

Whitewashing Detroit's Dirty Engine

by John Wicklein

Three little models in miniskirts, dancing around a Camaro. It's opening day at the 1970 International Automobile Show in the New York Coliseum. A girl in a deep-veed, Grecian gown coos into a microphone. "Beauty is an expression of the truth, in a woman, in an automobile. Beauty is integrity . . . beauty is character . . . beauty is that unique, one-of-a-kind quality, and the Monte Carlo is like no other car Chevrolet makes."

Women shrouded in black, marching silently by in gas masks. Behind them, strung out from the General Motors building to the Coliseum, thousands of men and women, carrying signs, protesting pollution from auto exhausts: "Cars Cause Cancer . . . The Internal Combustion Engine Kills . . . Make GM Responsible . . . Ban the IC Engine."

Inside the show, a commercial television crew interviews Edward N. Cole, president of General Motors, on the merits of the new cars. From a loudspeaker, the bouncy voice of the Escape Girl, a go-go in her cage: "Escape from the ordinary . . . Get away in an Oldsmobile Escape Machine."

In the protest march outside, a Congressman tells a reporter, "It's basically a dirty engine . . . there's no way to clean it up. . . . You've got to get rid of it."

Auto buffs, queued up at the entrance, surge into the show and mill around the cars. Chromium-plated, enameled in green and orange and red and gold, power-packed internal combustion engines turn on their display stands.

John Wicklein, a former reporter for The New York Times, produces television documentaries on public affairs in Washington.



Across the way in Central Park, Bess Myerson Grant, Mayor John V. Lindsay's adviser on consumer affairs, tells the auto pollution rally:

"The auto makers, the worst offenders, continue to roll merrily along . . . dirty business as usual, profits without honor. Declare another dividend and bury the dead, and why don't those trouble-making consumers patriotically shut up? Obviously, obviously, we are on a collision course."

Between the auto promoters inside and the protesters outside, there was no communication opening day of the Auto Show. But symbolically, the national battle to eliminate the internal



combustion engine had been joined.

The battle has been brewing 20 years—since the day in 1950 that Dr. A. J. Haagen-Smit, professor of biochemistry at California Institute of Technology, announced his discovery that the main ingredients of Los Angeles's smog were exhaust gases from automobiles. Until Haagen-Smit, Angelenos had thought stationary polluters were the chief culprits. But the biochemist, testing the polluted air, showed that when hydrocarbons and oxides of nitrogen are mixed in the presence of sunlight, irritating compounds are formed to cause photochemical smog. The chief source of hydrocarbons and nitrogen oxides in the

air, he found, is the auto exhaust pipe. Two other poisons, carbon monoxide and lead, are also discharged into the air by the explosion of gasoline in an internal combustion engine.

Since the discovery, medical researchers have found that lung cancer, heart ailments, respiratory diseases, and eye infections increase in proportion to the increase of automobiles. Smog causes death to plant life, too. Last year the United States Forest Service estimated that 1,300,000 trees in the San Bernardino National Forest near Los Angeles will die in the next five years, because of smog on the freeways.

The health problem, it's coming to be realized, is no longer a phenomenon peculiar to Southern California. Researchers find auto pollution a growing menace in every city with a population of 50,000 or more. Air pollution caused by cars ranges from 60 per cent in the small cities to 90 per cent in the large. Compared to the complexities of water pollution, the problem of air pollution from this source is fairly easy to solve; but so far, government and industry have refused to interrupt business-as-usual to get it done. The lesson to environmentalists is simply this: as of today, the movement does not have enough power to win even the easy battles.

Until very recently, the auto industry was unperturbed. In 1953, a Ford Motor Company executive told Los Angeles pollution control officials "these vapors are dissipated in the atmosphere quickly, and do not produce an air pollution problem." GM assured them that carbon monoxide was not present in harmful amounts in the L.A. area, "and so we have not been concerned with the

imminence of a serious health problem from this source.”

S. Smith Griswold, who served many years as director of air pollution control in L.A. and later in the equivalent federal office, says that until the evidence became inescapable, the auto industry was unwilling to admit it was responsible for air pollution. Griswold, now a pollution control consultant in Washington, D. C., told me:

“We had to clean up every other source to the limit of engineering science—and still have a smog problem—before the industry would concede that their product was responsible. We decided we had to make the manufacturers control emissions. The companies said it couldn’t be done. So we got independent companies to design emission control devices and ordered the auto makers to put them on their cars. Then we discovered the auto makers *had* the devices, and finally, when they were forced to, they put them on.”

This was the basis of a court suit against the auto industry brought by Griswold and the Justice Department in the Johnson Administration. Instituted in the U.S. District Court in Los Angeles January 10, 1969, the suit charged the Automobile Manufacturers Association and the four largest auto makers—General Motors, Ford, Chrysler, and American Motors—with conspiring for 15 years to limit the development and installation of auto-exhaust pollution control devices. Privately, industry people had expressed reluctance about installing the devices because they raised the cost of cars and reduced gas mileage—they were something of a drag.

To the disgust of Griswold and others fighting auto pollution, the Nixon Justice Department decided not to take the case to trial. They let the industry off the hook with a consent decree signed September 1, 1969. In the agreement, the manufacturers neither admitted nor denied the allegations, but agreed not to engage in the future in the practices specified in the suit.

California, exasperated by the in-

dustry’s foot-dragging, became the first state to adopt legislation requiring controls on exhaust emissions. The legislature has now set standards at a level which it hopes will drastically reduce pollution from exhausts by the middle of this decade. Early in the ’60’s the state set a goal of 80 per cent reduction in the average emissions from motor vehicles. But it was not until 1966 that it was able to get the manufacturers to attach devices that brought about such a reduction—and then only for hydrocarbons. Standards have since been set for carbon monoxide and oxides of nitrogen, but only for new cars sold in the state. No practical way has been found to control emissions from cars marketed before the devices became mandatory. So there is a built-in time lag before even the partial clean-up provided by the current standards can be achieved. It will be about 10 years before pre-control cars drop off the roads. After California, the federal government, acting under the Clean Air Act of 1967, began setting emission control standards. They were not, however, as rigid as California’s.

Once the auto industry accepted the fact of control devices, it began crowing about their benefits to the public. In April, 1969, Charles M. Heinen, Chrysler’s Chief Engineer for Emission Control, told the Society of Automotive Engineers: “We’ve done the job—the main battle against automotive air pollution has been won.” Other industry executives have become loud in their praise of emission control devices.

The reason is that today a far more drastic remedy to the air pollution problem—it hasn’t been solved yet—is being proposed, and it is scaring the auto makers silly. While the hullabaloo over control devices for the internal combustion engine was rising in California, other scientists, government agencies, and legislators began looking into the promised benefits of this “new” technology. They found that on every projection of pollution drawn by someone outside the auto industry, an ominous

curve appears. As devices are installed on new cars, air pollution begins to level off. That would seem logical, because, with effective devices, emissions from individual cars should drop off 40 to 60 per cent. But the fact glossed over by the industry is that the number of cars in the country is increasing rapidly—by the end of the decade, there will be twice as many on the roads. At that point, the pollution line takes a sharp turn upward once more.

But, as the technology improves, won't we have better and better control over emissions from conventional engines? Apparently not. The opinion of almost every researcher outside the auto industry is that the standards being promulgated for 1975 by California and HEW represent the technical outer limits for cleaning up the IC engine. After that, improvements are small, and methods of accomplishing them extremely costly. To many scientists, and one legislator, the remedy was obvious—force the automobile industry to give up its internal combustion engine and adopt another, nonpolluting means of propulsion for its cars.

The legislator was state senator Nicholas Petris of Alameda, California. Petris, a vigorous, gray-haired man with a penchant for bright shirts and colorful ties, had spent years advocating electric cars as an answer to California's smog problem.

In 1965, he became fed up with the industry's lack of concern and launched a head-on attack. He introduced a bill to ban the sale of cars with internal combustion engines. The legislators laughed. He introduced it again in 1967 and 1968. The auto industry laughed. But smog kept getting worse, and that was not funny. Last year, Petris tried again. His bill passed the senate, 26 to 5. If approved by the assembly, the new law would have ended the sale of conventionally powered cars in California by 1975. California buys 10 per cent of Detroit's output. The auto industry stopped laughing. It sent in money and lobbyists. The bill was referred to the

assembly's Transportation Committee, usually friendly to the manufacturers. An industry spokesman told the committee that Detroit had no alternative available, so they would be, in effect, banning the sale of cars in a car-dependent state. "The know-how isn't there to do the job," he said. And so the committee killed the bill—by one vote. A week afterward, a reporter asked the same industry spokesman if Detroit would have been able to market a car with another type of engine by 1975 if the IC engine had been banned. "We would have complied," he said, "and of course we would have remained in the business of producing automobiles."

Senator Petris feels he has made a point. "There's a remarkable change from ridicule to belief," he told me. On the walls of his office are several mea culpa bumper stickers:

THIS CAR MAY BE A HAZARD
TO YOUR HEALTH
SEE IT LIKE IT IS—FIGHT AIR POLLUTION
QUIT SMOKING—WALK

"I'm determined to continue the fight until the IC engine is eliminated. The industry has never volunteered to do anything that will favorably affect the health of the people. You have to club them with governmental action. I'm sorry to say this. I'd much rather go to them and say, 'Look, fellas, you're ruining our health and you are going to kill us off—would you mind changing that internal combustion engine?'"

People in other states are beginning to agree with Petris. A bill in Hawaii would ban the engine by 1974, one in Washington state by 1980. ("I think that's quite late," Petris says.) In New York state, a bill introduced this year with bipartisan sponsorship would provide a flat ban on sales by 1975. "We want to scare hell out of the industry," a Republican pushing the legislation told me over the phone. "We want them to come up with a clean alternative, now." Maryland, Massachusetts, New Jersey, Delaware, New Mexico, Arizona,

Connecticut, and Illinois also have "ban" bills in their hoppers.

In Congress, legislation to get rid of the IC engine was introduced by Representative Leonard Farbstein, a Democrat whose polluted district in Manhattan has a large stake in the outcome. The ban is also backed by Representative Alfonso Bell, Republican of California. In the Senate, Gaylord Nelson, a Wisconsin Democrat active in the pollution fight, has sponsored a similar proposal.

The Farbstein bill doesn't propose a flat ban, but the intent is the same. It starts with the premise that exhausts should be virtually free from pollutants. Rather than key the standards to the best the IC engine can achieve, it sets limits on emissions that can be met only by engines that are inherently clean—steam, gas turbine, or electric. These standards, in effect eliminating the conventional engine, would go into full force by 1978. IC engines would be phased out over four years, dropping the largest in 1975 and all by the end of 1977. The plan would permit the industry to introduce cars with alternative engines a few lines at a time.

Public support for a ban is building across the country. In California, the People's Lobby, headed by Ed Koupel of Los Angeles, has collected 425,000 signatures to put a referendum phasing out the engine on the ballot this fall. Koupel was the man who led the petition drive to recall Ronald Reagan as governor. Reagan's attorney general has challenged the validity of a third of the auto referendum signatures, in an effort to keep the question off the ballot. Nationally, the ban got a boost from environmental activists working toward Earth Day demonstrations. The Nader-sanctioned "Campaign GM" has made the elimination of the IC engine one of its aims.

But the industry tide is still running against the air pollution activists. "The Industry" is 50 per cent General Motors, and this one company, according to Nader, contributes 35 per cent of the nation's air pollution, by tonnage. In an

interview at the General Motors Technical Center in Warren, Michigan, GM President Edward Cole told me his company has no intention of abandoning the internal combustion engine. "We believe that the internal combustion engine can be made more pollution-free than any of the alternative power sources that we are working with," he said. "And so we are betting heavily that as far as the public good is concerned—that is, being able to own and operate individual transportation—we can do it most easily at the lowest possible cost by the employment of an internal combustion engine."

I must have struck Cole as overly concerned. After several questions about GM's efforts to stop pollution, he took me by the arm and said, "John, what I am saying is that *it is going to be all right*. We are going to take the automobile out of the pollution problem, and we expect to do it by 1975."

William G. Agnew of the GM Research Laboratories told me GM thought it was more productive to refine the IC engine by adding emission control devices than to go to an alternative "for the foreseeable future." Still, an executive who supervises this refinement at the labs was clearly pained that so much effort must go into tinkering with the standard engine to improve its pollution characteristics. Every year, he said, a new valve or device is added, making the engine more and more complicated, with more and more gadgets to go wrong. "You need a simpler engine, really," he said.

I talked to Herbert Misch, vice president—engineering, of Ford Motor Company, after he had testified at a hearing of the California Air Resources Board in Sacramento. I asked him if Ford thought the best way to meet the public demand for an end to pollution from automobiles was by trying to clean up the IC engine. "Look where we are spending our money—that's the answer to that," he said. "If we didn't think the IC engine was a better bet, we wouldn't be doing that."

Charles Heinen of Chrysler told the

Air Resources Board the same thing. The Chrysler Corporation had developed and tested a gas turbine for cars over an 11-year period, from 1954 to 1966. It proved practical to build, and virtually pollution-free. It rated high with 203 users who tested it under normal driving conditions. But Chrysler decided against marketing it. The cost of the changeover was considered too great, and the chief reward—less poison—not enough to justify the cost.

In sum, the Big Three said, stop worrying; we can clean up our mess with the very engine that made it. True, the IC engine does dump poisons into the air you breathe, but now we will sanitize it by attaching catalytic mufflers to the exhaust pipe to catch the poisons before they can get out.

Technical experts outside the industry are extremely skeptical. They find that anti-emission attachments haven't been living up to their promise, and there's no evidence that they will do so in the future. Since 1967, the National Air Pollution Control Administration (NAPCA) of HEW has been issuing standards for emissions that are supposed to be met by prototypes of vehicles to be marketed by the auto makers. The cars have control devices, put on at a cost of \$50 to each purchaser. Not surprisingly, the prototypes offered to NAPCA for certification have met the standards, which aren't too rigid in any case. But recently NAPCA made tests on 600 Hertz and Avis 1968 cars with mileage ranging from 3,800 to 16,000. Although they had the devices, between 75 and 80 per cent of these cars released more carbon monoxide and hydrocarbons than permitted under the regulations. (Another dangerous component, oxides of nitrogen, is not yet covered by HEW.)

Now it was time for the industry to make its own scientific discovery. You are right, says its spokesman. Our catalytic mufflers do get clogged up after they have been in use for 8,000 to 10,000 miles. But that's because there is lead in the gasoline! If you take the lead

out of gasoline, we can provide our IC engine with an emission control device that will function properly for 50,000 miles!

Early last year, when environmentalists began pressing to take lead out of gas because lead spewed into the atmosphere is a deadly poison, as well as a hindrance to controlling other poisons, the auto manufacturers had stood staunchly beside their allies, the oil companies. They could never agree to move away from lead in gasoline because it would cost the users \$2 billion a year for a gas without lead in it. Lead, they asserted, was put into gasoline originally to increase its octane—or power—rating. The public will never stand for a reduction in power of its automobiles, the industry spokesmen said.

But now the situation is changed. California has adopted standards calling for a drastic reduction in emissions of the three main pollutants by the 1975 model year. Lead, however, is not included. In February, HEW announced it intended to set new standards for 1975 that will be essentially the same as those for California:

Carbon Monoxide	11.0 grams per mile
Hydrocarbons	.5 gram per mile
Oxides of Nitrogen	.9 gram per mile

(An internal combustion engine, uncontrolled, puts out 80 grams of carbon monoxide, 11 grams of hydrocarbons and four grams of nitrogen oxides per mile. In grams, this seems small, but in gross tonnage of poisons, it bulks large. Estimates for Los Angeles, in tons per day are: hydrocarbons, 1,800 tons; carbon monoxide, 10,000 tons; oxides of nitrogen, 570 tons.)

The auto industry executives took a look at the 1975 standards, consulted their technical research people, and decided they could not meet them without removing the lead that clogs control devices. So, to save their technology, they jettisoned the oil industry. "Besides, that gets the monkey off our backs," one auto executive remarked to

a reporter. The oil industry, which would have to revise its technology, understood what was happening. In March, at a hearing of the California Air Resources Board (ARB) to consider removing lead from gasoline, one of its spokesmen remarked that the oil industry was being asked to eliminate lead to accommodate the auto industry. "They have put the onus on the back of the oil industry to give them the time to accomplish what apparently they haven't accomplished today in the area of the catalytic muffler." It's the only way we have to meet your requirements, Detroit's Big Three told the ARB. The board bought the argument, and recommended to the legislature that lead be banned from gasoline by 1977.

The Nixon Administration, apparently, has also bought the argument. It has asked Congress for legislation to set control of additives, such as lead, in gasoline. Now this has a good image with the public. The appearance is: We are getting tough; auto pollution is being solved. But what it does, in essence, is give the industry more time to delay the drastic step that inevitably will be needed: abandonment of its pride and joy of 60 years and the technology and tooling that goes with it.

The 1975 standards mark the best that can be expected of that engine, and yet, when you project the rise in cars at 10 million a year, they are not good enough. Gnawing at the minds of politicians, even those inclined to go along with industry as far as they can, is the feeling that, by the end of the decade, we will have to be doing something else. John Maga, head of the California ARB, while saying that the technology might still be found to get very low emissions from the IC engine, concedes "there will obviously be some point at which they won't be able to meet the standards if they are made increasingly strict."

California air pollution officials, smog projection chart in hand, are already calculating even more rigid standards to be met by 1980; so are air pollution researchers at HEW. But the Nixon Ad-

ministration is not ready to face the issue. The pressures from its constituency aren't strong enough yet. The people most harmed by air pollution—city dwellers who tend to be poorer and blacker than the Silent Majority—are not part of its constituency. However, even some suburbanites are breaking silence to complain about being gassed to death by Detroit.

Such expressions of concern are causing the President to move forward slowly. Last September he and his science adviser, Dr. Lee DuBridge, were saying that obtaining a low-pollution vehicle was a job that would take well into the 1990's to achieve. But recently, as the environment took on more political importance, DuBridge and the Administration said change might have to come about in the '80's. In February, the President included in his message on the environment the proposals to set stricter HEW standards for 1975 cars: require the testing of assembly-line models, rather than prototypes, for compliance with these standards, and authorize HEW to regulate polluting additives in gasoline. He praised the auto industry for developing emission control devices and for preparing "on its own initiative" to put on the market by 1972 automobiles that will not use leaded gasoline.

He then made a bow to the projection that shows pollution rising again by 1980: "I hope that the auto industry's present determined effort to make the IC engine sufficiently pollution-free succeeds. But if it does not, then unless motor vehicles with an alternative, low-pollution power source are available, vehicle-caused pollution will once again begin an inexorable increase."

If that's the case, what should the federal government do? I asked this of a Presidential assistant who helped draft the pollution message. Would President Nixon support setting emission standards so low that the industry would be forced to go to an alternative engine? "I know what the President would say to that—that's absurd," he replied. "We know the

auto manufacturers can't clean up auto pollution without going to an alternative engine, and that they are lying when they say they can clean up the IC engine. And they know we know, and we know they know we know. But we don't think we should tell the industry they have to get rid of the IC engine and go to an alternate source."

Then how are you going to make it happen? I asked him.

"We think the best way to do it is to produce one of these alternate engines publicly. Then if we find it is practical and that we have a perfect engine, we think the public pressure is going to be impossible for the manufacturers to resist, and they will have to start marketing a nonpolluting car."

To carry out this line of reasoning, the President asked funds for an extensive research and development program in unconventional vehicles, to be conducted by public and private agencies over the next five years. He proposed spending \$9 million the first year. He also backed a bill, now passed by the Senate, that would authorize the federal government to offer premium prices for purchasing low-emission vehicles for its own use, thus creating a potential market for cars with unconventional engines. When the Senate Commerce Committee unanimously reported out the bill, introduced by Chairman Warren G. Magnuson (D-Wash.) it commented:

The federal government's policy of adopting national hydrocarbon and carbon monoxide emission standards for automobiles and light trucks is inadequate. Nor will the present industry approach of adding emission-control devices to the internal combustion engine solve the air pollution "epidemic." The best solution is to develop a new propulsion system which produces few pollutants, and which performs at least as well as present propulsion systems.

When I mentioned the Nixon approach to bringing about a change in engines to Nick Petris, he snorted. "I

think this shows the kind of thinking which places danger to the public behind the desire not to offend industry. Now, we've done that too many times. We've had the public pay the bill to repair damage that's been done by some element in private industry." Industry has made its money on a polluting machine, he said, and it should be made to use this money in producing a nonpolluting machine.

Which of course is far from the Nixon thinking, and, for that matter, the thinking of most of those in Congress—Democrats and Republicans alike—who feel constrained to deal with pollution. Congress is concentrating on legislation that falls well short of the Farbstein-Nelson proposal. Senator Edmund S. Muskie (D-Maine), for example, is pressing to extend Section 104 of the 1967 Clean Air Act to increase research and development on emission controls and to authorize HEW to set emission standards for production-line vehicles.

To have any effect in cleaning up the air we breathe, these legislative proposals presuppose effective enforcement of their provisions by the federal government. Smith Griswold thinks this is a forlorn hope. From 1965 to 1967 he served as control chief at HEW's Office for Air Pollution Control, and resigned when he found his program for enforcement of the federal standards was being ignored. "I think HEW has a phony, industry-oriented program from the word go," he said. "The standards are phony, because the federal government doesn't enforce them."

Griswold hoots at auto industry claims for attach-on devices. "On the basis of past performance, with General Motors or any of the others, I think this is so much hot air," he remarks. "If they can't make this relatively low-quality device work, one that doesn't have to meet any severe standards, then how do you expect them to make a device that will work when the standards get tough?"

Expert after expert tells you the same thing—piecemeal, gimmicky half-

measures will fail; what is needed is a new start, with an inherently clean engine.

One engineer planning to develop such an engine is William Lear, the entrepreneur who had a great success in developing the Lear Jet airplane a few years back. He has taken over an abandoned Air Force base outside Reno and set up Lear Motors to try to bring it off. I asked him what he thought about the assertion by auto executives that they could clean up the IC engine.

"Well," Lear said, "I think the nicest thing to say is, that's fantastic." (Later he remarked that "fantastic" was the word he learned in Sunday school to replace the word "bullshit.")

The auto companies know they will ultimately have to go to a different engine, he said. "I think they all will admit, probably not publicly, but secretly, that the gas turbine engine is the ultimate engine they will have to go to. But in the meantime, they have an investment of somewhere around \$5 billion, in know-how, tooling, facilities, and so forth, for manufacturing the IC engine, and come hell or high water, they're going to stay with that engine as long as they can."

They will go to an alternate engine only when they are forced to do it by the government, Lear said. "The government will have to take a very stiff attitude and say 'Believe me, you will not be able to deliver cars unless you make a low-emission car; if you don't, you go out of business.' Now, they won't go out of business. They will then decide to quickly get into gas turbines. And it will take them six years, if they decided today to go into gas turbines, before cars came rolling off the lines."

When I asked Edward Cole what alternatives GM would go to if the government did ban the conventional engine, he said, first, that he didn't think the government would ever do such a thing, because it would not be in the pub-

lic interest—but that if it did happen, "probably down the road the best alternative would be the gas turbine engine." Lear, on the other hand, is betting the government *will* do it, and wants to be there first with a marketable engine when it does. It could be a good race, should the government insist it be run. Both GM and Ford intend to come out next year with gas turbine engines for trucks. Although they say now the engine is not commercially feasible for cars, their experience with the larger engines should bring them within striking distance of the technological capability Chrysler developed while testing out a gas turbine for passenger cars.

Lear first placed his own chips on the steam—or Rankine cycle—engine. He spent several million dollars developing a steam engine for a car to be tested out by the California Highway Patrol, and a larger engine for a bus to be tried out by the city of Oakland. Both experiments are being conducted by the state of California with funds from the U.S. Department of Transportation. In doing this, Lear proved to himself that a steam engine could provide very low emissions, but also that it had too many complications to make it practical in the family car. Now, although he intends to complete the California contracts, he has shifted his plans for the future to the gas turbine.

"The gas turbine is such a simple device," he said. "By comparison with the steam engine or the IC engine, it has about 15 per cent of the parts. It really has only one moving part, and that's the turbine." The advantage of the gas turbine, from an anti-pollution standpoint, is that it is by its nature a clean-burning mechanism that needs no after-thought attachments to its exhausts. The gas turbine burns its fuel—kerosene—evenly in the air, outside the engine. External burning provides much more complete combustion, and fewer emissions, than burning gasoline vapors inside a cylinder. In internal combustion, the exploding gases burn unevenly, and the resulting poisonous residue must be

dumped out of the cylinder and into the air.

Steam and gas turbines have been the chief alternatives considered as the search progresses. They seem to promise the performance the industry has educated the public to demand in its individual transportation: speed, power, acceleration, ability to drive for long periods without refueling, ability to run auxiliary equipment such as heaters, radios, and air conditioners. There are two other alternatives which are talked about but appear to have greater drawbacks: (1) Modifying the present IC engine to burn natural gas. This can be done fairly easily—in fact, it has been done for some gas utility fleet cars and for a number of California state vehicles. Emissions from natural gas are very low. The drawback here is that such cars can drive only 40 to 60 miles on gas cylinders equal to the size of a conventional gas tank. (2) Electric—battery-powered—cars. They have no emissions but, to date, provide very limited range and speed.

Other technical researchers are not yet ready to write off the steam engine as the car engine of the future. It burns its fuel externally, too, and it has been under development by a number of experimenters for a longer period than the gas turbine engine—though not nearly so intensively. After studying various alternatives last year, the staff of the Senate Commerce Committee concluded in a report that “the Rankine cycle (steam) propulsion system is a satisfactory alternative to the present internal combustion engine in terms of performance and a far superior engine in terms of emissions.” It gets better gas mileage using less expensive fuels, the report asserts, and its acceleration, auxiliary operation, and braking characteristics are superior to those of the internal combustion engine. The report, called “The Search for a Low-Emission Vehicle,” criticized HEW for spending most of its research funds on IC engine emission control studies and very little on researching alternatives.

Among all the alternatives, the gas turbine seems to be swinging into the lead as the system closest to being perfected for assembly-line production. William Lear concludes that, once in production, this engine would be cheaper to build than an internal combustion engine including the clean air devices that must now be added to the exhaust side. Developing such an engine would cost about \$25 million, he believes. Retooling to market a million a year, the number necessary to make it economically feasible, would cost about \$300 million, he estimates.

“I think,” he said with a wily smile, “that if the government would underwrite our research and development, it would be the greatest catalyst the government could use to get Detroit off its tail and going.”

There are probably more direct ways to accomplish it. The toughest, but most effective, would be for Congress to set a goal for return to pure air, then decree standards and enforcement to insure that return. Such a standard cannot be met by the present engine with tack-on control devices; therefore, the industry would have to come up with the alternative, nonpolluting power source. The manufacturers could be required to provide such an engine on an increasing percentage of cars produced, reaching 100 per cent by the end of the 1970's. Meantime, the lame duck IC engines being marketed during the phase-out period should be made to meet, through emission-control devices, standards that approach the technological limits of their capabilities.

Federal funds should be provided for assembly-line testing of these vehicles and for states to conduct spot checks of private cars to see that the certified vehicles meet the standards after prolonged use on the highways. Increased research funds should be provided to the National Air Pollution Control Administration to develop alternate engines on its own, as a check on the industry's effort to comply with the tough standards set in the basic legislation.

Is it reasonable to goad Detroit into the change, considering the costs involved, just to make certain the pollution curve will not begin to rise again? That's like asking, "How much is the quality of life worth?" If we look at some industry figures, we may not have to ask the big question.

Chrysler officials, in analyzing why they did not want to go into production of gas turbine cars, estimated it would cost the entire automobile industry \$5 billion to retool all its production lines to produce the gas turbine. The figure looks tremendous until you discover from other industry figures that Detroit normally spends about \$2 billion each time it accomplishes a complete model changeover. Ralph Nader reported to a Congressional committee that GM spent \$250 million to change its advertising signs to read "GM—Mark of Excellence"—yet spent only \$8 million the same year for pollution control research. Still other figures indicate that the industry will charge customers \$2.64 billion over the next five years to install emission-control devices without any guarantee of their effect on air pollution.

Representative Farbstein, in a report on an ad hoc hearing he and other New York Congressmen held on the question, said the costs of changing to an alternative engine are manageable, and could be made even more so if the industry changed over a line at a time. Compared to the cost of cleaning up water pollution, he pointed out, cleaning up air pollution is relatively cheap.

By any logic, the costs of the change would be small compared to the costs to society of continuing or increasing pollution caused by the present engine. Polluted air is estimated to cost the American people \$20 billion annually in clean-up and material repairs. In the Los Angeles area alone, studies show pollution from exhausts is costing \$132 million a year in damage to crops. The money costs of medical bills and days lost from work are difficult to estimate, although guesses put these in the billions. The cost in anguish—from sickness

and premature death—should alone be enough to force a change.

I agree with Lear that change, in this case, will come only through governmental action. And in our free enterprise society, the government itself must be prodded to resist its natural inclinations to ride along with the industrial managers and their money, status, and technological "know-how." It's hard to tell whether the people have become worried enough to make them want to apply the goad. The generation that has arrived at an age of political clout grew up with the idea that the smells from auto exhausts were inevitable. Except when we took in a lung-cutting whiff from a bus we got caught behind, the nuisance seemed tolerable, considering the benefits gained from having our individual transportation. Can the promoters of change whip up the public to take on an industry that provides an Escape Machine for so many? Or will it take a health crisis, with people clearly dying from atmospheric inversions caused by auto exhausts?

If we don't start now to force the change, we are doomed to live, at the end of this decade, in a world of increasingly foul air. With no measures beyond those envisaged for 1975, the amount of poisons in the air will double within the next 30 years.

But suppose we do force a technological change. Won't the dislocations in the auto industry and the oil industry and the garage industry be too much for our economy to bear? Nick Petris has an interesting answer to that:

"People are going to insist on being dislocated when they realize it's a matter of life or death. Who's going to be dislocated—the man who sells IC engines? Even if we adopt a rubber band and wind it up behind the car, he's going to sell it. Now, the service station operator? Okay—he's going to have to do somewhat of a different kind of service. But he'll be alive to do it." ■

(Continued from page 9)

hours in a community health program or on the one who had gotten his name tacked on last in a multiple-author paper on serum enzymes? Did internship committees in 1955 cherish a senior student who had worked summers in a Roxbury youth center or in a steroid chemistry lab? The answer is obvious—most House Officer programs never even considered *asking* about community involvement or interest in treating patients until the late '60's.

Dr. Knowles himself has written, "The 'best' students by the faculty's measure are encouraged to opt for 'straight' internships and residencies in medicine and surgery, followed by varying periods 'doing biologic research' and on to ultimate practice and teaching or full-time academic clinical work in the urban teaching hospital." (*New England Journal of Medicine*—V 80, p. 1271, 1969.) The better hospitals directed their house officers toward research, advanced them on the basis of research, and, if good or abundant research was not forthcoming, consigned them, *faut de mieux*, to practice.

It is particularly puzzling that Dr. Knowles would contest this, since it has been under his leadership that direct patient care has again become respectable among talented young house officers at Massachusetts General and, through its influence, elsewhere.

MICHAEL J. HALBERSTAM
Washington, D.C.

Farm Subsidies

In the process of working to reform our farm program by placing a ceiling on the huge subsidies—running into the millions in some cases—going to a handful of giant corporate farms, I have devoted a good deal of the time to studying this complex subject. I know of no single article which explains it with greater clarity and insight than David Francis's article, "The Remembered Americans: Down on the Farm" [April, 1970].

I was especially pleased that Mr. Francis noted Agriculture Secretary Hardin's own admission that a large percentage of these payments—65 per cent in the case of cotton—are nothing but "income supplements," and are *not* needed for production control. I think it fair, to put it mildly, for all of us to question whether the J.G. Boswell Company of California needed an "income supplement" of \$4,370,657 in 1969 or whether Senator Eastland needed the assist he received of \$178,263.

I am also pleased that Mr. Francis advocated a "low limit on payments—\$5,000 or \$10,000 per crop." When the farm bill reaches the floor

of the House soon, I intend to offer such an amendment at the \$10,000 per crop level. As the author of subsidy ceiling amendments which have twice now passed the House, only to be defeated in the Senate, may I take this opportunity to urge your readers to write their Senators in support of this reform.

SILVIO O.CONTE
Washington, D.C.

Mr. Conte is a Republican member of Congress from the First District, Massachusetts.

Using Tax Refusal Money

Kennett Love's article ["Hell, No—I Won't Pay"] is a valuable discussion of the issues involved with tax refusal. However, for those of us who participate in the Roxbury War Tax Scholarship Fund, a regional tax resistance project focusing on local needs, it leaves out one important aspect. While voting *against* guns, we want to vote *for* butter. If we are going to deny the military establishment, we feel we must place our unpaid taxes at the disposal of some constructive alternative purpose. For us, it is insufficient to simply hold this money in our own personal bank accounts, earning interest until the IRS comes to seize it.

Although there would have been many valuable alternative ways to spend this tax revenue, we have decided to concentrate on this community's particular educational needs. The fund's accounts are maintained in Boston's only black-managed bank, so that while the fund is earning interest for particular educational projects, it is also placed at the disposal of the black community for its own economic development. For all of us involved in this project, tax refusal is a symbolic act; we cannot permanently deny the government our tax revenues. Eventually, the Internal Revenue Service seizes the money; but before this happens, the principal backs loans for the black community and its interest is used to provide educational grants. In the process we lose the interest that the money would have earned and the interest which the Internal Revenue Service charges for late payment. We feel that this is a small cost for being able to make a clear and positive statement of preference for peaceful use of our tax money.

If others find themselves interested in this particular project, inquiries for further information may be sent to the administrator of the fund: Mrs. Edward Webster, 49 Dedham Street, Newton, Massachusetts.

DONALD PATTERSON
Roxbury, Mass.

The Great Helium Bubble

by John H. Rothchild

Helium is a great gas for conventioners, children, and dental patients. It is good for numbing teeth, and in balloons it is wonderful for launching candidates and getting kids to take walks. Such practical, down-to-earth uses make helium one of the inert gases most appreciated outside the laboratories.

Very few people who buy balloons, however, realize that the U.S. government has been conserving helium, at taxpayers' expense, in an underground reservoir near Amarillo, Texas, for use after the year 2000, when present helium sources are supposed to be depleted. This began in 1960 when the Helium Activity, as the office is called, in the Department of the Interior's Bureau of Mines contracted with four companies to provide, over a 22-year period, around 62.5 billion cubic feet of crude helium for underground storage, at a total cost then estimated at \$500 million. Although what was called the "helium conservation program" was launched with some public fanfare, we have lost track of it after 10 years.

The relative obscurity of the helium stockpiling scheme means that most of us are also unaware that the program has become financially crippled and that the assumptions under which it was created are obsolete. We do not know, for instance, that financial blunders com-

mitted at the program's inception have caused it to be economically untenable and that the estimated costs of helium stockpiling have grown from the original \$500 million figure to, according to one Bureau expert, "as much as \$4 billion" over the 22-year period of the contracts. We are unaware that Bureau of Mines studies have questioned whether there is any reason at all to save helium.

Like many small, but costly, government programs, the helium conservation program is isolated from the public that is supposed to benefit from it. We are aware of it now only through the courageous efforts of a few members of the Bureau of Mines staff who were willing to analyze it critically. It was the Bureau of Mines, in fact, that made the convincing case against its own program last September before the mines and mining subcommittee of the House Interior and Insular Affairs Committee. Hollis M. Dole, an Assistant Secretary of the Department of the Interior, told the subcommittee: "In our review, I find that changes have occurred since 1960 which affect its conceptual aspects and our ability to carry out the program." Since those hearings, the results of this self-study by the Bureau have put the helium conservation program into jeopardy. The Nixon Administration has taken \$24 million of the 1971 allocation for stockpiling helium out of the budget, pending results of several further studies.

John H. Rothchild is a free-lance writer based in Washington.