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SYNFUELS & CONSERVATION

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CONSERVATION: TRY IT, YOU'LL LIKE IT

With regard to oil, the United States is living beyond its means. Desperate to find some solution that did not necessitate a change in lifestyle, it turned this summer to synthetic fuels—oil made from coal or shale or tar sands, or biomass.

Gas lines announced the crisis. Reports from the House of Representatives suggested synthetic fuels were achieving considerable favor. But when the President succumbed to advice to jump in with his own massive synthetic fuel bill, he evidently engaged in overkill. Rather than fanning the movement of which he sought to become the leader, he almost blew out the flame.

From a few stories sympathetic to synthetic fuels, the press turned to reviewing the matter in the light of an $88 billion program with all the earmarks of a "panacea." In no time, the articles were skeptical and critical—and there was much to be critical about.

For once Congressional delays served their intended purpose. The Senate Banking and Energy Committees are now rewriting the President's proposals to much more limited and sensible sized programs. Fewer than a dozen demonstration plants will be subsidized with which our nation will determine, later, whether there is a synfuel in your future.

Now the pendulum is swinging back toward the conservation from which we should have started. With each boomlet in favor of some escape from the dilemma, the public, the Congress, and the press, are educating themselves to recognize that there is no easy way to increase supply.

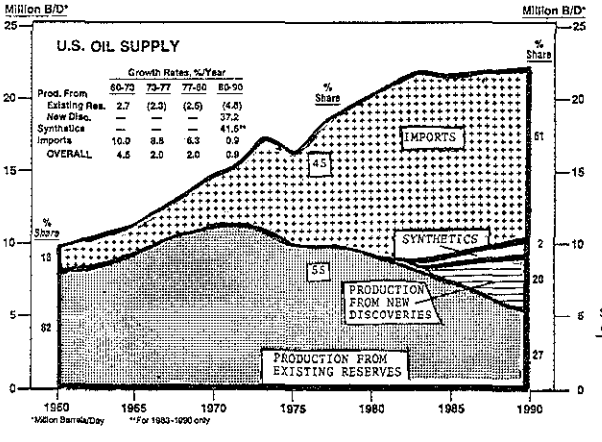
At this critical juncture, a distinguished group of energy specialists, a good number of them members of our organization, met in Berkeley and released the manifesto excerpted within. (See p. 2). It lists proposals with which it believes the equivalent of 6.5 million barrels a day could be saved by 1990; this is almost as large as our current import-covered deficit. The explicit proposals have been endorsed by the FAS Council as well as its authors.

The important thing to note is that these proposals do not require massive curtailment of activities or overhauls of current methods of conducting business or pleasure. Quite the contrary. The whole philosophy of the current conservation school is to exploit the "fat" in our energy economy to induce very substantial savings and make such dislocation unnecessary.

But as the graph below shows, conservation is a last change to avoid curtailment. Synthetics, as can be seen, are destined to be a minor element if they will compete at all. And they obviously cannot, for decades, change the nature of our vulnerability to OPEC, the degree of dollar outflows, the rate of inflation, or any other substantial parameter of concern.

Ironically, after seeking desperately to find some other way—any other way—to avoid conservation, it may be found, in the end, to be a relatively painless solution. The Council joins with the signers of the manifesto in saying: "try it, you'll like it."

Reviewed and Approved by the FAS Council



SOURCE: Exxon Co., USA, Energy Outlook 1978-1990, May 1978.

AUTOMOTIVE MILEAGE QUESTIONED—6; TV DANGEROUS?—7

CONSERVATION MANIFESTO

I. Proposals

Our goal is to augment the President's proposed short-term energy program by proposals to stimulate cost-effective increases in the efficiency of end-use with no loss in amenity. Our 1990 target is a 13 quadrillion Btu (quads) annual saving in gas and oil. This is equivalent to 6.5 million barrels of oil per day (mbd). In the past, energy conservation in the buildings sector of the U.S. economy has received far less attention than in industry or transportation. Therefore our program emphasizes retrofitting of buildings although it also covers industry, automobiles and light trucks. Not considered here are the remainder of the transportation sector and all of energy supply. We are guided by the following general principles:

1) Conserved energy (i.e., the new energy made available by more efficient end-use) usually costs less than current conventional energy supplies and probably far less than synthetic fuels. Hence government programs should vigorously stimulate investment in more efficient use of energy, and subsidy programs must be restructured to give highest priority to the most cost-effective option, which currently is conservation.

2) Investment decisions should be based on life-cycle costing which includes the replacement cost of energy, rather than simply its average or historical cost as is present practice. This "marginal cost pricing" would greatly promote the efficient use of energy; it is also consistent with minimizing costly and inefficient government interventions.

3) If prices of energy are to be permitted to rise, considerations of equity or social justice are paramount. If future energy costs generate enormous excise tax revenues, these should be rebated directly to consumers; if they generate enormous windfall profits, these should be taxed. In either case, repairs and retrofits of the residences of poor and economically disadvantaged people should be paid for out of these revenues.

4) In estimating replacement cost of energy, consideration must be given not only the direct cost of energy production, but to externalities (environmental degradation, public health, and national security).

5) Efficiency standards for new and old buildings, appliances, and autos are necessary to achieve rapid implementation of conservation. As discussed under point 2), these standards should minimize life-cycle costs.

The President's program should be augmented to include at least the following measures:

A. Buildings

1. Incentives, interest-free loans and/or subsidies should be provided to homeowners for residential retrofits. For example, Congress should take prompt action on the President's proposal that electric and gas utilities be required to offer long term interest-free loans to their residential customers, and allowed to include those loans in their rate bases. For oil-heated residences, since there are no oil utilities, the federal government should provide interest subsidies for such long term loans as the President proposed; however, this subsidy needs to be increased from $2 billion to $20-$30 billion. For commercial buildings low interest loans should be provided for those retrofits with a payback time of more than several years. For apartment buildings a mandatory retrofit program may be necessary. Other mechanisms for providing retrofit financing may also be necessary and those adopted undoubtedly will vary according to local conditions. These should evolve in the normal political process. Whatever mechanisms chosen for building retrofit financing, incentives must be provided for the owners to accept these interest-free loans; for example, by deferring repayment until the house is sold as in the Oregon plan, or by making the annual repayments of the principal tax deductible.

2. A nationwide program should be established to train specialists who are expert appraisers and planners for the

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retrofitting of residential and commercial buildings ("house and building doctors"). These people could be employed by utilities, homeowners, or by retrofitting contractors who would be able to offer "one-stop" home and building retrofits. When the funds and incentives are available there will be a real demand for building retrofits, and free enterprise can be counted on to supply that demand. This process will be accelerated by the availability of these trained specialists.

3. An expanded effort should be mounted in research, development, and demonstrations on retrofitting buildings, including HVAC and lighting systems, with the aim of achieving maximum energy efficiency consistent with present and expected energy prices. Parallel research on indoor air quality should also be expanded.

4. Research should be intensified on developing energy performance standards for new buildings, consistent with the higher replacement costs of energy. The National Energy Plan already mandates standards, and work is proceeding to devise an initial set. It is important to get started on developing next-generation performance standards for new buildings and appliances, in order to generate a market for new techniques and systems, and to stimulate the development of new hardware (as has been happening for automobiles). These standards should cover peak electric power as well as energy.

B. Industry

1. Industrial energy use should be allocated primarily through the marketplace, with industrial energy priced realistically. The government should propose measures that will accelerate the introduction of energy efficient technologies through a combination of effective financial incentives and energy pricing mechanisms that reflect the value of energy resources.

2. Legislation consistent with environmental considerations should be adopted to reduce the institutional barriers and regulatory constraints that inhibit the utilization of such fuel and cost-saving technologies as cogeneration. For example, it would be desirable to allow the use of natural gas for cogeneration. We estimate that by 1990 the natural gas saved by retrofits in the buildings sector alone could be 3.5 quads.

C. Automobiles

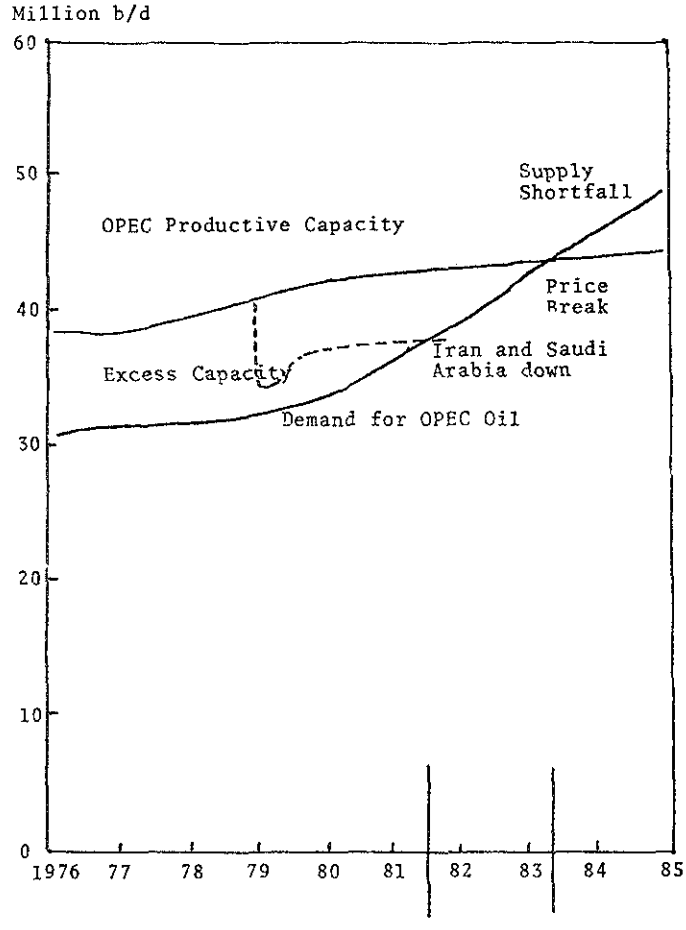
1. The replacement cost of oil should play a determination in the retail price of gasoline. This can be done either through decontrol accompanied by a windfall profits tax, or through an excise tax on gasoline. In either case the inevitable impact on low-income motorists must be mitigated, for example, by rebates or as some other part of a general scheme for redistributing windfall profits.

2. The federal 1985 automobile performance standards should be expeditiously implemented with due account taken of actual on-the-road performance, and federal standards for improved performance beyond 1985 should be developed and issued forthwith.

3. Federal performance standards for light trucks should be issued without delay to provide industry adequate lead-time to gear up for them.

4. An accelerated program of research should be initiated into cleaner ways to burn fuel, particularly diesel fuel, and into the health and environmental impacts of alternative motor fuels.

OPEC OIL: THE SUPPLY/DEMAND GAP



SOURCE: Central Intelligence Agency, The International Energy Situation: Outlook to 1985, ER77-10240U, April 1977.

Since 1977 the CIA predictions (that the Soviet Union would enter the world oil market) have been given increasing attention. The Soviet Union has apparently cut back on domestic Aeroflot services and has frozen the amount of oil normally supplied to the Eastern European Satellite nations at the 1977 level.

The committee preparing this Manifesto is composed of: Samuel M. Berman; Anthony C. Fisher, Jack M. Hollander and Arthur H. Rosenfeld (all of Berkeley); Marc H. Ross of Michigan; Robert Socolow and Robert H. Williams of Princeton; and Robert Stobaugh and Daniel Yergin of Harvard University. Persons interested in copies of the complete text and/or endorsing the Manifesto could contact Samuel M. Berman.

FAS has hired a staffperson to work, in particular, on energy conservation implementing these and related ideas. Interested members could contact Ms. Deborah Bleviss, formerly scientific adviser to Massachusetts Audobon.

ENERGY FUTURE: REPORT OF THE ENERGY PROJECT OF THE HARVARD BUSINESS SCHOOL

What follows is a summary and paraphrase of the major conclusions of the Harvard Business School Project.

The Harvard Business School project believes that the 1973-74 oil crisis was a turning point in post-war economic history, a warning of fundamental disorder. Economically and politically, also, it is considered hazardous to depend on Mideast oil. Eschewing political costs, the project considers the total "social cost" of oil to be $30 to $40 a barrel, including in this the cost of future price hikes and economic disruptions that come from increasing demand.

Oil is not likely to provide increased production, whether or not prices are decontrolled, the industry broken up, or unusual recovery methods tried. At best, even with deregulated price, natural gas production might remain at current levels. Coal's contribution is limited by the backwardness of the industry and the uncertainty about environmental requirements. Nuclear is bogged in controversy and, even if doubled in the next ten years, would still be providing less than 7% of America's total energy.

The most immediate opportunity is conservation, which should be regarded as a largely untapped source of energy that does not require technological breakthroughs—only a consistent set of signals—price, incentives, and regulations.

Conservation: The Key Energy Source

Conservation may well be the cheapest, safest, most productive energy alternative readily available in large amounts. It includes the undesirable "curtailment" if supplies are interrupted and "overhaul" if dramatic changes are required in the way Americans live and work. But also it includes the desirable "adjustment" or "productive conservation" which encourages improvements in efficiency.

Improvements in efficiency are not best left to the marketplace because energy prices are understated, not only through regulation but because the real costs of energy are much higher than even deregulated costs would suggest. GNP is not rigidly linked to energy use and can grow even while energy is saved.

By far the most promising area for medium-term conservation lies in increasing the efficiency of the vehicle. Weight of the automobile, which has been increasing rapidly, is the single most important factor in determining fuel economy. Higher gasoline prices would help but, as of the end of 1978, the real price of gasoline was no higher than in 1960, when OPEC was founded! Other methods to consider are graduated tax on horsepower or weight or flat minimum mileage standards. Fleet average mileage standards were set and ought to provide twice as great a saving from 1975 to 2000 as the reserves on the Alaskan North Slope, but actual driving results are lower than the EPA tests indicate. (See p. 6).

Industrial energy conservation can arise from "improved housekeeping" (maintenance, adjustment of lighting, etc.), "recovery of waste" (industrial retrofit to capture waste heat, cogeneration of electricity and steam) and "technological innovation" to embody more efficient technologies.

Approximately 40% of U.S. energy consumption is used to heat, air condition, light, and provide hot water to homes, commercial structures, and factories. Buildings can become cleverer in using and recapturing heat. Retrofit campaigns can be very effective. (See "House Doctors," FAS September *PIR*, p. 8.) And individual behavior in manipulating air conditioning and temperature levels should not be underestimated.

According to studies America could use 40% less energy than it used in 1973 and still have the same living standard simply by installing heat pumps; increasing refrigerator efficiency; reducing building heat losses; implementing cogeneration; using organic waste in urban refuse for fuel; and improving automobile efficiency. The problem appears to be persuading people that this is possible.

COST OF AN ADDITIONAL 5 MILLION BARRELS PER DAY: $35-$85 PER BARREL

The Project attempts to trace the implications of the U.S. moving from a 9 million barrel per day (BPD) shortfall to a 14 million BPD shortfall. It reasons first that an increase in U.S. appetite for oil of 5 million more barrels per day would set a trend that would increase Western European and Japanese (OECD) appetites by the same amount. The net effect would be to increase demand on OPEC oil from 30 million BPD to 40 million BPD. This could produce a 40% increase in OPEC prices. This would raise the cost to the U.S. of its first 9 million barrels, as well as of the later 5 million barrels. The resultant estimated total cost is $58 billion or $32 for each of the additional 5 million barrels.

Further, *indirect* economic costs are associated with inflation outflow of the additional dollars, and so on. The Project suggests $5 to $50 a barrel cost and the social costs of inflation, for example, would have to be added to that.

Thus total potential costs of the additional 5 million barrels daily come to between $35 and $85 a barrel.

A DIFFERING VIEW BY HANS BETHE

Hans Bethe, who was awarded the Federation's Public Service Award in 1976 for his long service to FAS goals, has a quite different view of energy priorities than does the center of gravity of other FAS energy specialists. Dr. Bethe wants major emphasis on also energy sources including not only conservation but all nuclear energy and synthetic fuels; re conservation he holds a disabused view of the likelihood that people will importantly change their traditional uses of energy. At the request of the Public Interest Report he sent along these comments.

Synthetics and the Energy Problem

1. Synthetic fuels (oil and gas from coal, and shale oil) are absolutely necessary. They go to the heart of the energy problem which is the scarcity of oil in the ground. Domestic petroleum production, after getting a boost from the (originally bitterly opposed) Alaska pipe line, is likely to go into a decline from here on. Worldwide oil resources are limited; if there are no synthetics and if demand increases at the historic rate, there will be a catastrophic failure in about 20 years; demand simply can then no longer be satisfied. Knowing this, OPEC prefers oil in the ground to dollars in the bank. Already their prediction for their exports in 1985 is 20% lower than the prediction two years ago. The more we can supplement petroleum by synthetics, the less will the oil nations be able to drive the price up and withhold supplies.

2. Synthetics are not enough, we also must reduce demand for oil. One area is house heating oil: I strongly support the suggestion by Williams and Ross of having well-trained "house doctors" who will suggest improved insulation of houses. This should be coupled with financial incentives, perhaps interest-free loans. In addition, domestic and commercial heating should be shifted from oil to gas as much as feasible; I believe gas can be made more available, e.g. by import from Mexico.

3. The main oil consumption (54%) is in transportation, and here again chiefly in private cars. I favor an equitable system of rationing, perhaps using local ration boards as in World War II. Gasoline beyond the ration should be heavily taxed, 50¢ to $1 per gallon. This would curb demand, and at the same time bring similar revenue as the proposed excess profits tax on oil companies.

4. Much thought, research and development have gone into synthetics, for many years. Several processes have been developed and tested. The Institute of Gas Technology at Chicago (Henry Linden), Professor Probstein at M.I.T., and others have investigated the amounts of water needed and have found that many locations of coal or oil shale have enough water for the processes. With time, synthetics production will be achievable by methods increasingly benign for the environment.

5. The cost of shale oil and of synthetic gas from coal seems to be similar as the present world market price of oil, $20 - $25 per barrel or the BTU equivalent. Oil from coal will be somewhat more expensive.

6. Many plans of action are possible. I would favor leaving it to industry to build the plants, with a sale price guaranteed by the government, such as $23 plus inflation escalation. Low-interest loans by the government might be added.

7. The Energy Production Board is an essential part of this, as well as of other energy programs. So many national and local agencies, often with conflicting demands, have to be satisfied on any new enterprise that nothing can be done unless there is a more powerful agency which can cut through the red tape.

VIEWS ON SYNFUEL COMPETITIVENESS

Just Wait: "The price competitiveness of synthetic and petroleum fuels is "telescoping rapidly . . . it appears there is a development almost every half hour in that direction." *(Congressman William S. Moorhead)*

Don't Hold Your Breath: ". . . it is probable that gasoline produced from coal will inherently remain more costly than gasoline refined from crude petroleum—*as long as this is available." (Ohio State study*, p. 148, March-May, 1979 hearings of House Banking on Defense Production Act of 1950) [Italics added]

The South African Experience: "The reason for the profit that SASOL I is making now is because the bulk of SASOL I was built 10 or 15 years ago, and because the plant was built with lower capital costs, rands or dollars.

"This was the point I tried to make before. The main reason why they made money last year was because their plant was built some time ago, and it is basically fully depreciated now.

"SASOL II when it starts up, because it was built with present day capital, will be far more expensive to operate than SASOL I, even though it is a far better process, because the capital cost is escalated so much. But five or ten years from now, I believe the same situation will happen when SASOL II will turn the corner." *(John T. Gallagher, Vice President, American Lurgi Corp.)*

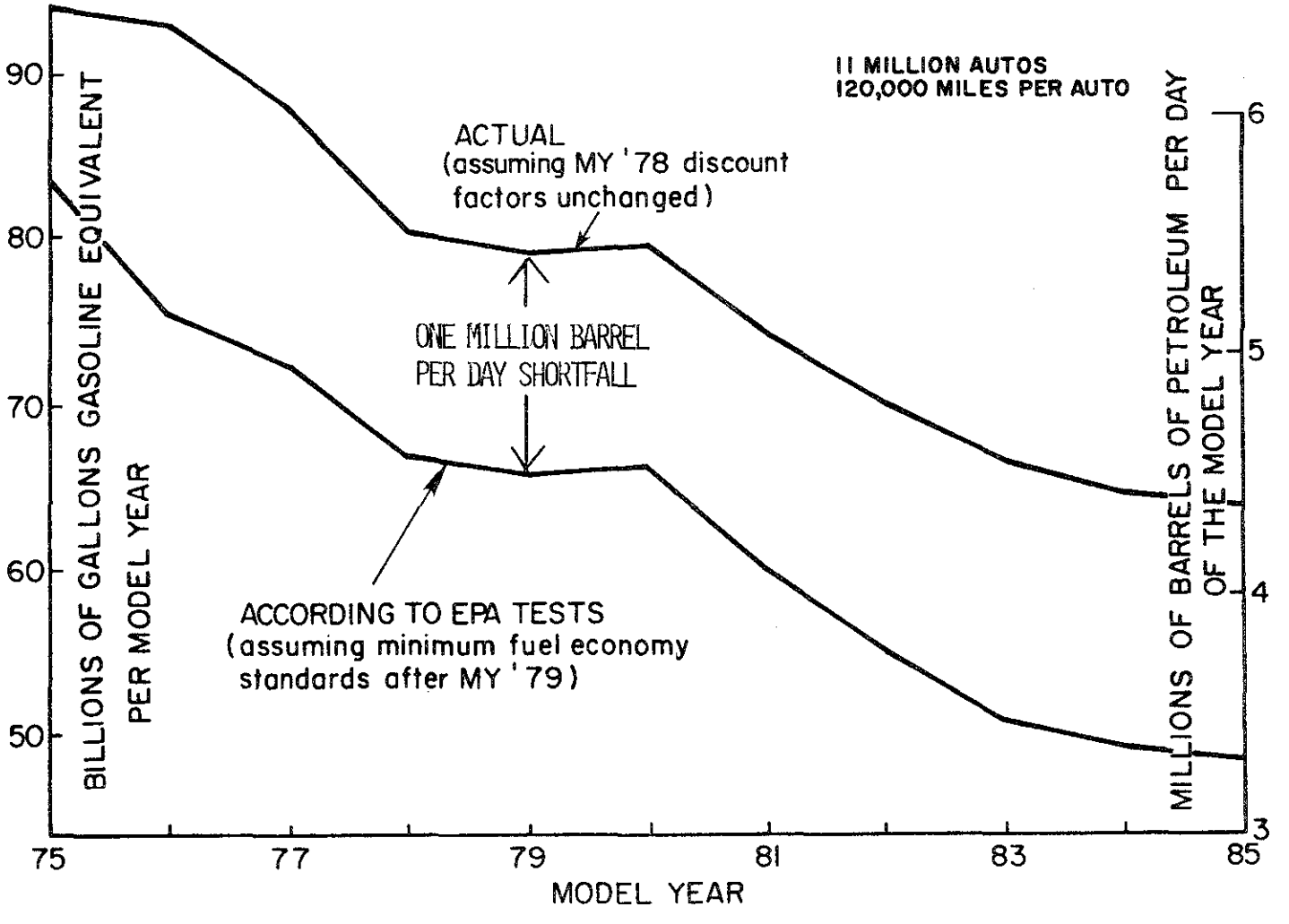
FUEL ECONOMY: LET THE BUYER BEWARE THE GOVERNMENT

New cars are not as efficient as Congress has mandated or as the Environmental Protection Agency has certified. The EPA tests showing 1978 model year fuel economy of 19.6 miles per gallon turns out, really, to be only 16.4 miles per gallon on the road. This difference will, eventually, cost America 13 billion gallons of gasoline—or almost one million barrels per day for a year. If each model year continued to shortchange Congress this way, it would eventually cost America one million barrels of gasoline per day indefinitely. Since the U.S. current deficit is on the order of 8 million barrels per day, this is about 10% of our problem.

Still worse, in later years when higher fuel economies are mandated, the discrepancies grow still greater. The 1985 fuel economy goal required by Congress is 27.5 mpg but cars achieving that goal in 1978 according to EPA tests are getting only 21 mpg on the road. This is a 50% increase over the 1975 average, not the 100% increase Congress wanted.

A paper by Princeton's Frank von Hippel and Margaret F. Fels calls this the "Case of the Shrinking Yardstick." EPA, aware of the fiasco, needs $1 million and 10-person-years to close the gap between the test and the onroad numbers, but, astoundingly, has not been given the resources to do it. The real problem, however, may be that the major manufacturers will complain that, with the yardstick corrected, they cannot meet the standards. According to von Hippel and Fels, new rule making efforts will be required after the tests are recalibrated to correspond to reality. Alternatively, or in addition, they note that the Secretary of Transportation can raise the economy standard as measured by the old test, subject to Congressional veto, if he believes a higher standard is possible. They propose, in addition, an acceleration of the process of establishing fuel economy standards for the post-1985 period.

LIFETIME FUEL CONSUMPTION COMMITMENTS FOR NEW AUTO FLEETS



TELEVISION: HOW DANGEROUS TO NATIONAL HEALTH?

During the summer, an FAS intern, Paul Sanders Thaler, 17 years old, prepared the following personal review of what may be a serious national problem: impelling, addictive, and conceivably physiological effect of television upon the young. He computed that students are spending approximately three times as many hours watching television as going to school, and reported that the educational testing service had noted that the advent of television was correlated nicely with a subsequent and continuing drop in Scholastic Aptitude Test (SAT) scores. Some have even hypothesized that too much viewing in such ages as 3 to 5 might permanently impair scholastic capabilities. On September 14, yet another such indication was found, this time from the National Assessment of Educational Progress, deploring a decline in mathematical skills. While multiple factors are usually said to be responsible for these and other declines, FAS considered the TV matter serious enough to call upon Charles Ferris, the Chairman of the Federal Communications Commission (FCC) to expand his study of television programming and the young into a study of the effects of excessive television upon the young—quite apart from what is programmed. What follows is Mr. Thaler's personal experience.

THE EFFECTS OF TELEVISION ON PAUL SANDERS THALER

Early in the fall of 1964, my mother was entertaining guests in the living room of our house. My brother, sister, and I were getting under the feet of the visitors when my mother innocently suggested that the three of us go watch television. She raved about a "new family cartoon — the *Flintstones*" and the benefits we would acquire by viewing it. I was three years old and am still curious as to why I would remember such a strange incident. However, as I look back, I can see all the bad effects that mechanical babysitter had on my life.

Television at one point in my life meant more to me than any artificial stimulant could to anybody. There is a spookiness to it all as I remember sitting and staring at the flashing box for hours on end. I have many memories of coming home from school and turning on the television in front of which I would have loved to live. By the time I was seven or eight, my mother would have to force my siblings and I to play outdoors. We would whine and complain and she would eventually put a minimum requirement for time outside, which usually meant only a half of an hour. My parents tried to enforce schedules in which each of the children would be allowed a certain number of hours a day to watch TV. These schedules never lasted, much to the regret of my father who insisted that television would turn our brains into "mush."

By the time I had reached my tenth year, each of the now four children had a television in his bedroom. Not much later, I got myself a subscription to *TV Guide*. Of the six hours I had between school and bedtime, I would estimate that I spent anywhere from two to the entire six hours in front of the television set. I would also venture to say that although these figures may seem startling, they are not uncommon among the youth of America. Last year, shortly before my seventeenth birthday, I decided to "kick the habit." Even though I still occasionally watch a program, I have generally become a more successful person.

It is hard for me to assess the damages television has had on my mind and body because I don't have anyone to compare me to who is the same person minus the number of hours logged in front of the TV. I do, however, have some fairly substantial hunches and who could say that an activity that I have spent so many hours involved in would not have some sort of effect?

I am convinced that had I not watched television to such an extent, I would have been more articulate, more verbal, less prone to passiveness, and more outgoing. I am obviously at least somewhat influenced by the articles and books I have read on the harmful effects of television on children, but as I evaluate myself, I can see signs that almost certainly confirm pointing the accusing finger at television. Often, as I was watching, I would find myself in a very comfortable stare that would be hard to come out of. This passive, resting viewing would get me simply more tired and frequently I would fall asleep. During all these hours of rest, I could have been playing. By neglecting myself of the physical strain of exercise, I became passive and timid among others which later affected my social life.

By spending so many hours viewing television, I obviously did not voluntarily read very much and also didn't do my homework as carefully as I could have (I often did my work in front of the TV). As a result, I am nearly positive that my vocabulary and ability to speak unhesitantly suffered. I don't consider myself very verbally articulate. Numerous tests have shown my vocabulary to be slightly below average as compared to my peers at the secondary school I attended. I do not see how anyone can possibly argue that TV did not in some way inhibit the development of my vocabulary as well as my overall intelligence. I know for certain that I was not paying much attention to the words used on television programs and rarely questioned the meaning of a word or phrase that was unfamiliar. I was in too comfortable a state to let my mind interrupt the beautiful peace I was experiencing.

Although there are probably other factors involved in my intellectual development, I firmly believe that television at least partially inhibited that process. The difference between living with television and living without is astounding. In the past year or so that I have restrained myself from watching, my marks in school improved by almost a full grade. I am also more outgoing. However, there are some things that cannot be reversed, such as my articulation and general verbal abilities. It seems as if the *Flintstones* may not be worth the rave reviews.

THE PROBLEM: A BILL FOR $50 BILLION

"As a result of the large increase in price and the continued growth of oil imports, the total cost to our balance of payments has risen significantly. In 1959, our oil import bill was $1.5 billion. In 1975, it was $27 billion. Last year it was over $42 billion. And it is estimated that this year it will be over $50 billion.

"As the CEA analysis that was part of our investigation indicated, at the current level of imports, each dollar increase in the real price of world oil increases U.S. oil costs by $4.5 billion and domestic inflation by two-tenths of 1 percent. The increase in the balance of trade deficit is estimated at $3 billion."

—Daniel H. Brill, Assistant Secretary of the Treasury

THE SOLUTION

"In the mid-term, the next five to ten years or so, we have one *main option* for reducing U.S. energy imports and that is to improve the efficiency with which energy is used—no other energy option can have such an impact during this time. Investments in efficiency, and simple solar energy systems such as awnings and south-facing windows, probably are the last 'source' of inexpensive energy to which this nation has access. These investments, moreover, represent one of the rare opportunities in which the least costly investment is also the one which presents the best opportunities for generating attractive employment and reducing environmental problems . . .

"Plainly there is a limited supply of the inexpensive 'saved energy' which can be released through investments in energy efficiency and this 'supply' cannot substitute for the search for new energy sources. The amount which we can *save* in the next decade, however, will almost certainly dwarf the amount we can *produce* from new sources during the same period."

—John H. Gibbons, Director, Office of Technology Assessment, July 26, 1979

SYNFUEL: RECURRENT MIRAGE?

The notion that synthetic fuel is an idea whose time has come surfaces periodically. An August 23 letter to the *New York Times* pointed observers to events 30 years ago when, right after the war, the U.S. suffered a petroleum shortage. Congressional hearings led the Secretary of the Interior to testify that "the dawn of a synthetic liquid fuels era in the United States is coming—and coming fast . . ." Sensitized to the need for an abundant supply of liquid fuels to win a modern mechanized war, the Interior Interstate and Foreign Commerce Committee reported out legislation calling for 30-year loans to develop "as many plants as are required to furnish an adequate basis upon which to develop a rapidly expandable and technologically advanced synthetic liquid fuel industry." The bill died.

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