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Not So Exotic

Solar Power for the Seventies

by Egan O'Connor

I wish to address the question of HOW SOON this country could enjoy safe electric power and clean fuels produced by solar energy.

In Nixon's outline of "Project Independence," his name for making this country independent of foreign fuel-sources by 1980, he did not mention solar energy once. That omission makes his speech completely consistent with the widespread notion that solar energy can't possibly help us out of our energy problems in the 1970's. A typical "explanation" of that "fact" goes like this:

It will take us years to work out the technical problems and test the demonstration plants and reduce the cost. And after that, don't you know it takes 10 or 20 years to build an industry and achieve a significant market penetration? Just look at nuclear fission. After 20 years of work and promotion, it supplies only one per cent of our energy. What makes you think it can be any different with solar energy?

It all sounds so plausible that even some friends of solar energy swallow it. I intend to examine those assertions point by point, but first I would like to make two points of my own: there's a lot of solar energy around, and working solar energy equipment exists today. Therefore, if this country were really determined to introduce solar energy in the 1970's, it could be done — which is the thesis of this paper.

WHAT DOES SOLAR ENERGY DO?

To describe the amount of solar energy arriving on this planet every day, I will use some estimates from the article by Dr. M. King Hubbert entitled "The Energy Resources of the Earth" in the September 1971 issue of *Scientific American*.

About 30% of solar energy reaching the Earth is directly reflected back into space. Another 17% of it is absorbed by the atmosphere, the land, and the oceans, where it is converted to heat; this heat, too, is eventually re-radiated into space — otherwise the planet would accumulate more and more heat every day. About 23% of incoming solar energy is spent driving the Earth's water cycle — evaporation and precipitation — before it is re-radiated to space as heat. It takes much less than one per cent of our incoming solar energy to power all the winds and the waves and the atmospheric and oceanic circulations; friction eventually converts this energy to heat, too, which is re-radiated.

Amazingly, all the plants on Earth, which provide all the food energy for all the animals on Earth, use less than three ten-thousandths of

the incoming solar radiation. Plants capture solar energy chemically through the process of photosynthesis.

Solar energy, which is just passing through our ecosphere on its way back to space, is manifest in many forms — heat, light, lightning, motion (kinetic energy), and chemical energy; it can also be manipulated to become electric power on its way.

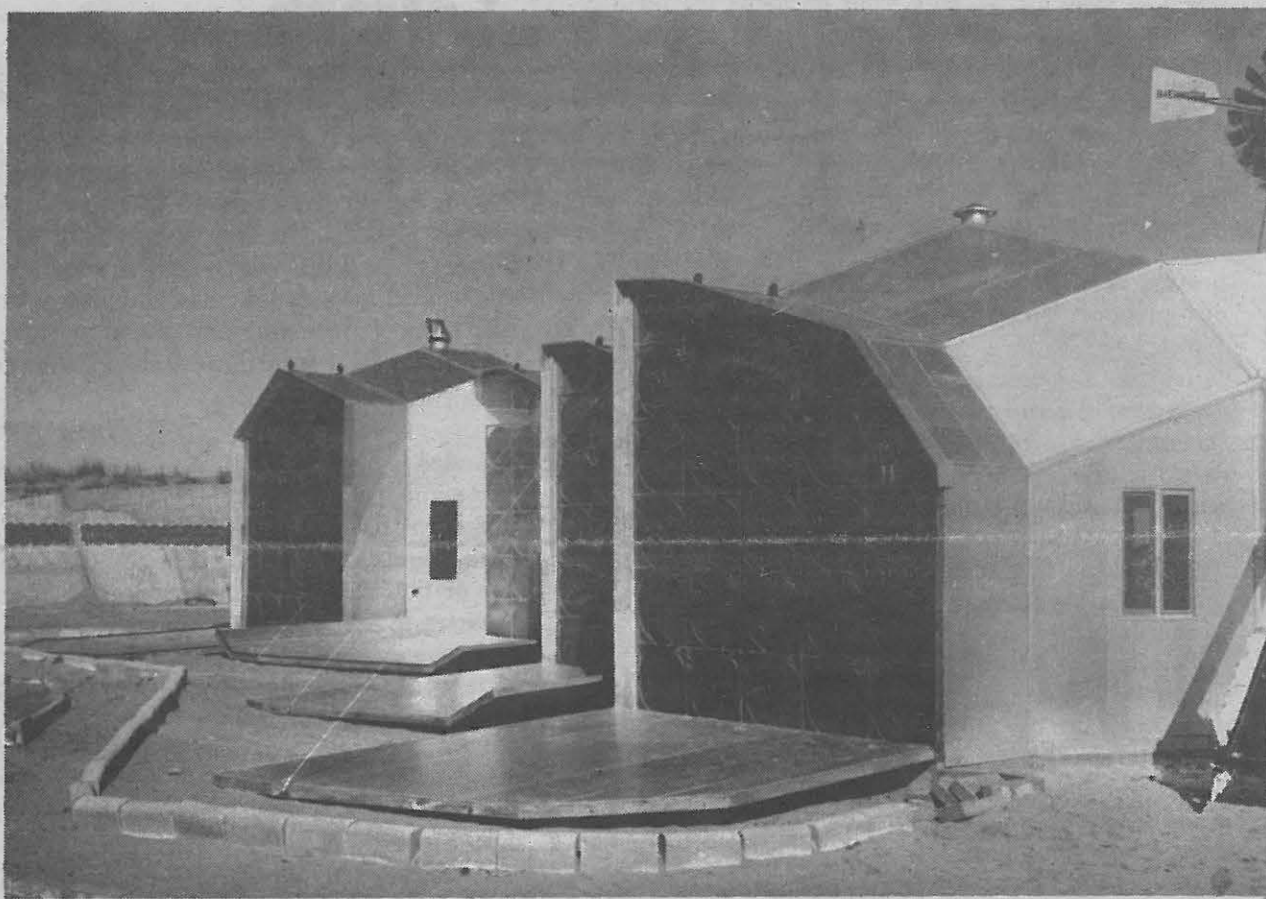
The late, great chemist, Dr. Farrington Daniels, pointed out in 1970 that, "Solar energy is amply adequate for all the conceivable energy needs of the world. It is harmless and it is certain to work. . . . Surely solar energy will be important within 20 years, and if enough financial support should become available, the time could be considerably less."

SOLAR EQUIPMENT

It defies common sense to say that, "realistically," solar energy can't help us at all in the 1970's. With our own eyes, we can go visit solar energy equipment and components which are working today:

- solar-heated homes;
- solar-powered refrigerators;
- solar-electrified homes (with wind generators);
- stoves and cars running on solar-made methane (or hydrogen);
- solar cells silently converting sunlight to electricity with 17% efficiency on Earth, and in Space, running Skylabs;
- a power plant getting 10% of its fuel from organic trash (ex-plants);
- an installation producing low-sulfur oil from manure (ex-plants) and sewage;
- fuel cells producing electricity without thermal pollution;
- electrolyzers converting solar energy to clean hydrogen fuel;
- hydrogen pipelines;
- low-temperature vapor-turbines suitable for solar-heated vapors;
- batteries-flywheels-air compressors (for solar energy storage);
- and an array of working solar devices at Dr. Erich Farber's Solar Energy Lab at the Univer-

(Continued on page 4)



Egan O'Connor asks in this issue's cover story "How soon before this country can enjoy solar power?" Steve Baer of Zomeworks in Albuquerque, New Mexico answers, "Right now!" Pictured above is some of the solar power equipment developed by Zomeworks. The blackened drums stacked on the south facing wall are filled with water which heats the dwellings. The windmill (Baermotor) in the upper right provides electrical power. For more on solar technology, see pages 8 and 9.

HIGH COUNTRY

By Tom Bell

John Cole, editor of *Maine Times*, has been talking of the post-industrial era for the last year or two. His discourse has been upon post-industrial ethics and policies as being applied to Maine. His idea, of course, is that Maine would be a good place to start the post-industrial era — a microcosm of the world.

The year 1974 may be a turning point for post-industrial ethics. It all depends on the reactions of the American consumer in the wrenching year we face. No one has really fully squared with the American consumer on some of the consequences that now appear possible. The fact is that we are into such a new and incomprehensible situation that no one can really foretell what lies ahead, even in the next six months.

Preliminary indications are that the American people have taken the initial shocks of the energy crisis in good stride. But what happens if literally hundreds of thousands of people are out of work by June may be another matter. The government, if it has made any contingency plans for such a development, isn't telling its people.

The horror of the energy crisis is that it may precipitate a food and a mineral crisis. When that happens we may all be in the soup.

But let us assume that the Mid-East situation improves, that oil starts flowing once again, and that our present situation is relieved ever so slightly. What then? Will we continue on our way of waste and conspicuous consumption, or will we stop and seriously consider the way ahead. In the latter category, the omens are not good. Politicians are scared to death of the inside information they are privy to. Some of them are surely aware of the consequences they see on the horizon. But they do not want to be the first to speak out. It is as I wrote at the end of this column just a year ago, "The truth is just too horrible to contemplate."

The year 1974 could be the year of the turn-around. In some ways, it could be a turning back, for instance more men in the fields instead of the huge gas-guzzling mechanical cultivators, sprayers and pickers. (The men may be glad to get the work anyhow.) More men are going to have to go into the deep coal mines eventually. Why not start training them now?

Somewhere down the road, growth has to be controlled. For the first time in recent history, our population increments are below the replacement level. If that level can be maintained for the next 70 years, our country's total population will be stabilized. That beginning, for population problems are basic to many of our other problems.

The energy crisis will force us to curtail growth in other areas. It has already caused some dislocation but nothing compared to what lies ahead. If the trauma does not bring on social chaos, we can weather it through-going and emerge stronger in will and spirit.

We can control growth. We need to compare our situation to a speeding train. In order to get off safely, you must slow it down gradually.

We have the time. We just need to know the way. In this situation, the words of the Bible are quite apt. "For narrow is the gate, and difficult is the way that leads to life." Matt. 7:14.

Some difficult decisions lie ahead. One of the most difficult will be to renounce the "growth is good" syndrome. In the short run some growth may be good — while we are slowing the train. But in the long run we must come to terms with a "spaceship earth." And that is what a post-industrial ethic is all about.



Letters



Dear Editor,

The industry line has gotten ahead of us on the Mansfield Amendment. They are all of a sudden pulling this big "concern for private property" act. What people should realize is that the federal government has way more control over what happens to your property if they do lease the coal for strip mining than if they don't.

A prime example is the Decker-Birney study. In the study area, over 70% of the surface included is private but 88% of the coal is federally owned. Based on the tremendous amount of federal property the BLM is now drawing up a "land use plan" for the area! There are one or two very large landholders in the area anxious to sell their surface (or lease it) and if all there were were written consent the rest of us would be washed away or developed away or polluted off the land.

The tentative development plans in the "preliminary discussion paper" given the Montana Energy Advisory Council speaks of minimum development as 80 million tons of coal exported a year and maximum is still 80 million tons mined but on top of that are eight gasification plants and two 1,000 MW power plants! — some 57,000 acres mined but some 200,000 acres of range land taken up for development and some 10,000 acres of bottom and farm land. This does not of course, include the Northern Cheyenne or the Crow Indian reservation or any of the rest of Montana or Wyoming.

I am extremely concerned about getting this kind of information out to the general public. Our real problems are with uncommitted people who find the "energy crisis" so compelling and for some reason really think that this western coal will solve the immediate problems.

Well with all that happy news and thoughts, I will abruptly change the subject and wish you and everyone at HCN a warm (hearted) and happy Christmas. I really would like to meet you some time!

Best,
Carolyn Alderson
Birney, Mont.

P.S. Surely there must be some ranchers in the oil shale country who object to the development! People really should be more concerned about where the water for their food and drinking is going to be found than for keeping their houses at 75 degrees!

Dear Sir:

The suggestion in your November 9 article "The Making of an Energy Skinflint" that conserving on home lighting will have an 'insignificant' effect on energy conservation has probably left your readers in the dark. A little arithmetic and a home experiment we carried out may help to shed some light on the subject. Two years ago we checked all the light bulbs in our house to find the minimum wattage needed for comfort and replaced all bulbs which had wattage in excess of our needs. The result was a 10% drop in our electric consumption without any other conservation measures.

Let's consider the effect of just two of the replacements. One was a night light of 40 watts which we replaced by a 7½ watt bulb. Assuming that this light burns for approximately 10 hours a day, the saving amounts to about 10 kilowatt-hours per month. A 150 watt bulb in my desk lamp was replaced by a 75 watt bulb. Assuming this bulb burns on the average of five hours per day, the saving would amount to about 11 kilowatt-hours. Thus from these two changes alone we achieved a saving of about 21 kilowatt-hours or 3% of our average consumption of 650 kilowatt-hours per month. It is easy to see from this how we obtained our 10% saving. The *Statistical Abstract of the United States* for 1971 shows that the average household uses 600 kilowatt-hours of electricity per month so that the figures I have used above are probably fairly typical.

It is true that the rate at which light bulbs use electricity is small, but so many are used and for such long periods of time that their contribution to household energy consumption is considerable.

Yours sincerely,
Robert B. Kelman
Professor of Computer Science
Colorado State University

P.S. In case you're interested in the calculation of kilowatt-hours given above, it goes this way. Switching from a 40 watt to a 7½ watt bulb gives a change of 32½ watts. Multiplying by 10, the number of hours the light burns each day, we get 325 watt-hours per day. Multiply that by 30 days a month and one finds 9750 watt-hours per month. Dividing by 1000 yields 9.75 kilowatt-hours per month. The calculation for the second light bulb is left as an exercise for the interested reader.

Editorial



High Country News-3
Friday, Jan. 4, 1974

Industry Ignores People

Big industry has come to be personified as an insensitive and impersonal institution whose actions are guided by an office bureaucracy impaneled on Wall Street or some other distant place. The object, pure and simple, is to make money for the stockholders and thereby the officers of the corporation. If people get in the way while the corporation is bent on profit, it is regrettable but necessary.

As big business and big industry begin to throw their weight around while acting in the "public interest" to alleviate energy shortages we will see more and more regrettable incidents. In other words, big industry is going to live up to its billing as a social ogre.

A good illustration came to light last week when Utah International announced it had applied for a reservoir permit on a tributary to Wyoming's Powder River.

My curiosity was aroused when I remembered good friends own a ranch in the area. I called to see what they knew of the reservoir. They knew nothing more than what they had read in the newspaper. I called the Wyoming State Engineers' Office and found application had indeed been made for a reservoir, on Nov. 30, 1973, by Utah International.

It turns out that Utah International has planned a huge coal gasification project just across the line in Montana but wants to store water in Wyoming. The company has never asked the two ranchers whose private lands are involved an aye, yes or no about the use of those lands in its vast plans.

Similar incidents have been brought to light in both Montana and Wyoming in regard to proposed strip mines, proposed railroad rights-of-way, and other features of huge industrialization.

zation.

Still another example of big company callousness has been revealed in Southwestern Wyoming. There, Texas Gulf Sulfur announced a \$75 million project to develop soda ash. The impact of development has already had devastating effects on the rural community of Lyman, some 20 miles away in another county. The area is already impacted by construction of the huge 3-unit, 1,500-megawatt Jim Bridger Power Plant. About twice as many construction workers were brought in as Pacific Power and Light Co. had earlier announced would be needed. Now, PP&L has said it is contemplating another 500-megawatt unit, with possibly two or three more in the future.

Montana has a siting act which requires companies to reveal plans years in advance of development. Such an act gives communities and county governments time to plan and prepare. It is time Wyoming considered a similar act. Big industry would then be forced to act socially responsible.

—T.B.

Guest Editorials



Reprinted from the DESERET NEWS, Utah, Dec. 11, 1973

Utah Faces Agonizing Energy Decisions

Utah, with extensive coal and oil shale beds, must make some agonizing decisions in the near future if the state is to fulfill its role in helping to solve the energy shortages.

That much is certain if Congress and President Nixon decide to adopt a five-year, \$10 billion federal program on energy proposed recently by Dr. Dixy Lee Ray, chairman of the Atomic Energy Commission.

Even if Dr. Ray's recommendations are not adopted, some variation is almost certain to emerge which puts heavy emphasis on coal, oil shale, tar sands, and uranium — all important for Utah.

One fundamental question the state must resolve is water. Gasification of coal and processing of oil shale both require great amounts of water. The Division of Water Resources estimates, for example, that roughly 150,000 acre-feet of water is needed annually for each

one-million barrels of oil produced from shale. That includes water needed for townsites.

That raises the prickly issue of water allocation. Industrial users almost invariably can outbid agriculture for water. And with limited supplies of water, how will Utah protect agricultural users?

Probably the greatest hope for new water resources to handle both needs is the Colorado River. Utah currently has about 200,000 acre-feet of Colorado River water-right that is still relatively uncommitted. That entitlement, however, is currently flowing on down to lower-basin states because the state doesn't have the dams to utilize all its entitlement.

Additional water resources may also possibly be found by reappraising previous commitments. The increasing development crunch, however, may well force a complete review — possibly a revolution — in how the state looks at water matters. Can the state, for example,

continue to allow water resources to go to the highest bidder, a policy which has persisted for at least 50 years?

Other vital questions also must be answered: Is it cheaper to bring the water to the coal and shale beds or to transport those products nearer the water sources? Is coal gasification economically feasible on a large scale, and is that the most efficient use for our huge coal reserves? Is "in situ" (in place) recovery of synthetic petroleum from oil shale the most practical method, considering environmental damage from strip-mining?

Considering all the ramifications of the energy program and its impact on the state, Utah may well consider following the federal lead in appointing its own energy czar. Certainly that is one way of focusing all the problems on one office in unifying the state's approach to the many decisions that must be made.

HIGH COUNTRY NEWS

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Reprinted from The Billings Gazette, Montana, Nov. 26, 1973.

Can Taxes Scare Coal Men?

Noted with much interest is the announcement of a Wyoming senator that he plans to introduce legislation to increase taxes on coal.

The senator's beef, an understandable one, is that Wyoming leases state-owned coal lands for 25 cents an acre. He calls it ridiculous, an understatement of the year.

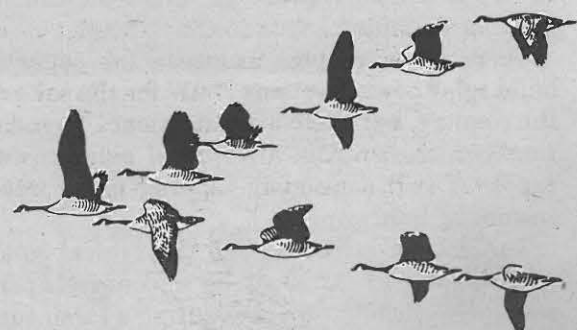
Wyoming should get at least as much as Montana, says the senator. And oh, how we do agree.

The Gazette has advocated for some time that states in this coal-rich region adopt uniform laws on coal taxes, strip mine regulation and pollution. In that way the people of the area would stand united in their determination to save their land, air and water from destruction.

But as things are, a few words of warning to the Wyoming senator. If you keep up those actions, raise those taxes and that sort of commotion, well, the coal operators will just move right out of your state and come to Montana!

That's what they told Montana legislators they were going to do when our coal taxes were raised.

Wyoming or bust!



Solar '70s...

(Continued from page 1)

sity of Florida (Gainesville 32601) which includes solar engines, solar pumps, solar water heaters, solar sewage treatment, and solar water distillers.

I doubt that Americans could keep their tempers very long if they could see what is being denied to them. Though government and industry are claiming that fossil fuels and nuclear fission are our **only** practical near-term options, I will make my counter-claim again:

Solar energy is the MOST practical and attractive and possibly even the cheapest way to expand our power and fuel supplies under "Project Independence" during the 1970's.

It takes over eight years to build a nuclear power plant. It takes about five years to build an additional coal burning plant. It will be 1980 before coal gasification plants are making a meaningful contribution to our energy supply. The same is true for oil shale.

To me it seems self-evident that engineers and industry could produce wind generators and methane-makers and solar heat-concentrating devices just as quickly as they could deliver on the so-called "immediate" fossil and fission options. Yet the notion is promoted that solar energy can't even be **considered** as a near-term contributor.

THE TECHNICAL PROBLEMS

"It will take us years to work out the technical problems." This objection often comes from technical experts. For non-technical people to realize what is meant, we can read proposals for solar energy research grants. They are replete with plans for comprehensive calculations on the performance, durability, efficiency, cost, and other characteristics of practically every sub-system and component; analysis of "trade-offs" at every turn between efficiency, cost, strength, and so forth of the various design variations; analysis of "interface" characteristics of one set of components with another; production and performance tests for various segments of the system, and so forth. Engineering is an awesome art which I respect.

The point is that there can be years of difference, even decades, between developing solar energy systems which just **work** (contribute power), and developing elegant systems which work as well as engineers know they can **someday** work. The first generation of fossil fuel electric plants certainly did not work as well as today's, but they surely produced a lot of power.

If competent engineers built wind power plants, methane power plants, and solar heat-concentrating equipment today with the knowledge they have now, it is **INCONCEIVABLE** that the plants would fail to produce fuel and electric power.

Therefore it is legitimate to ask: when do you interrupt cerebration and start **building**? When is a design good **enough**? When is solar energy equipment "practical" and who is making that decision?

There are a few engineers who are eager to build solar power systems **NOW** for the sake of the country, but the National Science Foundation (which controls all federal solar power funds) is still cautiously funding paper work instead of hardware.

The delays do not enrage the typical solar expert, however. After all, he seldom feels personal responsibility for preventing a fossil fuel and fission nightmare. His personal stake in solar energy centers on a new opportunity to do

interesting work, preferably at a comfortable rate, with lots of conferences thrown in.

He is the last person who wants to say that solar energy could contribute to our near-term energy supply, because that would mean pressure on him to produce "quick and dirty" solutions and compromises, instead of the excellent work which will satisfy his soul and possibly enhance his reputation.

It should be no surprise that many solar experts diligently caution Congress and the public not to expect solar energy too soon "because of the difficult technical problems to work out." Someone even managed to persuade a U.S. Senator to make the following statement last month: "It appears that we are still 50 to 60 years away from utilizing solar energy to generate electricity."

It is impossible to digest that statement in view of several solar technologies which could produce significant power **NOW**. What allowance, for instance, does such a statement make for the proposals of Civil Engineering Professor William Heronemus (University of Massachusetts, Amherst 01002) who has already figured out wind power systems which could satisfy **all** the electric power growth for New York City, New England, and Wisconsin, starting now and covering expected demand even in the years 1990 and 2000?

TESTING THE DEMONSTRATION PLANTS

It could take 5 or 10 years to build and fully test demonstration plants. But suppose that solar engineers are sure their designs will work, and work **safely**. Could we shorten or skip the long demonstration phase?

The suggestion has at least one precedent. The demonstration phase for **large** nuclear fission plants was skipped completely, which was downright dangerous. A possible second precedent could be coal gasification plants; the expectation that they are going to make a meaningful contribution to our energy supplies by 1980 reflects a virtual elimination of their demonstration phase.

Shortening solar power's demonstration phase **would** create some financial uncertainties, but it would also create some power.

From a business point of view, it is prudent to follow feasibility studies with small prototype plants, and then with bigger, better demonstration plants, before committing large chunks of private capital to the "risk" of mass production. Most prudent of all is to get the government to pay for the first three steps.

The question is: Should we tolerate 5 or 10 years extra deprivation from solar energy for the sake of business prudence?

Business will surely say, "If you want it that badly and fast, **YOU** (the taxpayers) offer us relief from all risk, and we'll do it for you." That is essentially what was done for civilian nuclear fission, for weapons, for the moon program, and what is proposed now for coal-gasification and geothermal energy. Why not for solar energy?

REDUCING COSTS

"It will take years to reduce the cost." The myth nurtured in this statement is that near-term solar energy would necessarily be much more expensive than nuclear or fossil energy.

Professor William Heronemus has shown convincingly that, with **mass production** of wind power equipment, wind power plants built from now on would be just as cheap, or cheaper, for New England than nuclear plants. For Wisconsin, he has shown that wind power electric systems could be competitive when average revenue for a kilowatt hour delivered on demand by a utility is 3½ cents. Right now in Washington, D.C., I am **paying** exactly 3 cents

per kilowatt hour.

Heronemus has also shown that Wisconsin wind power systems which produce hydrogen for **direct** use (not for conversion to electricity) would be competitive when natural gas sells for \$3.36 per million BTU's (perhaps as early as 1975) or when home heating-oil costs about 28 cents per gallon (perhaps this winter).

When overt and covert enemies of solar energy are confronted with the near-term competitiveness of wind power, they retreat to the claim that wind power is too limited to **make any significant** contribution to our energy supplies. According to Heronemus, however, the total energy available to this country from the winds via practical wind power system complete with the necessary storage sub-systems, could total at least one trillion kilowatt hours per year. That amount represents two-thirds of our **total** 1970 electric power consumption, and about one-quarter of our total alleged requirements for electric power even in 1985.

Space limits me from discussing all the other solar energy technologies which could be made cost-competitive in the very near future, so I will just quote the conclusion of the National Science Foundation (NSF) Solar Energy Panel in December 1972: "For most applications, the cost of converting solar energy to useful forms of energy is now higher than conventional sources, but due to increasing prices of conventional fuels... it will become competitive in the near future." By near future, the NSF Panel specified from 5 to 15 years.

The panel also singled out sea-thermal power for special mention. Sea-thermal power is based on the solar heat collected naturally by the sea. The panel said that if the U.S. tapped sea-thermal power from the Gulf Stream alone, "the total annual production could exceed the year 2000 projected total energy demands."

The one solar energy technology whose cost is **always** cited by solar power enemies is, of course, the one which is most expensive today. Namely, solar cells (photo-voltaics) which convert light from the sun directly into electric current. By citing the cost of the solar cells which are used in the space program, one can indeed make solar electricity sound "unrealistic." After all, one solar array for Apollo cost about \$2,000,000 per kilowatt. Such figures compare with nuclear power in 1980 at \$600 to \$800 per installed kilowatt. So we are told, "The cost of solar power will have to be reduced 4,000 fold before it can begin competing."

Those who actually manufacture solar cells for space say the cost is more like \$75,000 per kilowatt, because sales are too limited for mass production. William Cherry, a NASA expert, asserts that mass production could immediately cut the cost of solar cells for use on Earth to about \$10,000 per kilowatt. That would put solar cells into striking range of cost-competition, for all they would need is about a 10 fold cost reduction (not 4,000-fold). The additional costs of **storing** solar electricity, of course, would require a larger cost reduction.

If solar cells were mass produced and their efficiency sacrificed down from nearly 18% to 1%, the cells could probably be made competitive **NOW** at less than \$1,000 per kilowatt; the disadvantage would be the extra area consumed by cells of lower efficiency — perhaps a tolerable disadvantage on a temporary basis.

How long will it take to devise "practical" solar cells of reasonable efficiency (about 7%) at reasonable cost? The NSF Panel estimated 15 years, but progress this year has made several experts suggest it might be much sooner. The margin of pessimism in some solar cell estimates can be illustrated as follows:

In 1972, the National Research Council of the National Academy of Sciences stated that, "The additional research required to develop 16% ef-

Photo by Lynne Harris

National Bureau of Standards

Behind the scenes, meanwhile, the com-

efficient solar cells is estimated at approximately \$5-million (60 man-years) . . .” Nonetheless, in that same year, Dr. Joseph Lindmayer and his colleagues at COMSAT promptly achieved nearly 15% efficiency on a budget of less than \$500,000 — one-tenth of the expert estimate. (Note: solar cells are more efficient on Earth than in Space. Dr. Lindmayer's COMSAT cell is nearly 18% efficient on Earth).

Dr. Lindmayer, who has founded the Solarex Corporation (1335 Piccard Drive, Rockville, MD 20850), believes that with a research and development budget of \$1-million per year, he could produce a 7% - 10% efficient solar cell for \$1,000 per kilowatt by 1980 or sooner.

So I have two pieces of advice:

1. Don't be shaken by those high figures on the cost of solar cells; in spite of their cost handicap today, they may turn out to be a near-term winner.

2. Don't forget that there are several **other** solar energy technologies (wind, sea-thermal, methane, heat) which could certainly become competitive in the 1970's if industry or government would put up the money to begin mass production.

MARKET PENETRATION

“It takes 10 or 20 years to build an industry and achieve significant market penetration.” That depends. Once certain basic technical break-throughs had been made, we built a big TV industry, computer industry, space industry, and transistor industry all in less than 10 years. So it is not reasonable to say 20 years are **required** to build solar industries which require no further break-throughs. If investors would **finance** solar energy solidly, and **market** it as aggressively as nuclear power, then 10 years is a more reasonable estimate than 20 for building a big solar energy industry.

Meanwhile, **during** its growth, the solar industry could make substantial contributions to our energy supply. It is not true that 10 years more must elapse before solar power can start having its impact. In the last year and a half, more than a dozen small solar-energy companies have been formed, mostly on shoestrings. These entrepreneurs often say, “We don't want to over-sell solar energy and damage our credibility, because we (the tiny company) certainly won't have a significant impact on energy supplies right away.”

I agree. Tiny companies with tiny financial resources can not possibly bring about the significant and speedy introduction of solar energy to which Americans are entitled. And the billion-dollar corporations which **could** do it if the energy corporations continue refusing, probably **won't** do it. Why, for instance, should a Xerox or IBM or MMM or Texas Instruments diversify into solar energy in a big way, when it might mean facing fierce obstruction from even more powerful energy corporations? What company needs headaches like that?

On the other hand, if this country really were determined to introduce solar energy in the 1970's, business arrangements could be made between electronic companies, aero-space firms, oil companies, pipeline owners, utilities, nuclear industries, and building industries to get the job **done**.

First, we would notice the public relations — TV spots and full-page advertisements about the practicality of inexhaustible, reliable, clean, and natural solar energy. “A simple idea whose time has come.” The companies would point out with pride that several solar power technologies would even eliminate thermal pollution of our rivers and bays. Solar-energy development would be equated with patriotism and love of the country — which is correct.

Behind the scenes, meanwhile, the com-

panies would see to it that politicians enacted the right tax-benefits, zoning laws and building codes, and that the rights-of-way for additional pipelines (for solar fuels like methane and hydrogen) were secured, along with the necessary permission to use wind and light and solar heat available on some public land, city-roofs, offshore areas, or even wind-rights above sections of highways.

For make no mistake: if solar energy is going to have a **significant** impact, lots of laws and regulations will have to be re-written. Tiny solar companies with meagre financial resources and non-existent political influence will not be able to achieve significant “market penetration” very fast, no matter how wonderful their equipment is.

So it is **correct** to say that significant contributions from solar energy will be impossible 10 years from now, or even 60 years from now, **unless** powerful interests favor it. We are at their mercy. If they decide to support solar energy now, we could start enjoying it in the 1970's.

SOLAR VS. FISSION

It is true that after 20 years of hard work and promotion, nuclear power contributes only about one per cent of our energy. But there is simply no valid projection of its history onto solar energy. For one thing, nuclear engineers are always at work on the brink of catastrophe and at the edge of knowledge. Because of the

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radioactivity, they can't even **get** near the guts of their own machinery after **it has** gone into operation, and to this day, there is **some** uncertainty about what is happening in there.

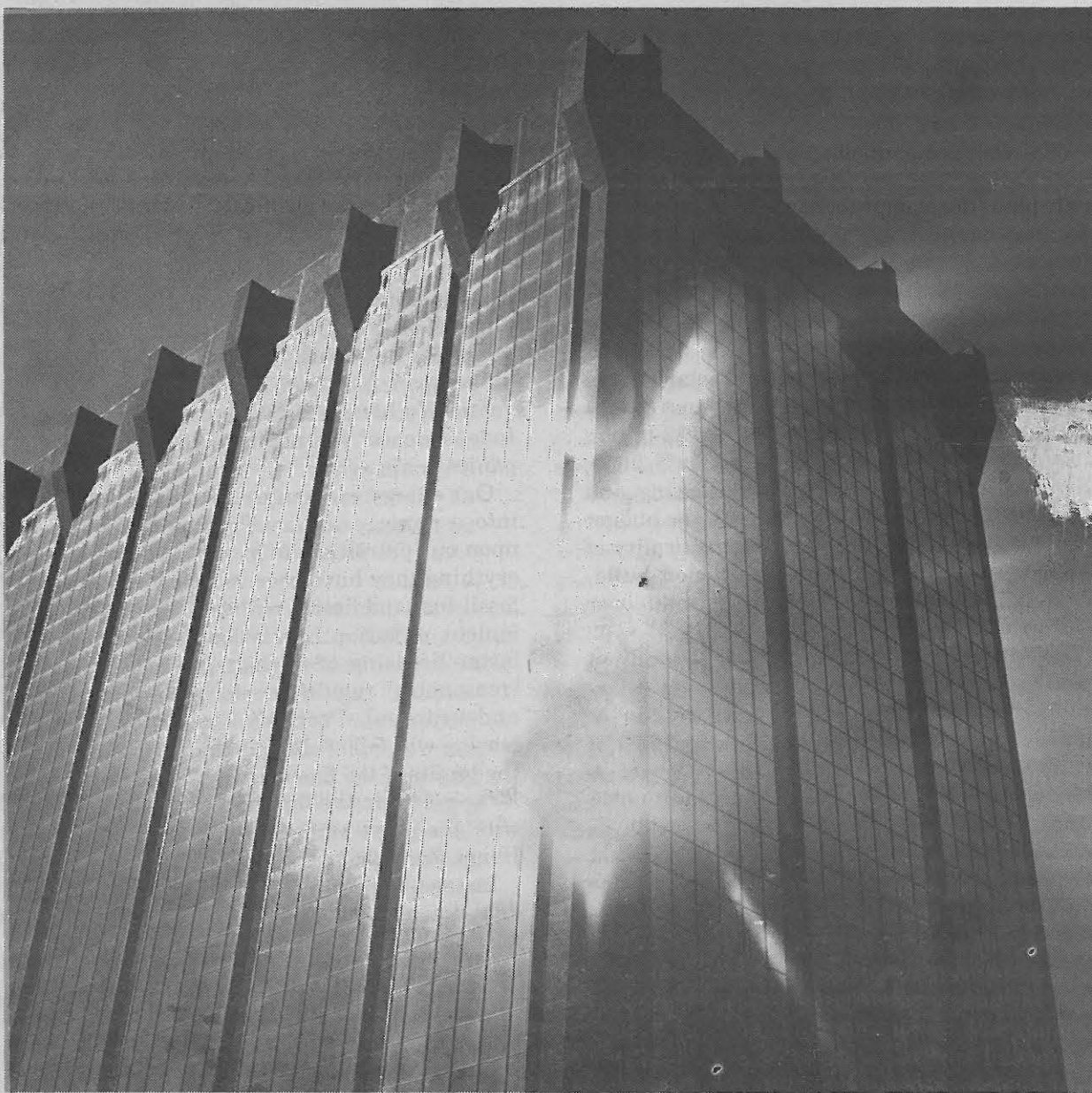
Rep. Chet Holifield, former Chairman of the Joint Committee on Atomic Energy, **acknowledged** in a speech May 21, 1970: “The construction and operation of nuclear reactors are **very** very complex, costly, and inherently highly dangerous matters.”

Tinkerers don't build nuclear reactors in their back yards. But they do build solar equipment.

The basic simplicity and inherent practicality of many solar energy technologies are manifest in the working mini-systems built by enthusiasts. Many kinds of solar energy equipment can **remain** simple when their size is increased and they go into mass production.

The opposite is true with nuclear power. The inherent complexity and danger never disappear, and as plants are made bigger, they acquire whole new safety problems and more intricate “defenses in depth” against their deadly radioactive centers.

According to Milt Shaw, the Atomic Energy Commission's former Director of Reactor Technology and Development, the big reason that nuclear power plants are years behind schedule is that there are not enough people who have learned how to build them. That problem will be
(Continued on page 6)



“The use of solar energy for space heating, air conditioning and hot water heating is one of the extremely attractive possibilities for conservation of nonrenewable energy resources. The annual incidence of solar energy on average buildings in the U.S. is six to ten times the amount required to heat the buildings. Solar energy is not only a presently unused and renewable source of energy, but during the cooling season the unused incident solar energy imposes a high load on air conditioning equipment which consumes energy from nonrenewable sources. It would, therefore, be appropriate to mount efforts to utilize Solar energy in local applications for building services.”

Charles A. Berg
National Bureau of Standards

Photo by Lynne Bama

Solar '70s . . .

(Continued from page 5)

virtually non-existent with solar energy equipment.

A second difference is that we are not going to see a regulatory agency having to de-rate or shut down solar power plants to reduce the likelihood of catastrophic injury to the public. Yet, this is what has happened in the last two years for about one-third of the "operable" nuclear power plants in this country.

A third difference is that utilities won't have to build two solar units to make sure that one is always "operable," which seems to be the only way to secure reliable power from nuclear plants. When a nuclear plant is down for a simple repair, it may take 7 months to do it, because of the radioactivity. And since nuclear plants are huge, they can not be spared that long. I think that nuclear "down time" may help explain why many utilities, which used to be satisfied with reserve equipment of less than 20% above their peak loads, are now building expensive reserves of 30%, 35%, and even over 40% above their peak loads.

Fortunately, solar plants — for example, wind-power stations — can be built in small units which don't deprive the system of huge chunks of power during repair and maintenance.

A fourth difference which could make the introduction of solar energy faster than the introduction of nuclear fission is the probable popularity of solar energy. Furthermore, solar energy could be **cheaper** than nuclear fission, perhaps in cost-to-customers and surely in research and development costs.

ENERGY TAX DOLLARS

The research and development program for civilian nuclear fission has already cost taxpayers over \$4-billion and another \$5-billion tax-dollars are estimated to bring the nuclear breeder to commercial readiness by 1985. By comparison, the Solar Panel of the NSF estimated that we might bring several solar-energy systems to commercial readiness in just 5 to 15 years with an R&D program of about \$3-billion (total, spread over 15 years). In fact, in S. 2650, Senator Alan Cranston's Solar Heating and Cooling Demonstration Act of 1973, the budget proposed for demonstrating the practicality of solar-heated and solar air-conditioned buildings is just \$50-million total over three to five years.

Others estimate that just \$1- to \$50-million per year for a few years would make even solar-cells competitive power-producers on Earth. Even if such estimates turn out low by 100%, it is obvious that making solar energy commercially ready is not going to cost \$9-billion in R&D like nuclear power.

However, "Project Independence" does not yet contain any commitment to develop solar energy with all deliberate speed. On the contrary. Right now, as this year's budget stands, the Administration intends to spend only \$15-million on all solar energy technologies combined. Congress authorized more, however.

For the Fiscal Year ending June 30, 1974, Congress directed the NSF to spend not less than \$25-million "for energy research and technology programs, including but not limited to solar, geothermal, and other non-conventional energy sources." That's still a drop in the bucket. The Senate passed \$50-million for that effort, but what survived the Conference Report with the House of Representatives is "not less than \$25-million" for solar and geothermal combined. Last year, Congress said

"not less than \$19.5 million" but the NSF spent only \$4-million on solar energy nonetheless.

By contrast, this year the Administration plans to spend about \$480-million on nuclear fission R&D (which excludes over \$100-million more for fission regulation and bio-medical research). The budget for coal R&D is about \$190-million. The appropriations for oil are miniscule because oil traditionally gets its public contribution the other way — by tax-benefits.

SOLAR — HOW SOON?

Let's return now to the original question: HOW SOON could this country enjoy safe electric power and clean fuel produced by solar energy? I think it is a political matter first (our insistence on doing it) and a technical matter only second. The energy corporations have very easily manipulated our submission to their best interests instead of our own. They have contrived a "shortage" in a nation blessed with abundant energy. Not only could solar energy have met all our conceivable needs, but the President announced that we have enough coal for 1,000 years.

Too dirty? We figured out how to gasify and clean up coal in the 19th century. At the very least, the energy companies should have been gasifying our coal decades ago, instead of dumping poisons and soot all over us. And why, if corporate goals have anything to do with public service, didn't energy corporation board members initiate a solar energy economy years ago, instead of stripping our land, sooting our cities, oiling our oceans, and creating radioactive garbage as an eternal blight on this lovely planet?

"Had it not been for an abundance of fossil fuels . . . we might today have a 'Solar Energy Economy' just as effective and efficient as our 'Fossil Fuel Economy'," according to Leon Gaucher in the National Petroleum Institute's U.S. Energy Outlook, 1972.

No excuse for the present energy "shortage" exists. It's a special insult to our intelligence to blame any part of it on the Middle East situation, as if it were a surprise we could not have planned around. The Arab-Israeli conflict is 25 years old, after all, and the Arabs' potential oil-weapon has been openly recognized for years. We have a right to know why "Project Independence" was not initiated by the oil companies years ago.

Our energy companies have maneuvered us into a panic, and now President Nixon calls upon our patriotism to give the companies everything they have been asking for: a gung-ho fossil-fuel and fission plan complete with more lenient pollution regulations and dirtier air, faster licensing of nuclear power plants, and "reasonable" regulations for strip-mining coal and uranium. Probably more off-shore oil-leasing will follow. Meanwhile, prices rise, and the profits of the five largest oil companies rose 25% — 48% in the first half of 1973 compared with the same half of 1972, according to Sen. Henry Jackson.

Instead of rewarding our energy-owners, it might have been more appropriate to install new public-spirited members on every energy corporation's board of directors, and to call the old directors to account for apparent abuse of their public trust. For there is a public trust involved in a free enterprise system. We let corporate board members and principal stockholders manage our consumer-dollars, our savings, and most of our tax-dollars, plus our skills and our job opportunities, because they promise that their capitalism will perform in the public interest. They profit handsomely on our money, and in return, they have an obligation to deliver on their part of the deal.

However, that moral obligation of theirs is still far from becoming a legal obligation in this

country. Thus, certain corporations have been able to abuse us with impunity.

Our minds are being abused with the Big Lie about the time required to develop "practical" solar energy. For six months, we've even been subjected to a misleading national TV spot from Atlantic Richfield Oil ridiculing wind-power. "A good idea . . . until the wind dies down." As if ARCO didn't know that the energy could be stored.

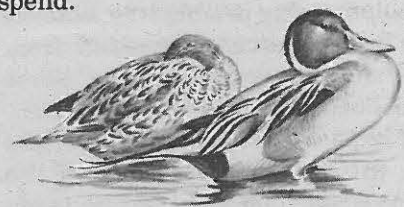
HOW SOON will we refuse to be treated like dumb beasts on someone else's estate? Is this our country or not? Part of fighting the Big Lie is developing more trust in our own common sense. This summer, Nobel Laureate (chemistry) Sir George Porter put it very well: "I have no doubt that we will be successful in harnessing the sun's energy. . . . If sunbeams were weapons of war, we would have had solar energy centuries ago."

While public interest in energy is so high, it's the right time to let people know about solar energy. Now's the time to **INSIST ON SOLAR POWER!**

Areas of Action

Two pieces of legislation vital to our lands and our future have gone aground on rocky political shoals. A Land Use Policy and Planning Assistance Act (S 268) was passed by the Senate last June. A similar Land Use Planning Act (HR 10294) has come up against tough opposition in the House Interior Committee. Developers, utility officials, strip mining companies and even some farmers and ranchers have tried to gut the bill. What is left is not the best legislation, but taken to conference committee with the Senate's S 268 would provide some protection. HR 10294 is still to be reported out by the House Interior Committee and then voted upon by the full house. Write your congressman (Rep. . . ., House Office Building, Washington, D.C. 20515) and ask him to support HR 10294.

On Oct. 9, the Senate approved S 425, a strip mining bill. Again, the House Interior Committee, working on HR 11500, has been rendered almost helpless by ruthless and concerted pressure from the mining and energy interests. Joel Pickelner of the National Wildlife Federation says, "I foresee a huge battle the third or fourth week of January when the House Interior Committee begins considering the strip mining bill. The National Coal Association said it's going to wipe the bill out." Letters are needed to your congressman with a copy going to House Interior Committee Chairman, Rep. James A. Haley (address as above). Tell them that safeguards for the land are imperative, now, before massive strip mining begins in the West, and that protection of the land is not at odds with energy production. It will just cost the coal companies more money which they don't want to spend.



"As far as air goes, we'll gain a lot more from mass transit and car pooling than we'll lose from switching plants from oil to coal — we've got plenty of low sulfur coal here. But when it comes to being the strip mine for the rest of the country — good grief!"

Miles Kirkpatrick, executive director
Colorado Air Pollution Control Commission

Citizen Lobbyists March to Capitol

High Country News
Friday, Jan. 4, 1974

Citizen lobbying efforts are becoming an increasingly important element in environmental matters. Big industry and big business have always been represented in the "Third House." And in addition, they have always had the wherewithal to wine and dine the state legislators. But in the final analysis, it is votes from back home that count.

Letters, cards, telegrams, and phone calls from constituents do make a difference to most legislators. The problem is in alerting the citizens back home to the actions going on in the state capitol. Realizing this need, citizen groups have devised an apparatus to get the word back home. The League of Women Voters has long

\$800 for a lobbying effort in the upcoming legislative session. But it is looking for financial support from other groups. And it, too, is looking for key leaders in communities throughout the state.

All of these activist groups are looking for small (or not so small) citizen contributions to support the lobbyist effort. It takes money to pay a full-time lobbyist even a subsistence salary, pay for lodging and meals, and pay for telephone calls, printing and postage, and other expenses. The success or failure of each state's

attempt is going to be marked by citizen participation.

Have you done your part?

For the information of citizens in each of the four states above, the addresses of the groups are as follows:

Colorado Open Space Council, 1325 Delaware, Denver, CO 80203; Montana Environmental Information Center, Box 12, Helena, MT 59601; Idaho Conservation League, Box 844, Boise, ID 83701 (phone 345-6933), and Wyoming Outdoor Council, Mrs. Jennie Parker, Secretary, 1621 Custer, Laramie, WY 82070.

Farmers Question Stripping

DENVER — The move west by the giant coal companies is creating a problem for the people who live in the region that must be met head-on, according to the national president of the Farmers Union, Tony Dechant.

Dechant announced that a Farmers Union Strip-mining Conference for the Western Region will be held at Rapid City, S.D., on January 18 and 19, 1974.

Dechant said several major concerns emerge in consideration of the problem:

- Preservation of the environment.
- Energy needs of people.
- Land policy for future generations.
- The regional effects of state policies.

"Strip mining is the most dramatic violation of the environment that man has yet devised," Dechant said. "It leaves once-green hills looking like the remains of a dead planet. Underground water supplies are destroyed. All of this has happened in Appalachia. But indications are that the effects will be much worse in the arid West. We've got to decide now — before it is too late — what the ground rules will be for tapping the enormous energy source that lies underground out here in the mineral-rich West.

"I have not yet made up my mind about what the ground rules should be," he said. "Can we afford to destroy fertile farm land in order to mine coal? I am opposed to ruination of the environment. I also want enough energy to maintain the prosperity and comfort of our nation. The fact is that the American people simply do not have enough information to chart a course of action now.

"We are told that we are so short of oil that we must mine coal. But we are being told this by the oil companies, or by people who use the oil companies' figures. We are told that coal companies can't afford to restore strip-mined land to its original condition. But we are told this by the coal companies, or by people who take the coal companies' words as gospel. The whole thing is complicated — or perhaps it is simplified — by the fact that most of the coal companies are now owned by the big oil companies. So we're getting the words from only one source. It's not a source most of us trust very much."

"One aspect of the problem — perhaps the central aspect of it," Dechant continued, "is that we're going to have to decide the future of strip-mining in the context of land policy for the future generations of this nation. Who will own the land and how will it be used? Big pieces of land — millions of acres, in fact, — are in the hands of large corporations whose shakers and movers are thousands of miles away and don't have to live with the effects of their decisions. We have been learning that some of the holders of corporate power aren't very concerned about future generations, or even the present generation.

"I think people out here in the West are going to have to decide what ought to happen to those

gigantic deposits of coal that lie under their feet. The largest single block of coal in the world lies under eastern Montana and part of North Dakota. It is called the Fort Union formation. Other great coal formations lie beneath Wyoming, Colorado, and South Dakota, as well as New Mexico and Arizona to the south.

"Lately, the Kansas Power and Light Company has been forcibly taking over good farm land for a huge new generating plant. The company has been 'condemning' the land in order to acquire it, which the company says it has the right to do under Kansas law. Some of our members don't want to give up their land for this purpose. They say the power company — which proposes to burn 6,400 tons of Wyoming coal a day — refuses to assure them that the ash fall-out won't damage crops, or possibly even kill people.

"So here is a situation in Kansas that affects the people of Wyoming. Maybe the people of Wyoming are anxious to have their coal turned into electricity in Kansas. Or perhaps they'd rather turn it into electricity in Wyoming, as the Basin Electric Cooperative is proposing to do, and ship it out by wire to other states. Maybe they don't want to do either. I don't know what they prefer, but I think somebody ought to be trying to find out before too much concrete is poured and before too much of their earth is torn up beyond repair.

"There is much concern about coal and the environment — concern over what happens when coal is mined, and concern over what happens to the air when it is burned. Some people don't think we ought to use coal. But the U.S. Geological Survey says that coal accounts for 87.1 percent of all the underground energy we've got left. Oil is only 3.5 percent and gas is 4.6 percent. So if we're going to continue using energy the way we've been using it — about 40 percent of all that is used in the world — then it would seem we're going to have to use coal. I was shocked the other day to read that practically nobody is doing research in coal. All the research is in oil and gas. That seems silly to me. We ought to be doing research on how to convert coal to energy without choking everybody to death. We ought to be doing research on how to get coal out of the ground without killing the environment, or the people who dig it.

"These are some of the questions we're going to be talking about in our conference at Rapid City January 18 and 19."

"Rather than cut consumption we've got to boost supplies — either by making up with the Arabs or going all out to increase domestic production."

Claude Brinegar
Secretary of Transportation
(an ex-official of Union Oil Co.)



had dedicated observers in state legislatures, with a means of alerting their own members. Other groups have had similar informal operations. But, it has become apparent that if citizens concerned with good government generally, and the environment specifically, are to be effective, they must have lobbyists. The lobbyists must be organized in some fashion, and they must be informed. And in order to be truly active, they must see legislators every day and be on a working relationship with them.

In addition, lobbyists on the scene must have constant communication with citizens throughout the state. For that purpose, telephone calling trees are established. The people at the state capitol call out to key people in communities. These key people in turn call 5-10 citizens, and these citizens call 5-10 more citizens, all relaying the messages.

If citizens from a particular legislative district are needed to work on their legislators on a face-to-face, personal basis, they may be called upon to do so.

Such a citizen effort is dependent upon two key elements. Those are the full-time lobbyists at the state capitol, and the citizens in every community. The citizen effort is all volunteer, but a lobbyist effort at the state capitol obviously costs money.

Colorado has had the best organized and most effective citizen lobbying effort for the longest period of time. The Colorado Open Space Council has an advantage in that it is based in Denver, the state capitol. The Denver area also happens to be the state's largest center of population.

The Montana Wildlife Federation has long had an effective lobbyist in the person of Don Aldrich. This year his efforts are to be combined with a newly organized Environmental Information Center based in Helena. The Center's stated purpose is to collect information and provide services for concerned citizens throughout the state.

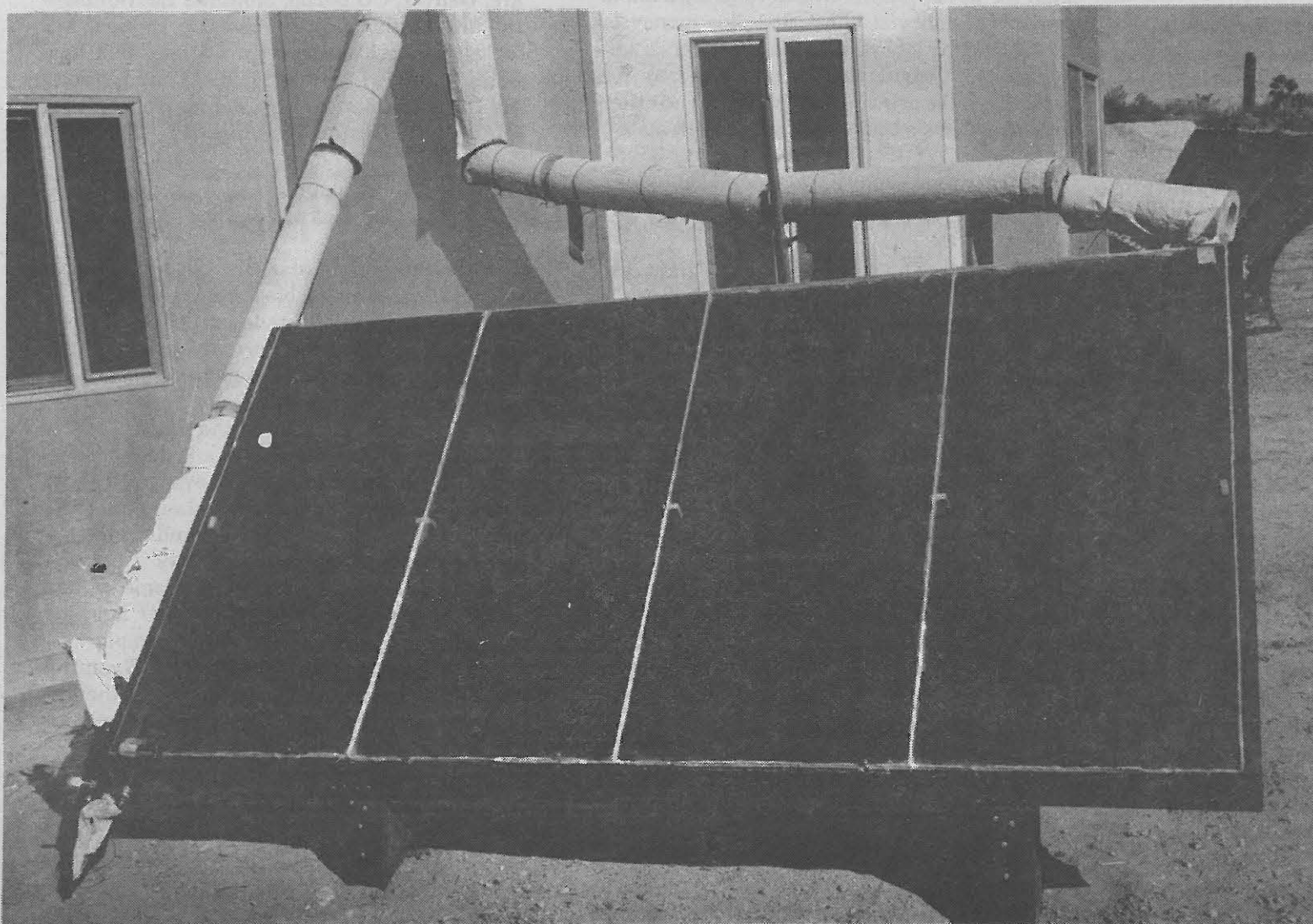
The Idaho Conservation League is a newly organized group of citizens based in Boise. But it is a statewide effort to give some direction to citizen involvement in the legislature. The League needs advisors and key leaders from Idaho Falls, Pocatello, Twin Falls, Ketchum-Hailey, Caldwell-Nampa, McCall, Lewiston, Moscow and Coeur d'Alene. It also wants student coordinators on campuses around the state.

Wyoming's Outdoor Council has pledged

Why Wait?

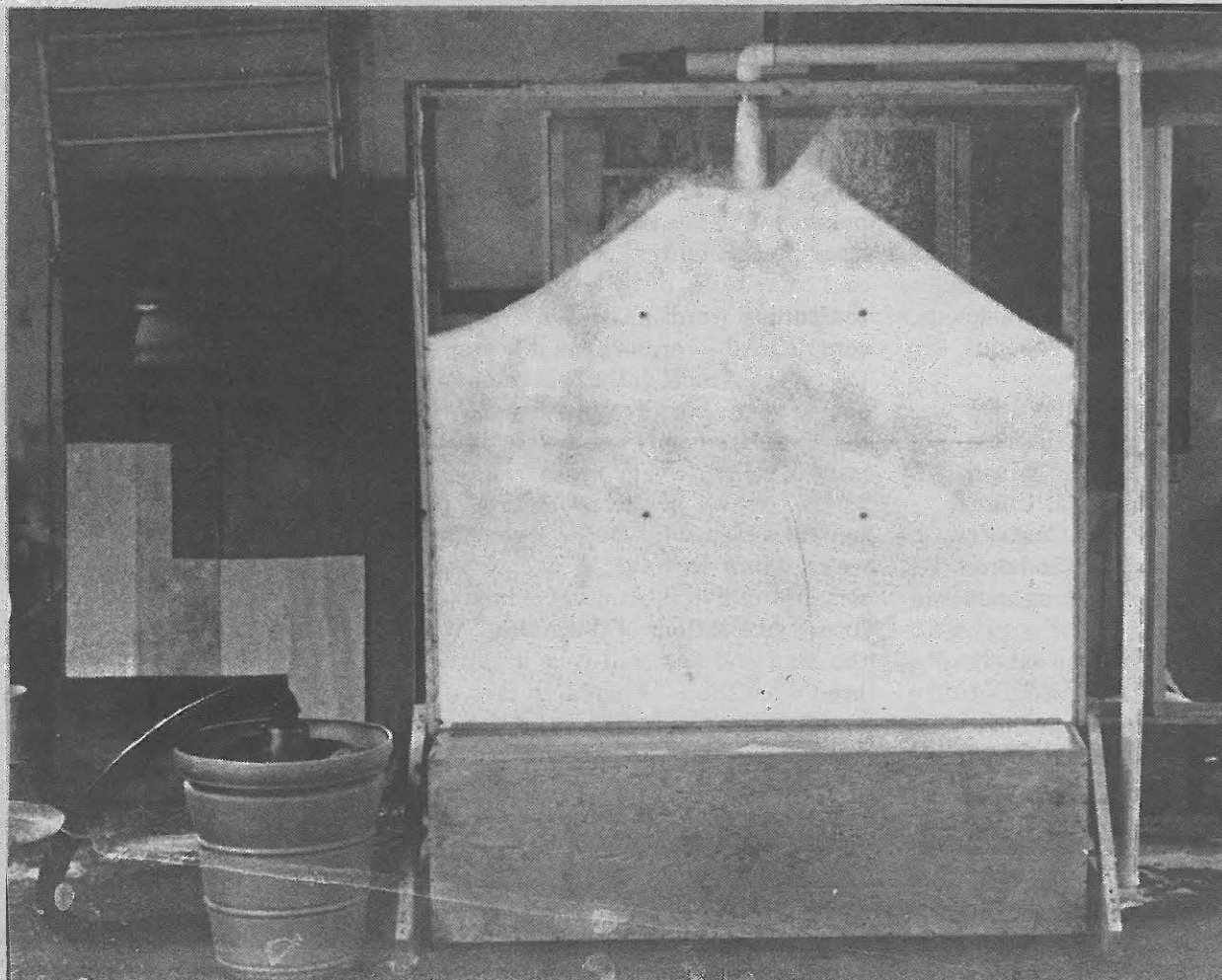
Solar Pow

While scientists and lawmakers argue about the feasibility of utilizing solar energy, the people at Zomeworks (Box 712, Albuquerque, N.M., 87103) are putting the sun to work. The technology to generate enough electricity from the sun's rays to service a city may be a ways off, but we now know how to heat individual homes, heat water and use other relatively simple applications. If put into common use, these simple applications could substantially reduce our dependence on fossil fuels. Pictured here are some of the technologies Zomeworks has developed.



Over six per cent of the energy used by the average American household is used to heat water. Zomeworks has approached this problem by developing a solar water heater. Water is heated in a flat plate collector that stands outside the bathroom. Cold water enters the collector from the bottom. As it heats up it rises up the collector. Hot water leaves through the pipe from the top of the collector and goes back into a storage tank in the bathroom.

Glass windows allow the sun to heat your house while it is shining, but they are poor insulation on a cloudy day or at night. One possible solution to this problem is Zomeworks' Bead Wall Prototype (photo at right). The south-facing windows would be two panes of glass spaced three inches apart. To insulate the window, styrofoam beads are blown into the air space between the panes of glass. A simple household vacuum blows in or sucks out the styrofoam beads which are kept in a storage reservoir when you want the sun to shine through.

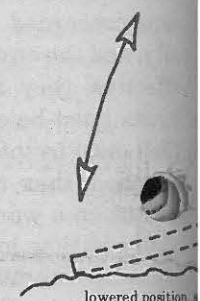
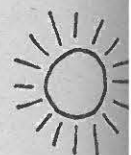
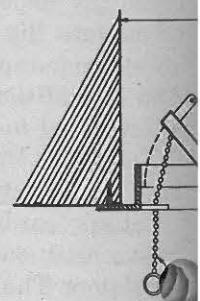


The zome, a modified dome, has a unique design developed by Zomeworks. The collecting wall faces south and is made of double sheets of glass. The drums filled with water collect the sun's heat. The wall facing out is blackened for absorption. The side of the wall facing inward is painted white.

Insulation is provided by the drums which are lowered by the sun shine in (See page photo). They are used during periods or at night to collect heat. The drums are made of fabric and have a core and covered with insulation. They weigh about 1.5 pounds and cost about two dollars. Weight restrictions are up to about nine feet larger.

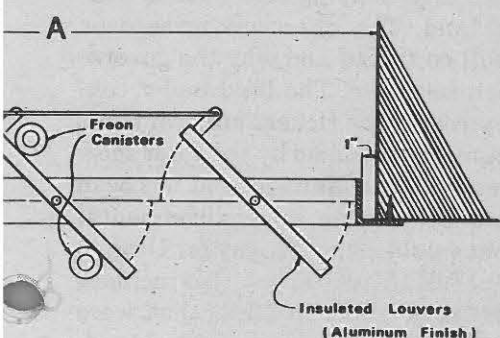
Drums are filled with water one inch from the top. The drums will collect heat. The drums will collect heat. The drums will collect heat.

When the doors are closed, the way for the heated drums is into the zome. The drums will collect heat. The drums will collect heat. The drums will collect heat.



r Works !

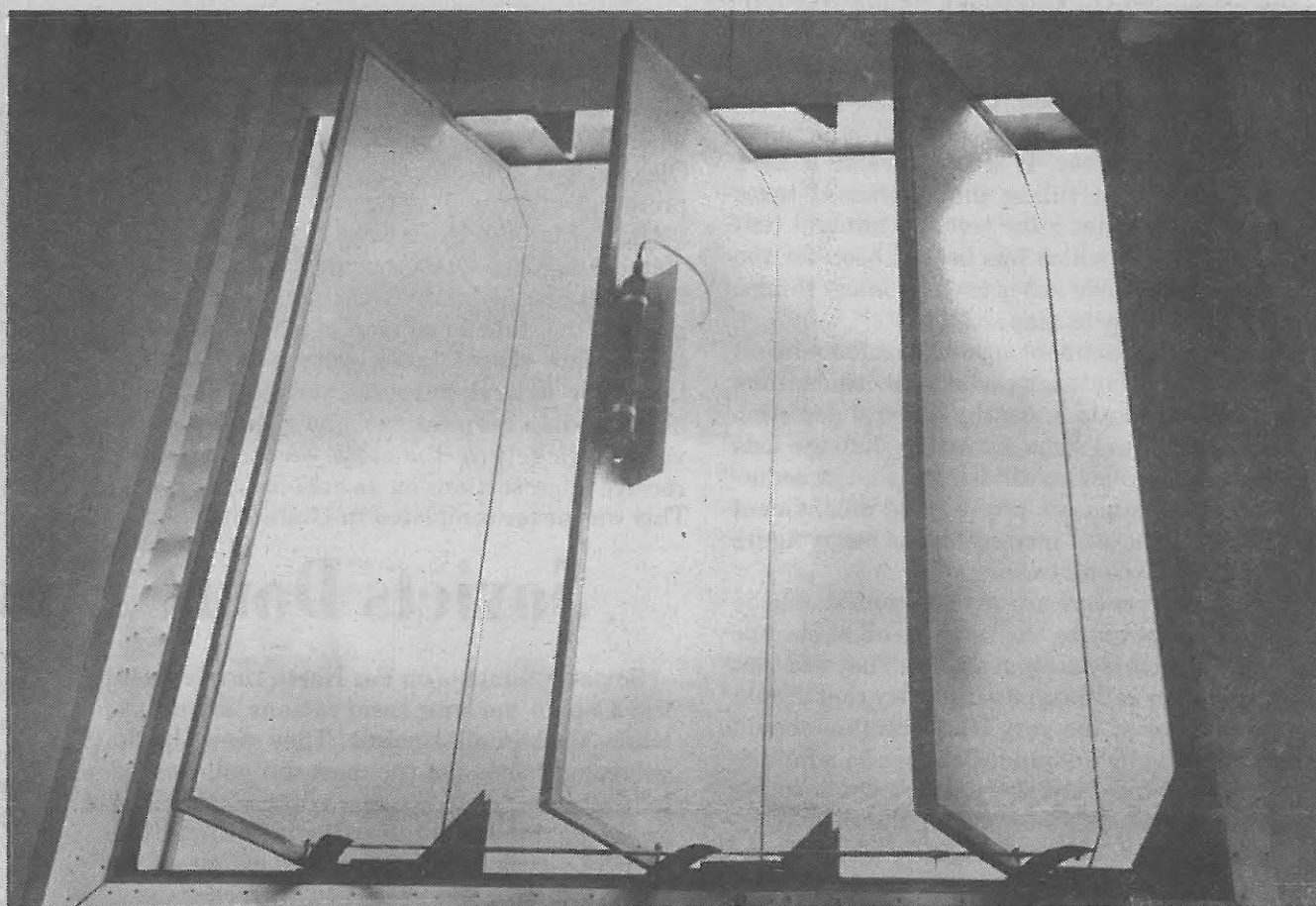
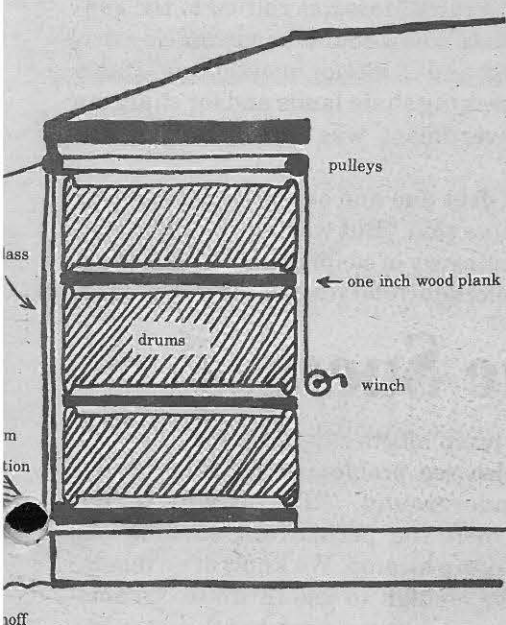
High Country News-9
Friday, Jan. 4, 1974



Zomeworks' Skylid (diagram left and photo below) is a solar heating device operated by the sun. The device opens when the sun shines to let in light and heat and actually follows the path of the sun across the sky to facilitate maximum heating. Skylid automatically closes at night or with a heavy overcast to prevent heat loss. There are no wires, switches or motors involved.

Skylid operates with freon (the same gas that is in your household refrigerator) flowing from a warmer canister to a cooler canister. The weight of the freon tilts Skylid open or closed. This works with one degree Fahrenheit difference in temperature between canisters.

The ideal location for Skylid is a south facing roof slanted at 15 to 45 degrees. The panels have a foam core and are covered with an aluminum skin. A lock chain shuts down the system during the warm part of the year.



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Reckoning from Washington

by Lee Catterall

Two amendments hanging on a bill being referred to as the Christmas Tree have stirred tax-conscious scrooges to point accusatory fingers at Wyoming's men in Congress.

The amendments, along with about a dozen others, adorn a bill intended to lessen taxes for American prisoners of war. Congressional tax-writing committees have chosen it to be this year's "minor" tax bill. Critics traditionally call it the "Christmas Tree" because it is underlaid with year-end tax "gifts."

Sen. Clifford Hansen, Sen. Gale McGee and Rep. Teno Roncalio had sponsored one of the ornaments as a separate bill this year. It would reverse a 1971 Treasury Department ruling that increased taxes paid by companies that mine trona, a mineral that yields soda ash and which has been a boon for the Rock Springs area. Soda ash is used for many things, ranging from cement to soap.

The Treasury Department opposes the amendment because it would cut into tax revenues by two million dollars a year. It would make the mineral depletion allowance apply to the trona ore rather than the soda ash extract. The depletion allowance is a tax deduction based on a company's profits. The amendment would have the effect of increasing the profit figure and, accordingly, the allowance.

The Wyoming sponsors argue that trona should be treated for such purposes the same as oil shale, the allowance for which is based on the ore. They add that the trona industry is "the type of industry that should be encouraged, or at the very least one that should not be hamstrung by unfounded change in administrative policy." Since half the nation's trona comes from Wyoming, it would be good for the state.

A nasty squabble developed over the other Wyoming ornament, sponsored by Hansen. Proponents describe it as a mere "technical" change in an obscure, complicated part of the tax code. It pertains to tax exemptions in situations where a stockholder of a company sells his shares back to the company but is paid in other kinds of securities rather than in cash.

A group of Chicago lawyers asked Hansen to sponsor the bill last year and again this year. When it failed to move rapidly through the Finance Committee, of which Hansen is a member, he hung it on the tree.

A lobbyist from a Ralph Nader-style tax reform group then became suspicious, and demanded to know who would benefit from the proposal, and by how much. A Hansen spokesman said his boss didn't know what specific people the lawyers represented. One of the lawyers told this column his client is Continental Illinois Bank of Chicago, which "has got ten or twelve trusts who are caught in this."

That satisfied neither the lobbyist nor Senators who took up his cause. An aide for Sen. William Hathaway (D-Me.) referred to the amendment as "Hansen's mystery bill," while a staffer for Sen. Gaylord Nelson (D-Wis.) described it as "essentially a private bill disguised as a tax measure." A private bill is one designed to benefit a certain person, whose name is in the bill's title. Hansen and his staff "know exactly who they're doing it for," the Nelson aide said. "Why don't they say?"

All those babs and humbugs were caused by what the lawyer described as a "drafting error" in a tax reform act that passed four years ago. "They forgot to put the parantheses in" around a phrase at the end of a paragraph, he said.

Of the scrooges, the lawyer said, "They're just looking for something. They're trying to drum up something that's not there."



Post Questions Shale Deal

The Washington Post has disclosed that the federal government is about to give away to the State of Utah 157,000 acres of prime oil shale land worth \$50 billion. This disclosure comes in the wake of the newly-announced oil shale leasing program scheduled to begin on six 5,120-acre tracts of public land this month. The Post was tipped off by the Colorado Open Space Council based in Denver.

COSC has charged that to announce a relatively small prototype oil shale program, while clearing the way for a much larger but unannounced mining project amounts to "duplicity" on the part of the federal government.

Carolyn Johnson, speaking for COSC, told the Post, "Utah intends to proceed rapidly with full-scale development of the oil shale lands when the transfer is completed late next spring. Clearly, this puts an entirely new light on the prototype program."

Utah's claim to the lands dates back to early statehood. When Utah became a state in 1896, four sections of land in each township were given to the state for support of schools. Some of these state school lands were subsequently taken for federal purposes such as national parks, Indian reservations, and military reservations. In return, the state was supposed to receive other sections on an acre-for-acre basis. This was never completed in Utah. The federal

debt to Utah amounts to 157,000 acres.

No one seems to be denying that Utah is entitled to some land. The questions arise over which land will be traded and why the government has been secretive. The land under consideration represents the richest mineral lands in Utah. Documents obtained by the Post show that the Bureau of Land Management has been working since October on an environmental statement that would clear the way for Utah to take title to the full 157,000 acres. This includes the two 5,120 acre tracts in Utah that were reportedly being put up for lease as federal land.

Secretary of Interior Rogers Morton stands in the middle. He is the one that must approve of the land trade. But on Nov. 28 of this year he assured the public, "The Department is committed to withhold further leasing of public oil shale lands until the environmental effects of these prototype leases are better known."

Utah Sen. Frank Moss has rallied to the support of his state's new-found bonanza. He criticized the Post and COSC for questioning Utah's motives in seeking shale lands and for charging that the government was trying to hide the transfer.

"This is a debt due and owing to the state for too long," Moss said. "But we find ourselves now cast in the category of suspicion by a carpetbagger from Colorado (referring to Ms. Johnson)."

Soviets Doubt Pipeline Success

Soviet specialists on Far North Development have some serious reservations about the trans-Alaskan oil pipeline. They view the development as one of the most difficult and potentially dangerous projects ever undertaken in an arctic area. "Unprecedented difficulties" with the project are the views expressed by Soviet construction engineers with experience in building pipelines in permafrost regions.

The Soviets have natural gas lines longer than the proposed 789-mile trans-Alaska pipeline. But their oil pipelines are shorter. Despite this experience, Soviet experts are expressing the same concerns as American environmentalists.

"Such projects demand entirely new technologies and approaches, and these have not been developed yet," said one senior Soviet scientist.

A major concern is the stress placed on a pipeline above the ground in the Arctic. "No pipe is able to stand these temperatures (range of 85 below zero to 95 above) without becoming tense, fatigued and breaking. We have an experimental gas line above ground, and we have dozens of seasonal breaks on it and virtually none on the below-ground segment. The temperature changes will even cause the pipe to

buckle and jump off its supports."

Soviets also see problems with putting the pipeline underground. "The oil will be hot enough to melt the permafrost, turning the whole area into a swamp. We know of no insulation effective enough to use in these circumstances. There are some promising materials, but none is sufficiently developed and tested."

The Soviets will travel to Alaska to observe construction of the pipeline.

Roncalio Opposes Future Blasts

Wyoming Congressman Teno Roncalio says he will oppose an effort to resurrect nuclear stimulation as a means of mining coal, natural gas, and oil shale.

The head of the Atomic Energy Commission, Dr. Dixy Lee Ray, has included \$107.6 million for nuclear stimulation of fossil fuels in a proposal for stepped up energy research and development. Her proposal was presented to the Joint Committee on Atomic Energy in December.

"I am shocked and disappointed that Dr. Ray would present Congress with such a proposal when we so desperately need to develop feasible measures that don't waste precious energy resources," Roncalio said.

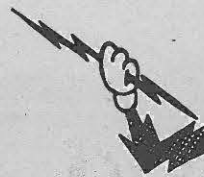
"This plan calls for funding on the hope, not the merit, that nuclear stimulation could prove feasible," Roncalio said. "The hope is that one of these shots will succeed after three consecutive failures."

He said the three shots, Gas Buggy, Rulison, and Rio Blanco, designed to release natural gas from tight rock formations have all failed to live up to expectations. Attempts at recovering the gas from the most recent shot, Project Rio Blanco in Colorado, have been shut down because of a drastic drop in pressure.

"Nuclear stimulation is wasting important supplies of uranium and contaminating irreplaceable reserves of natural gas. Continuing in this area is foolish and wasteful," Roncalio said.

"Ripping up the Clean Air Act, and ripping off all environmental constraints that industry may find uncomfortable, or that some individuals may find inconvenient, will not turn our energy faucet on full force again — and will do nothing to solve our energy problems in the months immediately ahead. . . . The environmental effort is not responsible for the energy crisis."

**Russell Train, Administrator
U.S. Environmental Protection
Agency**



The Hot Line

across the country

Jack Swigert, Jr., former astronaut and now executive director of the House Committee on Science and Astronautics' staff, says "We are in for a wrenching, bruising, teeth-rattling experience" because of the energy shortage. He predicts that by spring, the U.S. will have experienced an "energy Pearl Harbor."

Gov. John Love, former presidential energy adviser, said in Chicago just before Christmas that gasoline rationing is inevitable. Love said gasoline consumption must be cut by as much as 25 to 30% and that it could not be done except by rationing.

A former general manager of the Atomic Energy Commission and now a professor at M.I.T., **Dr. Carroll L. Wilson**, says it will be a struggle for the United States to even maintain the same levels of energy use as 1973. He thinks there will be a period "for quite a few years at best" without any energy growth. He foresees no alternative to the energy crisis except drastic changes in use.

Environmental Protection Agency Administrator Russell Train warned that abandoning the nation's environmental goals will "open a Pandora's Box of pollutants that the Clean Air Act and allied measures are helping to close." Addressing a municipal group in Los Angeles, Train said, "There are some who tell us that a little pollution never hurt anybody, and that it is — in any event — a small price to pay to prevent us from running out of energy. Let me be blunt about it: what these people say is simply not true and they know it."

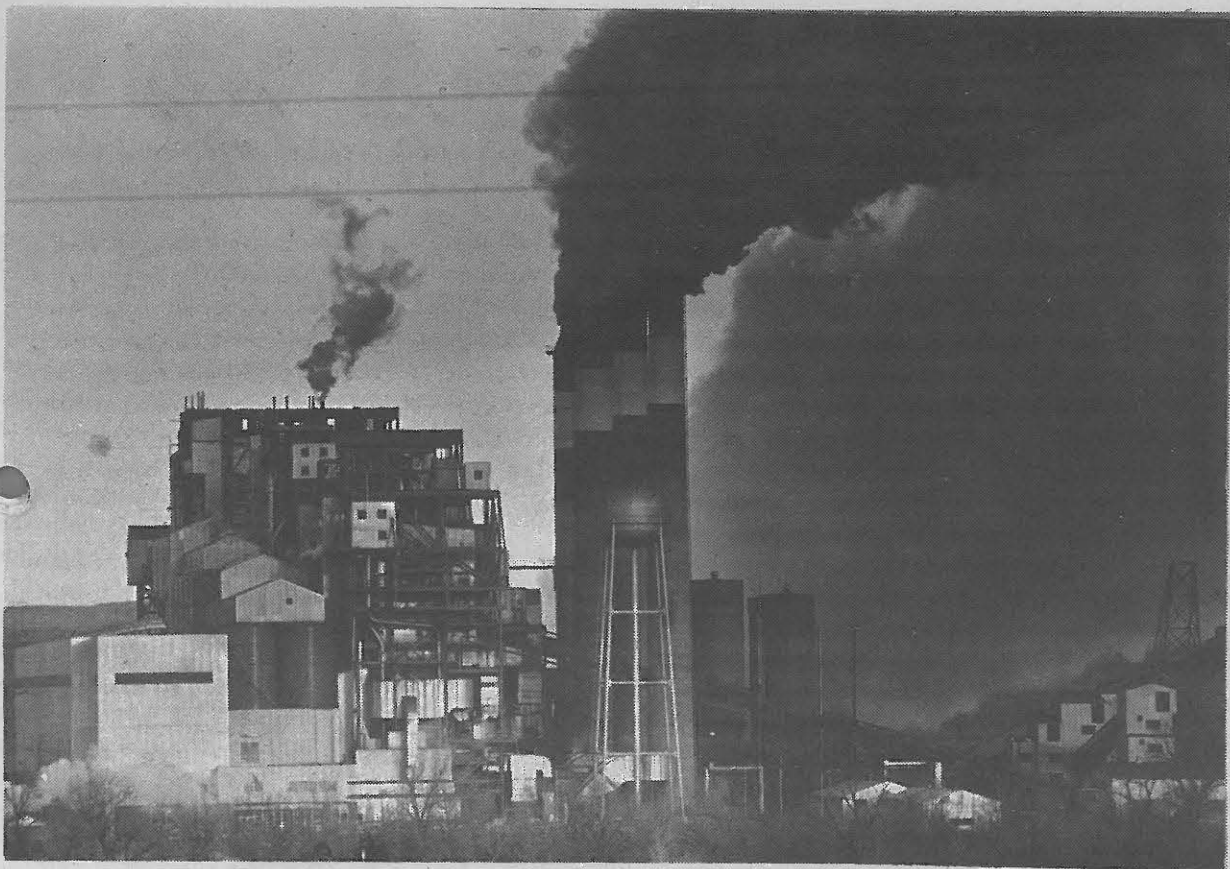
William E. Simon, the nation's energy czar, called in executives of 22 of the country's largest utilities just before Christmas and told them to knock off promotional advertising. He is said to have waved newspaper ads promoting sales of power at them and then told them such ads were irresponsible. Simon told reporters, "I'm anxious to see who prints the next ad like that in a newspaper."

During November, the **Ohio Public Utilities Commission** had under consideration a class-action complaint filed by the Ohio Public Interest Action Group. The group said power companies should be prevented from advertising and otherwise promoting the increased use of electricity. The Ohio Association of Broadcasters intervened in the case on the side of the power companies.

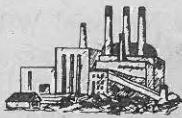
Pratt & Whitney, a division of United Aircraft Corp., has announced a \$42 million development project to perfect a fuel cell as a source of electricity. The company said nine electric utilities had agreed to put up \$28 million of the development costs. Electricity is generated directly from the chemical reactions in the fuel cell. It can use hydrogen, methane, natural gas, or other gaseous fuels.

The **Pacific Northwest**, first to suffer a regional shortage of energy, may have recovered sufficiently by early 1974 to export power to other energy short areas. Snowpack surveys in January are expected to show above normal moisture. The region was hit by a power shortage last year because of insufficient snow and rain to fill reservoirs.

The **Shah of Iran** said his country and other oil-producing countries are going to start basing their crude oil prices on the cost of producing alternatives. In announcing prices which more than doubled the price of crude oil from the Middle East, effective Jan. 1, the Shah said, "The world should have tried to diversify its energy sources years ago."



The very best of technology cannot prevent the escape of tons and tons of fine particulate matter (the kind that lodges in your lungs), sulfur oxides, and nitrogen oxides from the smokestacks of powerplants. The clean, clean air of the Rockies is soon going to be sullied by the gaggle of new plants already abuilding or announced. And the Northern Rockies and Northern Great Plains probably has not seen anything yet. Announcements of more new power plants, gasification plants, and other developments will probably follow one upon another during 1974.



Emphasis ENERGY



in the Northern Rockies and Great Plains

A Kansas City engineering company has released an environmental reconnaissance study of the Wheatland-Torrington, Wyoming, area for **Basin Electric Power Cooperative**. The study is a preliminary report for a proposed 1,341-megawatt, steam-generating electric plant. A proposed construction schedule would have the first 447-megawatt unit operating by late 1979. Water for the plant would be stored in a proposed 4,500-acre reservoir on the Laramie River between Wheatland and Fort Laramie. The study projects an estimated average number of construction workers to be about 1,000.

* * *

In one of the biggest transactions in coal development in Wyoming, **Texaco, Inc.**, has paid \$15 million to Reynolds Metals Co. as the down payment on a total of \$145 million for more than 2 billion tons of coal. Texaco will pay another \$10 million early in March, and a minimum advance royalty of \$12 million a year for coal mined during the next 10 years. Texaco obtained 37,000 acres and sufficient water rights to develop the coal. The coal property is located between Buffalo and Sheridan, Wyoming, near Lake DeSmet.

Texaco chief executive officer, Maurice F. Granville, said his company is developing a plan for the coal. The plan calls for possible use of the low-sulfur coal for gasification, liquefaction, or electric power generation.

* * *

Need information about the energy crisis or fuel allocation problems in the Northern Rocky Mountain and Great Plains Region? The Federal Energy Office for Colorado, Utah, Wyoming, Montana, and North and South Dakota is located at 645 Parfet St., Lakewood, Colorado 80215. The phone number for Mr. Dudley E. Faver, Regional Director, FEO, is 303-234-2420. The office of Mr. Donald E. Burkitt, Chief, Office of Investigation, Complaints and Enforcement is 303-234-2472.

Utah International, with uranium mines in central Wyoming and coal mines in Australia, gives indication of planning a complex of four gasification plants costing \$1.8 billion to be located in southeastern Montana. The firm has made application for a reservoir with a holding capacity of 106,000 acre feet. It would be located on a tributary of the Powder River just inside Wyoming in northern Campbell County.

* * *

Hollis M. Dole, a former Assistant Secretary of the Interior, says the United States should be developing an oil shale industry "because we have such a large amount of it." Dole says, "I think it borders on being a crime that it hasn't been developed before now." He says that by using oil from shale "in metropolitan areas such as Los Angeles, Chicago or New York, you could continue your industrial development without any degradation to the atmosphere." Dole, who is now general manager for Colony Development Operation, a consortium of four oil firms working on oil shale development, does say there will be some environmental problems associated with mining and retorting the oil shale.

* * *

Michigan Wisconsin Pipe Line Co. has been given tentative approval to build four lignite gasification plants in North Dakota. The company says it plans to have one plant operating by 1980 and build three more during the 1980's. Each plant would have a capacity to produce 250 million cubic feet per day of synthetic gas, would use 10 million tons of coal per year, would use more than three billion gallons of water in a year, and would cost \$450 million to build. A coal mine to fuel the plant would cost \$50 million.

Peoples Gas Co. of Chicago had earlier announced it planned to build at least four gasification plants in North Dakota. It plans to have a plant operating by 1979.



The auditorium at Eastern Oregon College in La Grande was nearly full. In the very room where my high school students two years before had presented "Gammer Gurton's Needle," Senator Bob Packwood was opening hearings on S. 2233, a bill sponsored by both Idaho Senators (Church and McClure) and by both Oregon Senators (Hatfield and Packwood), and S. 657, an earlier bill sponsored by Hatfield and introduced into the House by three Oregon Congressmen.

S. 2233 calls for an 864,494-acre Hells Canyon National Recreation Area that would include 282,315 acres of instant wilderness (with provisions for study of other lands within the Area), and for a hundred miles of instant wild and scenic Snake river. S. 657 called for a 725,400-acre National Forest Parklands bill with no instant wilderness or wild and scenic river but with a river study for both the Snake and the Imnaha and a wilderness study of 270,000 acres.

Nearly everyone who spoke at the hearing addressed himself to the former — and stronger — bill, S. 2233. The official State of Oregon stand, presented jointly for Gov. Tom McCall by Bob Brown, representing the Oregon Game Commission, and by Bob Potter, Oregon Scenic Waterways System Administrator was resounding support for a Hells Canyon National Recreation Area. Local opposition was largely uninformed and highly emotional, based on fears of losing potential revenue. A Boise Cascade spokesman, supporting "responsible legislation for protecting Hells Canyon," suggested the need for more timber cutting. The Northwest Public Power Association spokesman stressed the need for power development. (He failed to mention the fact that in 1972 more water spilled over the Hells Canyon Dam



than was used for power production and the fact that President Nixon has impounded funds designated by Congress to increase power production capacity at existing dams in the Columbia River Basin.)

Two of the most articulate and succinct presentations were made by Oregon law student Jeff Foote, representing the Oregon Environmental Council, and Doug Scott, representing the Sierra Club. Scott was particularly impressive as he answered Senator Packwood's questions.

Newspapers the next day reported the hearing comment as "strongly divided," but an editorial in the Idaho Falls **Post-Register** suggested that the proposed legislation may be the best bet for keeping our positive options open. The philosophy seems to be growing that Hells Canyon should be preserved in some form or fashion. Even many of the opponents to S. 2233 accepted that concept. Most of the disagreement came on the matter of how and how much. The proposed Hells Canyon National Recreation Area is a compromise that doesn't please everyone nor does it answer everyone's need and expectations, but certainly it is a move in the right direction.

Logging, Mining, Damming

Morton Opens Up Alaska

by Roger Mellem

Shortly before Christmas, Secretary of the Interior Rogers C.B. Morton offered lavish gifts of our undeveloped public land to the commercial interests of this country. Santa Claus Morton, by recommending the transfer of almost 20 million acres of superlative country in Alaska to the U.S. Forest Service (and thus to the loggers, miners and dambuilders), did a disservice to the people of America, to coming generations, and to the spirit of Christmas.

Alaska is being carved up now on paper, shortly before being carved up physically. As conservationists are seemingly unable to secure sane, rational planning for all development on the last frontier, we at least will strive to protect the most valuable places from the pick, shovel, blade, and saw.

Morton's decision was on the fate of those choice areas, up to 80 million acres of which Congress instructed him to select as "national interest" land, for further consideration leading to permanent protection as national parks and monuments, national wildlife refuges and ranges, wild and scenic rivers, or, in some cases, national forests.

Several years ago Alaskan natives had threatened through court action to block construction of the trans-Alaska oil pipeline, until their aboriginal claims to Alaska were settled. To clear away these substantial impediments to commercial development, Congress passed the Alaska Native Claims Settlement Act. This Act, signed into law on December 18, 1971, gave Alaskan natives title to 40 million acres of land, plus one billion dollars in cash and oil royalties.

Most important to conservationists, in section 17 (d) (2) the Act allowed the Secretary of the Interior to suspend development on up to 80 million acres of high quality wilderness land. Congress would then have the opportunity to insure preservation in perpetuity to at least some great parts of this tremendous national heritage.

Conservationists were very displeased then, at Morton's proposal that almost one-fourth of this area be given over for commodity production of timber and minerals, by management of the U.S. Forest Service.

The Forest Service would pick up three vast new national forests — the Porcupine of 5.5 million acres in east central Alaska, the Yukon-Kuskokwim of 7.3 million acres in central Alaska and, perhaps most disastrously of all, a 5.5 million acre Wrangell Mountains National Forest would be established in southeast Alaska. This latter is the most blatant sell-out, and will be the scene of a major fight to prevent devastating copper mining and clearcut logging. Conservationists will seek to include this valuable area in the adjoining proposed Wrangells-St. Elias National Park, as the entire region is outstandingly scenic, relatively accessible, and exceptionally high in wilderness quality.

Secretary Morton's recommendations, in the form of bills being proposed to Congress (with accompanying draft environmental impact statements), do have positive aspects of course. If enacted, the bills would designate about 2,600 miles of wild and scenic rivers, 32.26 million acres of national parks and monuments, and 31.59 million acres of national wildlife refuges and ranges.

There would be three new national parks. They would include an 8.36 million acre Gates of the Arctic National Park in the Central Brooks Range, a 2.61 million acre Lake Clark

National Park in southern Alaska, west of Anchorage, and an 8.64 million acre Wrangell-St. Elias National Park in south-central Alaska.

Mt. McKinley would be more than doubled in size with additions to the north and south totaling 3.18 million acres. Katmai National Monument would become a National Park with the addition of 1.87 million acres.

National Monuments would be established: Kobuk Valley, Cape Krusenstern, Aniakchak Caldera and Harding Icefield-Kenai Fjords, for a total of almost 3 million acres.

Also in the National Park System would be the Yukon-Charley National Rivers, a 1.97 million acre proposal, and the Chukchi-Imuruk National Reserve of 2.69 million acres. Birds found in the latter area migrate to all seven



continents. Each of the above proposals would make outstandingly splendid additions to the National Park System.

There would be five new National Wildlife Refuges totalling over 12 million acres — Yukon Flats, Koyukuk, Selawik, Alaska Coastal, and Togiak. The Arctic National Wildlife Range would be expanded by 3.76 million acres, and the Yukon Delta National Wildlife Refuge by 5.16 million acres.

Also in the National Wildlife Refuge System would be the Iliamna National Resource Range of 2.85 million acres between Cook Inlet and Bristol Bay, and a 7.59 million acre Noatak National Arctic Range. The latter, however, would be protected for only 20 years, while studies would be undertaken to find "ways in which arctic resources can be utilized without undue environmental damage." Conservationists will work hard to strengthen protection here.

The National Wild and Scenic River System would be expanded with the designation of 375 miles of the Fortymile River drainage, 135 miles of Birch Creek, 135 miles of Beaver Creek, and 60 miles of Unalakleet River. In addition, 1,900 miles of 16 rivers within the proposed national parks, monuments, wildlife refuges and ranges would be added to the system for additional protection.

It should be pointed out that conservationists will vigorously pursue the objective of blanketing these areas with another layer of protection — inclusion in the National Wilderness Preservation System. In fact, Secretary Morton himself had intended to propose a Gates of the Arctic National Wilderness Park, placing this area in the National Park System and the National Wilderness Preservation System at the same time (something which has not been done before). Six hours before Morton's press conference, Nixon's Office of Management and Budget overrode his recommendation. When asked by the Christian Science Monitor's Bob Cahn, Morton expressed hope that Congress would make the dual designation anyway, thus insuring the maximum protection possible right from the start.

Conservationists are hopeful that Congress will act decisively to accept Secretary Morton's positive proposals, and to make the very substantial changes and improvements which will be necessary for permanent protection of these great wilderness resources.

Western Roundup

Moths Drive Foresters to DDT

The U.S. Forest Service has filed a draft environmental impact statement on a proposal to use DDT on tussock moths in the Northwest. The proposal deals with infestations in Douglas fir forests in Idaho, Washington and Oregon. Meanwhile, Washington State University scientists say that the use of DDT may be a wasted effort until research determines why moth populations increase and decline as they do. Dr. Robert F. Harwood, chairman of the entomology department at WSU, says the use of DDT to control the moths has only disguised the problem and postponed a real solution.

Dale Jones, northwest representative of Friends of the Earth, says there has been some misrepresentation of the truth regarding the moth infestations. He points out that some 690,000 acres of forest show some signs of infestation but there are less than 20,000 acres on which the trees are all dead.

States Ask for Grizzly Protection

Grizzly bears outside of Yellowstone and Glacier National Parks may get more attention under a new plan proposed by state game management agencies. The plan would require the cooperation of the U.S. Forest Service since most remaining grizzly habitat is on national forests. It proposes that grizzly bears be transplanted into remote areas, and might use controlled burns to create meadows within the bear habitat. Areas of Montana, Wyoming, Idaho, Colorado and the Canadian provinces will be studied as possible transplant areas. The plan says the needs of the bears should be considered in land planning, and that grizzlies ought to be considered "a reason for not carrying on timber harvest or constructing new roads" in areas deemed suitable for the big carnivores.

Utah to Mend its Ranges

The State of Utah plans a range improvement program which could cost nearly \$30 million when completed. As a first step, the Utah Department of Agriculture proposes a budget request of \$500,000 for fiscal year 1975. Utah's Rangeland Development Committee is also going to request funds for an accelerated program of resource development on federal ranges. Range surveys have shown 30% of private grazing lands to be in poor condition, 40% of state lands and 40% of federal lands. Only five percent of the lands administered by the Bureau of Land Management are listed as being in good or better condition. Range improvements planned would include spraying with chemicals, chaining, fencing, and water developments.

Cattlemen Blame Environmentalists

The executive vice president of the Oregon Cattlemen's Association says environmentalists are responsible for the energy crisis and could cause a food crisis. Donald Astensoe says environmentalists "... are responsible for the fact that there is no oil coming from Alaska; they have either stopped or slowed down nuclear energy plants; they have been successful in delaying offshore drilling, and ... have forced the Oregon Water Resources Board to hold hearings ... for the prime purpose of stopping all hydroelectric dams from being built on the Middle Snake River."

Coyote-Getters Return

The chairman of the House Agriculture Committee, Rep. W.R. Poage of Texas, says the Environmental Protection Agency has advised him it will allow use of "coyote-getters" in predator control. The getters are small, gun-like cylinders which shoot sodium cyanide into the mouth of an animal which pulls on a bait. The cylinders are pushed into the ground and the bait appears to be lying on the ground but is actually lying on top of the muzzle of the getter. The getters will probably be allowed in Texas and western states with large sheep populations.

McCulloch Offers Gifts to Media

Representatives of McCulloch Properties Corporation have offered lavish Christmas gifts to media people in Idaho's Wood River Valley. Key people at the Twin Falls Times News, KSKI radio station and the Wood River Journal received gift certificates from the corporation for items worth from \$30 to \$80.

The McCulloch Corporation's plans for Idaho have been slowed by citizen opposition to their proposed development which could bring 6,000 people to the Wood River Valley. The corporation recently won a suit filed against them by local property owners.



Rocky Mountain National Park (RMNP) is one of this country's most popular parks, but popularity has its problems. The park is only 65 miles from Denver. A major highway between Denver and Salt Lake City bisects RMNP. This easy accessibility has become a problem as park values are threatened by overuse.

With the National Park Service operating under the philosophy that "parks are for people," RMNP has been the scene of major intrusions. The park has two livery stables and a major ski area within its boundaries. The crowning glory to a drive across the tundra along Trail Ridge Road is a souvenir-junk store at over 12,000 feet in elevation. Campgrounds have been so overused that recently the Park Service closed some of them to allow the areas to recover. Bear Lake has become so popular that the path around it is now black-topped to prevent erosion and the ever-expanding parking lot is always filled to overflowing. (See photo above.)

To counteract this trend of degradation, the Park Service has come up with a Master Plan and a Wilderness Proposal to protect the park. The Service recommends that 91% of the park be designated Wilderness. Areas left out of the 238,000-acre wilderness proposal are where existing man-made intrusions (roads, visitors centers, ski slopes etc.) already exist.

The Master Plan calls for holding the line on development of RMNP. There would be no new roads and no new campgrounds within the park. The most striking change proposed would be the institution of a mass transit shuttle service to Bear Lake. The existing road dead-ends at Bear Lake after winding nine miles through the park.

The Master Plan calls for a study of whether the Hidden Valley Ski Area inside the park should be left as it is or eliminated. The plan proposes eliminating the two horse stable concessions within the park since there are 25 stables surrounding RMNP. The Master Plan cites the Fall River Pass Store on Trail Ridge Road as a major cause of traffic congestion and tundra erosion. It suggests that "the curio and novelty sales section of the store is unnecessarily large and contributes to the length of time visitors stay" which "results in impact on all of the facilities." Limitation of service is recommended.

The primitive camping experience will be emphasized. "Vehicle camping will be encouraged by private enterprise outside the park." The plan also calls for the reintroduction of several wildlife species that were eliminated from RMNP in the past. Species under consideration are the otter, the shiras moose and the wolf. "The basis strategy is clear," says the report, "restore missing plant, animal, and fish types, and ensure that natural environmental rhythms continue."

The Master Plan also proposes expansion of the park boundaries. It advocates special congressional designation of the Shadow Mountain Recreation Area and the acquisition of two private properties adjacent to the park.

Public support for this foresighted Master Plan and the maximum-sized wilderness proposal is needed. Local economic interests, including the Estes Park Chamber of Commerce, have publicly opposed the new proposals.

Public hearings on both the Master Plan and the Wilderness proposal are scheduled Jan. 26 in Denver, beginning at 9 a.m. in the Denver Federal Center's Building 56 auditorium. The Grand Lake hearing on both proposals will be Jan. 28, beginning at 9 a.m. at the Shadow Mountain Village ranger station. The Estes Park hearing is set for Jan. 30 at 9 a.m. at the RMNP headquarters auditorium. If you can't go to one of the hearings, send written comments to Superintendent, Rocky Mountain National Park, Estes Park, Colorado 80517. Copies of both proposals are available at the RMNP Superintendent at the same address.

Thoughts from the Distaff Corner

by Marge Higley

Traditionally, the beginning of a new year is the time for good resolutions. This year, the energy shortage brings a ready-made resolution idea — personalized energy conservation. I decided to put a little thought and experimentation into it and see what I could do, right in my own home.

The well-publicized energy savers, such as lowered thermostat, less TV hours, etc., are already in effect. And I grew up in a family where turning off unused lights was a rule which became a lifelong habit. (Since I live alone, there is seldom any reason for me to have more than one light burning at a time.) But there must be lots of little places where I'm using more energy than is really necessary, without realizing it. All I need is some way to figure out what I'm doing wrong.

Easy, I thought, snuggling into my bed. I'll make a game of it. Starting tomorrow, every time I flip a switch, I'll consciously try to figure out some way I can do that particular job using less, or even none at all. Little did I realize that before the day was done my mind would be boggled with decisions, mathematics, and perplexities!

My day always starts with plugging in the coffee pot. Cord in hand, I remembered last night's resolution. Would it use less power to make the coffee on top of the stove, which also happens to be electric? Should I make a full pot, and just reheat it later? Or did I read somewhere that it uses less electricity to leave it plugged in, than to reheat? Well, that was something I'd have to find out.

The can of frozen orange-juice presented no problems. I had received a nifty hand-operated can-opener for Christmas, so I unplugged the electric opener and put it on a high shelf, feeling quite pleased with myself. I ignored the blender and mixed the juice with a fork. (No applause here — I discovered long ago that a wet fork is much easier and quicker to wash than is a sticky blender!) The toast and egg brought up the same dilemma as the coffee. Short of a bonfire in the back yard, I had to use electricity to cook them. Does a frying pan on an electric burner use as much electricity as the electric frying pan? Probably the smaller burner uses less, but it takes longer to get the pan hot. Somewhat dubiously, I decided on the burner. With a flash of inspiration I combined the bread and egg into a piece of French toast, thereby saving the use of the toaster. I had solved one small problem for one day, but I'm going to have to find out more about that, too.

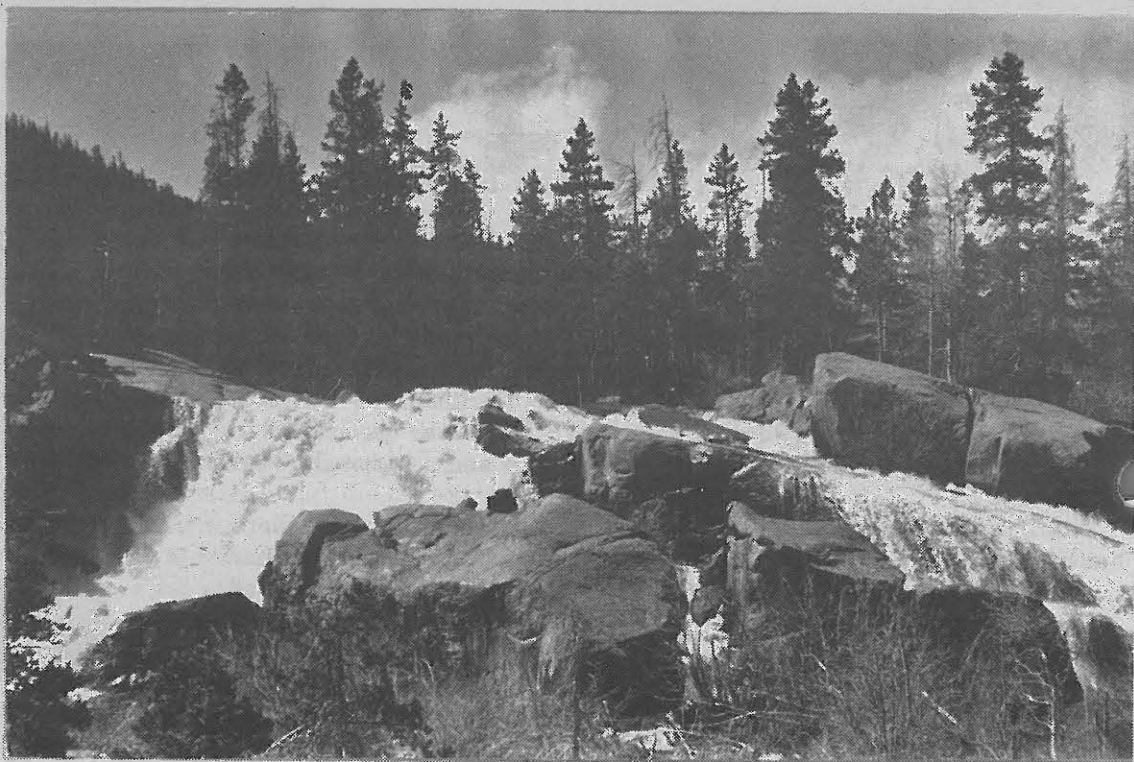
Then came the dirty dishes. Again pleased with myself, I decided I could certainly wash them by hand, instead of stacking them in the dishwasher, which I normally run once a week. Splashing hot water into the sink, I began to wonder — does it use more energy to heat water for dishes three times a day, or to run the dishwasher once a week? I'll have to find that out, too.

I ate a cold lunch, contriving to open the refrigerator door only once to remove leftover turkey, salad and milk. I had to open it again, of course, to return the left over leftovers. Would I have used less power had I left it open the first time long enough to take out just the amount I needed? I don't know that, either!

Somewhat unnerved by all these mental perplexities, I decided to relax with a new Christmas gift book. The day was dark, and cold air radiated from the window near my chair. I pulled the drapes, so that the thermostat wouldn't click on unnecessarily — and realized that I'd have to turn on the lamp in order to read! Decisions, decisions!

I sat there in the semi-gloom, the book unopened on my lap, and thought about what an eye-opener my little "game" had turned out to be. Like most people, I have always taken for granted an inexhaustible supply of electricity. On the rare occasions when there has been none at all, temporary makeshifts have not been difficult, because they were temporary. But now we are facing a long-term period of cutting down, and using as little as possible, so that there will be enough to go around.

There are two morals to this little tale. The first moral: all joking aside, it will help if we think twice whenever we flip a switch. The second moral: there ought to be a book about what uses how many kilowatts. If anyone out there knows of such a thing, please let me know. Or would a slide-rule be better? I'll have to find out!



Why, God? Why?

Reprinted from WYOMING WILDLIFE MAGAZINE, Jan., 1972.

by Sandy Marquis

I walked along a mountain stream and stooped to take a drink
Of the cool clear running water, than I stopped and had to blink.
What had once flowed freely with the clearness of each new day,
Was a mass of rotted garbage seeping slowly on its way.
I whispered, "Why God? Why?"

I took the path that lead me to the shade of forest green
But the forest was ugly charred wood, a nightmare not a dream.
And the charred remains of what was once a haven for man and beast
Was just a blackened graveyard for the greatest to the least.
I said "Why God? Why?"

I stumbled through the ashes and up the corroded hill
And the deadness of the land . . . I remember still
For now my son will never see the waters flowing clear,
Or touch a pine branch waving or see wildlife running near.
I fell upon my knees and shouted as I cried "Dear God. My God. Why."

The silence was around me as I knelt there and I cried.
I felt so very empty . . . the land I loved had died.
Then through the silence I heard a soft whisper from on high . . .
"Why Man? Why?"

Spare That Sagebrush

Sagebrush has a valuable role in providing food and cover for wildlife and livestock according to recent work completed in sagebrush stands. It also acts as a protection from overgrazing of adjacent grass stands by livestock and helps to enrich the soil productivity through action of its roots, according to the Idaho Fish and Game Department.

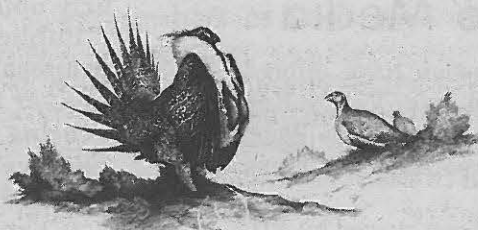
Traditionally, ranchers have thought of sagebrush as a weed, and thousands of acres in Idaho have been sprayed and replaced with almost solid stands of crested wheat grass. Studies in Colorado have shown that spraying of sagebrush also eliminates other desirable broad leaved types of vegetation like forbs

which were found to have more protein value for livestock than the grass.

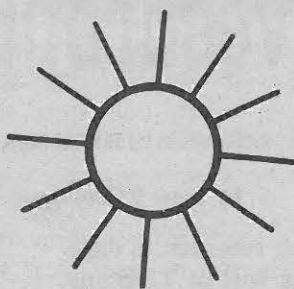
Other studies have shown that a mixture of weeds and grasses are much more beneficial to cattle since the weeds have a tonic effect on their well being far out of proportion to the amount consumed. Numerous species of wildlife are dependent on sagebrush for survival. These include deer, antelope, and sagegrouse. The isolated tracts of sagebrush in and around irrigated lands are often the key to maintaining pheasant populations since they constitute the only permanent escape cover.

Studies in the state of Washington also showed that sagebrush remained actively growing by utilizing moisture available far below the level utilized by grass during the late summer and early fall. This continued growth during the height of the summer season provided additional soil enrichment and more than doubled the thickness of the top soil that is actively involved in mineral re-cycling.

An additional finding showed that elimination of a sagebrush stand also causes the birds which help to reduce the insect populations to leave. This makes the remaining grasslands much more vulnerable to a large scale infestation.



The Solar Media



If you are intrigued by the possibility of using solar energy, but short on facts, we offer the list below. All are sources which we find useful and interesting.

Although the publications overlap, each of them seems to have a unique central mission. **Solar Energy Digest** offers worldwide perspective on the state of the art. Environmental Action Reprint Service makes definitive articles available to those who may have missed them in their original form. Mike Gravel's newsletter offers political perspective. Brace Institute is distinguished by its detailed how-to manuals. **Alternative Sources of Energy** may be the best way to connect yourself in a communications web with solar tinkerers.

Let us know about the sources of information we've missed. We'd like to add to this list.

COMMON MAN'S GUIDE

"I have a half-successful methane gas thing going here, but it's at a stage where I need technical assistance from someone more machinery-minded than I am."

Finding answers for this seeker and others like him is the mission of **Alternative Sources of Energy** (A.S.E.), a newsletter for people concerned with solar, wind and water technologies. A.S.E. is the common man's guide to alternative power systems.

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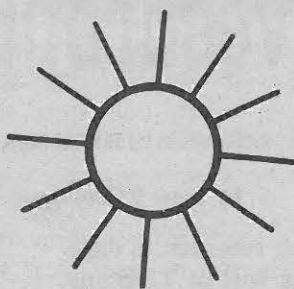
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Solar Media

sources of information on alternative energy.

16

The Solar Media



If you are intrigued by the possibility of using solar energy, but short on facts, we offer the list below. All are sources which we find useful and interesting.

Although the publications overlap, each of them seems to have a unique central mission. **Solar Energy Digest** offers worldwide perspective on the state of the art. Environmental Action Reprint Service makes definitive articles available to those who may have missed them in their original form. Mike Gravel's newsletter offers political perspective. Brace Institute is distinguished by its detailed how-to manuals. **Alternative Sources of Energy** may be the best way to connect yourself in a communications web with solar tinkerers.

Let us know about the sources of information we've missed. We'd like to add to this list.

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