway, so I won't pretend to know them. Being a demographer by background, I will have some things to say about the socioeconomic characteristics of California's population that may stimulate your thinking. ("Demography" is simply the study of population: who we are, how old we are, how many of us there are, the places we come from and where we're going.)

To begin with, what is meant by the "energy situation"? For my purposes, it means three things: (1) the escalation of energy prices, (2) the security of future supply, and (3) the institutional arrangements for delivering energy to the consumer. From this

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[1]Presentation made at The Conference Board's West Coast Seminar on Regional Energy Issues, held in San Francisco on March 16, 1981. Rand colleagues Arturo Gandara, Will Harriss, Dan Kohler, Ira Lowry, Kevin McCarthy, and Bill Mooz offered helpful comments and suggestions. Views expressed herein are the author's own and are not necessarily shared by Rand or its research sponsors.

perspective, why (if at all) is California's energy situation noteworthy?

The first point, perhaps an obvious one, is that California's situation is not all that different from the rest of the nation's. For one thing, energy prices have been rising everywhere, forcing everybody to shell out more and more of their income for energy--directly at the gasoline pump, and indirectly in higher prices for goods and services that take energy to produce. Consider the automobile. Everyone's attention is so focused on gasoline consumption and mileage that we forget the enormous amount of energy it takes to produce a car: to mine the iron ore, smelt it, roll it into sheets, transport it to factories, manufacture parts, assemble them, and transport the finished car to a dealer. One effective way to conserve energy, as someone has pointed out, is simply not to buy anything.

Second, rising prices are sure to create problems of equity because they will hit particular subgroups and particular places unevenly. In California we may not have to contend with frail old people freezing in the dark as in Eastern cities, but we have our own counterparts to these "energy-disadvantaged" groups. For example, there are the working poor who have been crowded out to the rural periphery by urban housing prices and who must commute to their distant jobs in fifteen-year-old gas-guzzlers because efficient public transportation isn't available. Small farmers, whose precarious financial position is easily upset by a sudden rise in energy prices, may be another affected group.

Finally, California, like the rest of the nation, is vulnerable to the threat of interruption in the petroleum supply, and therefore faces

the same problem of how to assure a continuous supply of energy over the long term.

What about the differences in California? Apart from the obvious fact that we have a warmer climate and more days of sunshine, there are three other big differences. First, California is far less dependent on fuel oil for home heating than, say, Massachusetts. Mostly, we use natural gas, still relatively inexpensive, while much of the rest of the country relies on fuel oil and faces higher bills for it. Second, we have access to special sources of energy--geothermal and solar. Third, California is probably more advanced than any other state in thinking through the institutional aspects of state energy supply.[2] Indeed, some people claim that California had an energy policy well before the Federal government did. For example, the State has taken a firm hand in dealing with the difficult problem of forecasting future electricity demand by requiring use of consistent forecasting methodology and consistent inputs. It also took the lead in mandating conservation standards and set the tone for the discussion of alternative technologies for energy supply.

Differences there may be, but California's population exhibits most of the trends found elsewhere in the nation, and it will be helpful to review these briefly, indicating their significance for the energy

[2]Several Rand Corporation studies in the early 1970s helped to motivate the creation of the California Energy Commission. See: W. E. Mooz and C. C. Mow, California's Electricity Quandary: I. Estimating Future Demand, R-1084-NSF/CSRA, The Rand Corporation, September 1972; R. H. Ball et al., California's Electricity Quandary: II. Planning for Power Plant Siting, R-1115-RF/CSA, The Rand Corporation, September 1972; R. D. Doctor et al., California's Electricity Quandary: III. Slowing the Growth Rate, R-1116-NSF/CSA, The Rand Corporation, September 1972.

situation.

Perhaps I can draw the clearest picture of what's happening by using the family as a starting point. Picture an American family around 1920, seated at a diningroom table and about to begin dinner--the father, mother, four or five children, and grandma. The father is the only wage-earner in the household, and if he's doing well, the family may own an automobile.

Now consider a similar family in 1981. Nearly every one of these elements has changed. Most notably: What used to be a single large household is now spread out over several households, the wife works for pay outside the home, there may be no children (or only two or three), and the family owns several cars. More specifically:

- Grandma doesn't live there any more. She's a widow, and the odds are two to one she lives by herself;
- The father and mother may well be separated or divorced--forming, in each case, yet another residential unit with its separate energy requirements.
- Chances are that the wife, too, is a wage-earner, making hers a dual-earner family, in which time itself is dearly valued and family income runs about one-fifth higher than in the traditional one-earner family. Both spouses will spend relatively more of their higher incomes on convenience items and will evaluate services and modes of transportation with reference to the time they can save.
- As for the children of 1981, they are leaving the parental home at younger ages and setting up their own households, whether

alone or with a roommate.

The implications of all this for the energy situation are apparent. Our one-household family of 1920 has now become transformed into three or four households. Indeed, a demographic paradox of this past decade is the fact that while population growth has slowed, new households have been forming at a sharply higher rate. Just as there are more cars, each carrying fewer passengers, there are more households, each composed of fewer people. When new households are formed, they immediately exert demand pressure on both the housing market and the supply of energy. (It takes the same amount of energy to light a kitchen whether one person is in it, or four or six people.)

On top of that, if both husband and wife are working and commuting separately, they are both consuming gasoline as they make two commuting trips instead of one. And with two paychecks and fewer children, they have more income at their disposal. Again, the demand for energy will increase. For dual-career couples, gasoline and other types of energy buy a very precious commodity--time.

Such trends can be seen at work in California. The numbers of households in the state are increasing 2.6 percent per year, nearly twice the rate of population growth. The average California household today contains 2.6 persons, down from 2.9 persons a decade ago.

California's population is growing faster than that of the nation, although nowhere near as fast as some other thriving states. The State's 18-percent population growth rate during the 1970s lagged well behind that of most of the Mountain states--in fact, California was the second slowest in growth among all 13 states in the entire West. Even

New Hampshire had us beat!

My purpose in emphasizing these sometimes surprising comparisons is to suggest that this state has attained a kind of comfortable middle age--growth that is above-average but not rampant. (One is reminded of what has long been known as "California's First Law of Growth," which holds that California will stop growing when it becomes equally as unattractive as the rest of the country.)

Within the State, residential patterns are changing, but there is sharp disagreement over what shape they will take. Some observers foresee a return to the core areas of cities. This conventional wisdom is based on several arguments--first that rising gasoline prices will sour people on long commuting trips to jobs in outlying suburban districts, and second, that if there are two or more wage-earners in a family, they should favor a location that's closer to their jobs, especially since housing presumably will be cheaper in the cities.

The facts, however, bear out neither the simple-minded geometry of this scenario nor its economics. It is based on an obsolete image of the American city as resembling an archery target, with the central city as a bull's eye, surrounded by a neat series of concentric rings. That is no longer true. Cities are now more like an assortment of balls on a billiard table, each with its own center. The scenario also assumes that most people work somewhere near the bull's-eye, but in fact a worker might actually shorten rather than lengthen his commuting distance by moving outward, because in doing so, one is settling closer to satellite employment sub-centers on the metropolitan periphery. The person who moves farther away from downtown Los Angeles or San Francisco

may actually be moving closer to a job in Palmdale or Santa Rosa.

Nor does the price of gasoline loom as a powerful determinant of where people choose to live, even if the price were to double or triple. Consider some simple back-of-the-envelope calculations. If one drives 18 miles to work each day in a car that gets 15 miles per gallon (both figures somewhere around the national average), one's annual gasoline bill (at $1.50 per gallon) totals $450. A tripling of gasoline prices (surely an extreme scenario) would increase the yearly price of the journey to work by $900--a price more easily offset by investing in a more fuel-efficient car than by moving closer to work. (Doubling fuel economy to 30 miles per gallon would limit the impact of a tripling in price to a mere $225 yearly increase, at a cost of perhaps $7,500 for a new smaller car, far below the likely total cost of changing to a more centrally located residence.)

We do not know precisely how energy prices are affecting settlement patterns, but what evidence there is fails to show any discernible influence. To be sure, the market for exurban homes dried up temporarily during the days of long gasoline lines, but that was due more to panic than it was to sober dollars-and-cents comparisons of commuting versus moving.

The reality is that population settlement patterns in California are moving in the opposite direction--toward deconcentration. People actually are moving away from the very large metropolitan areas to smaller communities--part of a nationwide trend. Some of that movement is merely outward metropolitan sprawl, with people escaping the problems of cities but remaining within one or two hour's drive of its

attractions. But people are also moving completely away from cities, apparently indulging a new-found taste for small-town and rural living that offers cleaner air, less crime, less traffic, and other features that go into what people construe as quality of life. Two good examples in California are Mono and Mariposa Counties, both of which roughly doubled in population during the 1970s. Indeed, California's nonmetropolitan areas as a whole (which contain 8 percent of the state's population) registered a 35-percent increase in the 1970s, which is twice the statewide rate.

Looking at these trends, we can see several possible directions in which our lives can go. On the one hand, we may all be commuting farther than before if cities are indeed the focal points of our lives. On the other hand, further dispersal of population around the countryside may mean that more and more people will be concentrating around a vast array of smaller nodes--closer to their work, and perhaps moving in the direction of what Alvin Toffler envisions as the "electronic cottage"--the stock broker in Siskiyou County, letting his words commute.

Let me turn now to the question of the security of energy supply for California's economy. The State has a diversified mix of industries that are energy-intensive to varying degrees. An interruption in the supply of energy is therefore a worrisome matter to contemplate. One possibility is a sudden interruption of petroleum imports. There are many scenarios for such a drastic cutback: Terrorists seize Ras Tanura, Saudi Arabia's main loading facility; a tanker sinks in the strait of Hormuz, effectively blocking it; the Arab producing states cut exports

as a result of another Arab-Israeli conflict; and so forth.

We in the United States are less vulnerable to oil suppply disruptions than our allies in Western Europe and apan. Still, imagine for a moment that the United States loses 40 percent of its petroleum imports. The net effect would be a 12- to 15-percent reduction in available crude oil to the United States economy.

An oil shortfall would hit everybody, but the blows would be distributed unevenly among sectors, states, and population groups. Two of my Rand colleagues, Dan Kohler and Peter Stan, have constructed a model that simulates such a situation and its impact on specific industrial sectors. In one such simulation, they considered the manufacturing sectors and kindly furnished me with preliminary comparative data for contrasting California and other places. I've shown the data here in Table 1, along with comparable figures for Michigan, to make a couple of points by comparison.

We see from the figures on reduction in output that impacts can range from a 1-percent reduction in output for ordnance and accessories to an 11.1 percent reduction in the output of automobiles.[3]

A useful measure of a state's dependence on an industry is the percentage of the nonagricultural labor force that an industry employs. Notice that California is generally less dependent on the hard-hit industries than the U.S. as a whole. Michigan, by contrast, would be hardhit, primarily because of its dependence on the motor vehicles sector.

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[3]These results depend, of course, on a set of assumptions and hypotheses about consumer and producer behavior. Different plausible assumptions can change the numbers by one or two percentage points.

Table 1

UNEVEN EFFECTS OF A HYPOTHETICAL OIL SHORTAGE
ON SELECTED INDUSTRIES

Industry	% Reduction in Output	Relative Importance (% of Nonagricultural Employment)		
		U.S.	California	Michigan
Hard-hit Industries				
Motor vehicles and parts	-11.1	1.3	0.5	10.8
Furniture	-9.1	0.5	0.6	0.6
Fabrics, textiles, apparel, etc.	-8.8	1.9	0.3	0.8
Machinery (except electrical)	-8.7	4.5	2.2	4.2
Rubber and plastics	-8.3	1.4	0.7	n.a.
Moderately Hit Industries				
Printing and publishing	-5.9	1.7	1.2	1.0
Transportation equipment and parts	-5.6	1.7	2.2	0.4
Ordnance and accessories	-1.0	0.5	(1.5)	n.a.

SOURCE: Model for Energy Supply Shortage (MESS), The Rand Corporation.

In the case of a serious cutoff of imported petroleum, then, California might get off somewhat easier in terms of employment and output than the nation as a whole or certain states like Michigan in particular. This may seem to contradict our experience with long gasoline lines during the last crisis. But the lines, while exasperating, did not cause wholesale layoffs or job losses. Moreover, most of the regulations that could be blamed for these spot shortages have either been rescinded or are scheduled to expire this summer.

As a whole, the service industries are less sensitive to oil import reductions and they are distributed around the country a little more evenly. This would equalize the burden among states a little more than we might have expected, considering the differences, shown in Table 1, among their portfolios of industries. On the other hand, it is probably true that the capital stock in the South and Southwest is newer and more fuel-efficient than it is elsewhere, in which case we could expect to see regional differences even within a single industry.

These figures here do not tell the entire story, therefore. Indeed, my intent is not to suggest that we at Rand have the answers yet. We are working on the analysis, but our vulnerability to oil supply disruption deserves more policy attention at all levels of government.

* * * * *

Most of the talk one hears about how our personal lives will be affected by the changing energy situation focuses on its price. The premise is that energy prices are rising relative to <u>other</u> things, which would mean that everybody would make do with less energy relative to other things--we'd travel about differently, live in different kinds of houses, move to different climates, and so forth. But the force of that entire argument is lost if higher energy costs diffuse throughout the entire price system. I suspect they do, and will continue to do so, making just about everything we do more expensive.


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