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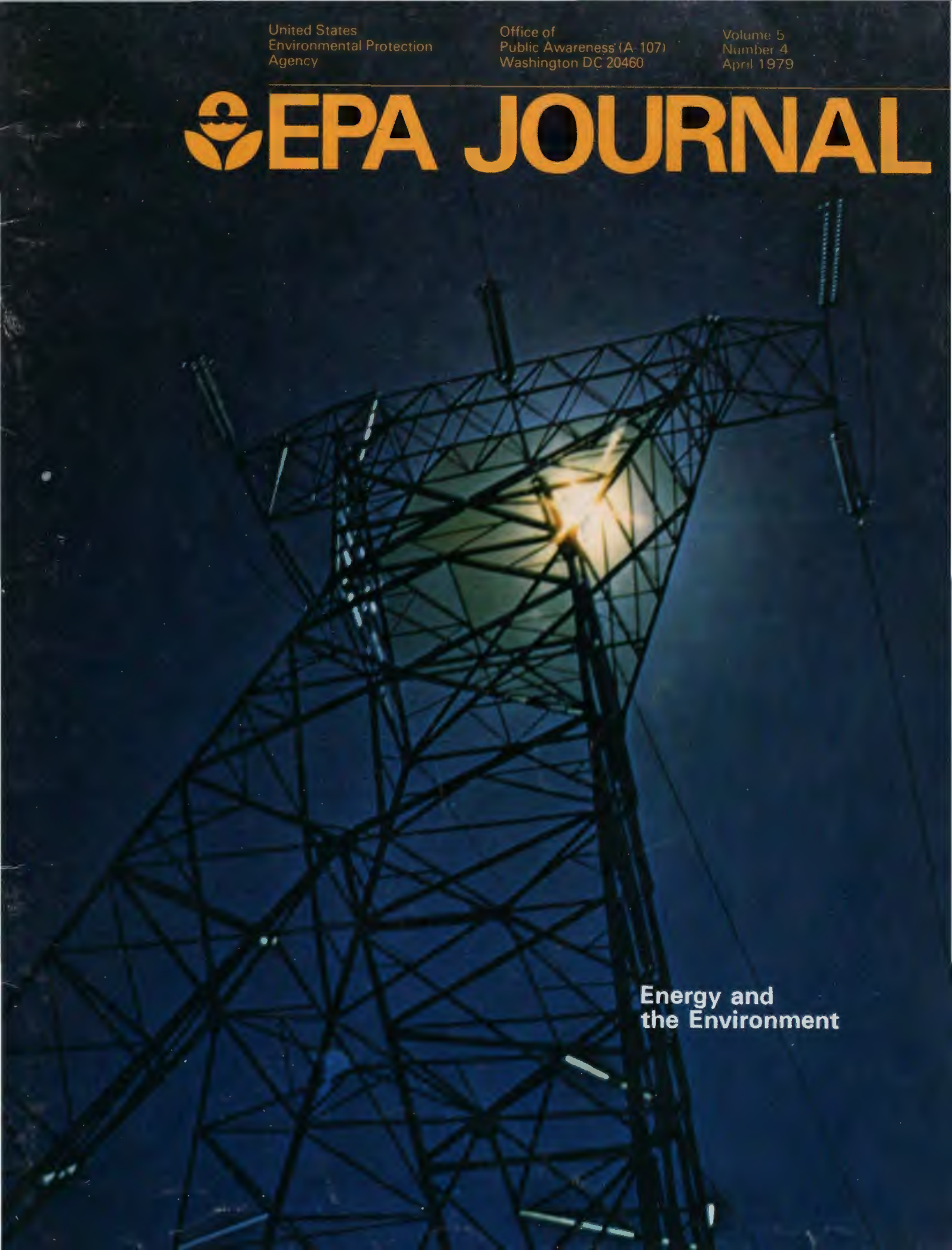

Energy and the Environment

The Search for Clean Energy

Solar power prospects are rising like the sun as seen here from Blythe, Calif.

The potentials and prospects of several types of energy such as oil, gas, coal, wood and tidal and solar power and their impact on the environment are reviewed in this issue of EPA Journal.

Some of the environmental aspects of nuclear power will be reviewed in an article on EPA's radiation program in a later issue.

The importance of conservation of energy is also stressed in an interview by S. David Freeman, chairman of the Tennessee Valley Authority.

Commenting on what he called "just a lot of loose talk that somehow has painted investments in environmental protection as being inflationary and non-productive," Freeman notes:

"It's the unnecessary waste of capital, the waste of gasoline, that is causing us to pay these enormous prices for new energy sources and is inflating the economy. And I think it must be recognized that the strongest weapon we have in the fight against inflation is conservation."

In another article, the Council on Environmental Quality reports that it is possible for the Nation to have a major expansion of its economy by the Year 2 000 while using only 10 to 15 percent more energy than it uses today.

By taking advantage of technology to make energy use more efficient, the Council said, "the United States can do well, indeed prosper, on much less energy than has been commonly supposed."

Deputy Administrator Blum points out in a piece about resource conservation that the equivalent of nearly 400,000 barrels of oil per day could be recovered from our municipal solid waste.

Administrator Costle warns against "Saving Ourselves Broke." He gives several examples of how the installation of relatively inexpensive pollution controls on a timely basis could have saved the public and private companies enormous costs later.

Another article relates the efforts being made by EPA's Region 8 Office covering the Rocky Mountain area to avoid sacrificing environmental values to energy development.

Ruth Clusen, an Assistant Secretary of Energy and former President of the League of Women Voters, explains in an interview the approach being taken by the Department of Energy to protect environmental values.

Other articles include an explanation of why using leaded gas in cars designed for unleaded gas is a bad idea and a report on a major urban conference slated for Detroit this month. □

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EPA is charged by Congress to protect the Nation's land, air and water systems. Under a mandate of national environmental laws focused on air and water quality, solid waste management and the control of toxic substances, pesticides, noise and radiation, the Agency strives to formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life.

Articles

Departments

Cover Photo: Power lines like this one at The Dalles, Ore., carry energy to cities and industries across the Nation. By David Falconer.

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Environmentally Speaking

Saving Ourselves Broke

By Douglas M. Costle
EPA Administrator

Kepone pollution of the James River forced many fishermen to hang up their nets because sales of contaminated fish were banned.

It is rare that I find television commercials helpful in developing a perspective on national problems. But recently I saw one that does seem to apply to a current national debate.

The screen shows us a mechanic grimly surveying two cars. One has been brought in to have its oil-filter changed, a routine bit of maintenance which, not counting labor charges, will run about four dollars. But the other car has been brought in for a drastic engine overhaul, at a cost of several hundred dollars. The reason for the overhaul, the mechanic informs us, is that the owner failed to change his filter.

As the mechanic expresses it, "The choice is yours: you can pay me now . . . or you can pay me later."

That slogan does seem to me pertinent, in one sense, to our current national arguments about the impact of health, safety, and environmental regulations on our economy. We are all concerned—justly so—with the impact of inflation on capital investment, on jobs, on productivity, on the value of our dollar at home, and on its shrinking value abroad.

As you have no doubt noticed, however, a frequent theme in this debate is that it's time to trim our ambitious efforts in the field of environmental, consumer, and other health regulation.

Now, the argument goes, growth in GNP is slowing down; industry should be spending its money on new machine tools, not stack-scrubbers; and we have to liberate free-enterprise from the crushing burden of Federal regulations that add to cost without any compensating benefit.

There is, as a matter of fact, some validity in these assertions. President Carter has recognized the possibilities for waste inherent in Federal regulation, and has directed agency heads to take a hard look at their rules, both the ones that are on the books now, and the ones proposed.

Moreover, in his inflation message last October 24, the President announced creation of the Regulatory Council. The purpose of this is to get Federal agencies together in a single forum to explore instances in which their regulatory efforts duplicate those of other agencies. So far, 35 Federal agencies are taking part in this effort to find cost-effective approaches to common regulatory problems.

As Chairman of this Council, I have a ringside seat at its deliberations, and I can tell you they are already making a difference.

But no matter how much progress we make, the fact remains that in a society as intertwined as ours, characterized by a technology as complex and massive as ours, a substantial amount of regulation is necessary. We have to protect health, safety, and environmental integrity in situations where such protection exceeds the jurisdiction or self-interest of any corporation. If, in the name of combating inflation, we reduce or postpone governmental control of potentially harmful activities now, we may produce vastly greater costs and inflation later.

Take, for example, the well-known case of the Love Canal in Niagara Falls, N.Y. Originally intended to provide hydroelectric power for new homes in a "dream" community, this three-block-long ditch was converted to a dumpsite in the 1920's. After roughly 30 years of use, it was covered over by the Hooker Chemical Com-

pany and sold to the city for a dollar. In the late 1950's, as homes were built around the site, a school was built on top of it.

So far, New York State has spent $23 million on cleaning up Love Canal. That expense includes evacuating 239 families, purchasing their homes, performing medical tests on the former residents, installing drainage pipes, and personnel costs for a task force of State employees. Claims against the chemical company are reported to exceed $2 billion. Even these dollar-sums exclude costs which we have no way of measuring; the lifelong agony, for example, to one girl born with a cleft palate, an extra row of teeth, and slight mental retardation.

Perhaps the most appalling fact of all is this: had the proper government regulation been in force at the time, it would have cost Hooker Chemical a maximum of $4 million—that's in current, 1979 dollars—to find, construct, and seal a secure, hazardous waste facility. Instead, the public has already spent $23 million, and the ultimate cost to former Love Canal residents and to the company is beyond credible calculation.

A few weeks ago, a trucker and his two sons were convicted in Raleigh of dumping PCB's along roadsides in North Carolina. Handling that waste properly would have cost about $100,000. Unless a simpler, equally safe method can be devised, that contaminated soil will have to be dug up and shipped to a secure site, at a cost of $2 to $12 million.

Similarly, an investment of about $200,000 at the Life Sciences plant in Hopewell, Virginia, would have made it safe for the production of Kepone. The owners' failure to make that expenditure led to the contamination of workers, the Hopewell water-treatment system, and the James River. To date, known judgments against Life Sciences total $12 million; damages awarded workers claiming nerve damage and sterility are unknown, because some are still pending and others have been settled out of court. EPA estimates that it would cost $8 billion to clean up the James—*if* that can be done, ever.

Each of these examples—and I could cite a dozen others—presents us with a case in which enormous social costs stemmed from the lack of environmental regulation, or from the violation of laws that were in effect. And these cost comparisons do not even include the costs of the damages—the damages that have actually occurred to life, health, and property—that occurred because we were penny-wise.

Now that economists have been asked to look for figures, they are beginning to find that health, safety, and environmental regulations have a sound economic base. To place such benefits on a more human scale, consider these examples cited by Dr. Stewart Lee, Chairman of the Department of Economics at Geneva College, in a January 31 letter to the *New York Times:*

- In the regulated products groups, safety packaging requirements have produced a 40 percent drop in ingestion of poisons by children over a four-year period. There are children who would not be alive today but for those regulations.

- Since the safety standard for cribs became effective in 1974, crib deaths by strangulation have fallen by half, and injuries by 45 percent.

- According to the General Accounting Office, 28,000 lives were saved between 1966 and 1974 because of Federal motor vehicles safety regulations. The same GAO report showed that in one State where a detailed analysis was conducted, there was also a substantial reduction in the frequency and severity of injuries. With auto accidents the number one cause of paraplegia in the United States, these figures are significant.

Dr. Lee closes his letter by remarking, "Government regulations are not all bad or all good. We need to be selective if government regulations are to benefit the general public."

That seems to me a fair statement of the case. We know there are regulations that are outdated, and suspect that others should not have been written in the first place. We are trying to get both types off the books, and to ensure that others justify in benefits the costs that they impose—as best we can make that judgment given our current state of knowledge.

What we do not need, however, is a regulatory witchhunt, for in the interest of reducing costs today, we may create nightmares for ourselves tomorrow—and have to pay a much higher price to recover from them. Out of a misguided sense of thrift, we can "save" ourselves broke.

For decades, as an airline ad of some years back expressed it, we have been a "Go now, pay later" society. As an expression of the credit system, pure and simple, this principle—based ultimately on faith in ourselves—has not served us badly. But when the principle is extended beyond the purely fiscal realm to the broadly social—when it becomes a state of mind—the associated debt can guide us into national bankruptcy. Little by little, year by year, we can defer payment on our current obligations until—when the bill finally comes due—we find we don't have enough assets to pay it.

Our health, safety, and environmental regulations have begun to reverse this process. We are beginning to redress our past profligacy in treating our air, water, and land as goods without limit. We have made a start toward cleaning up the dirt and damage caused by a generation-long vacation financed only by an I.O.U. drawn on the future.

That future has arrived. That I.O.U. has been presented. The vacation is over.

I will do my best, as head of EPA and the Regulatory Council, to make sure that every regulation pays its own way in terms of avoiding risk and providing benefit.

But I will also do my best to prevent a short-sighted, uninformed, intellectually anemic alarm over the immediate costs of regulation from reversing the repair work we have begun on our national home. As the man says, the choice is up to us: we can pay for that work now . . . or we can pay for it later.

We have made the right choice. Let's pay now. □

Clean Energy from the Tides

By Truman Temple

The ever-rising cost of fuel around the globe has prompted the United States, along with several other countries, to take a renewed look at a very old and reliable source of energy: the ocean's tides.

The U.S. Army Corps of Engineers has launched a three-year study of how to generate electricity from the giant tides at Passamaquoddy Bay in the Bay of Fundy at the northeast corner of Maine. The $3 million study, which has the backing of Senator Edmund Muskie (D-Maine), has revived a dream of tidal-generated electricity dating back nearly six decades in the State. At the same time, the Canadian government is showing increased interest in developing power from its own side of the Bay of Fundy. An obvious advantage of tidal plants over fossil fuel stations, of course, is that they generate no air pollution.

The French already are demonstrating that a full scale, commercial tidal plant is feasible. Their 240,000 kilowatt facility on the Rance River in Brittany near St. Malo not only has been successfully generating electricity for a dozen years, but its unique machinery has been remarkably free of the wear-and-tear expected in salt water conditions.

Other countries also investing in tidal power plants include the Soviet Union, which has built a 400-kilowatt experimental plant at Kislaya Inlet on the Barents Sea north of Murmansk, and the People's Republic of China, which has planned or built some 122 very small tidal plants with a total capacity of about 7,600 kilowatts, according to a report by the Energy Research and Development Administration.

Exploiting the force of the tides for commercial purposes actually is a very old practice. As long ago as 1066 A.D. an ingenious businessman in Dover, England built and operated a crude tidal mill to grind grain. Similar mills were constructed in France and Spain in the Middle Ages, and an enterprising Yankee, Captain William Traske, was recorded as operating a "tyde mill" to grind corn near the mouth of the North River in Salem, Mass., in 1640.

The idea for harnessing the powerful tides of Fundy to generate electricity emerged in 1919 when a Boston engineer named Dexter P. Cooper, who vacationed on Campobello Island, drew up a plan to convert the energy using dams and sluiceways. His idea attracted immediate attention since the Bay of Fundy has the greatest tidal range in the world, rising as much as 53 feet twice a day. Franklin Roosevelt was a friend of Cooper's and backed the idea, persuading the General Electric Company to make a preliminary survey.

In the 1930's President Roosevelt allocated $7 million to begin development of the project in nearby Cobscook Bay, an arm of the Bay of Fundy. Some engineering surveys were made, roads and a model village constructed, but the work fell victim to economy measures in Congress.

However, the idea refused to die. Congress in 1956 called for an International Joint Commission study of a U.S.-Canada Passamaquoddy project, and it was submitted in 1961. President Kennedy asked the Interior Department to review it, and in 1963 the Department found the idea feasible and recommended a combined tidal and conventional river hydroelectric project. (Since tides can only generate power intermittently, engineers generally envision feeding the power into a grid or other steady power arrangement on a supplementary basis.) Again the idea ran into economic objections since large coal or oil burning power stations still could do the job cheaper.

But then came the Arab oil crisis of the early 1970's and the seemingly endless series of petroleum price hikes by OPEC. Suddenly the arguments against tidal electricity didn't seem so powerful.

As one Canadian official put it, "Tidal power is as nearly inflation proof as anything can be."

Although the Canadians have blown as hot and cold on the idea as Congress during the past forty years, they now have begun taking it seriously again. The Tidal Power Review Board has recommended consideration of a huge 1,085,000 kilowatt tidal plant in the Cumberland Basin of Nova Scotia, a northern arm of Fundy, to be built at an estimated cost of about $3 billion.

Developments in the Middle East are exerting a powerful influence on the whole subject. An ERDA study has estimated that total fuel savings for the Cobscook Bay tidal power facility would be equivalent over a 50 year period to about 48 million barrels of oil.

In the meantime, engineers have the successful, working commercial tidal power facility in France where they can gather valuable data on costs and other matters. Specialists from all over the world have studied the Rance River project. One of its outstanding features, a bulb-shaped generator and pump that can operate with the water flowing in either direction, is being considered for use in this country. Some 200,000 persons visit Rance every year and the site has become a tourist attraction as well as a useful component in the country's power grid.

Although there are various designs and arrangements, the Rance project basically uses both incoming and outgoing tides to spin blades and thereby generate power from a dam. In addition, extra water is pumped above the dam so that electric power can be generated for a longer period on the outgoing tide.

Truman Temple is Associate Editor of EPA Journal.

The Rance project gives off no smoke, no sulfur oxides, no soot. The air around it is clean. The water has no problem with thermal pollution. Maintenance is minimal. Even the profile of the dam is low, compared to the Western dams in the United States that soar up to 700 feet.

Those are the kind of environmental benefits on the plus side of the ledger. On the minus side, some observers worry about how Passamaquoddy might disrupt marine life off the coast of Maine. There are no final answers to that yet, but so far the French have not found Rance to be a serious impediment to marine ecology. In any event, part of the Corps of Engineers study now under way at 'Quoddy', by Congressional order will focus on the environmental impact of a tidal power plant there. □

Maine Tidal Power Project

At high tide waters would flow in the direction of the arrows on this map, through filling gates and power houses and then into Passamaquoddy Bay and back into the sea.

Low tide leaves these wharves jutting far out of the water near Lubec, Me. The steep rise and fall of the tides in this area may someday provide electrical energy for New England. Shrouded in fog in the background is International Bridge.

The Competing Demands of the Three E's

An interview with Ruth C. Clusen

Assistant Secretary for Environment, U.S. Department of Energy

Ruth C. Clusen is no stranger to the environmental field. Before assuming office as Assistant Secretary for Environment in the U.S. Department of Energy, she was President of the League of Women Voters 1974-78, and from 1966-74 served the League in many other capacities including chairperson of its Environmental Quality Committee.

In a recent speech, you mentioned that the Department of Energy in the last fiscal year has spent about $300 million for environmental controls. Could you describe what that included?

We spend money on demonstration and research to find ways to mitigate various environmental problems.

The largest proportion of it is for research to see if, either in the governmental world or in industry, any kind of controls exist. Sometimes this is hardware, which can be put onto a process to make it less harmful. Some good examples are catalytic converters on cars and precipitators on smokestacks. We're dealing now with some very new technologies.

With the turn back to coal, for instance, we're experimenting with fluidized bed combustion, which would, of course, produce energy. But also it is a process that is environmentally more benign than combustion methods generally in use.

Are there any other examples?

We have to look at every possible kind of new technology that's down the road, almost no matter how far, and try to assess it. I know that many of the things we look at are also being looked at by EPA and by our research and development people at the same time.

We have an interest now in oil shale, because of the potential it offers for energy. We also know that it has considerable environmental problems. So we're looking at questions such as: Are there different ways to do the job? Are there any process changes? Is there hardware which could be developed? Are there certain kinds of safeguards that would make it possible for it to be less environmentally harmful?

We are looking very hard, as is EPA, at the emissions from diesel engines, because diesels offer a great possibility for fuel conservation. But we also know that there are some real problems about what comes out of the tailpipe.

You served a number of years with the EPA Technical Advisory Group on Wastewater Treatment, did you not?

Yes. At the time I first started, it was the management group on construction grants for water projects. And when I left, it had metamorphosed into an EPA overall kind of management group.

Was that experience helpful to you as background for your present duties, such as understanding the oil shale environmental problems?

Yes, I think so. Water has been the field of the environment about which I have learned the most over the years, and with which I have had the most direct contact. I think the involvement with EPA's technical advisory group gave me a rather lengthy experience in dealing with engineers, their terminology, and their ways of working. And it gave me a great appreciation, too, for the difficulties in applying the regulations which we—I was then in the outside world—were sometimes so eager to have adopted.

Water is a part of our energy problems, as you say in reference to oil shale. Oil shale has other problems. But the basic one is water.

How is the process going to create pollution?

There's the possibility of leaching into the ground water supply. And also of course there's always the possibility, if it's near an aquifer, of drilling into the aquifer during operations. It has some other problems also.

You've commented that the average American citizen uses about twice as much energy as the average Briton, and three times as much as the average Frenchman, and up to 100 times as much as a resident of a developing nation. Are there any ways we can, as Americans, help to reduce this waste of fuel, and can you describe the environmental implications?

The Department of Energy has again asked people to engage in voluntary conservation because we feel under some pressure from the conditions in Iran, and the shutoff of oil from there. We must constantly reiterate the possibilities of voluntary conservation.

I think that we have to be reminded every winter about fuel conservation because we're very forgetful of it. As everyone knows, the driving season lasted a long time last year because of climate conditions in a lot of the country, and this gave us some problems in regard to gasoline.

It's all the usual things: turning down the thermostat, driving at 55, the need to carpool, and many other measures that we're just extremely forgetful about. It's impossible not to notice the very wasteful way in which we leave buildings lighted at night. You can see it any part of the country, but probably more so in Washington.

We have not really even scratched the surface as far as voluntary conservation is concerned. And it seems to have kind of a ripple effect. When it's very cold, for example, people sense there may be a fuel shortage and they make a real effort. But we are not a Nation that is inclined to be conservative from the standpoint of energy, whereas this is an ethic that many Europeans grew up with.

The Department of Energy has to prepare an environmental impact statement in connection with its second national energy plan, which is probably occupying most of your thoughts these days. It sounded like an enormous task. Do you think you can do a comprehensive statement at this time?

I think we can. Indeed, I think we must. We have been at it for some months, doing pieces of it, as far as various technologies are concerned.

Can you give a broad brush description of what general topics this plan is going to deal with?

Of course, you must understand that any of these things can change, because as the fuel situation and the international situation shift, that can alter the format.

Possibly there will be proposed, for instance, such things as oil shale tax credits; and we are doing an environmental impact statement on that.

We know that there's interest on the part of the Administration in pressing further and stronger use of solar energy in every conceivable way. We think that there are hopeful trends in some of the other new technologies, like improved ways of recovering oil and gas from the ground and similar processes.

There will be, I think, about a half a dozen of those kinds of things, which are not new, but which we think need a larger push. There has not been sufficient comprehension of our interest in them in the past. It will make references to these things I've mentioned.

There also will be continued emphasis on conservation.

EPA recently proposed some hazardous substances regulations. Has your office had any input into that or into any other regulations that EPA is working with?

We have an ongoing relationship, in fact, with EPA through this office at the staff level, and at my level too, on any number of subjects, including many kinds of regulations. The Office of Environment at DOE and EPA are really joined, to a major degree, in the same mission. We have a great deal in common. We worked closely, in the process of the public comment period, on such matters as the strip mining regulations. We have worked on new source performance standards, to the extent possible.

We have some working groups and staff relationships on the matter of toxic and hazardous wastes. And I think it would be almost impossible to name an area in which there is an energy involvement that a day has gone by without someone here being in contact with somebody over there at EPA. It's a continuing working arrangement. We are, for instance, in the process now of developing together a fact book on diesel emissions because we both have the same data, the same information.

In the case of new source performance standards— before we held the last round of hearings through my office on that—we worked with EPA, and together developed the paper that was the data base for those hearings. So it's a constant relationship.

EPA and DOE have quite different missions and because of that, it occurred to us you might have a little friction—a little problem. Is that true?

We recognize and respect the fact that the agencies have different missions. However, the mission of the Office of Environment, within the Department of Energy, is to balance the competing demands of the Three E's—energy, the economy, and the environment. But while the mission of DOE is to develop energy, the mission of the Office of Environment, which is clearly stated in the energy organization, is to do this in the least harmful way, environmentally, and indeed to see that the technologies which we use are not only not harmful, but enhance the environment.

So I think that if there are conflicts between DOE and EPA, I'm not a party to them, because my relationship with them is entirely a cooperative one. Once in a while, we cannot go as far on something, because we are forced by the nature of the role of this office to balance economic and energy demands as well. But we're generally moving in the same direction.

How does it feel to be on the other side of the fence now?

It's a very interesting experience. I've been an outside activist for most of my adult life, and now I'm on the inside. And my relationship with outside groups now is rather interesting, too. They're still my friends. I have invited a broad range of groups to meetings with me and to see me on a regular basis, and tried to involve them to the fullest extent of public participation in the decision-making process. I think that one's perceptions are quite different when you're inside, but I have not forgotten the things that I thought about and wondered about when I was outside of government. And to some extent I think this has been helpful. I'm still close enough to not being in government to know the kinds of things that outsiders want to know—to know that we in government are sometimes viewed as incredibly slow, unresponsive, and apathetic, unconcerned at times. And to the extent that I can, I try to remedy this by being as open and frank as possible with outside groups about what the situation is, to the degree that their concerns can be taken into consideration realistically.

On the other hand, I have been surprised and pleased by the fact that I have found so many really good, competent, hardworking people in the Office of Environment. I've been extremely pleased with the professional expertise and the dedication of the staff, and the hard-work ethic which certainly abounds here.

I certainly am getting a better understanding of government, and of the fact that it is not always so easy over here, and that there are sometimes things which you cannot control. But on the other hand, I want to keep the perception that public participation is important, a necessity, and that I must always operate in the most open and accessible way possible.

Do you think the Nation can manage its energy problems, and still continue its present commitment to environmental controls?

I think we have to. I don't think that the people in this country want to turn back the clock 20 years to when we first began to have some glimmerings that we had environmental problems. I think there may be degrees of it. I can see how there might have to be a temporary pullback in some cases. But I have not seen any indication that people want just to throw over environmental controls and go back to being the wasteful kind of society we were in that respect.

In fact, there have been several recent polls bearing that out. Just last fall, I saw one from Harris, for instance, which clearly pointed out that Americans have not turned their backs on environmental concerns, in spite of the economic crunch and in spite of energy problems.

I think it's going to cost us more, both economically and in lifestyle, to do both, but it can be done with a will. And fortunately, at this point, I think we're still proving that not only do we want to stay where we are from an environmental point of view, but thanks to your Agency also, there are signs that we may even be moving ahead. □

A Great Adventure

"Solar Energy—The Great Adventure" is the title of a new film about ways to capture the most powerful source of energy available.

The movie about solar power was produced by the Consumer Affairs Office in the Department of Energy. EPA's Office of Public Awareness, which recognized the pollution abatement potential in the types of small-scale, solar-related technologies shown in the film, is a co-sponsor of the motion picture and is contributing $15,000 for the production and distribution.

Another co-sponsor is the Defense Department's Defense Civil Preparedness Agency, which views decentralized energy systems as a way to help protect our society against disruption by major natural or man-caused disasters.

Narrator for the film is Eddie Albert, stage, motion picture, and television actor. In the movie, Albert talks about eight individuals who are using innovative approaches to capture solar energy. He introduces these pioneers and then they display and explain their individual projects.

These eight innovators selected by the Department of Energy for the movie were among more than 3,000 participants in public hearings nationwide last year. The hearings were part of the Domestic Policy Review of solar energy options called for on Sun Day, 1978, by President Carter.

A variety of solar-using techniques are shown in this film by the solar pioneers who live in locations across the country.

The solar innovators and their projects are:

Valerie Pope, The Community Development Corporation, San Bernardino, Calif. Helped in part by State and Federal funds, Ms. Pope directs a minority community-based effort to "bring solar power to the people" and, in so doing, significantly reduce their utility bills. Local people do it themselves, from the design and construction of solar collectors to the actual installation of the systems in housing for low-income and handicapped citizens.

Bjorn Lunde, Micro-environment Research Group, Seattle, Wash. This group of young men and women is concentrating on projects to educate children and young adults about energy alternatives. Working in their spare time and without Federal funding, the group is renovating a 200-foot barge, called the "Heli-Arc," into a small-scale solar technologies demonstration facility.

Ted Finch, The Energy Task Force, New York City. This is an energy self-help project operating in the heart of the metropolis, by and for low-income minority groups and individuals. Solar collectors, windmills, organic gardens on vacant lots in the midst of burned-out buildings—all are part of this drive by center-city residents to survive economically in the face of ever-increasing energy costs. The project has been supported, in part, by both municipal and Federal funds.

Gardiner Greene, Dynergy, Inc., Laconia, N.H. A successful businessman in other ventures, Mr. Greene has turned his talents to the commercial development of a vertical-axis windmill. His wind turbines can generate electricity, pump water, and produce heat.

Ted Landers, The New Life Farm, Inc., Drury, Mo. Landers, an engineer from an urban background, now directs the activities of a rural community-based, non-profit research and educational group. The New Life Farm, assisted by a Federal grant from the Community Services Administration, sponsors projects wherein homeowners and farmers learn by doing. They build and install passive solar heating systems, biomass digesters for methane gas production, windmills, and other energy projects. Located in the rolling foothills of the Missouri Ozarks, the New Life Farm offers a method of energy self-sufficiency for the people of the region.

Rudy Gunnerman, Woodex, Inc., Eugene, Ore. Gunnerman set up his profitable business where the largest supply of raw materials in his area (forest wastes) could readily be obtained. The concentrated wood pellets made by the firm burn cleaner than coal. Gunnerman estimates that, if most of the forest wastes in the U.S. could be harvested and processed for fuel, the energy equivalent would surpass that represented by all the oil now being imported into the country.

Jim Piper, Piper Hydro Solar Systems, Anaheim, Calif. Inventor of a hydronics solar system for water and space heating, Piper has produced, without government assistance, a sophisticated and commercially viable technology which is being used with good results around the U.S. and in a number of foreign countries. The hydronics system is hot water partially heated by solar energy.

Peter Sardagna, San Diego Federal Savings and Loan Association, Calif. A Vice President of this major financial institution, Sardagna is an expert in the financing of solar-related energy technologies. He is concerned about public apathy toward the solar alternative, but sees hope for the future in better public education, the inevitable rise in prices for unsubsidized fossil and nuclear fuels, and in top-quality solar energy equipment that works dependably.

The movie was released Jan. 24 as part of a special event at the home of Energy Secretary James Schlesinger. The event was sponsored by Mrs. Rachel Schlesinger, working with ACT 79, a coalition of appropriate technology and environmental groups. ("Appropriate technology" is decentralized, often labor intensive, and is affordable for those who will use it. It also encourages self reliance.)

To produce the picture within its stringent time table, two film crews worked simultaneously across the country, with locations from New Hampshire to San Diego, Calif. Editing called for a blending of footage from both the East and the West Coasts, with the final version featuring elaborate sun sequences and special effects. □

(Prints of "Solar Energy—The Great Adventure" will be for sale at $162.50 per copy. through the National Audiovisual Center, GSA Reference Section—FF, Washington, D.C. 20409 (phone: 301-763-1896). Free loan copies will be available through the Energy Film Library, U. S. Department of Energy, P. O. Box 62, Oak Ridge, Tenn. 37830 (phone: 615-483-8611, ext. 34161).)

Wind, Sun and City

A group of designers and educators is finding a way to produce clean, cheaper energy while upgrading some rundown New York City neighborhoods. It is called urban appropriate technology.

This approach is bringing nature to the city in new ways, using the rooftops and upper parts of buildings to tap solar and wind power. The aim is to produce more affordable housing through reduced energy operating costs.

Why the inner city, hard hit by poverty and decay? "Urban poor people are in the greatest need," says Ted Finch, wind and solar energy designer with the group, the Energy Task Force. "They already spend over 25 percent of their income on energy."

Cut this big bill for energy, and urban housing becomes more affordable, Finch points out. Make housing more affordable, and there is a better chance for more livable, workable urban neighborhoods.

This Task Force strategy serves two key national aims: Cheaper energy relying more on renewable sources; and a decent environment protecting both natural resources and the quality of human life.

The Energy Task Force works through technical advice and education, serving mostly self-help housing cooperatives. The Task Force is made up of 11 full-time and three part-time architects, engineers, educators, outreach and management personnel. The cooperatives are made up of individuals working to gain housing shares through "sweat equity," the work they put into the project.

The three-year old Task Force won wide recognition in November, 1976, when a wind generator it designed was challenged by the area electric utility, Consolidated Edison, on grounds it would create a number of potential problems. The utility later reversed its position. The Task Force's work is included in a recent film, "Solar Energy—The Great Adventure."

An apartment building at 519 East 11th Street in the Bronx is an example of the group's approach. A solar hot water system has been installed. A wind energy conversion system supplies household electric energy needs. The building has been weatherized with insulation, caulking, and storm windows, an energy conservation step to reduce operating expenses.

Rehabilitation worker is silhouetted against New York City skyline that features a windmill and rows of solar panels.

Full-scale weatherization installed at an apartment building on East Fourth Street is projected to bring 60-70 percent savings over normal fuel oil bills, Finch says.

The energy specialist believes these technologies are "appropriate" to inner cities as they try to restore themselves. The energy systems are decentralized, relying on fuel sources at the site—sun and wind—and encouraging a sense of neighborhood, house by house, block by block. They are labor-intensive, providing jobs where they are desperately needed. They pollute less than large energy systems burning nonrenewable fuels. They provide an alternative to fuels such as gas, coal, oil, and nuclear.

Such measures are "very supportive of a more humane and controllable urban environment, and New York City's strength is in its communities," says Finch.

The Task Force has been serving about 10 community self-help groups at any one time, without charge, Finch says. The energy group is making "outreach" educational presentations to groups all around New York City, and has distributed more than 10,000 manuals on Task Force work, Finch says.

The overall goal, Finch adds, is "to create some viable demonstration and education programs here in New York. People can take the ramifications and implications. We're not going to other cities to set up programs."

The Task Force is "visionary," Finch said. But "I'd like to think we're trying to make our dreams more pragmatic." As examples, he says the Task Force in its three years has moved to more cost-effective wind demonstration systems and to simple solar air heaters 3 to 4 times more cost effective than the group's first solar hot water heating system.

The group has been largely supported by a $320,000 grant from the Community Services Administration over the past two years. But with cutbacks in the Federal agency's energy budget, the Task Force's survival chances are threatened, Finch says. The group is now trying to launch such projects as the first commercial urban wind energy generating system in the country. □

City Care

(EPA, the Department of the Interior, the Department of Agriculture, the Department of Housing and Urban Development and several urban, labor, and environmental groups are sponsoring a major conference on the urban environment at the Radisson-Cadillac Hotel in Detroit this month. The following article was excerpted from a story about the meeting, which appeared in the Sierra Club's magazine, *Sierra*. It reflects the effort being made to forge an alliance between environmentalists and urban interests.)

The Sierra Club will join the National Urban League, the Urban Environment Conference and Foundation and several Federal agencies in sponsoring "City Care," a major national conference on the urban environment to be held in Detroit, April 8 through 11, 1979. Other environmental organizations are also being asked to join the list of cosponsors. From 800 to 1000 grass-roots environmental and urban activists will gather to formulate a battle plan and to forge a new alliance—the first stages of an active campaign against urban pollution.

In sponsoring this conference, the Sierra Club is not setting out in a new or unfamiliar direction. Environmentalists have long been active in such issues, and the Club's goals will remain environmental—green areas, clean air, clean water, safe energy, proper land use. The traditional supporters of conservation will not be enough for the large, but necessary task of making our cities livable. Environmentalists need new allies, new friends. The Sierra Club will seek the active cooperation of city residents, labor unions, businesses, and minorities.

This new, even unique, coalition shares broad goals. But different members will undoubtedly use their expertise and involvement in different ways, and some disagreements may be inevitable. As Vernon Jordan, president of the National Urban League, put it, "There may be situations where blacks and whites violently disagree, but if the air isn't pure, it may not make any difference." The Sierra Club will stress, in its own efforts, the preservation and improvement of the environment.

In a way, wilderness issues are also involved in this urban environmental conference. Arguments against wilderness preservation are often presented in terms of adverse effects on cities. For instance, some timber companies argue that establishing wilderness area deprives the Nation of lumber needed to create housing and construction jobs in cities. But by approaching urban problems directly, we will be better able to protect wilderness. Wilderness needs an urban constituency; this conference may help to expand it. Even now, virtually all the votes in Congress for Alaska and wilderness are cast by representatives from cities.

"City Care" will be a working, practical conference—more of a town meeting than a series of speeches by high officials. The stars of the conference will be the grass-roots activists; the purpose is to enable local environmentalists from all over the Nation to develop coalitions with other groups involved in urban matters.

"City Care" will focus on specifics on success stories and local victories. Participants will pool their tactics and resources in what could become a national network for urban activists. To accomplish this, the conference will feature an unusual format. Each person will be assigned to a core group of approximately 30 members for the duration. Each group will reflect diverse issue and regional affiliations. As "melting pots," they will facilitate individual interaction, often a difficult task at a large conference.

During the conference each participant may attend five workshops, divided into two broad categories. Some will deal with the individual's relationship to the immediate neighborhood and community. Other workshops will deal with the interaction between the individual and the overall city and region.

The skills required for problem-solving on these two levels—neighborhood and region—differ markedly. The neighborhood/community workshops will be held in Detroit neighborhoods, where brief walking tours and structured field meetings will show participants the actual results of grass-roots action.

Each workshop will examine three aspects of specific issues: a general overview of the "what" and "why" of the subject area; successful and unsuccessful efforts that have been made to solve specific problems; and ways to acquire the skills, contacts and resources needed for solving these problems.

The following topics have been tentatively proposed for workshops.

- How to accomplish neighborhood revitalization and environmental improvement without displacement
- Community recycling of vacant lands: urban gardening, forestry, and neighborhood parks
- Fostering neighborhood environmental jobs and the economy
- Preventing environmental disease through community health care
- New neighborhoods in urban areas
- How to safeguard health in the workplace and in the home
- Using pollution control legislation to protect health
- The sanitation crisis: energy, health, and jobs
- Healthy, affordable energy supplies for cities
- Maintaining vital urban services to promote development
- Who owns the parks? Matching facilities planning, access, and transportation with recreational needs
- Regional migration and balancing national development
- Urban reinvestment and bringing people downtown
- Improving urban environments through zoning.

Last year, at the Sierra Club's annual banquet, EPA Deputy Administrator (and former Sierra Club activist) Barbara Blum told Club leaders, "It's time to recognize that there in no place to hide. It's time for *all* urban residents, inner-city and suburban, to acknowledge that they share a common destiny. And it's time for the environmental movement to forge a new urban vision and make a sustained commitment to create a healthy urban environment." □

Resource Conservation

By Barbara Blum
EPA Deputy Administrator

Excerpts from remarks by Deputy Administrator Blum at the Brookings Institution in Washington, D.C., Jan. 17.

We know that our cities consume a disproportionate share of the world's resources and at the same time create a disproportionate share of solid waste which we bury at higher and higher economic and environmental costs.

Yet we recover only one percent of the energy potential of municipal solid waste. Denmark recovers sixty percent. We ought to bear in mind that our energy recovery potential from our municipal solid waste is equivalent to 400,000 barrels of oil per day or one-third the present flow of the Alaskan pipeline.

Currently, the national tab for municipal solid waste collection and disposal is running in excess of *$6 billion a year*. And as we are also becoming painfully aware this cost is far from the end of what is only a small part of our national waste problem.

As recently as 1974, EPA warned of the potential contamination of underground drinking water supplies from municipal disposal practices. Then we had few cases to report. But by last August, incidents of ground water contamination had been reported in nearly all States.

In American cities solid waste disposal has become the number one political battleground and an increasingly contentious budget item.

In looking at different urban societies, I have been forced to question whether or not our own American institutional separation of urban energy generation by public utilities and of waste disposal by municipalities still makes economic or social sense.

In Denmark and in the Netherlands integration of municipal resource recovery with municipal power generation has created about 50% more energy efficiency than we have in the United States.

There is another low-cost option that will facilitate the transition to resource recovery in this country. That is to make grants to competing municipalities to help them figure out how to switch from solid waste disposal to resource recovery in the way best suited to their individual community needs.

As you may know, EPA, as one part of its contribution to the President's National Urban Policy, requested and received from Congress $15 million for Fiscal Year 1979 for about 40 such competitive grants. Two hundred applications have been received from communities both large and small in every part of the country. We have requested a similar level of funding for Fiscal Year 1980 and 1981.

The 40 or so resource recovery planning grants that EPA will award this year will allow a variety of municipalities to really think through the institutional and market relationships necessary for success. In addition, these pioneer systems will provide detailed models for hundreds of other municipalities to follow. And as the Resource Conservation and Recovery Act mandates, EPA will continue to disseminate information on what works under what kind of circumstances.

These planning grants are essential. While cities may well be eager to make the transition from disposal to resource recovery before they can justify making capital expenditures, they have to first figure out how to overcome the technical, marketing, financial, legal, and organizational barriers. Addressing these critical factors requires significant front-end funding. To date, because of the long lead times involved before payoff, few cities have committed the funds necessary to carry out this process. Therefore, typically, cities have either failed to implement recovery alternatives or have had unfavorable results from inadequate planning. For many medium sized cities, where resource recovery is likely to have a strong future, initial investments of $200,000 to $400,000 are often required before an adequate plan can be developed.

EPA has been building up the expertise to help this process along.

EPA has demonstration plants in Franklin, Ohio; in St. Louis; in Baltimore, and in San Diego. They have substantially increased our knowledge of various combinations of materials and energy recovery systems. These, and other commercial systems, have proved that recovery of energy and materials is not incompatible. Source separation and mechanical materials recovery methods can enhance the economic viability of an energy recovery system.

We see no competition between energy and materials recovery. EPA funding of demonstration resource recovery plants has, I think, enhanced the prospective success rates of conversion to municipal resource recovery. So, of course, has the research and development work being done by Rocco Petrone at the National Center for Resource Recovery.

Almost a century and a half ago, the greatest student of American democracy, Alexis de Tocqueville, foresaw that our problem would become one not of lacking material means but rather moral force, stability, and skill in managing our resources.

In my opinion, resource conservation is a strategy worth pursuing because it is a strategy of moral force, stability, and skill.

Resource conservation is no longer a "why". It's a "how", "how much", "where", and "how soon". And by moving toward a balanced materials policy, we can improve the quality of life both for ourselves and for our children. □

EPA's Energy Research Program

By Steven R. Reznek

For two decades, EPA and its predecessor agencies played a major role in regulating pollution from energy related activities. Late in 1974, the Agency acquired a challenging new responsibility—coordination of the $100 million per year Federal Interagency Energy Environment R&D Program.

The Interagency Program mobilizes the collective expertise of more than a dozen Federal agencies, including the Departments of Energy; Health, Education and Welfare; Agriculture; Interior; Commerce, and the Tennessee Valley Authority.

The Program cooperates with privately funded institutions, such as the Electric Power Research Institute, to assure that resources are used effectively.

The Interagency Program was conceived in 1974 as a result of the recommendations of two major studies commissioned by the White House Office of Management and Budget. A staff of less than two dozen persons under the guidance of Stephen J. Gage, now Assistant Administrator for the Office of Research and Development (ORD), planned and coordinated a $137 million program consisting of more than 500 separate research projects. This planning laid the foundation for today's program, under the direction of the Deputy Assistant Administrator for ORD's Office of Energy, Minerals, and Industry.

In late 1977, EPA was charged with the additional role of conducting the "Section 11" Public Hearing Review of the Nation's non-nuclear energy R&D efforts. Named after Section 11 of the Federal Non-Nuclear Energy R&D Act of 1974 (PL 93-577).

In carrying out the Section 11 process, EPA conducts continuing technical reviews of all Federal non-nuclear R&D efforts to assure adequate attention to energy conservation and the environmental consequences of emerging energy technologies.

Public participation in this process is encouraged through an annual hearing where a wide spectrum of interested parties—industry, environmental, public interest, and private citizen—is welcome to testify and offer advice to Federal energy research policy makers.

Reznek is EPA's Acting Deputy Assistant Administrator for Energy, Minerals and Industry Research.

EPA's Energy Environment Role

In the past five years, EPA has invested more than half a billion dollars in energy-related environmental R&D covering a broad range of activities. During this period, our energy research philosophy has remained constant, seeking to accomplish four tasks: First, provide adequate data concerning the health and ecological impacts of energy-related pollutants; Second, develop, test, and improve control technologies; Third, anticipate future health and ecological issues; Fourth, effectively communicate the research results.

Providing Scientific Data

The most vital task of any research program associated with a regulatory agency is to provide a solid scientific foundation upon which to develop and enforce regulations. Although EPA's research program covers a wide range of energy-related pollutants and their resulting impacts on air and water, we will focus here on sulfur and nitrogen pollutants in the air and highlight EPA's accomplishments.

Sulfates—Where They Come From

As much as two-thirds of the sulfur oxides released to the atmosphere are from the combustion of fossil fuel (mainly coal) in utility and industrial boilers. Over the Eastern portion of the United States sulfates account for 30 to 50 percent of the fine aerosol mass in the atmosphere.

Although these facts seem to imply a connection between combustion and sulfates, until recently no explicit relationship had been proven. Few sulfates are emitted directly from power plants. Instead, the most common sulfur compound in the exhaust gas, sulfur dioxide, is transformed into sulfate through a series of complicated reactions including photochemical oxidation. These reactions are influenced by a variety of atmospheric conditions such as ambient air turbulence, relative humidity, the presence of other pollutants to catalyze the conversion of sulfur dioxide to sulfates, and the length of time the sulfur dioxide is airborne.

Perhaps the most definitive study of sulfur dioxide/sulfate transport is the Midwest Interstate Sulfur Transformation and Transport Study. This study provided clear evidence that air pollution in one urban area may originate in another urban area, or from a rural power plant many miles away. Long range transport must be considered in developing future air pollution, and sulfate control strategies.

Impact of Sulfur Pollutants

One form of atmospheric sulfate is sulfur acid mist. During the past few years, exacting clinical research has compiled data on the health effects of sulfuric acid and some of its salts. When laboratory animals were exposed to this pollutant combination, no significant increase in mortality rate occurred. However, when the pollutants were introduced in conjunction with microorganisms, a significant increase occurred. Acid aerosols may have an effect on immunological processes and increase the vulnerability to infection.

Sulfuric acid is also responsible for acidic rainfall. A growing body of evidence suggests that acid rain is responsible for the acidification of surface or ground waters, and the acidification and demineralization of soil. Northeastern American and Canadian lakes are becoming acid to the point where they no longer support fish and acid leaching of soils reduce forest and agricultural production.

Recent data indicate that precipitation in a large region of the United States is highly acidic. The average pH was routinely less than 4.7 in the mid 1960's. These areas currently record pH values between 3.0 and 4.0 during individual storms.

Developing Controls

The second major task of EPA's energy-related environmental research program is to develop techniques and technologies for controlling energy-related pollutants. A main focus of EPA's Energy/Environment R&D Program has been to develop and improve alternative means of removing sulfur from coal. Sulfur can be removed from coal: prior to combustion by cleaning; during combustion in fluidized bed reactors and from the exhaust gases after combustion by flue gas scrubbers.

EPA has played a major role in all three areas. Through the Interagency Program, EPA funded the country's major research program on coal cleaning, conducted by the Bureau of Mines. In addition, EPA sponsored and developed a test fluid bed combustion system.

Flue Gas Desulfurization

Most of EPA's sulfur control activities have, however, been in the flue gas desulfurization area. The flue gas desulfurization (FGD) systems, or "scrubbers," wash flue gases with an alkali slurry, which reacts with and removes the sulfur dioxide. These systems either produce a disposable sludge or a commercial by-product such as elemental sulfur. Approximately 30 flue gas desulfurization systems are in operation on electric utilities today. Another 35 are operating on industrial combustion sources.

EPA has helped develop half a dozen

different flue gas desulfurization technologies and has sponsored many of the key demonstrations of these systems in this country. Working closely with the Tennessee Valley Authority, EPA has sought to improve the efficiency and reliability of existing technologies.

The use of chemical buffering additives to improve sulfur dioxide removal efficiency has been a unique achievement of EPA research. More efficient removal methods could make possible higher levels of performance or reduce the cost of flue gas desulfurization. Experiments carried out at TVA's Shawnee Test Facility have demonstrated the effectiveness of two chemical additives—magnesium oxide and adipic acid—in increasing sulfur dioxide removal efficiency.

Another focus of EPA research is on the waste produced by flue gas desulfurization systems—scrubber sludge. The most widely used alkali are lime or limestone. A key problem posed by this process is the disposal of the solid waste or calcium sulfide sludge that is produced by the sulfur dioxide lime/limestone reaction.

In an effort to reduce the quantity of sludge produced by the lime/limestone process and improve its potential uses, EPA is currently examining the use of far less costly forced oxidation processes that create a low purity gypsum ideal for use as landfill. This process will soon be evaluated at full-scale at TVA's Widow's Creek Steam Station. Compared with other recent methods of improved sludge disposal studies, the forced oxidation technique appears to be only one-third as costly, and allows land being used for fill to be reclaimed for further use.

Nitrogen Oxide Program

Because they damage the ozone layer, promote photochemical smog and high nitrate rainfall, and directly affect health, nitrogen oxides, principally nitric oxide (NO) and nitrogen dioxide (NO_2), are important air pollutants.

The high concentrations of these emissions are the results of human activity. In 1974, 23 million tons of nitrogen oxide were emitted. Ninety-nine percent of these emissions originated from fuel combustion; approximately half coming from stationary combustion sources and the other half from mobile sources, principally automobiles. By 1985, however, with the continued growth in energy use and increased reliance on coal as fuel, EPA anticipates a 70/30 percent split of stationary to mobile nitrogen oxides emissions. By the year 2000, in the absence of stricter emission standards, this trend could mean an output that is two or three times greater than present levels.

The Nitrogen Oxides Control Program endeavors to develop combustion modification technologies that will reduce these emissions without increasing other potentially harmful emissions, or reducing the efficiency of energy systems.

A variety of projects were undertaken by EPA in 1978 to study and develop low nitrogen oxides burners for utility and industrial boilers. Under this program, an advanced low nitrogen oxides coal burner has been developed based on the proven principle of staged combustion. This improved combustion design would be compatible with new or existing coal-fired utility and industrial boilers.

Anticipating Impacts

The third major task of EPA's energy/environment research is to anticipate potential pollution problems from emerging energy technologies and to provide guidelines for their control. Such guidelines, available before a technology is commercialized, allow industry to make carefully considered resource decisions.

Geothermal

In 1977, EPA was involved in a program to define the environmental hazards associated with geothermal energy and to work toward the establishment of preliminary guidelines for its development. EPA has worked with the Department of Energy as well as other Federal agencies to study a number of specific environmental problems affecting development and production of geothermal energy. Some of the problems examined were: disruption of land use patterns; land subsidence and induced seismic activity; water pollution and the degradation of nearby ecosystems; and localized climate modifications.

Oil Shale

To meet the environmental guidance needs of the emerging oil shale industry, EPA oil shale research efforts have been designed in anticipation of EPA regulations and standards and the development of suitable control technologies.

Oil shale environmental research has involved: measurement and monitoring techniques for air and water quality, instrumentation development, measurement quality assurance programs, transport and fate of pollutants and their effects on ecosystems, environmental assessment of regions of potential oil shale development, and, finally, the development of control technologies for oil shale extraction and processing.

Diesel Automobiles

A diesel powered automobile will achieve about 25 percent better fuel economy than its conventional combustion counterpart. Diesel engines are also able to meet virtually all of the 1980 EPA emissions standards for carbon monoxide, nitrogen oxides, and hydrocarbons with a minimum of technological modification. By 1985, the automotive industry estimates that 25 percent of new U.S. automobiles sold will be diesel powered.

In view of the projected increase in diesels on American roadways, EPA embarked on a program in 1977 to evaluate the potential public health problems posed by diesel soot in automobile exhaust. A diesel powered auto emitted 30 to 50 times more particulate matter than a comparable gasoline powered vehicle equipped with a catalytic converter. Diesel particulate matter has high carbon content and is similar to soot from other combustion processes.

Although future diesel emission research will focus on carcinogenicity, a special diesel exhaust inhalation study is now underway to study non-carcinogenic diseases such as fibrosis and emphysema. Future carcinogenic studies will be carried out to complete whole animal tests, and relate the test results to human epidemiology studies.

Communicating Results

Communicating with the research community is the cornerstone of the EPA's Interagency Energy/Environment Research and Development Program. In such a broad area as the health and environmental effects energy systems, the problem of meaningful information exchange is a challenge. Through reports, seminars, and conferences the Interagency Program brings together the key personnel in various aspects of energy/environment research and development. Such direct contact is an effective way to coordinate the Federal research effort and to avoid unnecessary duplication of, or misdirection of, research.

One way to advance our research is to improve information transfer between the technical community, the decision-makers and the public.

Perhaps the two most important events that serve to aid communication are the annual conference on the research and development results of the Interagency Energy/Environment R&D Program and public hearings under Section 11 of the Federal Non-Nuclear Energy R&D Act. The next conference will be held in Washington, D.C. on June 7 and 8 and this year's Section 11 hearings are scheduled for September.

For further information on ORD's energy-related research program, contact Richard Laska of the ORD Technical Information Office at 202-426-9454. Questions on the Interagency Energy/Environment Program should be directed to Francine S. Jacoff, Technical Information Coordinator for the Office of Energy, Minerals, and Industry at 202-755-0324. □

By John Heritage

A Future for the Rockies

Snow plumes arch hundreds of feet into the air, blown from the edges of Rocky Mountain peaks. Ancient cliffs wind across the northern plains, marking the edge of a long vanished sea. Ponderosa pine march up the flanks of mountain foothills.

This is the Rocky Mountain West, as seen recently from a small airplane. The vistas—from 14,000 foot peaks to vast plains—awe visitors and inhabitants alike.

But the region of snow plumes and a far away horizon contains still another impressive gift. Beneath the basins and mountain slopes lies a sleeping giant, a huge reservoir of potential energy.

The area has 50 percent of the Nation's coal reserves, 50 percent of the uranium reserves, 100 percent of the oil shale deposits, and 9 percent of the oil reserves. The region's strippable coal totals 195 billion tons. Its shale oil potential totals 600 billion barrels.

Yet for all the region's grandeur and power, it may be the country's most vulnerable.

Dryness is one of the greatest sensitivities. "The West can't hide its mistakes," says Alan Merson. He is Administrator of EPA's Region 8, with a jurisdiction covering six States—Montana, North Dakota, South Dakota, Wyoming, Colorado, and Utah.

Tracks from the settlers' wagon wheels can still be seen on some mountain passes. A ski slope cut decades ago still marks a hillside with a wide scar.

The spectacularly beautiful geography helps create other weak spots. In the valley near Anaconda, Mont., air pollution from a copper smelter almost forced evacuation of part of the town recently. Smog from air trapped in the basin where Denver has grown has become an unsightly, unhealthy menace.

John Heritage is an Assistant Editor of EPA Journal.

Rocky Mountains rise in the background on a clear day in Denver, Colo.

These weaknesses might not have mattered. The region might have gone on for another 100 years, easily accommodating occasional visitors on the Interstate highways and new neighbors fleeing crowded cities of the East and Midwest. The wagon tracks might have remained a sentimental reminder of the past.

Then came the Middle East oil embargo. The Nation began to count its own energy resources. The new goal was energy independence. In this pursuit, the Rocky Mountain West—much of EPA Region 8—was recognized as an extraordinary asset.

Once again, the country has begun to turn West, creating a new frontier—this time in fuel. Instead of seeking the wide open spaces and blue sky it seeks the black coal, the brown oil shale, and a yellowish uranium oxide.

"Clearly the big story is energy development—rapid energy development," says Merson. EPA's Region 8 is in the forefront of efforts to see that this energy growth is wisely managed.

The development pace is awesome. The region's coal production will increase by more than 300 percent from 1977 to 1987, EPA Region 8 estimates. Power plant generating capacity will nearly double from 1976-1986.

To match the fuel boom, one half the workload in EPA Region 8 now involves energy development, Merson estimates. For instance, the office will be reviewing environmental impact statements on 50 proposed energy-related projects within the next two years.

The energy drive is affecting, or could affect, 325 communities in the region, according to a Department of Energy study on impacted areas. The sprawling metropolis of Denver is as much an energy boom town as little Craig, Colo., surrounded by mines and power plants, adds Merson.

Faced with soaring populations of mine and power plant workers, small towns can find themselves overloaded with debt to finance more streets, schools, waste treatment and water supply facilities. They can be plagued with alcoholism, crime, pollution.

The implications? The open space and freedom which settlers sought in the last century could be destroyed. The clean environment which attracted many of the Nation's young people in the 1960's and 70's could be ruined.

EPA's job now is mostly protection, not correction, says Merson. Much of the air is pristine, with the view unimpaired. Most of the streams are still clean. Many of the most spectacular areas are set aside in the region's national parks, from Yellowstone to Mesa Verde.

But Merson sees great potential for conflict between energy policy and environmental values in the region. Energy development is demanding water, degrading air, and bringing in more people. The issue is whether the effects can be kept at acceptable levels.

"If we can't win recognition for some of the values here, I doubt if it can be done anywhere," Merson says.

The energy-environment conflict is turning up in Federal coal leasing plans, urban growth, groundwater supply and quality, surface water quality, wildlife habitat, dust from coal mining, dust and gaseous emissions from uranium mining and milling, disturbed land from coal stripping, agricultural water supply, salinity of the Colorado River, protection of pristine air, Indian rights, and oil shale development.

To keep pace with this eruption of energy issues, Merson maintains a heavy work calendar packed with meetings and appointments. Wasting little time, he knifes to the key points with his questions; Why can't you produce a new kind of cleanup technology?

All 330 employees of the Region 8 office are being taxed by a similar workload in the energy development onrush.

Above all, Merson is an environmentalist. In his first report as Regional Administrator, he told employees, "The final test or decision for any Region 8 program will be, 'Is it good for the environment?' "

Merson—who has served widely in the Region in activities such as Chairman of the

Colorado Land Use Commission and teacher of environmental law—mirrors the conscience of many people in the area. He sees residents as guardians, preserving something unique, adapting to the environment as the Indians adapted to the land.

With such an attitude, the region still could be saved from the wounds that scar Appalachia, Merson believes. One asset that Appalachia didn't have is the EPA, an agency with "protection" as its middle name, Merson adds.

But EPA's role in the region is not that of a naysayer, Merson explains. "EPA's role is one of making sure that when development occurs it takes place in a manner that's consonant with environmental legislation and that certain standards are adhered to in the building of a power plant or any other facility."

The case of two giant power plant units proposed at Colstrip, Mont., illustrates this approach to energy-environmental issues by EPA Region 8.

When the EPA Regional Office found that Montana Power Company's proposed new Colstrip power units would violate pristine air standards on the Northern Cheyenne Indian Reservation, Merson denied a crucial environmental permit.

Montana Power challenged the decision in court. But it also investigated ways to increase the efficiency of its air pollution control systems. EPA Region 8 encouraged the Montana Power effort and subjected its own research to independent review at the Agency's Research Triangle Park, N.C., facilities.

Then Montana Power recently amended its air permit application, proposing to increase the efficiency of its sulfur dioxide cleanup to more than 94 percent. It would be one of the country's best air pollution control systems on a coal-fired plant. Public hearings on the amended proposal are expected soon.

"What's happened here is, in the face of a turndown by the Agency, Montana Power has committed to a much cleaner power plant," says Merson. The Regional Administrator emphasized that a permit still isn't guaranteed. Reviews by EPA and the public are necessary.

The Colstrip case is showing EPA's willingness to fully hear both sides, to consider all the evidence, and to encourage better technology rather than simply turning down energy projects. It is an example of the art of the possible, providing power to avoid brownouts in Seattle while protecting the clean air values of an Indian tribe.

The Agency is "an orderly, healthy restraining influence," says Merson. If it tried only to oppose energy development in the Rocky Mountain West, EPA would lose more than it gained, he adds. Environmental laws might be greatly weakened, to make way for the energy growth EPA was resisting, Merson explained.

The fronts of EPA action range from the Colorado River to Wyoming uranium mines. They include:

Visibility. Under the Clean Air Act, EPA is to issue regulations to protect the view in areas classed as pristine air. The cherished western visibility can be dimmed by fine particles from power plant emissions and impaired by brownish plumes from the plants. Nitrogen oxides form the brown color.

Fugitive dust. EPA Region 8 has declared a policy requiring use of best available control technology to keep down wind-blown soil around strip mining operations, a major western polluter. Controls range from chemical sprays to fast replanting.

Uranium. Under the recently-enacted Uranium Mill Tailings Act, EPA would provide environmental standards to guide the Department of Energy and the Nuclear Regulatory Commission in deciding on proposed uranium mining operations. Meanwhile, in a typical year EPA Region 8 reviews 15-20 environmental impact statements on proposed uranium mills.

Air quality. Of the 80 air quality permits Region 8 is now working on, more than 90 percent are for energy sources. The permits are to "prevent significant deterioration" of the region's clean air, part of a national EPA program under the Clean Air Act.

Oil shale. When and if this massive energy resource is developed, EPA would be responsible for clean air and water discharge permits and solid waste regulations under the Resource Conservation and Recovery Act.

Coal leasing. EPA Region 8 is reviewing new coal leasing proposed by the Bureau of Land Management in the Department of the Interior. The EPA office is making comments on the Interior agency's environmental impact statement on the coal development.

Salinity. With EPA approval, seven States have adopted standards to regulate saline discharges into the Colorado River, including those from coal mines.

With these energy-related actions, EPA is already making a difference in the region's environment. But, Merson cautions, EPA Region 8 cannot be "an overseer of the total quality of life." It deals with specific environmental problems, under authorities spelled out by Congress. The EPA role in the region is mostly protection of air and water.

But Merson is an unconventional thinker in a conventional job. While he respects Congressional mandates, he points out that the lawmakers have authorized some novel approaches in protecting the environment.

The most dramatic example of this was the so-called Overview Environmental Impact Statement for 10 proposed wastewater treatment plants in Denver. In this non-energy case, Merson argued that the plants should not be allowed unless urban sprawl and related air pollution were controlled. While not opposing Denver growth, Merson was using his authority to encourage better-planned development. He based his argument on provisions in national pollution control laws.

Meanwhile, EPA's grants and technical assistance give room for innovation, Merson adds. The Agency can't turn down a coal-fired power plant if the facility meets clean air requirements. But EPA can provide aid to a wastewater treatment system that will try new recycling methods and perhaps plan to use alternative energy sources for its operation.

Recently, Region 8 sponsored a conference on just such possibilities. The session emphasized smaller, decentralized technologies appropriate to the small towns and sparse populations of the West. "I think we have an obligation as EPA to promote technologies less harmful to the environment," says Merson. "The National Environmental Policy Act asks us to evaluate alternatives and to disclose the least damaging ones."

EPA is also helping the region answer questions about its environment before it is too late. With a device called a telephotometer, the Agency is measuring visibility throughout the area, providing a yardstick if pollution begins to creep in.

Region 8 is looking ahead too, trying to sort out the environmental "No's" now so it can say "Yes" later to energy projects. Merson has met with regional representatives of the Interior and Energy departments. The aim: As energy goals are set, environmental contingencies can be plugged in.

But as Merson reflects on the gigantic push to develop the region's energy resources, he sees the crucial need for an informed, dedicated constituency to protect the environment.

Now, says Merson, the trend is pro energy development. But he sees evidence of another constituency: The average citizen who is concerned about getting out of the rat race, the rancher who seeks peace and quiet, the Indian tribe at Colstrip that wants clean air.

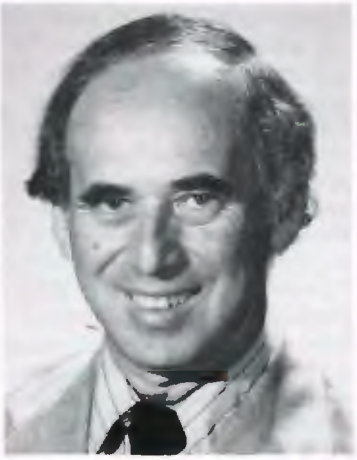
With informed citizens and political leadership, good development is possible, Merson says. He points to Mercer County, N. Dak. State and local officials have worked together there to plan lignite mining and power development. They've produced a framework for growth, he says, while preventing the dire consequences that can come with it.

There is reason for optimism, Merson says. It lies in the actions of agencies such as EPA, and in the attitudes of people themselves, who ultimately will arbitrate the future of the Rocky Mountain West. □

TVA's New Look

Interview with David Freeman
Chairman of the Tennessee Valley Authority

This interview was conducted by Truman Temple, Associate Editor of EPA Journal.



Back in 1977 President Carter remarked, "The TVA program, which used to be a very valuable demonstration project for progress and innovation, has become dormant and just another power company."

That was before he appointed S. David Freeman, an engineer, lawyer, and innovative populist, to TVA's board. Confirmed by the Senate in August, 1977, and designated Chairman last May, Freeman has been bringing many fresh ideas to the utility, as the accompanying interview shows.

He served as a TVA attorney five years, was assistant to the Federal Power Commission's Chairman 1961-65, and later headed a Ford Foundation research project on energy problems. Prior to his appointment at TVA, he was a member of the White House energy staff, serving as assistant to James Schlesinger, at that time the President's energy adviser.

Press reports have stated that you were personally responsible for changing the mood of TVA, and making possible the recent settlement with EPA to reduce air pollution from coal burning power plants. Could you describe how you were able to quickly end the litigation that had dragged on so long?

The mood of an agency is set by the agency leadership, so that it's no great mystery as to how that is changed. I don't feel that what we did was really all that spectacular. We worked out an agreement that will enable TVA to comply with the law of the land, which seems to me a prerequisite for a citizen or a Federal agency.

When I came here I found that TVA board and staff realized that they had exhausted their legal options for attempting to implement the tall stack theory of compliance, which the Supreme Court had ruled unlawful in '76, and was clearly outlawed by the 1977 amendments to the Clean Air Act.

The question was really just trying to get two agencies that had been at each other's throats, so to speak, to stop fighting and sit down and work out an agreement. There was a desire on the part of the TVA staff to work out such an agreement because our power people knew that we had to do it, and the sooner we did it the cheaper and better it was going to be.

I did serve a role because I had had some credibility in the eyes of the EPA people, since I was new and not involved in the fight, and I was able to speak for TVA in working the agreement out. My own personal attitude was that eliminating a million tons a year of pollutants in the air was a very important thing to do, not only because the law required it but because the health of the people throughout the Eastern part of the United States required it.

You have created a new solar division since taking office. It seems a radical departure from TVA's traditional concern with hydro and fossil fuel power. Could you explain the reasons behind that?

I do not consider the initiatives that we've undertaken a radical departure at all from TVA's historical role. I would consider it getting back to our basic mission. Throughout most of its history, TVA has been an innovative leader in the field of natural resources. As a matter of fact it started off life as an environmental protection agency.

The policy perspective that I'm supplying here is getting back to our origins and the expectations that Franklin Roosevelt had and Jimmy Carter has for TVA. If there was any radical departure, it may have been the course of action that TVA embarked upon a decade ago to depart from those principles.

TVA has always led in the energy field. People forget that the integrated development of a river basin was an innovative approach back in the Thirties and Forties. That was the TVA approach. Not just to look at flood control or recreation or power, but to try to get the most out of river basin development.

Also, TVA pioneered flood plain zoning—that is, not building dams where presumably you could persuade people through zoning not to live in the flood plain. In the energy field, we did pioneer in hydropower. When the hydropower wasn't sufficient, we pioneered in the economies of scale for coal-fired plants. TVA also pioneered in the nuclear field. I think that it is logical, now that solar energy has become economically feasible for many uses, and we see the bottom of the oil barrel, and we see the horrible environmental impacts of mining and burning coal, and are aware of the safety problems and proliferation concerns with nuclear power, that we continue our pioneering role. We've got to go for the sun.

TVA is probably better situated than any other organization in the country to demonstrate a happy marriage between an electric power supply organization and solar energy, passive or active, in people's buildings. Those are the demonstrations that we're putting on.

We have no reason for existing if we're not a model for the rest of the Nation. Otherwise, why should the Federal Government have billions invested in a power supply organization in one part of the country? I think that we are doing our job. We also are self-sufficient in terms of our power system so that we're not being financed by the rest of the country.

The solar applications we're demonstrating are economical. It's going to save people money. And that is what we're going to demonstrate.

Do you have any solar projects under way now?

Yes. We are installing solar hot water systems in 1,000 homes in Memphis. These are with long-term loans from TVA, repaid in electric bills. The systems are economic on the basis of electric power rates today, and they will result in savings over the next 20 years to the consumer as the price of electricity continues to go up. Once a solar system is installed, it's inflation-proof. It's not going to go up in price.

And, of course, it doesn't add to pollution the way the equivalent amount of coal or nuclear power would. We feel that we're making a marvelous contribution, if that project proves as successful as it appears to be, and we expand it valleywide, just as we're doing with our conservation program.

You remarked a moment ago that TVA started out out as an environmental protection agency. In what sense did you mean that?

In the early 1930's the Valley soil was washing away in the rivers, due to the flooding and the lack of vegetation. This major problem of soil erosion was one of the first jobs that TVA tackled. Those trees that we planted are now 30 to 40 years tall, and 60 percent of the Valley is in forest.

The Tennessee Valley Authority, working with State and local people and our forestry department, has successfully eliminated soil erosion throughout much of the Valley. Putting a green cover back on the land was, I think, a massive job in environmental protection.

The whole TVA concept of integrated development of resources had a conservation and environmental protection mandate. If you look at the TVA Act, you will find the word conservation in there, as many times as you find the word production. This was an insight that my colleague on the TVA board of directors, Richard Freeman, pointed out in his confirmation hearings.

You also have to remember that hydropower was pushed by the conservationists in the early days because we were conserving water power that was otherwise wasted at sea. We were using a renewable resource.

When I say that solar energy is in TVA's finest tradition, you have to remember that hydropower also is a form of solar energy. It's a renewable source of energy as a result of the ecological system of nature.

We started off with an energy base that was renewable. It was only after World War II that we started draining the capital resource of fossil fuels and started using coal. And, I think it is in the best tradition of TVA that we've got to help lead the way to get this country back to a renewable energy base, and one that is more in harmony with the ecological system.

Are there any more hydro sites left in your seven State system?

There may be some sites, but none that are economically or environmentally feasible to develop. As a matter of fact, one of the biggest problems that I have inherited is what to do about a dam that has not yet been completed, and has great difficulty in complying with environmental laws.

There are no additional hydroelectric dams that we are planning to build. The dam-building era of TVA is about over.

Our focal point will be in developing alternative energy sources, and helping the rural communities in the valley grow in a sensible way, for both quality growth and somehow to try to stop the spread of neon signs and strip development, which is blighting the countryside.

We've got a major role to play, I think, in helping plan the growth of this valley so that we don't wake up in the year 2000 looking and smelling like northern New Jersey.

On the subject of coal burning plants, both EPA and the Department of Energy have spent a good deal of money on R&D on fluidized bed combustion. Is TVA also trying to research that?

I would not agree that they spent a good deal of money. Compared to the kind of expenditures we're making on nuclear or fusion power, the amount of money that is being spent on fluidized bed combustion is small.

TVA is designing a 200 megawatt fluidized bed demonstration plant, and I think that we are leading the Nation in that effort. The Department of Energy has acknowledged our leadership, and is supporting our plans to go ahead. We expect to have that demonstration plant on the line and completed by 1984 or at the latest 1985.

If the data that we are relying on out of the Department of Energy's pilot plant in Pennsylvania continue to prove to be satisfactory, in another six months we'll have a basis for going ahead with the design and construction of the TVA plant.

TVA will make a sizable contribution to the financing of it. So we are, I think, in a leadership role in the fluidized bed technology.

In your book, *Energy—The New Era*, you stressed the need for energy conservation. Is TVA now promoting such conservation in the same way that it once promoted the idea of cheap, abundant power?

I would not say that we have reached that millennium yet because TVA really led the world in the promotion of cheap electricity. But I will say that we have turned the corner and have mounted a mighty effort to promote conservation. Bob Hemphill, who was the deputy assistant secretary in the Department of Energy, and one of the foremost experts in energy conservation, is down here and he is heading the new division in TVA, the conservation division. Some of us on the inside call it the "Unelectric Division." It also includes our solar office, which is headed by Fran Koster, former coordinator of energy programs at the University of Massachusetts, whom we were fortunate to get.

We've got some people with national reputations and expertise in conservation to mount this new effort. I think it's important and we've got a lot of programs under way. We now offer each of our customers a loan of up to $2,000, interest free, to weatherize their homes. And we've had 70,000 homes that have already taken advantage of that.

We provide a free audit, to tell people what they need to do that is economical. They pay the loans back in their electric bills, and the program now is being expanded to our commercial and industrial customers.

So we have a comprehensive energy conservation program where we provide a package, delivered to the consumer's door, including financing and easy repayments. We expect to build the equivalent of several thousand megawatts capacity through investments in energy conservation over the next ten years. And that will be the cheapest, the quickest capacity that we can build.

What does electricity cost a resident in the TVA region?

About two and three-quarters cents per kilowatt hour on the average for the residential customer. The industrial customers pay about two cents a kilowatt hour.

How would that compare with Washington, D.C. or the New England region?

Oh, I think it's 30 to 40 percent cheaper than the average in the United States east of the Rockies. Our rates have gone up tremendously, but they are still appreciably lower than the residential rates throughout the country.

Our industrial rates are getting close to what utilities in the South charge industry, but I think that they still have more promotion left in their industrial rates than we do, and I suspect they will be increasing them very sharply.

We will be increasing rates but we are beginning, I think, to get our costs under control. I hope that TVA's electric power rates will not go up any faster than inflation in the next ten years.

In other words, the real price of electricity in terms of real dollars hopefully will stay about constant. That would be quite an accomplishment.

Why is TVA power so cheap for residents in this area?

Well, the hydropower is very low cost. It hasn't gone up. It's like the sun. Once you make the investment, the fuel charges are practically free. Only 30 percent of our electricity goes to residents, and we're giving them the benefit of the hydropower. And we'll have rate reforms to do it even more.

Then we have some other fairly low cost sources of energy. We are able to build our plants cheaper than the private company because we use our own construction organization, and we have a record of efficiency. We also have a large, integrated grid system, and we run a pretty good shop.

We have the advantage of hydropower that most systems in the East don't have, but we do pay our way. And when we borrow money, our bonds pay Federal income tax. We're not charging less at the expense of consumers in other parts of the country.

We will have some increased costs to "clean up our act," but that will amount to a very small percentage of the total cost of

electricity—at most eight or nine percent. We expect, as we complete the nuclear plants that are under construction, that they will provide us with cost effective sources of energy that will offset some of these other increased costs.

Do you have any plans for building more nuclear plants beyond what's on the books now?

We don't have any present plans. We will obviously need to make additional investments to balance supply and demand. But we have our staff looking at all the options, and we are now in a policy framework where conservation and cogeneration and solar energy are getting equal billing with coal and nuclear.

We will make these decisions on the basis of marginal costs. We will choose either conservation, solar energy, or cogeneration or central station coal or nuclear, whichever is the most cost effective, also taking into account environmental and economic impacts.

Do you have any plans for managing the radioactive wastes of present nuclear plants?

We are intensively examining our options. We have until 1988 to implement one or more options. We've got enough capacity at our existing nuclear plants to store the spent fuel until 1988. Other utility organizations are not in that good a shape.

The basic question is: Do we build a central facility where we store all of the spent fuel for all of our plants, or do we provide storage at each plant so that there will be no transportation of the spent fuel?

The transportation of spent fuel is a source of great concern to a lot of citizens. I want to know what the arguments are for and against central versus decentralized storage of the spent fuel. We'll examine those arguments and the facts and make a decision on that point well before the year is over.

We are not going to wait for Washington to decide the spent fuel storage problem, because we've got the spent fuel. I feel a responsibility that TVA, as the organization that is generating it, should come up with a satisfactory solution. Here again is a place where TVA can exercise some leadership and serve as a model for the rest of the Nation.

Our solution may not be appropriate for other parts of the country, but we are going ahead with the job of deciding, and not just wringing our hands over it.

Some critics argue that energy conservation is going to cost jobs. Do you feel that is true for the TVA region?

I find those arguments to be made either out of ignorance or with malice. It doesn't really require a Ph.D. in economics to understand that you create jobs when you invest in insulating buildings just as much, and even more per dollar, as in building a power plant.

The problem may have stemmed from a misconception in some people's mind that conservation means doing without. But most of the conservation that we can achieve comes from investments—in storm windows, insulation, heat pumps, heat exchangers, and other equipment, and changes in existing buildings, plus additional investment in new buildings, to save energy.

This country has grown over the years on the basis of doing things efficiently. Not only will conservation investments generate more jobs per dollar in investments than the power plants that they may displace, but because they are more cost effective, they are anti-inflationary.

One of the major causes of inflation today is the fact that we have been wasting and not conserving. Studies that I've done in the past suggest that we're wasting perhaps $100 billion of capital and inflating the economy something awful if we do not implement conservation.

So it's not just the protection of the environment. That may be considered as a happy by-product. The most compelling reason right now to invest in conservation is the need to combat inflation. Energy inflation is what's been heating up the economy.

We cannot exempt energy from our anti-inflation fight. That is a suicidal path. The way that we combat inflation in the energy field is by conserving, by using our resources more frugally, by getting more energy out of existing plants, and when the energy is manufactured to make it do more work for us in our homes and in our factories. By saving energy we save money and cut down on the inflationary impact of higher and higher energy prices.

That is the burden that TVA has to shoulder and is part of our modeling effort.

When you say pollution control is a happy by-product, you're saying that the less fuel consumed, the less pollution you have.

Of course. There is no way that you can mine a ton of coal and burn it without adding to our pollution burden. There is no way that you can mine a ton of uranium ore and refine it and build a nuclear plant without adding to the dangers of radioactivity and health and safety and impacting the land as well.

So the surest way to combat pollution is to get by with using fewer Btu's of energy to get your job done, unless you are using solar energy. But we use very little of that thus far.

You have mentioned a need to hire more minorities in the TVA region, and at TVA itself. Do you have a percentage goal you're working toward?

We have percentage goals, but so does everybody. That's not a big deal. The real question is what progress we are making to implement this goal. We are working quite hard at it, and making some progress.

I just received a report from a panel of citizens who are not TVA employees, one black man and two white people, who looked at our situation in Chattanooga. They interviewed TVA black employees and our managers, and they made a lot of suggestions which we are going to implement in the next 30 days, to improve the work environment for black employees.

I think that one impediment to recruiting able black people is that they feel you're doing it just for show and you're not going to give them a fair shake at promotions once they get there.

So we're trying to eliminate that impediment. We're trying to recruit minority citizens, but we're not going to discriminate against white people. Our Act requires that we hire on the basis of merit and efficiency. I happen to believe that there are plenty of black people who have plenty of merit and efficiency and who need to be recruited.

We're trying to do that. We need to have more training once people get on the job at TVA to fulfill their inherent capabilities. But this is a long haul because many of the needs that TVA has are in highly skilled professions and crafts. And minorities have not had the opportunity for upward mobility in the past, so we're stressing training.

We may hire people in jobs that are not that attractive and try to upgrade them after they're here, but I want to say this: Most of what I have to say about minority employment still represents aspirations and not accomplishments.

One of our initiatives will play a very big role in terms of minority contractors. We're trying to set up a mechanism so TVA can plan its programs to create more activities for small businessmen and minority businessmen. And that's where solar energy comes in.

Not only is it pollution-proof and inflation proof, but it gives the small business person and the black entrepreneur a chance to compete and get the business. There is no way in the world a small black or white businessman is going to get much of a piece of a big nuclear power plant.

TVA has to build those itself, and to the extent that we contract, it's got to be to a large organization. They in turn employ some black people, but you won't get the black entrepreneurs with large, central station

power plants. You give them an opportunity with the smaller, decentralized technologies, like solar collectors, fuel cells, and things of that type.

There is also a trend away from doing everything with your own staff, is there not, where you're letting out contracts to smaller entrepreneurs?

We've got $500 million of subcontracs out now, and we'll be doing more of that. We had an independent management team look over our construction organization, and it made a lot of suggestions about this. And I think you will find that we are trying to utilize all the talents that are in the Valley.

I will say this for our construction organization. They have a record of cost effectiveness that is hard to beat, and we do have a mandate to keep the price of electricity as low as feasible. We're going to continue to implement that more forcefully than I think has been the case in recent years.

And that means that we are going to build these power plants ourselves unless we can find contractors that can do the work cheaper.

Business Week has mentioned your interest in promoting the use of electric vehicles. What prompts your interest in them?

I think the electric vehicle concept is one of the fundamental answers to the environmental crisis, as well as the energy crisis. I don't think that we will ever achieve implementation of the clean air standards in our major metropolitan centers, unless we get internal combustion cars the hell out of there.

And yet people are not going to be able to be served exclusively by mass transit in the foreseeable future, perhaps ever.

Certainly we've got too much of a decentralized suburbia built. I see the electrical vehicle as being the means to keep the mobility that people treasure, their independence, the freedom to stop off at a store or whatever on the way home rather than having to go in a carpool.

I think that the electrical car is a fundamental answer and I think TVA can play a useful role in pulling that technology ahead, rather than simply sitting back, as everyone seems to be doing, and waiting for some inventor to achieve a breakthrough in the battery that supposedly is going to transform it from a turkey to a treasure overnight.

I don't believe it's going to happen that way. I think we're going to make incremental improvements in the battery right along, but there are a number of institutional and marketing barriers that have to be overcome. I think that vehicle will start off first in fleets in the cities for stop and start traffic. Some of that already is being done.

It will gradually grow, taking over the second car urban vehicle market, and in time perhaps we will have electric vehicles that we can drive from one city to another.

But if you've got a car with a good 100-150 mile radius, it's going to be economical. The curves are going to cross. Every time OPEC meets we have a breakthrough in electric powered vehicles.

As the price of oil gets higher and higher, it is going to be more economically feasible to use coal or nuclear power or solar energy for electricity to charge batteries to run a vehicle. I dare say that by the turn of the century, electric power will be dominating the automobile market.

I hope that TVA can play a role in making it happen a few years sooner, and maybe in the process encourage some of the industry to locate in this part of the country and bring jobs to people in rural areas so they can keep the good life and not have to go to Detroit to get a job, which was the situation a few decades ago.

Does TVA have money in electric car development now?

We are putting some of our own corporate research and development funds into electric cars. We only have a half dozen or so vehicles now.

I'm awaiting firm recommendations from the staff as to which vehicles we should purchase and get out on the road, but our 1980 budget visualizes that TVA will be spending millions of dollars, perhaps, on a fleet of electric vehicles, to begin demonstrating their use, to get some experience in our own operations, and encourage our distributors, State agencies, and others to do so. We are working with the Electric Power Research Institute. It is a beautiful load for electric utility systems, on top of everything else, because the batteries can be charged at night. It's an off-peak load that will fit into our hydro and nuclear power system quite well.

We won't have to build any new power plants for a long time to serve the electric car market—we can just run existing plants at better load factors. From an energy point of view, it's a more efficient way to use energy than an internal combustion engine.

But aside from that point, you can get off imported oil, which is the heart of the energy crisis.

So I cannot overemphasize the importance of getting on with the development of automotive electric power. Sometimes I think that we neglect the positive answers and pour all the money into yesterday's non-answers.

You've spoken of the evils of strip-mining and deep mining coal. Are there ways TVA as an organization can help to assure proper mining practices, or are you relying on Federal law enforcement for that?

I think it's going to take a lot of both. TVA is working closely with the Office of Surface Mining (OSM) to implement the new law. Until it was passed, we had requirements in our coal power contracts that required our contractors to do a minimum amount of reclamation.

With the new Federal law we don't need those requirements any more, but we support OSM, not only through loaning them some people, but our coal contracts will now provide that if any company is in violation of Federal law, it is also in breach of contract with us, and we're not obligated to buy the coal.

And that is a rather powerful, supplemental deterrent to encourage them to comply with the law.

In addition to that, we have a team of people to assist the small coal companies to comply with the new strip-mining law, which is very difficult for a very small company. They don't have the technical expertise. So we're trying to help positively.

We also do not enter into contracts with companies that are in violation of the strip mining law. And we get advice from OSM before we award the contracts. So we have a series of policies and programs that supplement the people who are struggling with the enforcement of this new surface mine law.

On the deep mine front I don't think that we have any special effort, since there is an agency of government that is enforcing the underground mining law. I think that more and more they've become effective. There's been a tremendous improvement in the levels of dust in the underground mines in the last ten years, and I think gradually the safety record is improving.

You observed a year ago that in the environment and energy debate, the real enemy was the calendar. What did you mean by that?

Well, I felt that we were losing precious time in that we have continued to drain America first, as we exhaust our storehouse of fossil fuels, and have failed to put a concentrated enough effort into developing longer-lasting alternatives, such as solar energy. And we have failed to implement the conservation options that could buy us more time.

Unfortunately the environmental perspective has taken a kind of defensive tone in the last year or two, which I think

continued to inside back cover

Hidden Gas
Another Alternative

By David Tundermann and Joel Schwartz

The continuing question in energy policy circles has always been "Do we have a near-term alternative to coal?" We suggest that the answer is yes, and natural gas is at least part of that alternative. At a price competitive with imported oil it can provide a more environmentally acceptable substitute for that oil than coal would be. Morever, potential supplies of this gas are fully as large as our coal deposits if we look to unconventional sources.

The difficulties with coal are twofold. First, expansion of supply is quite costly. Previously coal was a cheap fuel, but that low price was obtained only by excluding from the price of the coal many of its real costs. With the advent of mine safety and needed environmental regulations, the price of coal production has escalated dramatically. With the advent of the Clean Air Act requiring the control of dangerous pollutants, the cost of combustion has escalated as well. Finally, when adequate provision was made for proper maintenance of rail roadbeds, the cost of transporting coal skyrocketed. All of this made coal more expensive than oil in much of the country, and led to the "disappointing" growth in coal demand and production.

The second problem with coal is that there remain noneconomic reasons not to use it. Even when a coal boiler meets all environmental regulations, it still produces much more pollution than a gas boiler. And even when a mine meets all safety regulations, it is still a lot more dangerous than a gas well. Many people's response to these developments has been to attempt to suppress them, but these problems are very real. They indicate that alternative solutions to our energy supply problem should receive greater emphasis.

The most environmentally favorable source of additional fossil fuel is, of course, natural gas. We have a number of unconventional sources of this gas that may offer a far better transition fuel than coal to the energy supplies of the next century. The four major sources are: gas dissolved in geopressurized water, gas from Devonian shale, gas from Western tight sand rock formations, and gas from very deep wells. Some estimates of the supplies available from these resources have been astronomically high, so an important caveat should be mentioned here. Most of these supplies are unproducible at any reasonable price and most of the estimates are based on much too little data. Even so, the potential supplies seem quite large, and are summarized here.

Geopressurized Gas

There are large deposits of hot water, under pressure, along the Gulf Coast and in the Gulf itself. They are at temperatures of 250-300° F, and many of them have large amounts of natural gas dissolved in the water. While the small number of exploratory wells make speculation about the size of the resource hazardous, there are at least several hundred to several thousand trillion cubic feet of gas in place. A trillion cubic feet of gas is approximately equivalent to half a million barrels of oil per day for a year in energy value. The Department of Energy has a modest drilling program to determine the extent of producible reserves, and to develop the technology for that production.

There are several difficulties that development of this resource must overcome, but potential reserves are so high that all of these hurdles still leave very large potential supplies available from this resource, depending on price. Imported residual oil already costs close to $3 per million Btu's, delivered. Expected increases in the price of oil should make this resource competitive in the near future. Any action to deregulate or otherwise increase domestic oil prices to world level would of course also advance this timetable.

Currently, the Department of Energy is spending $28 million per year on research into geopressurized gas, with an increase to $36 million scheduled in fiscal year 1980. By contrast, coal gasification, whose estimated price of $4 per million Btu is certainly no cheaper, is budgeted for $169 million. Total Energy Department spending on all unconventional gas in FY80 will be $64 million.

Tight Sands

The next large source of unconventional gas is the tight sand formations in the West. These stone formations contain several hundred to a thousand trillion cubic feet of gas, but aren't very porous. Here, the technology for production is better established. It consists of drilling many wells closer together and fracturing the rock formations. Both of these increase flow rates from reservoirs, and both are expensive.

Difficulties faced by this resource are the high cost of fracturing and of many production wells. Those formations with continuous beds of gas-bearing rock are already in production, but most of the gas is in discontinuous beds. This spotty nature of the deposit makes fracturing less effective, and requires more wells. As a result, production is extremely sensitive to price.

A recent DOE study showed ultimate recoverable reserves from known deposits, with advanced technology, of 149 trillion cubic feet at $3 per million Btu's (plus inflation). Production in 1990 is estimated at over 7 trillion cubic feet per year at that price. This is the equivalent of 3½ million barrels of oil per day. Increased exploration, moreover, may discover additional formations.

As long as oil is price controlled (with the average cost of oil in the United States only two-thirds the world price), potential users will be tempted to use imported oil instead of this gas. Efforts to reduce this incentive are probably more important to production than additional fracturing research.

Devonian Shale

Devonian shale is a brown rock distributed throughout Appalachia. Enormous amounts of gas are dissolved in this rock, and there are existing wells in this shale already, some over a century old. Most of these wells are located in the most favorable regions, so again, the total resource base is unknown. The Congressional Office of Technology Assessment in 1977 estimated economically recoverable reserves at prices between $2 and $3 per million Btu's in-

(Tundermann is Director, EPA's Division of Policy Planning, and Schwartz is an energy policy analyst)

volving between 23 and 38 trillion cubic feet with maximum production of about 1 trillion cubic feet per year. The low production is due to low porosity. Higher prices or more advanced fracturing techniques would lead to increases in both production and recoverable reserves. The major obstacles to more rapid development are the need for improvements in fracturing techniques, and the lack of any customers who are being forced to make a choice between the real cost of imported oil and this gas.

Deep Wells

Deep gas is perhaps the most conventional of all the unconventional sources. It is unconventional in the depths, 15,000 to 40,000 feet, at which it occurs. On the other hand, alone of all the unconventional sources deep gas wells flow at much greater rates than normal wells. While very little is known about reservoirs at these depths a paper presented recently at the Aspen Institute Workshop on R&D priorities and the gas energy option estimated 200 trillion cubic feet of "deep" gas in Oklahoma alone.

It is estimated that prices necessary to develop these reserves were in the range of $3-3.50 per million Btu's. Here again cost is a major factor. A well drilled to 15,000 feet costs 12 times as much as one drilled to 5,000 feet. Even with greater production rates, higher prices are clearly necessary.

The significance of these supplies of unconventional gas is simply this: At a price competitive with, or below that of synthetic fuels we seem to have vast supplies of the cleanest burning fossil fuel. Furthermore, at a price competitive with foreign oil, we have large economically recoverable reserves of gas that can replace that oil with far less environmental cost than coal.

There are technical problems that will keep us from producing this gas overnight. And as long as oil prices in this country are kept below imported prices, customers will be few. Nevertheless the potential of this gas is vast. What remains to be seen is whether our price and allocation controls for energy in this country will be adjusted to let us use it. □

Wood

A Growing Energy Source

By Chris Perham

"Firewood warms twice, once when you split it and again in the woodstove"
folk wisdom

"Split wood not atoms"
bumper sticker

Searching for ways to cope with the energy crunch, many Americans have rediscovered wood as a fuel not only for home heating, but for industrial needs, and for power generation as well.

Wood fuel proponents, whose ranks swell with each fossil fuel price increase, point out that wood is safe, available, cheap, renewable, and versatile. Forests cover over 80 percent of the land in New England, and more than one-third of North America.

In Missoula, Mont., Champion International uses waste wood from its plywood mill to replace 84 percent of the power formerly supplied by diesel fuel and natural gas. The company has announced plans to replace a gas-fired boiler at its hardboard plant in Dee, Ore., with one that burns wood waste.

Chris Perham is an Assistant Editor of EPA Journal.

Potlatch Corporation has said it will build a power boiler at its Lewiston, Idaho facility to burn wood waste and bark. In Vermont, a power company fuels one of its generators with wood chips.

In Millinocket, Me., the Great Northern Nekoosa Corporation has a stockpile of bark that covers 15 acres to a depth of 60 feet. The company is considering building a $30 million boiler that would burn the bark and cut the company's oil purchases by 20 percent.

The Wood Fuel Research Institute in New England studies conversion possibilities for wood waste. In Michigan and Georgia State governments are investigating the large-scale use of wood for industrial fuel. Dr. John Burchard, Director of EPA's Industrial Environmental Research Laboratory, is a member of the Board of Science Advisors of the North Carolina Energy Institute, which has wood burning high on its priority list.

Dr. Burchard says, "Wood fuel is gaining acceptance in heavily forested areas of our country. Pollution from these sources has not been a high priority in the past because it was such a small part of the industrial fuel supply, and other health-related research took precedence.

"Now the Agency is analyzing the pollution potential; mainly polycyclic organic materials that vaporize from burning wood, and particle emissions. Many of the methods needed to analyze these vapors were not available 5 or 6 years ago and some are still being perfected."

While a great deal of wood fuel is waste from timber cutting or fireplace logs, many users are also turning to wood chips. These are produced right in the woods by machines that chew up entire trees or tree sections into chips the size of a matchbook and shoot them into a trailer truck.

Part of an EPA study now in progress at the Process Technology Branch in Research Triangle Park will look at the pollution caused by industrial boilers that use wood for fuel. As more companies turn to wood to cut their fuel bills, EPA scientists are seeking pollution control measures best suited to wood fuel. According to project officer Warren Peters, the pollution varies according to the type of use, the location of the facility, and even the kind of wood being burned.

EPA's studies of wood-fired boilers show wide variations in such pollutants as particles, carbon monoxide, nitrogen oxides, unburned hydrocarbons, and polycyclic organic materials. Similar pollutants can be produced by fireplaces and stoves, depending on the type of combustion unit, whether the wood was green or seasoned, and how fast and well it burned. A study underway for the Agency now is comparing fireplaces, ordinary wood-fired stoves, and

stoves that have baffle plates and secondary combustion chambers, to record the effects of each on air quality.

A homeowner can choose to burn pine or oak in a fireplace, a stove, or a furnace. Fireplaces are the most romantic and least efficient way to use wood. Incomplete combustion leaves creosote deposits in chimneys and sends smoke and pollutants into the air. Often because of thermal draft, fireplaces cause a net loss of heat to the home. An air-tight stove uses the solar energy stored in wood more efficiently. Using some new wood-burning furnace designs residents can heat a house on four sticks of wood a day.

State and local government officials may soon have to consider the density of such home heating use when planning for clean air goals. Some New England States have raised the possibility of requiring permits for wood-fired home-heating devices. EPA's Denver office has advised the cities of Vail and Aspen, Colo., that wood burning emissions are a significant part of their air pollution problem.

A wood stove may smell "homey" on an isolated farm in rural North Dakota, but the effect of many stoves and fireplaces in a suburban area can be air pollution. EPA scientists point out the home chimneys are often placed so that downward air movements carry pollution to where people breathe instead of allowing it to disperse into the atmosphere.

If a simple stove can cause air quality problems what about industrial use? EPA is interested because increasingly industries located in out-of-the-way places, which have transportation problems and high costs for conventional fuels, are finding ways to put wood to work for them.

In Northern Vermont the Burlington Electric Department converted one of its generators to burn wood chips instead of coal late in 1977. One ton (wet) of wood chips produces approximately the same heat in Btu's (8 million) as a barrel of oil or one-third ton of coal. However because of the price differences between these fuels the utility can generate electricity for less than 2.5 cents per kilowatt using wood, compared to 3 cents per kilowatt hour with coal.

Local support for the utility is strong. Residents approved the sale of revenue bonds to fund construction of an $80 million generator that will use wood to produce 50 megawatts of power. While proponents expect the price of wood to rise in response to the new demand, they feel it will continue to be cheaper than coal and oil. The money spent on wood fuel makes jobs for local wood workers, machine operators, and truckers.

The State government also has begun turning to wood. A boiler at the Vermont State hospital in Waterbury was converted to burn wood chips harvested from State forest lands. Forestry officials see the trend toward wood fuel as providing a market for trees that were previously unusable. Over the last century unrestricted cutting and clearing for agriculture has often left woodlands with low quality trees and many that are diseased, rotten, misshapen or otherwise unsuitable for commercial use. Selective cutting of such trees can be compared to weeding a garden. Chip harvesting provides an economic incentive to remove them and improve the health and esthetic quality of the forest.

What effect will this have on air quality? Perhaps less than the smoke from the many fireplaces that burn in Vermont's largest city. Burlington is an area that does not meet all air pollution standards, and pollution control permits may be required for the planned 50 megawatt plant, according to EPA's Regional Office. Meanwhile the Burlington Electric Department uses a precipitator to control the particle emissions from the wood-fueled generator, just as it does for those that burn coal. Wood chips have the advantage that they produce relatively little sulfur dioxide, a combustion by-product of coal.

In the Northwest logging wastes have often been burned in the field leading to air pollution disputes, especially near urban areas. Now more industries and utilities are considering the economic advantages of converting the wastes, called slash, into fuel. Some wood industries are trucking the slash to their plants where it is burned to produce steam, along with mill waste and other wood residues.

In the past mill waste was stockpiled or burned in coneshaped incinerators called tepee-burners. These were also sources of dirty air. Few of the industries can afford such practices with today's fuel prices. Waste stockpiles are dwindling as the companies recycle their wood for steam.

"Wood products plants in the West are supplying part of their energy needs from wood waste and a few plants are approaching 100 percent satisfaction of their energy needs," says Dr. H. Kirk Willard, Chief of the Food and Wood Products Branch at EPA's Industrial Environmental Research Lab in Cincinnati, Ohio. He adds, "Initially labor costs were too high to justify collecting and using wood waste as fuel. The trend toward increased wood use began after the shortage of cheap natural gas in the late 60's and picked up after the increased cost of oil in the 70's. We now estimate that over one-third of the 110-150 million tons (dry) of wood wastes, largely from mill-waste and harvest residues, produced in the U.S. each year are used for fuel. Dr. Willard points out that in addition to reductions in sulfate emissions the substitution of wood as fuel allows a significant reduction in ash generated, less than 25 percent that for coal.

EPA's Seattle office reports that while some of the older wood-fueled sources can be a problem, the newer plants can be controlled as well or better than coal. EPA is working with the Department of Energy and the U.S. Forest Service in Region 10 to find environmentally safe and economical ways to convert wood wastes and other biomass to energy.

Biomass is the total volume of all living matter in a given area. The term includes plant materials once considered waste but which can be used as fuel. In addition to slash from wood operations, it includes such plant materials as cornstalks and bagasse, the stalk left after sugar has been extracted from sugarcane.

The ingenuity that turns biomass into fuel has helped a wide range of industries and institutions.

For example in the Midwest a walnut processing firm uses the walnut hulls, shells, and shards to fuel the ovens that dry the nut-meats. Some farmers are using chopped cornstalks to feed their grain drying ovens.

Wood wastes can be formed into pellets for easier transport and more efficient burning. A firm in Vermont is developing a small gasification furnace for home heating fueled by pellets. This home heater would operate on a thermostat much like an oil furnace, taking fuel from a supply of wood pellets blown into a cellar bin by a delivery truck.

EPA is supporting a project in cooperation with the California Solid Waste Management Board to design, construct, and field test a mobile pyrolysis system to convert agricultural and forestry wastes into char (a combustible residue) and oil energy products. The unit will be able to travel to the source of the waste and convert up to 200 tons per day of wastes into energy products. When the waste supply runs out the unit can move to another area. From every ton of waste processed the system is projected to produce 270 pounds of char, 250 pounds of an oil similar to Number 6 fuel oil, and 1,500 pounds of low Btu gas. This concept will provide an alternative to current unacceptable disposal practices such as open burning, while producing fuel products.

EPA Scientists at the Industrial Environmental Research Laboratories in Cincinnati, Ohio and Research Triangle Park, N.C. are working with industry, and other government agencies to help make wood a fuel that pays off in dollars and in a better environment. □

CEQ Urges Energy Conservation

The Nation can achieve a major expansion in its economy between now and the year 2000 while using only about 10 to 15 percent more energy than it uses today, according to the President's Council on Environmental Quality.

In a special report, *The Good News About Energy*, the Council said recent studies showed the real Gross National Product will increase between 60 and 90 percent in the next 21 years but energy use need not grow by more than a fraction of that, if the United States makes a determined effort.

In announcing the findings, Council members said their overall conclusion was that "the United States can do well, indeed prosper, on much less energy than has been commonly supposed. The principal basis for this good news is the accumulating evidence that the means are available to wring far more consumer goods and services out of each unit of fuel that we use, whether it be a barrel of oil or a ton of coal or uranium."

What has happened is that the technology to make energy use more efficient is now available, according to the report. CEQ cited such things as improved housing construction to conserve fuel, new car models that guzzle less gas, and waste heat recovery systems in industry that can provide a 30 to 50 percent annual return on investment.

"Energy productivity . . . thus refers to getting more from the energy we use, not to a back-to-the-caves reduction in amenities," members explained.

The 49-page CEQ report pulls together conclusions from a number of recent studies dealing with energy by the National Academy of Sciences, the Oak Ridge Associated Universities' Institute for Energy Analysis, the Ford Foundation's Energy Policy Project, and by independent researchers. Although they differ on many assumptions and details, these studies point to the real possibility of a low energy growth future, although accompanied by an economy with steadily rising GNP.

"As a result of this large potential for energy savings," the report noted, "we can fuel the growth of the economy in years ahead in large part by increasing the productivity of the energy we now use rather than by greatly increasing our energy inputs. Energywise, a barrel of oil saved through increased efficiency is as useful as a barrel produced and in other respects it is better."

Gross National Product is a term to describe the total value of the goods and services produced in a country during a specified period such as a year. It is a familiar yardstick used by economists to indicate how the Nation's economy is faring. The U.S. GNP last year reached more than $2.2 trillion, compared to about $1.9 trillion in 1977.

The recent studies indicate that the GNP is not likely to grow as rapidly in the decades ahead as in the past. Among the reasons given are slowed population growth and a historical shift in the U.S. economy to less energy-intensive goods and services. CEQ's report said, "These two trends mean that our demand for the things energy can provide will be growing at a reduced rate at the same time that our ability to provide those things with less energy is increasing."

How can the Nation cut back on its energy use patterns? The report cited numerous areas for savings. It emphasized that several European countries such as Sweden, West Germany, and Switzerland have per capita incomes comparable to the U.S. but have substantially lower energy/output ratios. Sweden, for example, uses only about 60 percent as much energy as the U.S. but has a comparable standard of living.

There is no single factor that explains the higher use of energy compared to productivity in the U.S. More than half the difference is attributed to energy use in three areas: passenger transport, residential space heating and air conditioning, and industry.

"Some of our relative inefficiency in passenger transport is probably due to our less dense living patterns," the report declared, "but the data also indicate that our automobiles are less efficient, that we use less mass transportation, and less clearly, that we take more short trips in our autos, including trips in congested areas." In housing, Americans employ less efficient heating practices combined with a preference for larger homes and single family dwellings. Industry-for-industry, the U.S. is considerably less efficient than Western Europe, using more energy to produce a given amount of a product such as steel, according to the report.

The CEQ report called for a strengthened national commitment to energy conservation, and suggested the following areas where efforts could achieve large fuel savings:

Residential and commercial buildings:

Reduce heating losses by 50 percent with better insulation;

Substitute heat pumps for electric resistance heating;

Cut water heating fuel requirements through more insulation, reduced hot water temperature settings, and use of solar energy or heat recovery;

Increase efficiency of new air conditioners and refrigerators;

Improve lighting systems in commercial buildings.

Transportation:

Emphasize smaller, light-weight vehicles (a move well under way already in Detroit);

Improve efficiency of car drive trains, such as greater use of manual transmissions;

Improve fuel mileage by greater use of radial tires, streamlining, and modifications of auto engines and power accessories.

More efficient airliners and greater use of diesels by truck fleets, as well as shifts to more piggy-back transport of truck loads by freight trains.

Although the report suggested encouraging wider use of mass transit in major cities, it was silent on the subject of rail passenger service between cities. The Administration recently proposed cutbacks in Amtrak service.

Industrial sector:

Improve "housekeeping" practices such as turning down thermostats, turning off unnecessary lighting, and repairing steam leaks.

Produce more process steam through cogeneration, a term for producing electric power and other energy such as process steam from the same facility, and add heat recuperators;

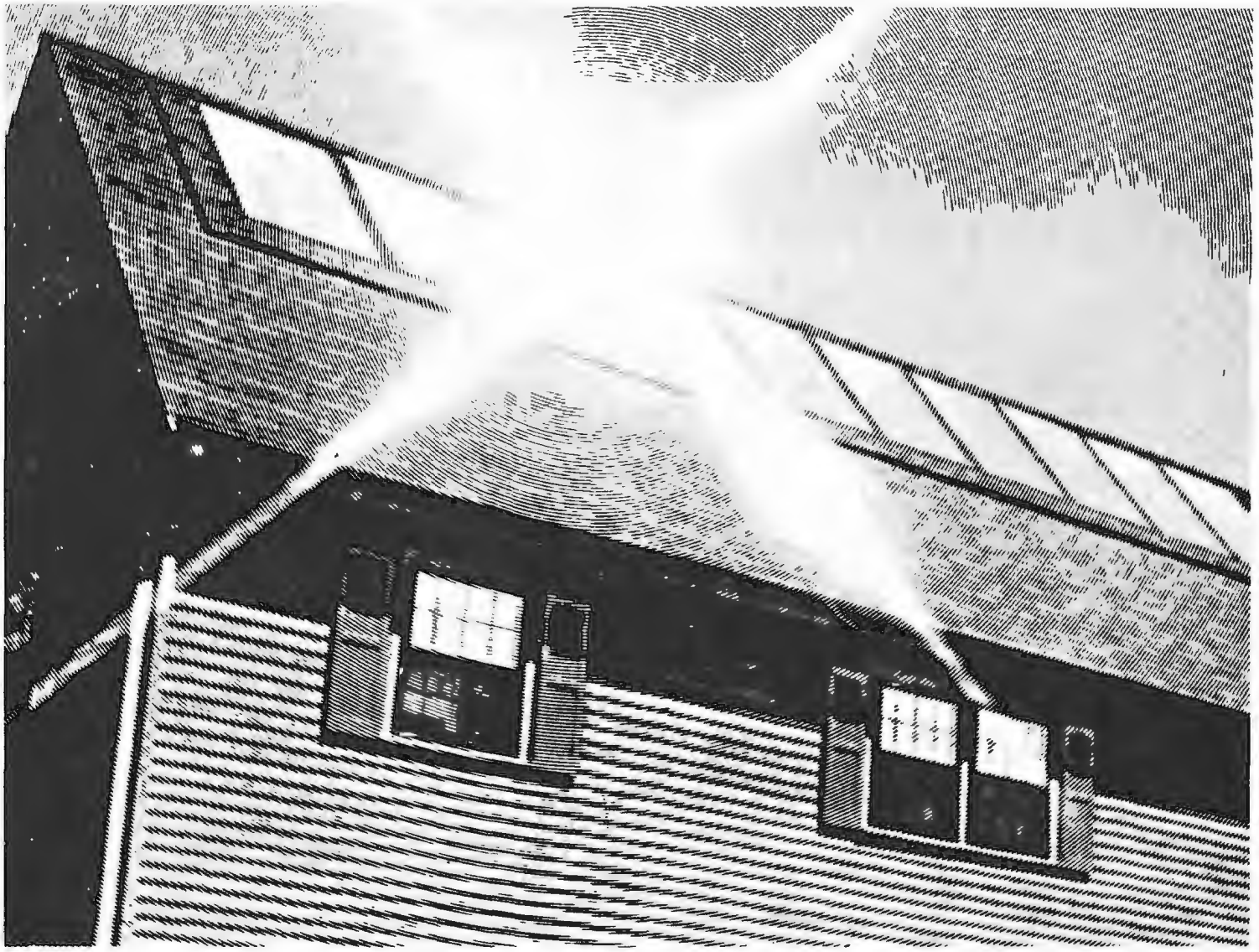
Reduce losses in electric power generation by such measures as locating stations closer to load centers;

Recycle steel and aluminum in urban refuse and use more solid waste for fuel.

The CEQ report said that low energy growth in the next two decades means that the Nation can avoid many difficulties. Instead of needing some 500 new power plants, we can limit the number to perhaps 25 percent of that total; we can lessen our dependence on oil and gas imports; we can free capital from new energy facilities and use it to create jobs elsewhere, and we can conserve our own fossil fuels.

"In an age increasingly beset by all kinds of limits (resource, environmental, and social), conserving energy through improving fuel productivity is the single most effective means of easing our long-term environmental and energy problems," the report declared.

Copies of the report may be obtained by sending a self-addressed mailing label to: Council on Environmental Quality, 722 Jackson Place N.W., Washington, D.C. 20006. □



Toward a Solar America

By Denis Hayes

The U.S. economy was built on oil that cost $2 per barrel. International oil now costs nearly $14 and the price is climbing. As the price of our chief energy source climbs steadily higher, dramatic changes will certainly ensue. Many such changes will reflect investments to enhance the efficiency of energy use, since such investments are the most cost-effective energy choices available today.

Yet, no matter how heroic the effort we make to conserve energy, substitutes for domestic oil and gas must be found. Supplies of both have been declining steadily for several years. The time has come to begin the transition to a sustainable energy base.

The arguments in favor of a program to accelerate solar development are well known. Renewable energy resources, used widely, have fewer negative environmental consequences than do conventional energy resources. They produce no radioactive wastes or bomb-grade materials; nor do they threaten to trigger a planetary greenhouse effect. Solar sources tend to be labor-intensive, stable, and resilient; they tend to foster self-reliance, political and cultural pluralism, and a favorable balance-of-payments. Moreover, used worldwide, renewable resources should discourage the proliferation of nuclear power with its associated weapons potential.

Americans are beginning to appreciate the social, environmental, and economic advantages of solar energy. Recent polls suggest that, in an era when most new energy sources are deeply embattled with a hostile public, 94 percent of the American people favor the rapid development of solar sources.

Economic history provides a powerful set of arguments for solar energy. Two major energy transitions have swept the United States in the last 125 years. First, coal replaced wood as the dominant source of commercial energy. Then, coal was itself displaced by oil and gas. Both these changeovers occurred with breathtaking speed. In 1850, coal contributed only 10 percent of the Nation's energy; just thirty-five years later, it provided more than half the Nation's fuel. In 1910, less than 10 percent of the United States' energy supply came from oil and gas; thirty-five years later, oil and gas accounted for half the Nation's energy.

We are now entering another transition. No doubt the era now aborning will be powered mostly by renewable energy sources. The critical question is whether this transition will proceed fast enough to enable us to avoid massive economic and social disruptions.

Past energy transitions have been encouraged by strong Federal policies. If renewable resources are to compete with conventional fuels, their development should be similarly encouraged by explicit Federal policies. Part of such a Federal commitment must take the form of subsidies. Virtually every form of energy sold in this country, with the notable exception of solar energy, has received massive Federal subsidies for development, transmission, and use. Nuclear power has received a generation's worth of government-sponsored research and development at no metered cost to those buying electricity from a nuclear power plant. Every stage of the nuclear fuel cycle, from the enrichment

of uranium to the disposal of radioactive waste, continues to receive heavy Federal subsidies.

Vendors of oil, gas, coal, and nuclear power, represented in Washington by formidable trade associations, have managed by influencing legislation to shape the energy marketplace to serve their interests. The tax code stands as a monument to the skill of lobbyists in minimizing taxes on the particular form of energy development their clients control. The case for a major Federal role in promoting rapid solar development rests heavily upon the government's desire to balance a market heavily biased toward encouraging continued investments in conventional energy sources.

All our assumptions about the real cost of solar energy must be overhauled in light of new economic realities. Conventional wisdom holds that while solar energy has many attractive characteristics, it is currently too expensive for widespread application. But yesterday's half-truth has become today's misapprehension, especially when viewed from the broad vantage point of national interest. since consumers want to obtain as much energy as possible per dollar of investment, the question is simply which *new* investment produces the most bang for the buck.

Homeowners or business executives considering the purchase of solar equipment do not ask this question. They compare the price of the solar collector with the average price of fuel. These consumers may or may not know that oil prices are an average of the costs (plus profit) of cheap oil from old domestic fields, imported oil, frontier oil from Alaska and other remote places, and advanced-recovery oil obtained by using sophisticated techniques to pull more oil out of "dry" wells. They may not know that the cost of *new* oil is much higher than this average. The real replacement cost is considered by some to be the cost of making oil from coal—$30 to $40 per barrel.

The point is that the individual consumer, who has to shoulder the full cost of a new solar water heater, never has to come to grips with the cost of new oil. Instead, the price of new oil is averaged with the price of cheaper old oil, and all consumers pay for the expensive new oil with slightly higher bills. This effect is most dramatic with respect to electricity; in some parts of the country, power from a new power plant costs ten times more than the average price now paid by the consumer.

If everyone paid for oil at the world price, for gas at the price of imports, and for electricity at roughly the cost of power from the least expensive new power plants, the Nation's annual energy bill would be $70 billion higher. This market distortion amounts to almost one billion dollars per year per quad of commercial energy sold. If society subsidized solar technologies to this same degree, the impact would be revolutionary.

Solar energy now makes economic sense at the margin; the energy from an unsubsidized new nuclear power plant (if there were such a thing) would cost more than that from an unsubsidized new solar unit. If society's scarce capital is to be invested efficiently, the micro-economic interests of individual consumers must be brought more closely in line with the macro-economic interests of the Nation. Only through Federal policy can such an alignment come about.

What sorts of policies are needed?

(1) *Financing.* Solar technologies suffer in the marketplace because most of their expense is in "front-end" money, because competing fuels have been and are now heavily subsidized, and because important economic externalities are omitted from conventional balance sheets. In seeking remedies for these problems, it is important that Federal policy be relevant to the needs of all consumers, including renters and poor people.

(2) *Consumer Protection.* Most consumers continue to view solar technologies as risky investments. Strong programs must be implemented to protect consumer interests while not stifling creative innovation in the infant solar industry.

(3) *Competition.* Safeguards must be erected to ensure that control of the solar industry does not fall into the hands of a few giant firms.

(4) *Job Training.* Investments in renewable energy sources yield more jobs than do similar investments in conventional facilities. A major job training program will be necessary if sufficient skilled workers are to be available as needed.

(5) *Federal Procurement.* An important Federal role is to set an example for the rest of the country. A major Federal procurement effort will also have the effect of lowering costs to the public by encouraging economies of mass production. Specific goals must be set for Federal solar purchases.

(6) *Research, Development, and Demonstration.* To date, a disproportionate share of Federal solar funding has gone to large, centralized facilities to generate electricity. Future funding must be intelligently distributed among a broad range of promising technologies. Little attention has traditionally been paid to neighborhood scale technologies, and to the wind and biomass research programs.

(7) *Government Organization.* Interdepartmental coordination of the solar effort should be handled by a special Solar Policy Council chaired by either the President or Vice President. Control over the DOE solar program, the Solar Energy Research Institute, and the regional solar centers should be centralized in one office.

(8) *International Programs.* Several important policy objectives can be achieved simultaneously by a strong international outreach program. With economies of mass production, domestic prices should decline; as U.S. entrepreneurs visit other lands, they can acquire new technologies and ideas to bring back home, and a prime excuse for nuclear proliferation should be undercut.

With a strong solar program, the United States could obtain 25 percent of its energy from renewable sources by the year 2000. Such a goal will not be cheaply achieved. Yet the net costs, stretched over the next 22 years, would amount to less than the proposed expenditures on national defense for next year alone. In weighing Federal expenditures, it is necessary to recall that the solar energy being harnessed will displace conventional fuels, all of which also receive substantial direct Federal subsidies. In addition, a strong solar program would reduce the level of many indirect Federal outlays, e.g. for public health, unemployment and welfare programs, radioactive waste disposal, the national petroleum stockpile, etc. To the extent that solar sources are substituted for imported oil, they not only save foreign taxes but also employ Americans (who pay taxes and whose purchases of goods and services have a multiplying effect within the Nation's economy).

The *net* cost to the Federal Government over the next 22 years of pursuing a 25 percent goal would be approximately $50 billion, or an average of roughly $2.5 billion per year. The total cost to the society would be lower than those associated with a conventional strategy, provided that solar investments are made intelligently.

The case for a solar transition is compelling. With proper policies by the Federal Government, the solar prospect should be bright. But meaningful action is long overdue.

Denis Hayes was Chairman of Sun Day, 1978, and now is a senior researcher with Worldwatch Institute. He also is a member of the U.S. Department of Energy's Research Advisory Board, and is author of Rays of Hope: The Transition to a Post-Petroleum World. *He founded and headed Environmental Action, 1970-71, and was national coordinator of Earth Day. Last year he was the first recipient of the DOE annual award for Outstanding Public Service. The above article was adapted from* Blueprint for a Solar America. *The full text is available from the Solar Lobby, 1028 Connecticut Ave. NW, Suite 1100, Washington, D.C. 20036. ($2.)*

The Oil Outlook

Charles J. DiBona
President, American Petroleum Institute

"Hell with the lid off." So Charles Dickens described the polluted night sky over Pittsburgh when he once visited the city. For too long, Dickens' phrase would have been an apt description of many American cities. After World War II, though, milestones in our cleanup efforts began to appear.

In Pittsburgh, a cooperative effort of industry, households, rail and steamship lines, and local government achieved a dramatic cleanup of much of the city's dingy air. New York City cut by 90 percent the amount of sulfur in the fuels burned in the city. Across the Nation, particulate levels in the air dropped sharply with the switch from coal to oil and gas as home heating fuels.

Thus, by the start of this decade, the Nation had already made big gains in cleaning up the air. And progress has continued under the Clean Air Act.

The increased emphasis on cleaner air over the last decade has been good for the Nation. And in the future, more improvement can and will be accomplished.

But we will have to pay close attention to energy development, as our dependence on imported oil continues to grow. We import about 43 percent of the oil we use, and the amount available from Western Hemisphere sources has declined sharply. So, we depend more and more heavily on the Eastern Hemisphere members of OPEC—the Organization of Petroleum Exporting Countries—which now supply more than 82 percent of our oil imports.

This shift means that our main sources are not only more distant, but also less stable. Obviously, the best current example is Iran, which supplied nearly 11 percent of our oil imports until the political turmoil and oil strike led to a cutoff of Iran's oil exports in late December.

So, it is becoming increasingly important that we consider our domestic energy goals and our clean air goals together. The questions and answers get a lot tougher as we seek to eliminate the last few percent of air pollution.

The benefits to public health are less apparent. And the costs of control begin to include an increasing number of lost opportunities. One important opportunity will be to increase domestic energy production, but ever tighter rules may foreclose much new energy development. Another point worth emphasizing is that job creation will be slowed not just by plant closings, but, perhaps more important, by projects—and potential jobs—that simply never materialize.

It is increasingly difficult to balance these considerations. Just as it is hard to quantify many of the real benefits of pollution control, so it is hard to quantify the value of energy and other projects that die quietly in board rooms.

Difficult or not, we must seek such a balance. Emotional confrontation will not get the job done, and we have, I believe, seen too much of it. Businessmen and women find it easy to question the motives of those who oppose their projects, while environmental groups are often tempted to put the business community on the side of "dirty air" and poor health.

Such charges may serve as rallying cries for both sides, but they merely attack a straw man. No one wants dirty air. Everyone wants clean energy development.

It is a matter of record that energy and the environment are compatible. For example, the giant Gulf Coast ecosystem, with 25 national wildlife refuges, numerous State and private refuges, a national park, 7 million acres of wetlands, one-fourth of the Nation's commercial fish harvest and 2 million sport fishermen, coexists with more than 35,000 oil and natural gas wells and 10,000 miles of pipelines.

I believe the Clean Air Act can serve as an effective framework for continued progress of this kind. Contrary to what the public may have been led to believe, the Act is neither all good nor all bad. Congress recognized this when it established the National Commission on Air Quality, which is to study problems arising from the Act and its administration and then to make recommendations for changes to Congress.

There are questions badly in need of study. What are the options for a company that is new to an area and has no available emission offsets? What will happen as emission offsets eventually disappear through growth or regulation? Is there a way to eliminate the lengthy delays caused solely by differences in Federal, State, and local permitting processes? How do we deal with natural pollution that exceeds the standards in remote areas with energy potential? Or allowable pollution increments that are too low even for projects using the best modern control technology?

Resolving these and other questions while assuring progress toward cleaner air will require some adjustments to the Clean Air Act. The potential future problems are illustrated by some troubles which are appearing today and which affect all phases of the petroleum industry.

In production, for example, we have seen nearly two years of delay in granting permits for thermal recovery projects in California. These projects would recover up to 5 billion barrels of crude oil—the equivalent of two years' supply of oil imports.

In transportation, we have seen a similar delay in approval of a terminal and pipeline to receive and ship Alaskan crude oil to the parts of the country that need it. The delays continue despite strong approval by voters in a referendum last November.

It has become nearly impossible to build a new, modern refinery that can produce the fuels that today's environmental rules require, such as low-sulfur fuel oil and unleaded gasoline. Proposed new refineries at Eastport, Me., and Portsmouth, Va., are still in limbo and have been for years.

These and other examples could turn out to be either the exception or the rule. It depends on whether we take a calm, rational approach or allow emotional confrontation to grow. Two questions summarize both the issues we face and the emotional pitfalls we must avoid. First, what level of air quality will protect public health? And, second, how do we achieve that level efficiently?

In January, for example, EPA slightly relaxed the ozone standard, from 0.08 to 0.12 parts per million. This revision—or any upward revision—is decried by some as both a "sellout" to industry and a compromise of public health.

It is neither. The emotional argument ignores the fact that the standard was set several years ago when data were slim. The current scientific consensus, based on confirmed studies, is that adverse health effects have been demonstrated only at levels more than twice as high as the new standard.

So, the standard is still far more stringent and billions of dollars more costly than is necessary to protect public health. Also, the standard will continue to hamper energy projects. For example, needed expansions in refinery capacity will still be virtually impossible across the country. Thus, a further relaxation of the standard is necessary

...page 40

Coal
The Key Fuel

By Carl E. Bagge

Just a little over five years ago, coal was thought by most Americans to be a fuel of the past. It was a fuel which had powered the Nation to greatness over the previous century, but it was a fuel of the industrial revolution and not of the space and computer age.

Coal had lost its public visibility. The mental image of stacks belching smoke—once a sign of progress—had given way to the cleaner horizons of the environmentally conscious Seventies. Few homes or businesses used coal anymore and the nostalgic steam locomotives were limited to museums as relics of an era that had passed.

Coal mining and coal use today exist one step removed from the vast majority of the public. However, the images of coal's not-so-glamorous past still linger. Coal to many Americans is still dirty black stuff mined from the bowels of the earth by char-faced men with picks and shovels. Its smoke pollutes. Orange stained water seeps from its mines and fouls the rivers. And barren and ravaged lands bear witness to its environmental insult.

While these not entirely accurate images of coal's past remain in the minds of many, few remain in reality. The coal company of today is a far different enterprise than its predecessors. Anyone with a close working relationship or knowledge of the coal industry knows well the sharp and dramatic changes which have occurred in this vital and basic industry.

Since the middle and late Sixties, the coal industry recognized its future was bright. However, previous decades of shrinking markets and profit margins took their toll on the industry. Fewer and fewer companies scrapped for a share of the ever-smaller market. With a future bright only in the long-term, the sons of coal miners left their homes for work in other areas.

Coal's vital role is now well known. In only a few short months during the fall of 1973, the public was reintroduced to its most abundant energy resource. Coal was again enthroned as king and savior of our petroleum-dependent economy. And a new industry has emerged out of the pains of decline to rebirth. Grandfathers and grandsons now work together in much different mines.

The public, the press, and the government now know the fact the coal industry has clutched for so long, that: Coal is inevitably, irrefutably, and unavoidably the single most important fuel to the Nation. That—of course—doesn't mean coal will replace all other fuels, or that coal is the right fuel for all applications. Nor does it mean coal is the only answer to our energy problems. It simply means that as the Nation's energy needs grow, those new demands will be supplied increasingly by coal.

A future perspective

As the coal industry looks ahead, it must focus on the traditional problems of business in meeting the increasing demand for its product. Coal executives must plan mines, secure financing, attract and train workers to operate complex mining equipment and systems. And they must compete for the development markets and earn a

Carl E. Bagge is president of the National Coal Association, a coal industry trade group.

fair profit for their investors. All of this alone is a mammoth task.

However, traditional business management problems are not all the coal industry must contend with as it moves ahead to meet the Nation's need. Government—in its many facets—has created myriad new variables affecting the equation for business survival in the present and the future. New social and environmental goals must now be considered by business—and rightly so.

The coal industry has no basic quarrel with the need for including such goals in its operations. It is the proper role of government to protect its citizens. The coal industry, too, is concerned about the air we breathe and the water we use. And we, too, are concerned about the legacy we leave our children.

Coal's problem today

Coal today is mined and burned more safely, cleanly, and in a more acceptable fashion than ever before. And some of the improvement is the result of government regulation. But the costs are high and expected to go higher. The effect of regulation often goes beyond easily identifiable costs and benefits. And the combined effect of all government regulation is having an insidious impact on the coal industry.

A recent coal industry journal carried a front page editorial cartoon depicting a modern day "Coal Industry" Gulliver roped and tied to the ground by Lilliputians labeled with government acronyms. The cartoon aptly captured the feeling of most in the coal industry today. While it exaggerates reality, it carries a truth not visible from within a single regulating agency.

No single government regulation or particular agency's actions will likely prevent the Nation from using its abundant and accessible coal resource. But the combined impact of regulation, and other factors beyond the industry's control, can and do create delay and indecision in the sectors of the economy that must make decisions on fuel production and use.

Trainload of coal winds its way through West Virginia.

The problems created by government regulation of the coal industry can be broken into three areas: the uncertainties of future costs and markets; confusing and conflicting requirements; and the balance between costs and benefits.

Air quality regulations, including proposed new source performance standards, prevention of significant deterioration provisions, and yet to be proposed new source performance standards for industrial plants, already have and will continue to have an enormous effect on the comparative price of coal to other fuels and the cost of burning different coals.

While the primary focus of EPA's air quality regulations is protection of public health and welfare, the regulations nevertheless have a very real and dramatic effect on the shape of current and future markets for coal. Such regulations make or break the economic viability of coal reserves currently held by individual companies within the industry. The regulations, in some cases, also will cause siting changes and may even force customers to delay or cancel expansion plans.

The problem for coal producers and consumers is often a question of timing. Industry, in many instances, can adapt to air quality standards or new siting criteria provided there is sufficient time to adjust without significant economic loss. I must add parenthetically that many of the problems of timing have been created not by EPA, but by Congress in the 1977 amendments to the Clean Air Act.

The coal industry in recent years often has found itself whipsawed by various government agencies as each pursues its individual mandate.

Dozens of examples exist of the unforeseen and negative impacts of Federal regulation of the coal industry, but it is sufficient to say the end result of each is increased cost, reduced productivity, or confusion in the business planning of coal producers and consumers. Each of these symptoms of "over-regulation" further compounds the Nation's basic inflationary spiral.

Finding a better way

Positive actions are afoot within and outside the Federal government. An emerging majority of public officials now agree that we simply must find a better way of regulating such vital industries as coal. The risks of failure are just too great.

Creation of the President's Regulatory Council, headed by EPA Administrator Douglas Costle, is a positive sign that the interrelationship of various agency regulations has been recognized. The Regulatory Analysis Review Group, of the Council on Wage and Price Stability, also has taken a firm stand for balancing various national needs in its review of developing Federal regulations. Such a voice within the Federal Government structure is essential and that group has already begun to play a valuable role.

But there is a burden also which rests with industry. The coal industry and other regulated industries must make certain that the full range of effects of Federal regulations is well articulated and made public. For it is the public—in the long run—who will judge how well government and industry responded to the Nation's need for a clean environment, its need for a secure energy supply, and its need for a strong economy. □

Coal miner heads home at the end of his shift.

A Government Solar Report

By Robert Caughlan

On May 3, 1978, millions of Americans and people in thirty-five other nations celebrated "Sun Day—the dawn of the solar age."

President Jimmy Carter, speaking at the dedication of the Solar Energy Research Institute in Golden, Colo., announced the formation of a multi-agency task force to review, analyze, and accelerate solar energy * development in the United States. "The job of this committee," he said, "will be to develop an over-all solar strategy for speeding the use of solar technologies—both by new programs and by improving existing Federal programs."

In the Domestic Policy Review on Solar Energy, over 100 officials representing more than 30 executive departments and agencies participated. Twelve regional public forums were held and the quantity and the quality of the testimony were impressive. Over 2,000 citizens and officials submitted advice, criticisms, and recommendations. The review team also received special briefings from representatives of solar advocacy groups, small businesses, consumer groups, utilities, and State and local leaders.

The findings of the committee can be summarized in nine major categories:

1 Solar energy offers a number of important advantages over competing technologies. It can provide the Nation with an abundant and renewable energy source with far fewer negative environmental ramifications than other sources of energy. The increased use of solar power will decrease our national dependence on increasingly expensive foreign sources of oil, improve our balance of payments, alleviate associated economic problems, provide thousands of new jobs, and contribute to our national security.

2 In spite of the fact that many people still believe solar energy is an exotic technology of the future, the committee found that many solar applications are already economically competitive and can be used in many ways.

3 Limited public awareness of, and confidence in solar technologies is a major barrier to accelerated solar energy use. The public consistently asks for more and better solar information, and the task force cited the need for new and more effective programs to educate solar users in residential, industrial, and commercial sectors.

4 Federal and State policies, as well as market imperfections, effectively subsidize competing energy sources. These policies include tax credits; pricing policies; utility rate structures based on average pricing, and research, development, and demonstration expenditures.

According to "An Analysis of Federal Incentives Used to Stimulate Energy Production" (Battelle, 1978) the U.S. Government has spent more than $100 billion for financial assistance to conventional energy sources since 1918. In contrast, solar power has received less than $2 billion and only during the past several years.

5 Financial barriers faced by users and small producers are serious obstacles to increased solar energy use. Although the new solar tax credit in the National Energy Act will improve the economics of fuel costs in the residential sector, other barriers still exist because of the high initial costs and the lack of experience in financing solar systems.

6 Research, development, and demonstration priorities should be more closely tied to national energy goals. The task force concluded that the R&D budgets have not adequately focused on systems that have near-term applications and can help replace oil and gas. Significantly, the review team also concluded that electricity from large, centralized systems has been over-emphasized, while near-term and community scale applications have not received adequate support.

7 Significant potential exists for expanding the nation's use of solar power. Although the estimates of future solar energy demand and supply are inherently imprecise and the exact "quad" ** count remains highly controversial, (ranging between 15 and 30 quads by the year 2000) the potential is certainly clear.

8 Solar energy offers the United States important new opportunities to advance our foreign policy and international trade objectives. Developing nations are having a harder time paying for oil than we are. And, since they don't heavily subsidize conventional energy systems, solar is already more economically competitive. Finally, the increasing seriousness of the international firewood crisis in the developing nations has generated unprecedented international interest in solar technology.

9 Because of the decentralized nature of solar energy all Federal efforts must be assisted and in many cases led by State, local, and private actions. Many barriers, such as utility regulation, land use policies, and building codes must be reformed at the local and State levels.

Because of many environmental issues that are interwoven with our energy policies, the Environment Protection Agency played a major role in the Domestic Policy Review.

Deputy Administrator Barbara Blum and Dr. Stephen Gage, Assistant Administrator for Research and Development (ORD) were the lead participants. David Graham and David Berg of ORD, Dave Shaller of the Office of Federal Activities, and Greg Ondich of the Office of International Affairs were instrumental in the collection and inclusion of the significant environmental conclusions that the committee reached.

The environmental benefits of solar energy are significant. Except during production of equipment, it will not contribute to air pollution. According to the task force, increasing solar energy applications to the maximum practical degree would cut down emissions of particulates, hydrocarbons, sulfur oxides, carbon monoxide, and nitrogen oxides by 15.7 million tons, or between 8 and 50 percent, depending on the fuel being used.

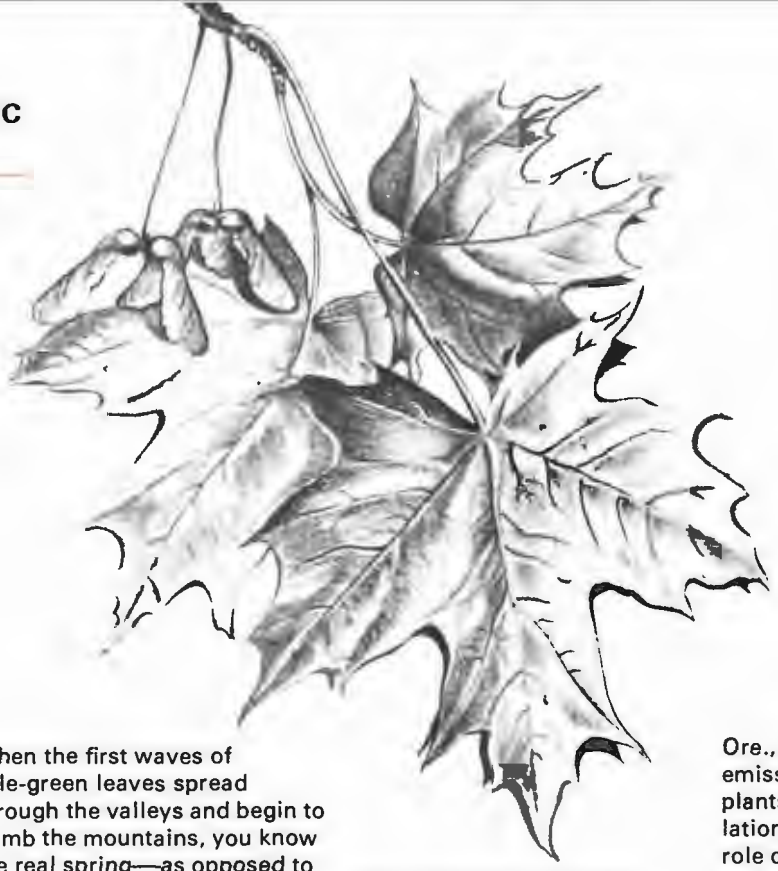
Although solar energy utilization is not entirely environmentally benign and some pollution and land use problems will have to be carefully addressed, the DPR concluded that it certainly does not pose many threats to human health and safety and the environment that are associated with conventional technologies.

Thus, as far as positive and preventive environmental medicine is concerned, the future of solar is bright indeed. □

Robert Caughlan is a staff member of the EPA Office of Public Awareness.

**"Solar" power was broadly defined to include the other renewable resources such as wind, biomass, and low-head hydro power.*

***A "quad" is one-quadrillion British Thermal Units. The United States currently expends about 76 quads a year.*



Leaf Power

When the first waves of pale-green leaves spread through the valleys and begin to climb the mountains, you know the real spring—as opposed to the calendar spring—has arrived.

Billions of new leaves are unfolding on trees and other plants as the new season advances northward and rises from the river flood plains to the surrounding hills.

These leaves are miniature power stations which use solar energy to turn packaged sunlight into new growth.

The leaf is a remarkable machine, which long ago perfected the skill of capturing energy from the sun—something human beings are still struggling to learn.

Although a leaf may seem simple, it has elaborate mechanisms which enable it to provide energy for the tree or other plant it serves.

While leaves vary tremendously in size and shape, the basic leaf is generally flat so it can present the most surface and least volume to receive maximum light without any waste of cells. Evergreen needles are a more primitive form of leaf but they package sunlight in the same way that broad leaves do.

The great invention of the plant kingdom is chlorophyll, a pigment which can absorb the sun's energy to combine water and carbon dioxide and produce sugar in the form of glucose. This production process is called photosynthesis.

Each leaf has an elaborate plumbing system. Where the leaf is joined to a branch or twig it has vascular bundles, tiny pipelines. Through these pipelines the leaves can draw water and minerals in from the roots of the tree and send packages of freshly made energy sugar out to the rest of the plant.

In the leaf itself the vascular bundles branch into veins, which serve as the leaf's irrigation system. On the bottom of each leaf are the stomata (mouths) which serve as pores to let water in or out. They also control the intake of carbon dioxide.

Leaves have an impact on their environment because they discharge oxygen while manufacturing glucose and also give off carbon dioxide at night when the leaf factory is closed. Also emitted from leaves are hydrocarbons. The amount of this type of discharge is determined by plant species, light, temperature and other factors influencing the plant energy balance.

These plant-produced hydrocarbons can react with nitrogen oxides to produce ozone, a key pollutant in smog, in the same way as hydrocarbons emitted from auto traffic and other human activities.

EPA's Environmental Research Laboratory at Corvallis, Ore., has been studying the emission of hydrocarbons from plants. Scientists at this installation will also investigate the role of plants as air purifiers as well as polluters.

Some industry representatives have seized on the fact that plants can emit hydrocarbons to argue that Mother Nature is the real polluter of this country's air.

In response to these statements, David G. Hawkins, EPA's Assistant Administrator for Air, stated recently that "hydrocarbons from vegetation are dispersed over broad areas so their concentrations in urban-suburban areas are trivial compared to hydrocarbons" released by human activities.

"No doubt," Hawkins said, "there are some rural ozone readings dominated by natural phenomena but the evidence simply will not support the claim that nature is a significant contributor to smog in our cities."

In any case, it is green leaves that support civilization everywhere in the world. The evolution of animals could not have occurred without that of the plants before them.

"All flesh is as grass," says the Bible, "and all the glory of man as the flower of grass. The grass withereth, and the flower thereof falleth away."

Not only is life fleeting but while it lasts it is utterly dependent on plants.—C. D. P.

The Hitch

(EPA has received an increasing number of inquiries about why motorists with late model cars should pay more for unleaded gasoline when they go to their service station. The following fact sheet was prepared by the Agency's Mobile Source Air Pollution Control Office to answer these questions.)

What is Switching?

Fuel switching is the term used to describe the use of leaded gasoline in a vehicle designed for unleaded fuel. Fuel switching is also called misfueling.

Why Does Switching Occur?

Apparently the most overwhelming significant reason is that unleaded fuel costs more than leaded fuel. The national average is about 4 cents a gallon more, although there are cases of a price spread exceeding 10 cents a gallon.

How Much Switching is Going On?

Estimates differ, but EPA's own studies of the problem indicate that about 10 percent of the vehicles that require unleaded fuel may be using leaded gasoline. Most car owners are complying with the law and manufacturers' recommended specifications.

Why is EPA Interested?

EPA is interested in fuel switching for the same two reasons that EPA controls lead in gasoline—the health effects of lead and its effects on emission control systems, which of course, are interrelated. Lead is a toxic material, and EPA has established a health-based National Ambient Air Quality Standard for it. Small children are most susceptible to the damaging effects of lead pollution, especially those who live in urban areas where ambient lead levels are high. EPA's "phase down" regulations to reduce the average lead level in all gasoline are designed to alleviate this public health problem. EPA requires that unleaded gasoline be available in order to ensure that the emission control systems installed on many cars will work. The most prominent example of an emission control device whose operation is negatively affected by lead is the oxidation catalyst that has been used on most cars since 1975 to reduce hydrocarbons (HC) and carbon monoxide (CO). Lead poisons the catalyst.

What Happens to the Air If Switching Occurs?

Your health, the environment, and your car are adversely affected. Exhaust emissions from your car go up substantially. HC and CO will increase be-

cause lead can destroy the catalytic converter, which is the most effective emission control component on late-model cars. With continued use of leaded fuel, HC and CO emissions will increase by several times over what they should be. Also, deposits caused by lead and other additives in leaded fuel could plug up exhaust gas recirculation (EGR) valves leading to substantial increases in oxides of nitrogen (NOx) emissions. Emissions of lead will, of course, also increase. Fuel switching then will have a major negative influence on the rate at which the air in the polluted parts of the country is cleaned up.

EPA is also concerned about the emission of other pollutants not currently regulated from motor vehicles, and which will increase due to fuel switching. The primary example is ethylene dibromide (EDB). This is one of the two primary additives put in leaded gasoline to reduce the deposits inside the engine caused by the combustion of the lead additive. The other "scavenger" additive is ethylene dichloride (EDC). EDB has been shown to cause cancer in laboratory tests with animals. EDB will be emitted from a vehicle using leaded fuel both from the exhaust and from the vapors that are emitted from the fuel system. Although the exact amounts aren't precisely known now, EPA is concerned about any increase in the amount of cancer-causing substances emitted into the air that we all breathe.

What Could Happen to My Pocketbook or My Car if I Switch Fuel?

More Frequent Maintenance

Many cars today need oil changes only every 7,500 miles and spark plug changes every 30,000 miles, but if you switch fuel, you will have to change them about twice as often in order to make sure that your engine is operating properly. This increased maintenance will cost you money. The longer intervals between spark plug changes that are common for current cars are due in large part to the use of unleaded fuel. Since spark plug deposits are reduced, and the oil isn't contaminated with combustion by-products of lead and other additives, maintenance intervals can be extended for cars that use unleaded fuel.

Also, the use of unleaded fuel will make your muffler last longer, so if you switch, you could wind up paying for more frequent muffler changes. In addition, there may be some cars that might have problems with internal engine components such as valves if switching occurs.

Your Engine May Knock

If the use of leaded fuel causes your EGR valve to plug, your engine may start knocking, since EGR is an effective anti-knock agent. If knocking becomes severe, engine damage could result.

Vehicle Performance May Be Reduced

If enough lead is used the catalyst on some cars is apt to become plugged. This will increase the backpressure on the engine and reduce the performance of the vehicle. If the EGR valve is plugged, this can alter the shifting of your automatic transmission and cause premature transmission wear.

What are Legal Penalties for Switching?

You Could be Caught by an Inspection Program

Because the air in many areas isn't as clean as it should be, most major metropolitan areas around the country will be starting Inspection and Maintenance (I/M) programs in the near future. These I/M programs will generally involve some test of your car's emissions. If your car fails the test, you may not be able to get new license plates until the car is fixed and passes a retest. Since your car's emissions will have greatly increased if you have switched, there is a good chance that your car will fail the test and need maintenance work. If your catalyst needs to be changed, this could be expensive, since the cost to change a catalyst could be over a hundred dollars. You cannot expect to get the catalyst replaced under the emission warranty on your car, because you probably will have voided that warranty by switching.

You May Be Breaking the Law, Or Causing Others to Break It

Twenty-nine States have laws that prohibit tampering with your emission control system, and there is a good chance that these State laws would treat switching as tampering. In addition, it is a violation of Federal law for service station attendants to cause or allow switching to occur. This law carries a $10,000 fine, so you could be causing trouble for your service station owner or attendant by switching.

Summary—Don't Switch

There are a lot of problems involved in fuel switching. It is a bad idea.

EPA realizes that several cents per gallon is an extra bite out of people's pocketbooks. However, we all will have to pay for the cleanup of our air, and fuel switching could cost you more in the long run than what you would save.

EPA believes that most of the push toward fuel switching is caused by the fact that unleaded gasoline is more expensive.

If you have been thinking about switching for that reason, you may want to write to the Department of Energy and ask them why the difference at the pump is so big when EPA's studies show that it cost only 1 or 2 pennies per gallon more to make unleaded gasoline. Congress is also planning to look into this situation. □

in Switching

Update

A review of recent major EPA activities and developments in the pollution control program areas.

AIR

Aid Planned For Clean Air, Growth

The White House has announced that eight urban areas have been selected to participate in a $4 million demonstration program aimed at aiding industrial growth while meeting clean air requirements.

The program, announced by Jack Watson, Assistant to the President for Intergovernmental Affairs, is sponsored by four agencies: EPA and the Departments of Commerce, Transportation, and Housing and Urban Development. Watson chairs the Interagency Coordinating Council, which includes the four agencies.

The Air Quality Technical Assistance Program is part of the urban policy President Carter announced March 27 last year.

The urban areas, selected from 75 applicants, will receive up to $500,000 each. They are Philadelphia, Pa.; Boston, Mass.; Bridgeport/Waterbury, Conn.; Buffalo/Erie County, N.Y.; Portland, Oreg.; Chicago, Ill.; Elizabeth, N.J.; and Minneapolis/St. Paul, Minn.

EPA Deputy Administrator Barbara Blum noted, "Non-attainment of air quality standards is a problem many distressed cities face. We look forward to the results of the demonstrations and are optimistic that they will show that economic development and the quality of the environment can co-exist."

New Clean Air Standards For Heavy-duty Engines

EPA is proposing new air pollution standards and testing procedures for heavy-duty gasoline and diesel engines in buses and trucks over 8,500 pounds in gross weight.

As required by the Clean Air Act Amendments of 1977, the new standards will mean 90 percent reductions in hydrocarbons and carbon monoxide as compared to uncontrolled 1969 emission levels. The shift in certification testing requirements is toward a better simulation of real-life operation, and is expected to ensure that the standards are being met on the road for the vehicle's full useful life.

"As the total amount of urban air pollution from light-duty cars and trucks is reduced, heavy-duty engines become a more important part of the overall problem," EPA Administrator Douglas Costle said.

Grant Awarded for Urban Air Planning

As part of President Carter's urban policy, the first of many Federal grants to assist urban areas in meeting transportation-related air quality problems was awarded recently by the Department of Transportation (DOT) and the EPA. The $129,050 grant was to the Portland, Oreg., Metropolitan Service District.

"Financial support from these air quality planning grants helps deal with one of the major causes of lung and heart problems in urban areas," said Barbara Blum, EPA Deputy Administrator. "These grants help fulfill President Carter's promise last March to provide assistance, under the Administration's urban policy, for areas earnestly striving to deal with unhealthy air."

The grants will provide 100 percent Federal funding to implement an integrated air quality/transportation planning process in areas not meeting clean air standards.

EPA apportioned $50 million for air quality-transportation grants under Section 175 of the Clean Air Act. An initial $25 million has been transferred to the DOT Urban Mass Transportation Administration, which will administer the grant program. This program is separate from the grants being awarded in eight urban areas to aid industrial growth while meeting clean air requirements.

Symposium Set on Particle Emissions

EPA and the Denver Research Institute of the University of Denver, Colo., will sponsor the second symposium on the transfer and utilization of particulate control technology. The symposium will be July 23-27 at Stouffer's Denver Inn. More information can be obtained from Fred P. Venditti, Program Chairman, Denver Research Institute, University of Denver, P. O. Box 10127, Denver, Colo. 80210. Phone: 303-753-2241.

ENFORCEMENT

Clearance for Fuel Additives

EPA announced recently that it has granted waivers to the Atlantic Richfield Co. (ARCO) for the use of two fuel additives, Arconol and MTBE.

Arconol, consisting primarily of tertiary butyl alcohol (TBA), may be blended into unleaded gasoline at concentrations up to seven percent. MTBE, which stands for methyl tertiary butyl ether, also may be blended in at levels up to seven percent.

EPA Administrator Douglas Costle pointed out that Arconol can be used to boost the octane of gasoline, acting as a replacement for lead and MMT which cause auto emissions to increase. MTBE can be used to increase the production of unleaded gasoline without adversely affecting automobile emissions, he said.

Coal Washing Agreement

The EPA and Columbus and Southern Ohio Electric Co. have reached an agreement in principle under which the company would continue to burn coal mined in Ohio and "washed" to comply with Federal air pollution standards. Cleaning of the coal prior to combustion would allow the burning of Ohio coal at less cost to the utility and the consumer than buying out-of-state coal. It would also help protect the jobs of Ohio coal miners.

EPA and Columbus and Southern will continue negotiations to work out details of the agreement.

GENERAL COUNSEL

Legal Opinions

The complete legal opinions of the General Counsel of the EPA are available for the first time in regular book form from the Environmental Law Publishing Service.

The General Counsel's Opinions include formal and informal interpretations of EPA's statutes and regulations. Many of these opinions carry the force of law. Others are relied on as precedent in deciding environmental disputes.

The two volumes, totaling 1,200 pages, are available for $150 from the Environmental Law Publishing Service, a subsidiary of ABC Publishing, 20675 Bahama Street, Chatsworth, Calif. 91311. Phone: 213-998-9830.

PESTICIDES

EPA Approves Natural Pesticide

EPA has approved a natural bacterium as a pesticide to control a serious plant disease that now destroys ten percent of nursery fruit trees on the West Coast.

The new pesticide, brand named "Galltrol-A" by AgBioChem, Inc., of Orinda, Calif., combats "crown gall," a plant ailment that kills or weakens young trees by causing cancer-like growths on their roots and stems.

EPA is limiting use of the bacterium to immature almond, apricot, cherry, peach, and plum trees in nurseries and orchards in California, Oregon, and Washington.

In a related development, EPA is revamping its processes for approving the sale and use (registration) of "biological" pesticides, such as bacteria, viruses, and hormones, so that they can be exempted from some of the tests required for conventional chemical pesticides. The ability of the biologicals to control target pests without affecting beneficial insects, wildlife, and man makes them attractive from an environmental and crop protection standpoint.

EPA plans to improve its handling of biological pesticides through:

- publication of a policy statement on the regulation of biologicals;
- development of guidelines beginning in July, 1979, that specify testing requirements for these products;
- completion of guidelines for companies to determine whether a would-be biological effectively controls pests;
- creation of a panel to recommend methods for assessing the risks posed by these products.

This panel will consist of university, U. S. Department of Agriculture, environmental, and industry experts.

Conditional Approval For Cotton Pesticides

To help cotton growers fight the increased resistance some cotton pests are showing to currently-used pesticides, the EPA is conditionally approving the use of four new cotton pesticides.

The new pesticide products are "Bolster 6" by Chemagro Corp., and three "synthetic pyrethroid" products—"Ambush" by ICI United States, Inc., "Pounce" by FMC Corp., and "Pydrin" by Shell Chemical Co. The sale of the insecticides will be allowed for 23 months while manufacturers complete additional tests on the products' effects on fish and wildlife in actual field conditions to assess their environmental impact.

Planned Action On Pesticide

EPA has completed reviewing the risks and benefits of the pesticide chlorobenzilate used to control mites on oranges, grapefruit, and other citrus.

At press time, EPA planned to allow continued use of the pesticide on citrus in Florida, Texas, Arizona, and California, but with certain restrictions to reduce possible risks to applicators.

Non-citrus uses on almonds, apples, melons, cherries, cotton, pears, walnuts, ornamentals, trees, and certain outdoor uses of chlorobenzilate are planned to be cancelled.

This action was scheduled to be effective within 30 days unless persons affected by the order requested a hearing.

R&D

Joint Research Set On Toxic Effects

EPA and the Food and Drug Administration (FDA) recently announced a $1.2 million joint research project to determine what effects toxic chemicals have on the human nervous system.

The research effort will be directed at developing short-term animal and test-tube tests for rapidly determining how toxic substances affect nervous systems. Scientists also will study the way in which chemicals in the environment affect animals and how the results of such studies might help in assessing possible effects on people.

Fire Impact Study

An EPA-state cooperative study is under way on the impact of agricultural and silvicultural burning in Oregon's Southern Willamette Valley. Involved are EPA laboratories in Las Vegas, Nev., Research Triangle Park, N.C., and Corvallis, Oreg., as well as EPA's Region 10 office in Seattle and the Oregon Department of Environmental Quality.

An air monitoring program was established last summer to identify the levels and sources of air pollutants. A smoke dispersion model is being developed at the Oregon State University Air Resources Center. The EPA Environmental Research Laboratory at Corvallis is attempting to put an economic value on the visibility loss to residents and visitors of the valley caused by field and slash burning.

Symposium on Fuel Conversion, Environment

The fourth symposium on the "Environmental Aspects of Fuel Conversion Technology" will be April 17-20 at the Diplomat Hotel in Hollywood, Fla. The sponsor is EPA's Industrial Environmental Research Laboratory. The objective is to review and discuss environmentally-related information on coal conversion technology. For further information, contact Franklin Ayer (phone 919-541-6260), or N. Stuart Jones (919-541-6258). Both are at Research Triangle Institute, P.O. Box 12194, Research Triangle Park, N.C. 27709.

SOLID WASTE

Resource Recovery Aid

EPA Administrator Douglas Costle recently announced that 68 communities across the U.S. have been selected to receive funding for solid waste recycling and resource recovery projects as part of EPA's new $15 million program to accelerate resource recovery. The funding will assist communities in the planning and development of projects to convert municipal trash and garbage into energy and to recover valuable materials usually discarded in landfills.

The program is part of President Carter's urban policy announced a year ago, designed to help the Nation's urban areas in dealing with social, economic, and environmental problems.

"Up to now," Costle said, "cities have often lacked funds to properly plan and carry forward the complex task of developing a resource recovery system. This program will help provide those funds."

TOXICS

Facts Point to Chemical Plant

The EPA recently said that available information continues to suggest that Dow Chemical Co.'s plant at Midland, Mich., represents the major, if not the only, source of trace contamination from dioxin chemicals called "TCDD's" in Michigan's Tittabawassee and Saginaw rivers.

The Agency's statement was made in a preliminary evaluation of a November, 1978, Dow report, entitled "The Trace Chemistries of Fire," which contended that the Dow pesticide making facilities were not measurable sources of the TCDD's previously found in fish taken from the Tittabawassee River, and that in fact dioxins may be a natural by-product of combustion.

Toxics Group Has New Member

The U.S. Department of Agriculture's Food Safety and Quality Service, which inspects meat and poultry products, has become a member of a Federal interagency group to curb hazards from toxic compounds.

Other agencies in the Interagency Regulatory Liaison Group are the Occupational Safety and Health Administration, the EPA, the Food and Drug Administration, and the Consumer Product Safety Commission

WATER

Public's Role Strengthened

EPA has revised its public participation regulations to provide more effective public involvement in planning and carrying out water pollution control, solid waste management, and drinking water programs.

One revised rule is intended to encourage and assist public participation in all programs under the Clean Water Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act. A companion rule establishes more specific requirements to promote public involvement in sewage projects built under the Clean Water Act's multi-billion dollar municipal grants program administered by EPA.

Sewage Treatment Costs

EPA has estimated that it will cost $106 billion, three percent less than estimated in 1976, to build the sewage treatment facilities needed to control water pollution from municipalities across the Nation, excluding pollution from storm sewers.

The 1978 estimate is three percent lower than the estimate of $109 billion (January, 1978, dollars) reported in the 1976 Needs Survey. These latest estimates reflect a better formulated and more consistent survey methodology; the greater amounts of information now available from such sources as new facility plans, basin plans, and discharge permits; and the expansion of the survey to include all facilities nationwide.

EPA's Needs Survey is conducted and submitted to Congress every two years. It provides a comprehensive estimate of the cost of meeting the Act's municipal requirements and assesses the needs of each State to serve as a possible basis for allocating construction grant funds among the States. □

REGION 1

Pittston Appeals

The Pittston Company has appealed EPA's decision to deny its request for a permit to discharge wastewater from its proposed 250,000 barrel per day refinery and marine terminal in Eastport, Me. A hearing date had not been set at press time. According to the Regional Office the permit would violate the provisions of both the Endangered Species Act and the National Environmental Policy Act. The denial was based on information from the U.S. Fish and Wildlife Service that showed the project would have serious adverse effects on the bald eagle. The eagle is endangered in the northern United States. EPA determined that nothing short of denying the permit would mitigate the adverse effects of the project on the eagles and their habitat.

REGION 2

Landfill Cited

Based on a request from the Region 2 office, the U.S. Attorney for New Jersey recently filed a 69-count complaint against the owner and operators of a landfill in Edison, N.J. The complaint is being made under the "imminent hazard" provisions of the Resource Conservation and Recovery Act of 1976. The civil action seeks an injunction, penalties, and damages against Scientific, Inc.; SCA Services, Inc., and a number of their subsidiaries, as well as three officials of those firms. Regional Administrator Chris Beck hailed the action saying, "This case is a prime example of how chemical waste landfills even after they are closed can go on like ticking time bombs threatening the public health and welfare. This particular landfill was closed by the N.J. Department of Environmental Protection two years ago, but it is still leaching material that we believe is endangering valuable groundwater resources."

Action on PCB Violations

EPA's New York office has initiated six civil actions recently for alleged violations of PCB regulations that govern disposal and marking of the toxic compound. At press time two settlements had been reached. A General Electric facility in Waterford, N.Y. paid $25,000 in penalties for four days of burning PCB's without EPA authorization. SCA Chemical Wastes Services, Inc., in the Town of Porter, N.Y. paid $15,000 for improperly storing PCB wastes in an unauthorized area on their property. The Regional Enforcement Division cited four other companies: New Jersey's Public Service Electric & Gas, the International Dismantling and Machinery Corporation, Edison, N.J.; Atlantic Electric in New Jersey, and Newco Chemical Waste Systems, Inc., Niagara Falls, N.Y., for similar violations.

REGION 3

Economic Aid Program Set

EPA's Philadelphia office is working with three other Federal agencies on a program to lessen the impact of pollution control costs on industry. Cooperating agencies are the Small Business Administration, the Economic Development Administration, and the Farmers Home Administration, which offer low interest, long-term direct loans. EPA has started a program to make businesses aware of those financial assistance programs by funneling information through State pollution control agencies and through notices about the program that accompany every Federal environmental permit issued in the Region. The program is part of the President's Urban Initiative because many eligible small businesses are located in cities. EPA Headquarters Economic Analysis Division and the Enforcement Program will determine which industries are most likely to be affected by pollution control regulations so the program can be tailored to their needs. Studies of individual plants will determine enforcement and assistance options.

Sewer Needs EIS

Region 3 will prepare an Environmental Impact Statement for the proposed wastewater treatment facilities of the Borough of Nazareth and the Bushkill-Lower Lehigh Joint Sewer Authority in Northampton County, Pa. The borough and the sewer authority have asked for Federal financial help to build the facilities. EPA can provide 75 percent of the funds for the project if it is approved. The Impact Statement is needed because of considerable public controversy over the project. Some of the major questions raised by concerned citizens include: whether the regional collection system is the best method of solving the sewage disposal needs of the area; what the social, economic, and environmental impacts of the project will be, and what alternative treatment methods are available. The Environmental Impact Statement will address the environmental aspects of these questions.

REGION 4

Energy From Solid Waste

The City of Memphis is using an innovative approach to solve two environmental problems and to produce energy at the same time. City garbage and sludge from two city sewage treatment plants will be incinerated at a city-owned Energy Conversion Center that was recently approved. The idea was first proposed in 1969 when the sewage treatment plants were being built because there was no appropriate site for sludge disposal. At the same time the city landfill was reaching capacity and officials were having difficulty finding a new site. The idea of a joint incineration facility was explored repeatedly, but encountered numerous problems. The sludge and garbage difficulties continued. The new $143 million Energy Conversion Center will be located near a refuse processing facility, which separates the metal and glass from city garbage and grinds the remainder into fuel. The fuel will fire a multi-hearth incinerator that dries dewatered sludge and then burns it. A boiler will convert the heat to steam, which the Memphis Light, Gas, and Water Company will sell. The Center will have a standby supply of coal or gas to ensure uninterrupted supply to energy customers. The part of the project dealing with sludge, about one-third, is eligible for 85 percent funding from EPA construction grant funds under the Clean Water Act because it uses innovative and alternative technology.

REGION 5

Fumes Waste Energy

Region 5 Enforcement recently took action against 13 oil company sources to reduce summer ozone levels in Ohio and to save gasoline. Regional Administrator John McGuire noted that a cleanup of current procedures at the loading racks of these facilities would take gasoline, which is now evaporating, out of Ohio's air and put it back into Ohio's automobiles. Improved handling of petroleum materials could save an estimated million gallons of gas per year. The oil companies that received violation notices for organic emissions are six companies owned by Standard Oil Co., four owned by Union Oil, and one each by Ashland Petroleum, Shell Oil, and Atlantic Richfield. EPA estimates that approximately 3,600 tons of polluting hydrocarbons are emitted by the 13 sources each year, more than four times the legal limit of 877 tons.

REGION 6

Environmental Office Opens

The Dallas Regional Office has provided funds to help New Orleans establish a new Environmental Affairs Office. EPA provided a $200,000 grant that will help the city train employees to respond to critical environmental problems. Regional Administrator Adlene Harrison said, "This kind of innovative project has my complete support. We will continue to work closely with New Orleans Mayor Ernest N. Morial and his staff to find practical environmental solutions that will benefit the area and its citizens."

DDT Use Approved

EPA has given the Louisiana Department of Health and Human Resources a crisis exemption to use DDT for control of fleas carrying murine typhus. The exemption is authorized under the terms of the Federal Insecticide, Fungicide, and Rodenticide Act. One case of typhus has been reported in a Shreveport, La., warehouse and diseased rats have been found in the area. A large number of employees in the warehouse may have been exposed to the disease and officials acted quickly to prevent it from spreading further.

REGION 7

Iowa Public Participation

Region 7 is always looking for a better way to tell people about environmental programs and regulations. To help get the word out and to make sure that the message is understood, the Iowa League of Women Voters presented a series of six environmental training meetings for about 25 Iowa county representatives. The training, which was sponsored by an EPA Public Participation grant, helped the representatives to publicize the final draft of Iowa's Areawide Water Quality Plan under Section 208 of the Clean Water Act. The meetings featured a panel of radio, television, and newspaper people who showed ways to get local media interested in stories about the 208 plan.

REGION 8

Rail Emergency

The Region 8 Emergency Response Team recently was called to the scene of a train derailment near Tie Siding, Wyo. Fire erupted from two phosphorus filled tank cars, which cracked open when the Union Pacific train went off the tracks. Farmers and ranchers in the area were evacuated because of fumes from the fire. Federal, State, local, and railroad representatives at the site agreed to the solution proposed by Army officials. They detonated an explosive in one of the cars to speed up the burning, and drained the remaining phosphorus out of the car into a containment area so that nearby Dale Creek would not be contaminated. Farmers were allowed to return to their homes and cleanup operations began the next day.

REGION 9

Conservation Program Funded

Two California projects used EPA water quality management funds to encourage local farmers in the use of soil and water conservation practices. The Association of Monterey Bay Area Governments coordinated the projects through the Gloria Resource Conservation District, which hired a soils specialist to give technical assistance to their farm educational program. In a complementary arrangement with the Soil Conservation Service, EPA paid for program development and the SCS provided transportation, office space, and technical equipment. With the help of the project, Monterey Bay farmers invested over $250,000 in farming methods designed to decrease soil erosion and conserve water. The soil specialist also helped two farmers near King City, Calif., to control a serious irrigation runoff problem that was causing flooding in parts of the city. They built a $40,000 water recovery system that diverts irrigation runoff into a holding pond where sediment settles out, then recycles the water into the farms' irrigation networks. The projects were so successful that a neighboring resource conservation district has cooperated to rehire the soil scientist to continue the program.

REGION 10

Lab To Open

Region 10 laboratory personnel plan to move into new quarters in Manchester, Wash., next month. The $2.1 million laboratory will support EPA programs in Alaska, Idaho, Oregon, and Washington with chemical, biochemical, biological, and microbiological analyses and evaluations. The lab, which will eventually have a staff of 40, is located across Puget Sound from Seattle. It will provide assistance to other government agencies and private laboratories as well.

Water Penalty Set

The chief judge of the U.S. District Court in Boise, Idaho, has assessed $114,640 in civil penalties against the Bunker Hill Company's lead and zinc smelter complex in Kellogg, Idaho. The penalties were set after a court trial for violations of the company's wastewater discharge permit, which took place between 1974 and 1977. The bulk of the penalties, $84,500, was assessed at the rate of $500 per day for unauthorized discharges from one of six outfalls. Unauthorized discharges from the other five outfalls were fined at rates of $10 or $100 per day. □

Michael Cook

He has been named Director of the Facility Requirements Division in the Water and Waste Management Program. His job is to guide, assist, and evaluate planning for construction of federally-funded municipal sewage treatment systems, and to analyze long-range policy for the construction grants program. Cook has been Acting Division Director since September, 1978. He was chief of the Facility Requirements Branch from 1975 to 1978 and of the Permit and Policy Branch in 1974 and 1975. He joined EPA as a program analyst in 1973. His previous government service was with the Department of State in various positions from 1966 to 1973. Cook received his B.A. from Swarthmore College in 1963, was a Woodrow Wilson School Fellow at Princeton University in 1963, and was a Rhodes Scholar at Oxford University, England from 1964 to 1966. He was awarded the EPA silver medal for superior service in 1976, and the EPA gold medal in 1978.

Donald E. Hamer

He has been appointed Director of Budget Operations in the Office of Planning and Management. In this position he provides advice and guidance to the Administrator and staff officials on budget policy; develops and issues budget policies systems and procedures for EPA; directs and coordinates preparation of the EPA budget and helps present it to Congress. Hamer comes to EPA from New York City's Human Resources Administration where he was Commissioner of the Department of Employment, directing the administration of its $364 million employment and training program. He began working for the Human Resources Administration in 1971 as Director of the Public Works Project, and subsequently served as Assistant Commissioner for Planning and Program Evaluation and for Comprehensive Employment and Training. For several years he was a consultant to Federal, State, and city governments and private businesses in the development of training programs. Hamer began his education at MacMurray College, Jacksonville, Ill., and continued it at Columbia University, and the New School for Social Research, Center for New York City Affairs.

Sheldon Novick

He has been appointed Regional Counsel for EPA's Philadelphia office. Novick joined EPA as Special Counselor to the Region 3 Administrator in October, 1978. Before coming to the Agency he was an attorney for a New York City law firm. For more than 10 years Novick edited and published *Environment* magazine, which monitored the activities of Congress, the Courts, and Executive agencies on environmental matters. He has written three books and numerous articles for national newspapers and magazines. Novick received his law degree from the Washington University School of Law, St. Louis, Mo.

Martin Luther King III, son of the slain black civil rights leader, was a featured speaker during EPA's Black History Week observances. He outlined in a talk at EPA Headquarters important events in the early civil rights movement and spoke about the tremendous strides made by black people during the last 25 years. King said, "all the decisions shaping our lives come through those elected. We must support those who will represent us.

"Now many cities have black leaders," he continued, "but our quest is not over." He pointed out that economic justice is a necessity. King spoke about the establishment of the Martin Luther King, Jr. Center for Social Change in Atlanta to address the concerns his father raised about poverty, racism, and war. He is a senior at Morehouse College in Atlanta and plans to go on to law school before pursuing a political career. King works parttime at EPA's Atlanta Region in the Civil Rights Office, where he works with contract compliance and equal employment opportunity programs. He says one reason EPA interests him is because of its large public works program and the impact it can have on minority and small businesses.

A Reply from the Steel Institute

The subject of the January 1979 issue of the *EPA Journal*, the impact of the environmental cleanup on the economy, is one with which the American Iron and Steel Institute, a trade association whose 63 member companies represent 92% of the nation's steel production capability, is very seriously concerned.

In general, I thought that the presentation was good and well balanced.

The article, "An Economist's View," an interview with Dr. Paul Samuelson, in discussing the steel industry, presents a distorted viewpoint of the industry, of the place of our industry in the nation, and of the place of the United States in the world economy. It made me angry. It is out of place in a publication like the *EPA Journal*.

In response to a question about the steel industry, he says, "And so an extremely filthy industry . . . simply ought not be in the middle of a prosperous suburb or in the middle of a prosperous country." His whole argument centers around "letting the industry move abroad." He talks about "the old Pittsburgh and Gary Ind. approach." He talks of "the old 1919 methods of polluting the environment."

We certainly acknowledge that the steel industry has the potential to put a lot of dirt into the air and a lot of pollutants into the water. But we recognized our problems long ago, and we have come a long way toward solving them. The American steel industry has in place today environmental control facilities worth over $5,000,000,000. We have commitments to spend and are spending additional capital at a rate of over $500,000,000 per year to provide further controls. Our modern up-to-date plants are, environmentally, as good as any in the world.

Yes, we still have a long way to go. Yes, we disagree with some of the regulatory policies of EPA, largely because we believe that they are not cost effective. Yes, a number of steel companies have been sued and have even paid fines for noncompliance. But, no, we are not an extremely filthy industry. And, no, we should not be banished from the United States.

The Solomon Report stressed as a U.S. government objective, "to assist the steel industry in a manner which will stimulate efficiency and enable the industry to compete fairly." The EPA was encouraged to investigate to see if "it may be possible to achieve our goal of a cleaner environment at a reduced economic cost." Since that report was issued, EPA has been working with the American Iron and Steel Institute to try to develop regulatory policies to achieve that goal.

Must we again have rhetoric calling us a filthy industry and suggesting we be banished from the country? For shame. *EPA Journal* should not foster this sort of thing.

E. F. Young, Jr.
Assistant Vice President
Environmental Affairs
American Iron and Steel Institute
Washington, D.C.

News Briefs

Steel Cleanup Agreement

EPA, three States and Wheeling-Pittsburgh Steel Corporation, the eighth largest U.S. steel producer, have reached a major agreement on a program to bring the company into compliance with air and water pollution control regulations. The agreement, which covers all of the company's plants will protect nearly 15,000 jobs in Pennsylvania, Ohio and West Virginia. EPA Administrator Douglas M. Costle announced the agreement will mean compliance by all Wheeling-Pittsburgh plants between now and 1982 with clean air and water standards.

Calendar of Regulations

The new Regulatory Council recently published the first Calendar of upcoming Federal Regulations. The Regulatory Council is composed of the Departments and Agencies that regulate. The calendar, to be updated and re-issued by the Council every six months, shows 109 important rules in five general areas being considered by 20 Federal departments. "I believe this first edition of the calendar marks a significant milestone in the collective ability of the regulatory agencies to examine their actions and produce the most cost-effective rules possible," said Council Chairman Douglas M. Costle.

The Oil Outlook

Continued from page 27

if we are to efficiently meet our national goals for both health and energy.

The idea of Prevention of Significant Deterioration, or PSD, has also caused much emotional stirring. These rules are stricter than the secondary standards, which, according to the Clean Air Act, are supposed to protect public welfare, including "effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being."

Beyond that, there seems little left to protect. So, many in industry have raised a question about the need for PSD rules in wide areas of the country. For raising the question, they are labeled "despoilers of our national parks." In the case of parks, wilderness regions, and wild and scenic rivers, no one quarrels with the intent of the PSD rules. Certainly, the petroleum industry has neither the need nor the desire to plop a refinery down in the middle of a national park. By focusing on those truly pristine areas, the emotional debate does the Nation a disservice. It draws attention from the much larger PSD areas farther away, where much of the Nation's energy potential may lie.

Finally, and perhaps predictably, people tend to get emotional when they talk about money for pollution control. Environmental advocates argue that because health is involved, we must have "clean air at any cost." The business community, on the other hand, has found it too easy to label much environmental spending as inflationary.

Environmental controls are indeed expensive. They are also necessary. But this does not mean we can afford clean air at any cost. The reason, ironically, is found in the cornerstone phrases of the environmental movement: "Everything is related to everything else"; and "There is no free lunch." These phrases are absolutely correct, and they apply absolutely to pollution control.

Quite simply, to get cleaner air, we give up something else. And this is especially important for improvements beyond health protection. Each dollar spent on pollution control is unavailable to be spent on social services, mass transit, vacations, housing, or whatever else people want or need. Clearly, those who advocate clean air at any cost are making a lot of important decisions for a lot of citizens.

Our Nation has a long way to go to resolve its energy and environmental problems, but I am much encouraged by some of the trends I see. More attention is being paid to cost-benefit studies. There is a greater recognition of the need for flexibility and the potential for improved efficiency in emission control.

One example of such flexibility is the "bubble concept," which would set overall emission limits for a plant—as if it were under an imaginary bubble—rather than regulating each separate stack or piece of equipment. Thus, a company could find the most efficient way to reduce plant emissions, and innovation would be encouraged.

Another example is the idea of "banking" emission offsets. Banking will give a company future credit for shutting down an older, polluting facility and thus will speed the cleanup today and help provide a margin for growth tomorrow.

These ideas are long steps in the right direction. Just as important is the spirit they represent—the will to determine the proper goals and set up flexible, efficient ways to achieve them. With that spirit, all interested Americans can cooperate, make the Clean Air Act work and enjoy its benefits. □

States Served by EPA Regions

Region 1 (Boston)
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
617-223-7210

Region 2 (New York City)
New Jersey, New York, Puerto Rico, Virgin Islands
212-264-2525

Region 3 (Philadelphia)
Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia
215-597-9814

Region 4 (Atlanta)
Alabama, Georgia, Florida, Mississippi, North Carolina, South Carolina, Tennessee, Kentucky
404-881-4727

Region 5 (Chicago)
Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota
312-353-2000

Region 6 (Dallas)
Arkansas, Louisiana, Oklahoma, Texas, New Mexico
214-767-2600

Region 7 (Kansas City)
Iowa, Kansas, Missouri, Nebraska
816-374-5493

Region 8 (Denver)
Colorado, Utah, Wyoming, Montana, North Dakota, South Dakota
303-837-3895

Region 9 (San Francisco)
Arizona, California, Nevada, Hawaii
415-556-2320

Region 10 (Seattle)
Alaska, Idaho, Oregon, Washington
206-442-1220

TVA's New Look

Continued from page 20

is not in the public interest. You know, we still have a major need to clean up the air. And TVA just issued a report entitled "Where the Water Isn't Clean Any More."

The Tennessee Valley is full of troublesome water quality problems that the enforcement powers of EPA and State agencies have not cleaned up yet. It's not our job, under the law. We're not the enforcement agency, but we could "smell it."

We're trying to change the tone of the debate, to get the polluters on the defensive rather than the people who are trying to clean things up. I have been troubled at the irresponsible comments by people in high office, in my administration, saying environmental protection is inflationary.

I think people who have soaked themselves in the facts know better. Some of the best investments that we're making in this country are investments in air pollution control where the data show that the benefits are enormously great. And these investments are anti-inflationary.

If you add years to someone's life, that is productive. There is just a lot of loose talk that somehow has painted investments in environmental protection as being inflationary and nonproductive. It is investments in power plants to heat the outdoors that are inflationary investments.

It's the unnecessary waste of capital, the waste of gasoline, that is causing us to pay these enormous prices for new energy sources and is inflating the economy. And I think it must be recognized that the strongest weapon we have in the fight against inflation is conservation.

The conservationists and the environmental protectors are identical, practically, in terms of their perspective, and they are often the same person. I know from having been in this, way back before there were any "energy czars," the people who were environmentally sensitive were among the first in this country to raise the conservation option.

They knew that conservation was the most fundamental way to protect the environment, because there weren't any alternative sources available that really were benign. So, I would hope that the people responsible for environmental protection can stand up proud. We have a powerful message that needs to be delivered to the American people. We need to reverse the tables and get the people who are inflating the economy to defend their practices, rather than making offensive remarks about the programs that I think may lead this country out of its economic problems.

Water vapor is discharged from cooling towers in foreground at TVA's Paradise Steam Plant in Western Kentucky.

Back Cover: Spring flowers bloom near a stream in the Rocky Mountains.

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