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Business & Financial Letter

Decelerating From 75 Quads

This could be labeled National Energy Week, because it marks the beginning of a great national debate over the Administration's efforts to moderate the growth of energy consumption without slowing the growth of the economy. Some authorities doubt that much can be done to break what they see as a close energy-GNP relationship, but others are much more optimistic, pointing for proof to the example of the Germans and especially the Swedes, who use almost 40 percent less energy per capita than we use.

Actually, the optimists have a good case. The energy needed to produce a dollar of output has fallen irregularly over time, reflecting a structural shift in the U.S. economy to less energy-intensive industries and services, along with industrialists' successful efforts to improve the energy efficiency of their technology. Also, U.S. energy consumption declined almost one percent between the 1973 peak year and 1976, despite an increase of more than two percent in real GNP over that period. The economy in 1973 required 74.6 quads, or quadrillion British Thermal Units—the energy measure representing the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit. Last year's energy consumption of 74.0 quads was higher than the 1974-75 recession lows but still below the earlier peak. Petroleum supplied 47 percent of the total, natural gas 27 percent, coal and lignite 18 percent, and nuclear power less than 3 percent. But almost 41 percent of the petroleum supply came from foreign sources, on the heels of a sharp 1976 increase in oil imports.

The 1974-76 deceleration in energy consumption was rather modest in view of the severity of the recession and the sharp increase in energy costs of this period. Although energy growth henceforth is expected to fall below the historical trend, many experts foresee a strong expansion of consumption in future decades, even with the recent upsurge in relative energy costs. According to a composite of several government research studies, the economy could require 160 quads by the turn of the century—about 42 percent from oil and gas, 36 percent from coal, and 21 percent from nuclear. By the year 2025, energy use could rise further to 230 quads—56 percent nuclear because of the depletion of other fuels. But the Administration, with its emphasis on energy conservation, rejects the inevitability of this projected growth and the stress on increased production it entails, in many respects reflecting the arguments developed by Amory Lovins in an influential article in the October 1976 *Foreign Affairs.*

Drawbacks to growth

Lovins notes that the usual proposed solution is based on the rapid expansion of three energy sources: coal (mainly strip-mined, then

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made into electricity and synthetic fluid fuels); oil and gas (increasingly from Arctic and offshore wells); and nuclear fission (eventually in fast-breeder reactors). Even over the next ten years, this scenario envisions massive supply requirements. And by the turn of the century we might need 450 to 800 nuclear reactors, 500 to 800 huge coal-fired power stations, and 1,000 to 1,600 new coal mines.

Lovins argues that there are serious drawbacks to this growth scenario. Despite intensive electrification, which would consume more than half the nation's total fuel input in 2000, we would still be seriously short of gaseous and liquid fuels, because of the slow and incomplete substitution of electricity for the two-thirds of fuel use that is now direct. Despite enhanced recovery of resources in the ground, shortages would steadily deepen for natural gas (such as the material needed for plastics and nitrogen fertilizers), and later for fuel used for transport (such as that half of the oil supply that now runs our cars). Besides, more than half the energy growth would never reach the consumer because it would be lost in the increasingly inefficient fuel chain dominated by electricity generation (which wastes about two-thirds of the fuel consumed) and coal conversion (which wastes about one-third).

Investment implications

Sharply rising capital costs meanwhile would make it difficult to provide all the energy facilities now projected. In the 1960's, the total investment to increase consumers' delivered energy supplies by the equivalent of one barrel of oil per day was only several thousand dollars—or only several hundred dollars for Persian Gulf wellhead investment, in 1976 dollar terms. Today, for North Sea oilfields, the total investment is roughly $10,000 to deliver an extra barrel per day, and in the 1980's, the cost could range between $10,000 and $20,000 for Arctic and offshore oil, and between $20,000 and $50,000 for coal-based synthetic fuels. And capital costs could be many times greater for new systems that generate electricity than for those that burn fuels directly, reflecting the much higher costs of delivered kilowatts than for installed kilowatt capacity (as normally calculated).

On the basis of such data, Lovins argues that new energy investment could require as much as three-fourths of the nation's projected private investment spending over the next decade—in contrast to the typical one-fourth share. Requirements of that magnitude obviously could not be met in view of the other demands on the nation's resources, so the economy must continue to find ways to do more with less energy. In Lovins' words, "First, we can use thriftier technologies to produce exactly the same output of goods and services—and bads and nuisances—as before, substituting other resources (capital, design, management, care, etc.) for some of the energy we formerly used. In addition, or instead, we can make and use a smaller quantity or a

different mix of the outputs themselves, thus to some degree changing (or reflecting ulterior changes) in our life-styles."

New approaches

The first approach, involving "technical fixes," looks especially promising. According to M.H. Ross and R.H. Williams in the February 1977 *Technology Review*, we could nearly double the efficiency with which we use energy with only those technical fixes that could be implemented by the turn of the century. This would permit steadily increasing economic activity with roughly constant primary energy use. For example, improved design of new buildings and modification of old ones by 1990 could save a third of the nation's current total energy use. For another example, cogeneration—the generating of electricity as a byproduct in industrial steam plants—and more efficient electricity use could together reduce our use of electricity by a third and our central-station generation by 60 percent. (Already, cogeneration provides 29 percent of West Germany's electricity supply but only 4 percent of U.S. supply.)

Despite the difficulties created by a wide array of institutional barriers, technical fixes could be successful with the help of the economist's tool kit. The approaches could include: applying flat (even inverted) utility rate structures rather than discounts for large users, pricing energy according to what extra supplies will cost in the long run (long-run marginal-cost pricing), assessing the total costs of energy-using purchases over their operating lifetimes (lifecycle costing), counting the costs of complete energy systems including all support and distribution systems, properly assessing and charging environmental costs, valuing assets in terms of their replacement costs, and encouraging pro-competitive antitrust enforcement. The economist's basic approach, of course, would be simply to permit energy prices to rise to free-market levels.

Lovins argues, however, that long-run solutions would require not simply technical fixes, but also "social changes" providing better fits between energy choices and the end-products desired. "Plainly we are using premium fuels and electricity for many tasks for which their high energy quality is superfluous, wasteful and expensive." A preferred approach would include technological solutions such as solar energy and organic conversion of wastes to fuel supplies, but it would also involve a scaling-down of present-day technology—the adoption of smaller, simpler supply systems entailing much shorter development and construction times, as well as the adoption of smaller, less sophisticated management systems. With such approaches, Lovins claims that energy use could peak around the year 2000 at 95 quads—compared to the 160 quads required under present trends—and could decline to 65 quads (compared to 230 quads otherwise) by the year 2025. With those projections in mind, the great debate can now proceed.

William Burke

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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT

(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 4/6/77	Change from 3/30/77	Change from year ago Dollar	Change from year ago Percent
Loans (gross, adjusted) and investments*	97,615	+ 3,057	+ 8,447	+ 9.47
Loans (gross, adjusted)—total	74,033	+ 2,327	+ 7,524	+ 11.31
Security loans	2,142	+ 675	- 539	- 20.10
Commercial and industrial	23,573	+ 125	+ 1,558	+ 7.08
Real estate	22,324	+ 55	+ 2,507	+ 12.65
Consumer instalment	12,526	+ 23	+ 1,614	+ 14.79
U.S. Treasury securities	10,657	+ 692	+ 604	+ 6.01
Other securities	12,925	+ 38	+ 319	+ 2.53
Deposits (less cash items)—total*	96,467	+ 1,624	+ 7,137	+ 7.99
Demand deposits (adjusted)	28,347	+ 1,499	+ 2,925	+ 11.51
U.S. Government deposits	485	+ 297	+ 96	+ 24.68
Time deposits—total*	65,819	- 132	+ 4,036	+ 6.53
States and political subdivisions	5,178	- 101	- 1,039	- 16.71
Savings deposits	32,265	+ 12	+ 6,484	+ 25.15
Other time deposits‡	26,111	- 227	- 1,108	- 4.07
Large negotiable CD's	9,690	+ 70	- 2,813	- 22.50

Weekly Averages of Daily Figures	Week ended 4/6/77	Week ended 3/30/77	Comparable year-ago period
Member Bank Reserve Position			
Excess Reserves (+)/Deficiency (–)	– 20	+ 48	+ 82
Borrowings	1	1	0
Net free(+)/Net borrowed (–)	– 21	+ 47	+ 82
Federal Funds—Seven Large Banks			
Interbank Federal fund transactions			
Net purchases (+)/Net sales (–)	+ 49	– 740	+ 1,139
Transactions with U.S. security dealers			
Net loans (+)/Net borrowings (–)	+ 280	+ 121	+ 779

*Includes items not shown separately. ‡Individuals, partnerships and corporations.

Editorial comments may be addressed to the editor (William Burke) or to the author. . . .
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