CONGRESSMAN'S REPORT
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"Solar Energy: A Ray of Hope"

Of all the speeches and newsletters I have written over the past few years, I'd be the first to admit that some ought to be taken out and buried where they could never be found again. But there are others that I look over with some pride. Perhaps the one that stands out is the newsletter of May 1973. In it I warned of the coming energy shortages -- and that was a full six months *before* the now-famous Arab oil embargo which sent me along with thousands of fellow Arizonans to many an early morning vigil waiting for opening time and a chance at a tank of gas.

The title of that newsletter was "The Energy Binge is Over." Well, the prediction of shortages was right, but the notion that the binge was over was not. The binge goes on today and it very well may take a shocking event like another Middle East war or another devastating winter to jar us again into conserving and cutting back.

Our energy problem is serious. We import nearly half of all the oil we use. The terribly cold winter of last year showed how our energy supplies could be strained beyond capacity.

But what is happening? Our energy appetite continues to increase. Gasoline consumption is at an all time high. Electricity usage is still going up. The crux of the problem seems to be a lack of public awareness of its real severity. In a recent poll less than half of those interviewed knew that the U.S. must import oil to meet its energy needs.

The truth is that since the oil embargo of 1973 our domestic oil production has dropped and our imports have risen sharply to nearly 50 percent of consumption. We are highly -- some say dangerously -- dependent on foreign oil.

To illustrate that fact, if the whole world burned oil at the rate we in the United States do, we would exhaust all the supplies discovered and speculated within 15 years. Clearly something has to be done, and soon.

As we in Congress have discovered, there is no single, simple solution to the energy problem. President Carter realized the gravity of the situation soon after taking office as he declared the "moral equivalent of war" in asking the nation and the Congress to meet the crisis. The House of Representatives responded by passing most of the President's program intact. The Senate, however, is showing reluctance and the package is bogged down. Even as I write this, House and Senate conferees are locked in debate attempting to reach compromises on such delicate issues as taxes on gas guzzling cars, a crude oil tax and natural gas prices. So far, the one shining light to emerge from the conference committee is the solar energy program. The role of the sun as a source of inexhaustible, nearly pollution free energy for this nation seems assured -- and that's good news for all of us.

SOLAR ENERGY TO THE RESCUE

Sunshine has always been important to Arizona's economy. Our rich agriculture and tourist industries thrive on an almost always present sun. That natural blessing has even more significance now on the eve of the solar energy boom. Solar now provides less than one-thousandth of one percent of current U.S. energy requirements. Official predictions from the Energy Research and Development Administration show solar supplying seven percent of our national needs by the year 2000. But even that period of time may be too long given the enormity of the oil problem. It is true that we can never expect solar to meet all of our energy needs. Without elaborate, sophisticated equipment to concentrate and distribute the power of solar energy, it is too diffuse and its temperatures too low. But these very attributes make solar ideal for heating and cooling buildings and heating water. With sunshine readily available and the low temperature range adequate for home use, we can expect solar to furnish up to 70 percent of the nation's residential heating and cooling in the not-too-distant future. We ought to be able to do even better in Arizona, although we have just barely scratched the surface at this time.

The solar energy industry is now in its infancy with a long way to grow to reach its potential. For example, solar sales would have to increase by 50 percent for each of 10 years to reach a goal of supplying 10 percent of the nation's energy.

Change in Daily Oil Consumption

	From 1976	**From 1973**
United States	+8.8%	+7.5%
Japan	+7.0%	-0.7%
France	-1.4%	-8.6%
Germany	-0.5%	-10.8%
Italy	-2.6%	-5.0%

United Kingdom	-1.5%	-19.5%

--*Wall Street Journal*

THE FEDERAL RESPONSIBILITY

Recognizing the solar potential, the federal government has taken a number of steps to speed development of this important resource. A new Department of Energy has been formed to draw together various programs which have been operated by different agencies. Creation of this cabinet-level agency has served to dramatize the importance of our energy problems as well as to streamline the government's efforts. Within the DOE, solar programs are joined with energy conservation to form a single division. Without good energy conservation practices such as insulation, double-glazed windows and natural shading, solar energy systems cannot work effectively.

Specifically, DOE has outlined a number of programs for utilization of solar energy, including:

* Demonstration programs to stimulate more widespread use and public acceptance of solar heating and cooling of buildings and hot water heating. (Such solar functions are now competitive with traditional electric systems.)
* Direct generation of electricity from solar photovoltaic cells -- the solar panels similar to those used to power NASA's spacecraft. (The cost is high now, but we can expect a ten-fold reduction in price over the next three years, making it competitive for some applications.)
* Generation of electricity from the heat produced by solar thermal plants. The size of these installations range from the large centralized "power tower" concept down to modest plants located where power is consumed, thus eliminating transmission costs. (Such an application would be ideal for irrigation).
* Although seemingly unrelated, wind power to generate electricity is included under the solar program. Sunshine is the ultimate driving force for the wind, thus the correlation. In remote locations small scale wind-powered generators look practical. (The DOE also is considering large windmills with 100-foot blades for central power generation).
* Fuel generation from feedlot and sewage wastes comes under the DOE solar program. (Tucson had a functioning pilot plant for several years.) The program also includes the production of alcohol from grains and wood wastes. When mixed with gasoline the resulting "gasahol" makes an effective and less polluting fuel.

THE STATE'S RESPONSIBILITY

Sensing the potential of solar energy, the State of Arizona has been aggressive in establishing a healthy solar industry. Created two years ago, the Arizona Solar Energy

Research Commission is the key to that effort. Among its functions are a small grants program to encourage private solar energy research and demonstration projects and an information program to acquaint citizens with the practical application of solar energy. The commission has established good contacts with federal agencies and has been instrumental in securing several solar energy grants for the state. The commission also is setting statewide standards of performance for solar devices, an important function that the U.S. Department of Energy is leaving to the states.

Another key element to this new industry is Arizona's excellent solar energy tax incentive program, one of the best in the country. It includes property and sales tax exemptions, rapid amortization and income tax credits for solar devices.

Solar research at our three state universities in Tucson, Tempe and Flagstaff continues to be a most important part of the research and development effort in the state. Facilities have been constructed at the three campuses where students and professors seek to improve methods for harnessing the sun's energy. Their efforts are crossing traditional departmental lines as physicists, chemists and astronomers join forces with architects and engineers in this multi-discipline quest.

In the private sector, Arizona's copper industry has been one of the leaders in exploring the use of solar energy. Recently, I had the opportunity to drive a non-polluting electric car developed by the copper industry. In Tucson, Decade 80's solar house built by the copper industry is a beautiful example of near-future technology artfully crafted into a truly stunning Arizona house. Because of its superior heat transfer properties, copper will play a major role in the efficient use of solar energy. In addition to enormous potential in the United States, the outlook for a substantial foreign market for solar equipment is very encouraging and should provide a real stimulus to Arizona's copper industry in the future.

SPREADING THE WORD

One of the key elements to extensive solar energy usage is informing the public about existing programs and potential. We as a people are just now beginning to learn (or re-learn) how to use solar energy, its opportunities and limitations, the facts and fallacies. A few sources of information are given in the box in this newsletter. One of these deserves special mention -- the Department of Energy's National Solar Heating and Cooling information Center. Their toll-free telephone hotline (800/523-2929) provides information about all aspects of solar heating and cooling. You'll find the responses to be quick and informative. You might ask for the free booklet, "Solar Hot Water and Your Home."

As part of an effort to "spread the word," I am cosponsoring a seminar on solar cooling to be held in Tucson in December. Because solar air conditioning technically is more difficult than heating, progress has been slow. But I want to encourage good contacts between Arizona groups and the Department of Energy, and we want to be sure that Arizona builders are aware of the latest advances.

It is my own feeling that the nation's news media will be playing a most important role in educating the public about solar technology and the true scope of the energy crisis, and in gaining public acceptance of some of the costs of solar operations. The start-up costs will be high, but this fact should not discourage us from utilizing this energy source. The concept of life cycle costing must be widely accepted before a really significant number of people will pay the initially large cost of installation.

The media also can contribute by joining in the fight against possible fraud. Solar is a new industry and most consumers lack experience in planning or purchasing proper apparatus. It could be easy for modern-day snake oil salesmen to play upon public gullibility by delivering shoddy, substandard solar equipment at outrageous prices.

[Note: In the original newsletter, the background of the following box was a photograph of Kitt Peak National Observatory. Click here for an image of this box as it appeared in the original newsletter.]

Saving Energy: A Kitt Peak Success Story

During the 1973 Arab oil embargo, the federal government mandated that energy saving programs be started in all its agencies. Kitt Peak National Observatory, headquartered in Tucson, responded with a series of specific energy savings steps. The results have been a spectacular series of reductions in the use of fuel and energy.

Individual responsibilities were assigned to see that this plan was carried out. The effort has continued to receive attention and support at all levels from the director down, even though the embargo is three years behind us.

The Kitt Peak program is composed of the following steps:

* Thermostats were lowered to 68° in winter and raised to 76° in summer.
* All outside spotlights not needed for safety were removed.
* Personal heaters in offices were forbidden.
* Unnecessary trips were eliminated. A shuttle bus for employees was started between the downtown headquarters and the telescopes on the mountain.

This program has not caused any hardships or reduced the scientific output of the observatory. Yet the energy savings have been spectacular. In the third quarter of 1977 compared with the same quarter of 1973 the following savings have been made:

* A checkoff system was started so that all idling machines in shops and offices were turned off.
* All non-essential power was cut off between 10 p.m. and 6 a.m.
* Non-essential lighting was cut off. Non-critical illumination was reduced and more use was made of natural light.
* Electricity usage down 13 percent
* Natural gas usage down 43 percent
* Gasoline consumption off 12 percent
* Diesel fuel consumption reduced by 69 percent

We should all say "Congratulations" to Kitt Peak and incorporate their steps in our homes and businesses.

--Kitt Peak National Observatory

A responsible and alert media campaign could provide an educational service to the public that would be the best defense against fraud. Government agencies, too, could be of assistance. The Office of Consumer Affairs of the Department of Health, Education and Welfare, has put out a booklet entitled, "Buying Solar," which is available at no cost by writing that agency in Washington, D.C. 20201.

Although tapping sunlight for heat appears to be an easy process, successful operation is far from simple. Delicate and careful design in all phases is necessary to prevent costly, if not disastrous, failure. My advice to anyone planning to build or install a solar device or simply wishing to make a wise choice of a commercially built and installed unit is to go to an expert for assistance. Presently there are not enough local experts and that is why I am supporting the Department of Energy's plan to set up an Energy Extension Service to help communities with advice, publications and general information.

THE CHALLENGE

But as I said before, no single solution is going to ease our energy shortage. Even solar's abundance won't give us relief unless our energy program includes conservation. That 1973 newsletter of mine emphasized conservation -- and conservation continues to be the keystone in 1977 and 1978 and beyond. As a nation we have not responded to the crisis as have some other countries. We have to improve that record. However, some individual organizations have met the challenge of energy conservation. The Kitt Peak National Observatory is an example to us all.

The increased utilization of non-fossil fuel sources such as solar are a part of the challenge of conservation and efficiency that must reform the basis of our life style in the years ahead -- especially here in Arizona. Just as the United States finds itself

dependent upon foreign oil, Arizona, with virtually no natural gas or oil, is dependent upon the producing states for these supplies. But solar power offers Arizona a measure of energy independence -- and we must take full advantage of the opportunity. These early demonstrations of solar energy use now being undertaken are important for at least two reasons: first, to uncover problems and reach solutions for future applications; and second, to make us more aware that the sun's energy can be harnessed to work for us.

For example, in Arizona there is a proposal to use an array of solar cells to generate 10 percent of the electrical needs of a new terminal at Sky Harbor Airport in Phoenix. Designed by the Motorola Corporation, the solar cell array would cover 10 acres and would produce 500 kilowatts of electrical power, making it the largest such project in the country. If authorized and completed, this project would give us vital experience in how to use local power generated together with an existing commercial power network, a significant technological advance.

Another federally funded project is underway near Coolidge with solar heat being used to run generators that produce electricity for deep well irrigation. Much of that irrigation now is powered by natural gas piped in from out of state. In agriculture, a cloudy day or two will not be disastrous -- thus eliminating the need for an expensive backup system or transmitting power to remote fields. And, importantly, the farmer won't find himself listed at the bottom of the priority list as "non-essential" if and when the next widespread shortage occurs.

The Motorola project and the Coolidge test illustrate diversified sources as the way we ought to go in this country. Twenty years from now I think we'll see a major trend away from the centralized concept under which we now operate. Instead, we'll have moved towards utilizing local sources of non-fossil energy. The dependence on oil will be eased to a large extent, removing a principal cause of the punishing balance of trade deficits from our economy and going a long way toward making energy inflation a thing of the past.

Twenty years is a long way off, but there are things we can do today to hasten the growth of energy independence on the local and even the individual level.

* We need to encourage research, development and use of alternative energy sources such as coal, solar and wind in order to preserve scarce fossil fuels and curtail their wasteful consumption. In particular, the single biggest user of oil and gas, the automobile, must be brought into line.

* We also have to maintain the option of on-site electrical generation by establishing policies that don't excessively favor the utilities, and give the consumers a fair break, say, by allowing consumers to sell excess power generated by solar units or windmills back to the utility.
* More than this, we have to overcome the problems of hooking many small on-site generators into the major utility systems. This will require close cooperation plus the development of certain manufacturing standards and sensible operating procedures. This interworking is crucial to orderly diversification.
* Finally, we really must see that utility rates are restructured to favor conservation, not penalize it as presently is the case.

Yes, there are obstacles remaining on the energy front, but I feel that we are beginning to move. The Congress and the President are working hard, the State of Arizona is making significant progress, private industry is getting involved, and it's all very encouraging. But it still remains up to all of us individually to keep up the momentum.

Mo Udall

SOURCES OF INFORMATION ON SOLAR ENERGY

A good place to start is:

National Solar Heating and Cooling Information Center
P.O. Box 1607
Rockville, MD 20850
Call toll free (800) 523-2929

Their free booklet, "Solar Hot Water and Your Home," is good. They have bibliographies for many aspects of solar heating and cooling.

Office of Consumer Affairs
U.S. Department of Health, Education and Welfare
Washington, DC 20201

An informative booklet entitled "Buying Solar" is available free in single copies.

Within Arizona information can be obtained from:

Arizona Solar Energy Research Commission
1700 W. Washington, Room 502
Phoenix, AZ 85007
Phone 271-3682

They have several free publications including a directory of Arizona firms working in solar energy and a synopsis of Arizona's current solar incentive laws.

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