MINUTES

ASSEMBLY COMMITTEE ON TAXATION
SUBCOMMITTEE ON EXEMPTIONS FOR USE OF RENEWABLE NATURAL RESOURCES
MARCH 2, 1977
4:00 p.m.

Members Present: Chairman Schofield
Mr. Craddock
Mr. Horn
Mr. Jacobsen

Guests Present: David W. Baker
Allan Buchanan, Barlow and Peek
David R. Cowperthwaite
Carl Kidman
Helena Kolodziej, Senior Citizens
James C. Lien, Department of Taxation
Tom Moore, Clark County
R. G. Richards, Sierra Pacific Power Company
Steven Stucker, North Las Vegas
Al Throckmorton, Solar Heating Industry
Bob Warren, Nevada League of Cities
Tom Young, Sierra Pacific Power Company

ASSEMBLY BILL 277
ASSEMBLY BILL 292
ASSEMBLY JOINT RESOLUTION 7
ASSEMBLY JOINT RESOLUTION 9

Chairman Schofield began the meeting at 4:04 p.m. He went over the previous amendments submitted to the subcommittee on A.J.R. 9 and A.B. 292, which are included in the February 21 subcommittee minutes.

Mr. Schofield said that he did get some information submitted by several of the guests and that it had been passed on to the subcommittee members (Exhibits A, B, C). He said that the subcommittee will work now on placing A.B. 277 over the private sector and work on A.B. 292 for the commercial sector.

Tom Young introduced Dick Richards, who he said has been doing quite a bit of research on solar energy. He said that Mr. Richards had brought information for the subcommittee's use.

Mr. Richards said that his information was fairly general. He said that he had reproduced several items from the Solar Heating and Cooling Information Center (Exhibit D), relating to clarifying some common misgivings about the existing situation of solar energy.

Mr. Craddock asked Mr. Richards if there was a projection timewise on when solar energy will become the rule. Mr. Richards said that most of the projections seem to indicate pushing the year 2000. He also said that give or take the prices and availability of oil, the change may occur in the 1980's or 1990's.

Mr. Jacobsen asked if Mr. Richards worked full time on research. Mr. Richards answered that this was a personal interest. Mr. Jacobsen asked if Mr. Richards thought more on the line of commercial or for the home owner. Mr. Richards said that his work was more with the domestic uses.

Mr. Schofield suggested a situation where a commercial building in Reno might expend "X" number of dollars to set up a solar energy unit. What type of rebate set-up would be appropriate. Mr. Richards mentioned the possibility of a ten-year payback period as a basis for a rebate. He said that this might be practical for commercial. Mr. Young said that some buildings would be 2500 square feet while others would be 25,000 square feet. He said that you would have to consider the capacity of the unit.

Mr. Schofield said that possibly a percentage factor would be something the subcommittee could address itself to. Mr. Lien said that this would be no problem once values are established.

Mr. Schofield used Mr. Lien's submitted recommendations to make some comments concerning A.B. 292. Mr. Lien had stated that this bill was very broad. Mr. Schofield said that the Legislature did not want to create administrative problems for the assessors. Mr. Lien mentioned restricting A.B. 292 to heating or cooling systems, but Mr. Craddock said that he thought the bill was not intended to be left at that. Mr. Schofield said that this bill would not be just these types of systems.

Mr. Lien said that one of the things the should be brought into focus is whether facility and device are the same as system. Mr. Schofield referred to the amendment for A.B. 292. He said that in Section 4 of the amendment, Page 2, the term "system" should be deleted, and reference should be made to "facility or device" as stated in Section 2, Line 1, Page 1.

Mr. Schofield said that what they were really trying to do with the legislation is to get started on something that will be upon us before too long. He said that we have to begin somewhere. He said that if they must keep the bills

down to the definition of nonfossil, that the subcommittee could live with that.

Mr. Lien raised the question if solid waste was nonfossil. Mr. Craddock said that it was and that the concept was that we are trying to save fossil fuels. Discussion ensued on various types of solid waste, and Mr. Lien pointed out that Section 3 excluded any material that was man-made. He said that there are some things that the subcommittee may not want to exclude. He also said that atomic fuel, although nonfossil, is something that must be converted to energy by man. Mr. Schofield asked Mr. Lien if he felt that Section 3 should be eliminated. Mr. Lien said that he felt it should.

Mr. Horn asked about the production of electricity. Mr. Schofield said that if a power plant constructed a facility to convert nonfossil type resources into electricity a tax relief would be given. Mr. Horn asked if Boulder Dam would qualify. Mr. Craddock said that at the present time it would. Mr. Lien said that certain facilities would have to be excluded unless the subcommittee wanted to include them. Mr. Schofield said that perhaps an effective date would be the way to go. He said that the intent is to produce new sources of energy from nonfossil resources, and that this legislation is searching for these incentives.

Carl Kidman asked if A.B. 292 would include agriculture. He said that he could see agriculture providing many of the different resources for the production of energy. He said that the 1955 edition of Encyclopedia Britannica indicates this. He said that the main reason wood fuels such as methane and methanol had not been more widely used was because petroleum products had been so plentiful. Mr. Schofield said that he did not see the bill limiting or eliminating any of the things Mr. Kidman mentioned.

Bob Warren spoke next. He said that since the subcommittee had attacked such a huge problem that perhaps they could consider another. He expressed a concern of the number of measures before the Legislature exempting various segments for various reasons from taxation. He said that all of the bills together, if passed, could cause erosion of tax bases.

Mr. Craddock answered that the subcommittee was talking in terms of a "henceforth situation." He said that services provided by political subdivisions must still be supported by

the users. He said that there are much better ways for future Legislatures to establish new tax bases, if that is necessary.

Al Throckmorton spoke next saying that he had also been concerned about property value. He read portions of an article from Science Magazine, June 25, 1976, which are quoted as follows:

"In a typical attached house built before 1970, in Baltimore, Maryland, with a floor area of approximately 1500 square feet. Taking that house as an example at 1975 average prices for natural gas and electricity, the corresponding annual cost for natural gas is about $840. If the house has electrical resistance heating, its 1975 annual energy cost could be as much as $1400. These household expenditures are nearly double the expenditures for the energy requirements in 1970.

"Existing dwellings that have low thermal efficiency and cannot be improved economically will become increasingly obsolete. This will result in decreased property values relative to energy efficient dwellings and in extreme cases outright abandonment. There has already in some suburban counties around New York been a decrease in property values which erodes the tax base.

"If energy prices do continue to increase significantly, there is a possibility of rapid accelerating economic obsolescence in a significant fraction of existing particularly single family attached housing.

"Two cloudy, potential troublesome issues are the impacts of energy conservation on mobile home economics and the prospect of accelerated obsolescence of much existing single family housing that is thermally inefficient."

Mr. Throckmorton further had some quotes from a paper that was presented at a New Mexico Solar Energy Association seminar in September, 1976, relating to the consumer:

"Residential lenders are reasonably well informed as to the present and projected shortages of fossil fuel but do not appear to relate how these shortages affect existing residential portfolios. We recognize that some 20% of the U.S. per capita energy use is in the home. That some 75% of that use

is to generate home heat. Rapid escalation of fuel costs does not appear to materially affect rates of consumption. If it is cold outside, you are going to burn the oil you need to keep the house warm regardless of what the price is. This fact combined with population projections which demonstrate that even with maintenance of the low birth rate that the U.S. population will grow 250 million by 1990 to cause concern to many long-term residential lenders. If less fuel becomes a fact, then less consumption may become a value and more consumption may be more generally viewed as being in poor taste as well as being in poor judgment. That is the case, how will our existing portfolios of energy efficient homes be affected. Solar add-ons would be encouraged through a program sponsored by the government and utilities, and houses which are unadaptable, such installations would suffer rapid deterioration of value."

Mr. Craddock said that the fact that we will have to suffer to some extent is of no concern now. He said that we are already going into "inverted rates." He said that the goal has to be placed beyond the obsolescence cost because of escalating energy costs.

Mr. Schofield asked Mr. Lien to explain how these bills work as they are now written. Mr. Lien said that in A.B. 292 a person would be allowed a total tax credit up to the cost of the original unit. On a $10,000 unit, he said a person could be exempt from taxes for up to about 15 years if the yearly tax bill was about $600. He stated that under A.B. 277 the tax-free period would only be up to about three years because this bill addresses a $2,000 limitation. The subcommittee agreed that this was not their intent, and that the bills would have to be amended to reflect a tax rebate only for the portion of the property valuation that covers the facility or device operating on nonfossil fuels.

David Cowperthwaite said that he felt this legislation would only be marginally effective. He said that the only way to be really effective is to generate capital formation in the production of energy.

Mr. Kidman said that he felt whatever type of incentive a person might have, whether it was for his own good or in the form of a tax incentive, would be a starting point and there would be the possibility of meeting technology halfway. He said that presently a solar unit costs approximately $10,000, and with the improvements through technology, he could see the price at $9,000, then $8,000, then $7,000, etc.

Mr. Craddock said that he would like to see the complete subcommittee report put together with enough time to let the expertise on this subject view the report. Mr. Schofield said that this would be done.

Mr. Schofield adjourned the meeting at 5:07 p.m.

Respectfully submitted,

Carl R. Ruthstrom, Jr.

Carl R. Ruthstrom, Jr.
Secretary

EXHIBIT A

February 25, 1977

Mr. ~~Jack~~ Jim L. Schofield
Assemblyman
State Legislative Building
Carson City, Nevada 89710

Re: AB 277, AB 292
Comments

Dear Mr. Schofield:

Following are some of my thoughts concerning Assembly Bill 277 and 292. As a member of the solar industry and as a private citizen interested in using alternative energy sources I am behind any incentive, help, leadership and financial assistance that can be originated at the state legislative level as long as it does not lead to more bureaucratic administration or cost and is written within the constitutional authority and responsibility of the legislature. If it also represents the desire of a majority of the citizens of the state, then certainly the matter should be pursued and carried through.

In reviewing the proposed legislation it was necessary to list a goal and subsequent objectives for possible legislation; and grade each proposed bill as to its possible performance in accomplishing these objectives. A general goal as I see it might be stated as follows:

To provide leadership in making Nevada and its citizens energy independent, without adding to the tax and bureaucratic burdens of its citizens and industry, subsequently providing them with increased freedom.

To meet the above goal a list of objectives come to mind for any proposed legislation.

	AB 277	Amended 292
1. Encourage the use of alternative sources of energy not just solar.	10	10
2. Provide leadership in the switch from fossil fuels.	0	0

	AB 277	Amended 292
3. Provide ongoing effort to publicize benefits available and adverse consequences.	0	0
4. Does not restrict civil liberties.	10	10
5. Is clear and specific.	6	8
6. Available to all citizens and industry.	3	5
7. No cost or low cost to state and citizens.	5	10
8. Low impact on administrative work loads.	5	10
9. No or little increase in bureaucracy.	5	10
10. Benefits all citizens not priviledged few.	6	8
Totals	50	71

While the above list is not all inclusive it does provide a quick guideline from which to start. The weight in favor of amended AB 292 is due primarily to the easier administrative task and less red tape involved in granting tax relief assuming the constitution can be amended.

Item 5 concerning the clarity of the bills - I have a question concerning the first line of section 3. Are nuclear fuels manmade? Are they nonfossil resources?

I commend the committee for taking the time to include alternative forms of energy and not just solar. While I am certain solar will ultimately outdistance other alternatives presently available to us, I believe all possible alternative sources should be encouraged and explored.

As of the end of 1976, seventeen states have passed property tax legislation. Of those, ten have provided for relief only for solar sources. Seven have taken the time to define other alternative sources.

Montana has apparently gone through a loop similar to ours with the exception that they have limited any exemptions to a maximum appraised value of $100,000.00.

As this state is totally energy dependent I do not favor any limit at all. We want to encourage large solar power installations to come operate in this state in preference to our surrounding neighbors who are not energy dependent.

In reviewing all the other bills that have been passed by the state legislatures throughout this country, it would appear that AB 292 as amended is one of the best.

However, against my listed objectives there are several weaknesses. I realize there is only so much that can be done with a tax bill, but in any case if the legislature is going to make sure its legislation is to be effective quickly, more needs to be done. The state could make sure that all state buildings, future as well as present, be periodically reviewed, so that if solar energy is cost effective the buildings

could be modified. This will provide further leadership and help, publicize benefits and provide a pool of working technology with the state

Also we should make sure we publicize continuously the efforts by the state to change the energy dependent status. For instance, some states have set aside small amounts of money to make sure the citizens are aware, insuring that any legislation would have its full desired impact.

California is taxing electrical power .0001 to raise the funds for ongoing development of alternate sources. Montana has applied a severance tax to coal to pay for their programs.

While I question raising taxes of any kind, I feel strongly, the state government should develop an information center or pool whose charter is to keep every legislator and state agency thoroughly informed, as well as to disseminate information to the public.

As most solar technology companies are presently small, operating with limited budgets, it is difficult to spend the money to attend conferences around the country or for educating the public. Some well meaning but disinformed people will be responsible for exaggerated claims either for or against. A center where information could be gathered and passed would be very helpful.

Sponsoring programs in the High Schools and State Colleges would also expedite the spreading awareness of availability of alternate energy resources.

"Give a man a fish and he is fed for a meal, teach a man to fish and feed him for a lifetime."

If you would like to contact me for further information please feel free to do so. I thank you for your interest.

God speed.

Alwyn A. Throckmorton

EXHIBIT B

NOTATIONS ON AB 272

1) How many years will the tax rebate be allowed on a given installation? 10 years?

2) If a tax rebate is allowed for the addition of insulation and thermopane windows, will the final cost figure, to the building owner, include both time and materials?

   a) Sometimes a contractor may be hired to do added installations.

   b) At times the owner will make added installations.

3) When the home is sold will the new owner be in line for a tax rebate, even though he had nothing to do with the original addition of energy saving materials?

2) If no rebate is given to the second home owner, will the home then be taken off the tax rebate list and taxed at its full value?

4) Which materials will be considered , in the case of solar energy, as energy conserving?

   a) Private home: Any materials which are in addition to a conventional heating system. 1) Solar collecting devices, storage tanks, for hot water, pipes leading from solar collectors, and hot water storage tanks.

   b) Commercial: Probably the same.

) In the case of a utilities company setting up a plant for the creation of usable energy, and totally run by nonfossil resources, will the entire facility be tax exempt? If so, i'll bet they would get their drawing boards out in a hurry.

Allan Buchanan,(Barlow and Peek)

EXHIBIT C

STATE OF NEVADA

Department of Taxation

CARSON CITY, NEVADA 89710

In-State Toll Free 800-992-0900

MIKE O'CALLAGHAN, *Governor* . . JOHN J. SHEEHAN, *Executive Director*

February 25, 1977

MEMO

TO: Assemblyman Jack Schofield, Chairman
Subcommittee on Renewable Resource Bills

FROM: Mr. James C. Lien
Deputy Executive Director

SUBJECT: AB 277 and AB 292

In response to your request at Monday's Subcommittee meeting, I submit the following.

AB 277:

1) You may want to consider changing renewable to nonfossil throughout the bill.

2) If you do number 1, line 12, page 1 is not necessary.

3) If you remove line 12, you may wish to substitute non-commercial hydroelectric which would eliminate the problem of trying to collect an allowance on a newly installed electric airconditioner which under the current language could be interpreted as being allowable.

4) The bill is broad enough to cover commercial properties, but would exclude nuclear power or geothermal plants because power is sold for profit. However, the $2,000 limitation should be removed if commercial properties are to be expected to qualify.

5) The bill is broad enough to include wood; accordingly a fireplace could qualify for an allowance. We believe standard or conventional wood and electric fireplaces should be excepted as gas fireplaces would be.

6) We have no problem administratively as a Department; Clark County and Carson City have concurred in that opinion.

7) We feel a $50,000 appropriation would be adequate.

AB 292 as amended:

1) This bill is very broad because it specifies conservation of energy while AB 277 is limited to heating and cooling systems. Accordingly, it applies to Thermopane windows, a heatalator in a fireplace, the addition of storm windows or doors, insulation above code, etc. This creates an administrative problem - the drafting of regulations stating what qualifies, particularly under "reduction of waste or dissipation of energy".

2) Section 4, paragraph 1b of the amendments: the term system should be deleted and reference made to facility or device as stated in Section 2, line 1, page 1.

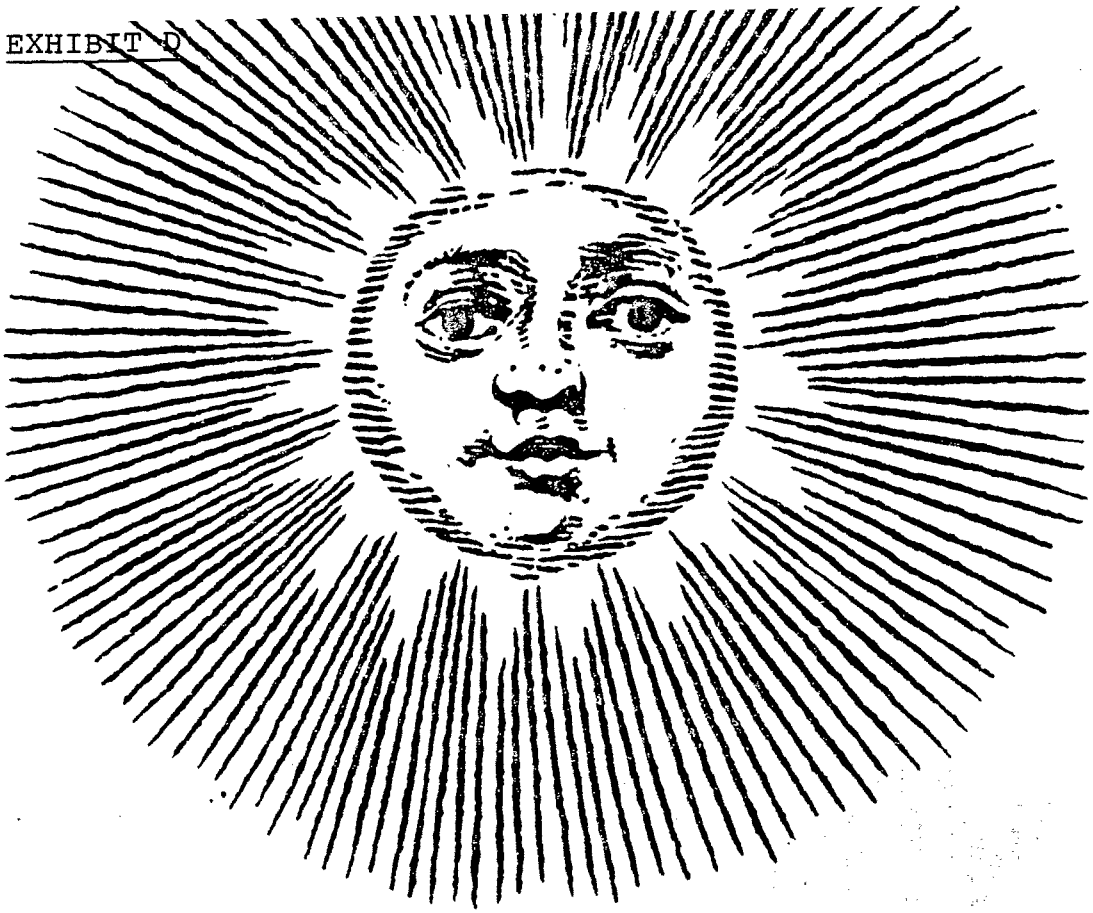
3) Section 3, page 1 of the amendments: We question the inclusion of this limitation: for example, uranium in itself is not a fuel; but its man-made derivation is. Certain wastes are not useable until converted by man - the term "any material which is man-made" is too restrictive on potential engergy sources.

4) This bill would include an entire power plant - for example a $100 million atomic plant would qualify as "production of energy from any nonfossil resource" as there is no restriction regarding selling the energy for profit as in AB 277. We doubt the State is ready to pay out even $10 million on a small geothermal plant - accordingly some limitation should be set.

5) As the bill is written, we would have to project a needed appropriation of $100,000 even if the portion raised under 4 is corrected.

JCL/jbd

EXHIBIT D



Solar Energy Now: Why Aren't We Using It More?

By Andrew Tobias

"... Solar-energy applications run the gamut. Some of them are simple, reliable, and economically compelling right now..."

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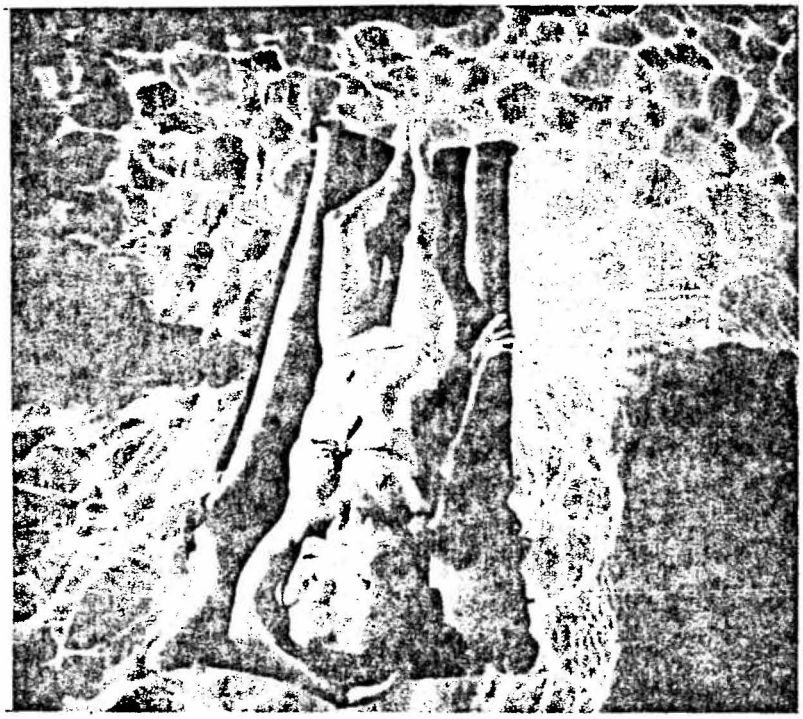
The Energy Research and Development Administration and the U.S. Department of Housing and Urban Development have established this national information center to promote the concept of Solar Energy. For more information on solar heating or cooling write:

SOLAR HEATING
P.O. BOX 1607
ROCKVILLE, MD 20850

or call toll free during your local business day. From anywhere in the Continental United States, except Pennsylvania, call 800-523-2929. In Pennsylvania, call 800-462-4983.

NEW YORK

DOUG METZLER



It works: *Enough energy in the form of sunlight falls on this person in a day—if we could collect it all—to power her home for a week.*

Solar Energy Now: Why Aren't We Using It More?

By Andrew Tobias

"... Solar-energy applications run the gamut. Some of them are simple, reliable, and economically compelling right now..."

I don't know if it's true about the woman who spread aluminum foil all around her sun chaise and baked herself to death, like a potato, but the general principle is compelling. The sun is a furnace of almost unimaginable proportions. Enough energy in the form of sunlight falls on New York State in one day—if we could collect it all—to power the entire country for a week. (Enough falls on California to power the whole world!) And when I was in Huntsville, Alabama, attending the First Annual Alabama Solar Energy Products Show—an eleven-exhibit affair all too indicative of the fledgling state of the solar-energy industry—I actually did see a man hold a board up in front of a twelve-foot concave reflector he had built in his garage, and watched as the board almost instantly burst into flames. (Then he held up a Coke can, which melted.) The temperature at the focal point of his $200 Mylar-and-bicycle-chain contraption was around 2,000 degrees Fahrenheit. Focus it on a tank of water and you would soon have steam to run a turbine to generate electricity to power your home.

Now, the natural organization for a story like this would be first to demonstrate the overwhelming reasons why solar—not nuclear—energy must become the energy of the future, and then to catalog the ways you and I can use solar energy *right now* to save money and, at the same time, conserve fossil fuels and cut down on pollution. But it is only natural to be more interested in saving money than in saving the world, so I've reversed the order. For now, suffice it to say that when Dr. Edward Teller, "father of the hydrogen bomb and longtime advocate of nuclear-power expansion," as the Los Angeles *Times* characterized him, visited Huntsville a couple of weeks after I did last month, he said that the *long*-term answer to our energy needs lies in solar, not nuclear, energy development, and that this is where our first priority ought to be.

The sun's rays are free, clean, and virtually inexhaustible. The stuff of nuclear energy—both fuels and wastes—which we are now gearing up to produce on a truly grand scale could hardly be more hazardous.

Along with the technological and economic problems standing between 1976 and the "solar age" are four popular misconceptions.

Misconception 1

Solar energy is in its infancy, highly technological, unproven . . . wait twenty years.

"... On a day when the temperature ranged from 17 to 5 below zero, a Chicago house remained at 72 degrees all day long ..."

In fact, some solar-energy applications are simple, reliable, and economically compelling right now.

Anyone who heats a swimming pool —and more than half a million Americans do—ought to consider installing a solar water heater. Today. A different kind of solar installation makes sense for hot-water-heating. Today. Home space-heating is trickier, but anyone who pays his own heating bills—and certainly anyone planning to build a new house—should read on. Solar-powered air conditioning is trickier still, but not far off.

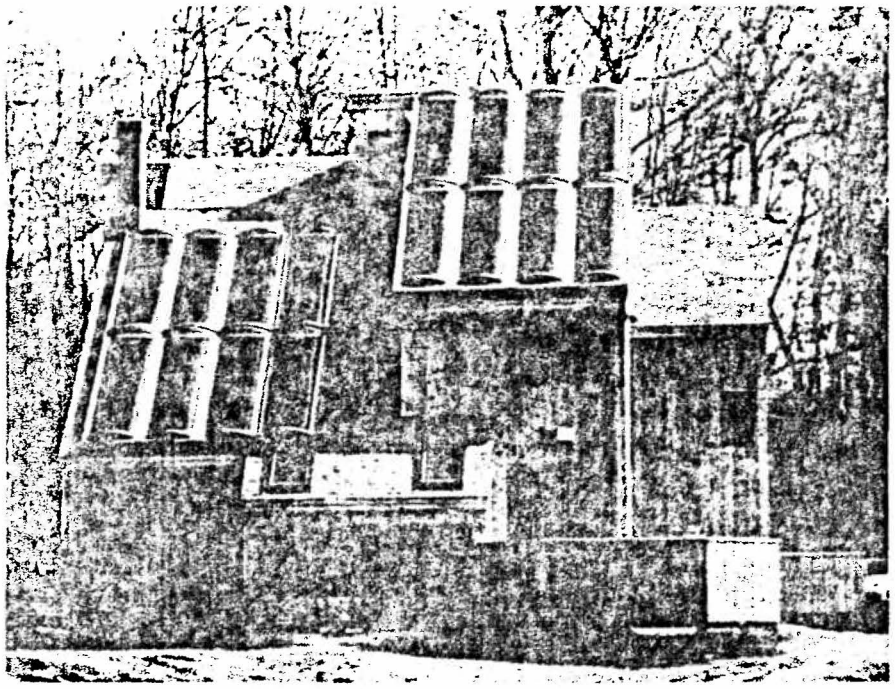
Upwards of 250 companies nationwide are involved in solar-energy development, ranging from one-man backyard operations to major corporations like PPG Industries, Revere Copper & Brass, Owens-Illinois, and subsidiaries of Mobil and Exxon. Happily, this is an industry ideally suited to the small-business man, with lots of room for ingenuity and competition. Fafco, Inc., a Menlo Park, California, firm with a growing dealership around the country, is installing its solar pool-heating systems at the rate of 6,000 a year—profitably. In Japan, 160,000 solar water heaters were sold in 1974; Hitachi is now offering much the same rudimentary heater, in kit form, for $359 here. Champion Home Builders, of Dryden, Michigan, is beginning to manufacture solar furnaces in nine of its plants, and plans to market them through its 4,000-odd mobile-home dealers. Several hundred such "furnaces"—insulated rock piles that sit beneath solar collectors—have already been manufactured and sold by licensees. Arthur D. Little, the consulting firm, esimates sales of water- and space-heating gear may reach $1.3 billion yearly by 1985.

"This is the number-one thing architects want to know about," says Lola Redford, a prime mover in promoting conservation and solar energy.

There are barely 300 solar houses in the U.S. today, but already Fire Island's first is under construction (designed for environmental lawyer George Davison-Ackley by architect Steven Robinson and solar engineer Fred Dubin), with a second in the planning stage. Can the rest of the nation be far behind?

It is only in the field of solar electric generation—turning the sun's rays into electricity, not just heat—that major technological advances are needed (and being achieved). Even now, photovoltaic cells are becoming economical for low-power applications in outlying areas, such as to power buoy lights at sea. Someday orbiting power stations may collect the sun's energy in space (where it is perpetually sunny) and beam it via harmless microwaves to receiving stations on earth. There it would be converted to electricity and fed into the national power grid. Electric "city cars," like the ones already available from Sebring-Vanguard, could then plug in, charge up, and drive off on what would be, indirectly, batteries full of sunshine. This scheme, the brainchild of Arthur D. Little vice-president Peter Glaser, is seen by some as a possible means by which the nation's space program could eventually become economically self-sustaining.

ROBERT PERRON



Solar collector: *This three-and-a-half-bedroom house in Quechee, Vermont, is equipped with Grumman solar panels and extra-heavy insulation which will cut fuel consumption by two-thirds per year. Builder/engineer/owner Robert Terrosi says the solar system retails for $8,000 and the special insulation, $2,000—and he is building two similar houses for clients now. Annual tax-free "dividend" versus electric heat: about $1,600.*

The problem is that people tend to lump all solar-energy applications together as "space-age," when some have actually been around for centuries. Twenty-four hundred years ago, Xenophon noted that "in houses with a south aspect, the sun's rays penetrate into the porticoes in winter, but in summer the path of the sun is right over our heads and above the roof, so that there is shade." He suggested building houses with tall south walls, to capture the winter sun. Think what he could have done with modern insulation and plate-glass windows!

Windows allow the sun's heat into a room, but impede its escape. Anyone who has entered a car parked facing the sun in the wintertime has probably noticed this "greenhouse" effect. In 1942, in Chicago, there was a brief sensation over a "solar house" that had been designed with huge south-facing windows, much as Xenophon described. In the midst of a severe cold spell, on a day when the temperature ranged from 17 to 5 degrees below zero, this house was able to maintain a 72-degree temperature from 8:30 in the morning to 8:30 at night without burning a drop of fuel. It was a great curiosity, but as the weather warmed up, and with fuel cheap, people quickly lost interest.

Similarly, there were 60,000 solar water heaters operating in Miami in the fifties. But with the advent of cheap natural gas, their use diminished.

Dramatic technological advances in solar-heating equipment are unlikely. There will be important design and engineering improvements, certainly; and it's true that investigating the field and investing in solar heating at this stage require a certain pioneering spirit. But it will not be like buying a $300 electronic calculator only to see the price fall to $19.95 five years later. Rather, what will make solar heaters

seem cheaper and cheaper will be the inexorable price increases of conventional fuels.

The *reason* there's not much room for miraculous breakthroughs in solar heaters is that they're so simple to begin with. Picture a hot black roof under a scorching sun. Now picture a hose that runs water up from your pool (or water tank) to the top of the roof, lets it trickle down, and then runs it back into the pool. That's a solar pool heater. Put a piece of glass or plastic over it, to let the sun in but keep the cold air out, and it will work in January—and attain temperatures hot enough to scald you. Put that hot water in a Thermos bottle, and it will last overnight. Blow air past it and it will heat your living room.

The practical mechanics of all this can be troublesome (corrosion, disintegration, freezing, condensation, leaks, etc.); but the basic concept is just that simple: collector panels on the roof connected to a storage tank downstairs.

Misconception 2

Solar energy is fine for Arizona, where it's hot and sunny, but not here.

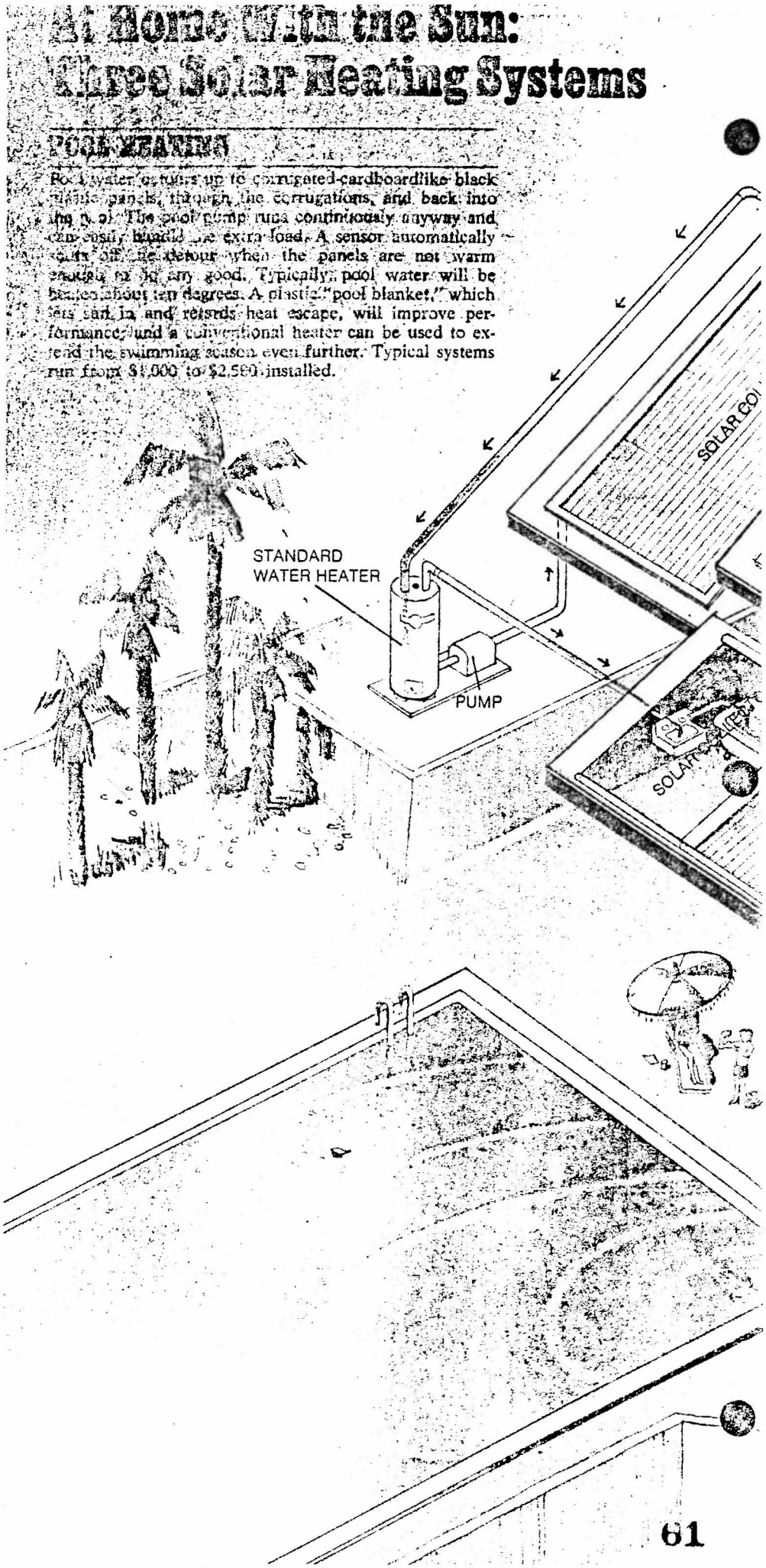
The idea is not to replace conventional heating with solar energy but to supplement it. To design a system that relied 100 percent on the sun would be uneconomical in most areas, because the extra collector and storage capacity needed to see you through the very worst weather would be wasted most of the time. Systems are designed instead to shoulder anywhere from 30 to 90 percent of the load. Simple thermostats tell the conventional heater when to kick in and do the rest.

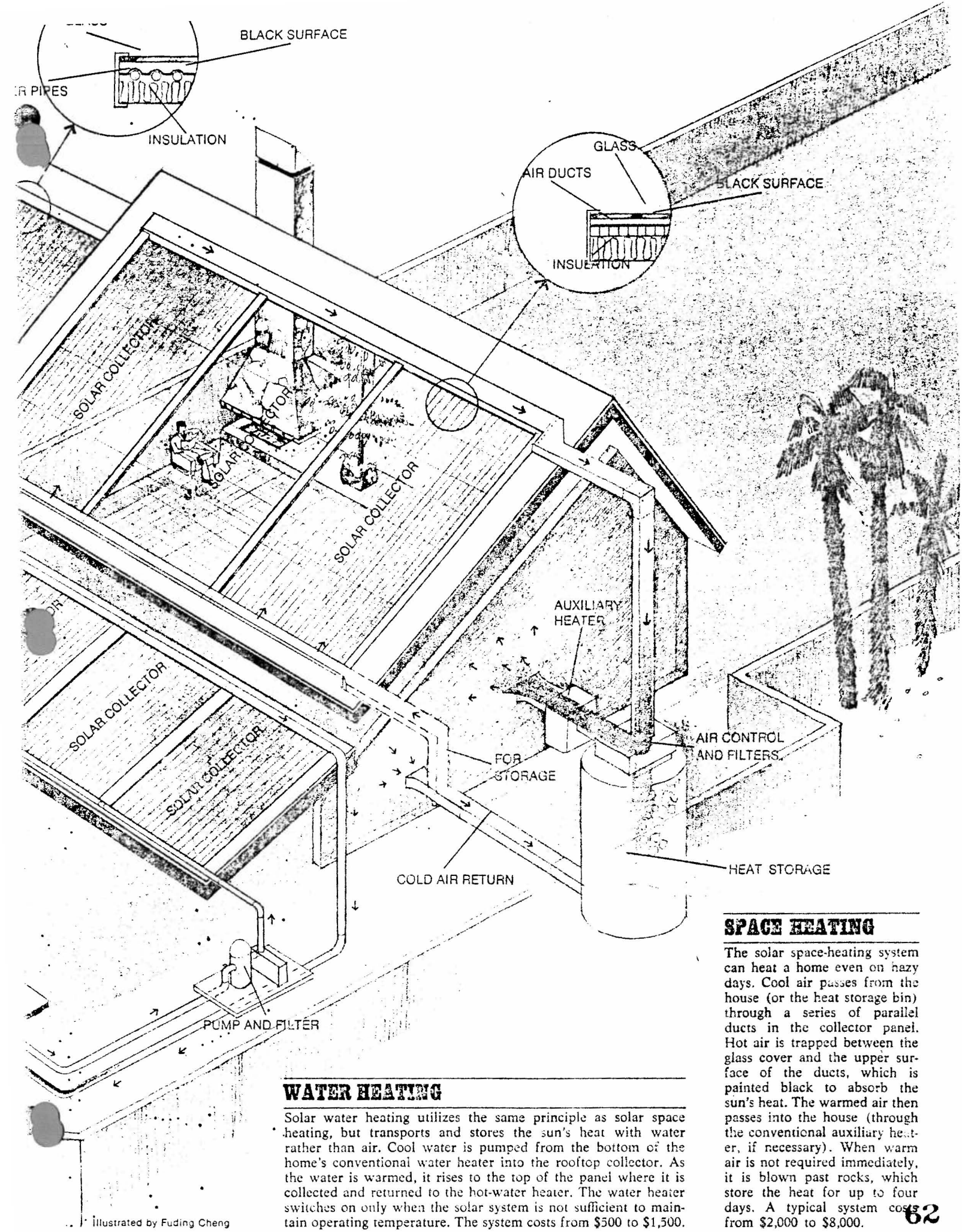
Naturally, solar panels will collect more sun in Phoenix than in New York. But they still make sense in New York. Water in an insulated storage tank will stay warm longer down south than up north. But up north it can still retain its heat overnight, and sometimes over two or three days.

Misconception 3

The question is: If I install one of these things, how quickly will it pay for itself? Five years? Seven? I'm patient, but I'm not crazy.

With any solar system, it's the "first cost" that's high. Once installed, fuel is free and maintenance practically nil. *But payback is the wrong concept to use.* When you install some kind of solar heater, you are actually buying your own small utility company. Not just ten shares—the whole thing. You are the chairman of the board and sole stockholder, and you receive monthly dividend checks in the form of savings on your *other* utility bill. These "divi-





Illustrated by Fuding Cheng

WATER HEATING

Solar water heating utilizes the same principle as solar space heating, but transports and stores the sun's heat with water rather than air. Cool water is pumped from the bottom of the home's conventional water heater into the rooftop collector. As the water is warmed, it rises to the top of the panel where it is collected and returned to the hot-water heater. The water heater switches on only when the solar system is not sufficient to maintain operating temperature. The system costs from $500 to $1,500.

SPACE HEATING

The solar space-heating system can heat a home even on hazy days. Cool air passes from the house (or the heat storage bin) through a series of parallel ducts in the collector panel. Hot air is trapped between the glass cover and the upper surface of the ducts, which is painted black to absorb the sun's heat. The warmed air then passes into the house (through the conventional auxiliary heater, if necessary). When warm air is not required immediately, it is blown past rocks, which store the heat for up to four days. A typical system costs from $2,000 to $8,000.

"...You are buying your own small utility company. Your monthly dividends are recession-proof, inflation-proof, and *tax free*..."

dends" are recession-proof, inflation-proof, strike-proof, pollution-proof, terrorism-proof, computer-error-proof . . . and, most important, *tax free*. (The government doesn't tax us on money we save, only on money we earn. "A penny saved is two pennies earned.")

If you put $1,000 in a 7½ percent savings account, after taxes you would earn maybe 5 percent—a $50 "dividend" every year. But if you put it into a solar water heater that cut your gas or electric bill by just $10 a month, you would in effect be getting a $120 annual dividend. One way to look at that is as an eight-year payback, which sounds awful. Another way to look at it is as a 12 percent tax-free return—hard to beat. After ten years you would have received $1,200 in "dividends," compared with $500 from the bank; and, if it had been well made, your original investment would be safe and sound on your roof.

In areas with high utility rates (nowhere higher than New York), the payback can be much shorter than eight years, the tax-free dividends much higher than 12 percent. Even in the Hollywood hills, where low-priced natural gas is still available, one pool owner saw his gas bill drop from $100 a month to $30 after he put in a $1,500 solar heater. He expects to save $600 a year—a 40 percent tax-free return.*

It's true you can't withdraw money from your solar heater when you need cash for a vacation; it's true it won't beautify your roof; and it's true only time will tell whether the thing will really hold up for ten or twenty years like other plumbing/roofing-type installations. But consider the pluses:

The interest on your savings account is not likely to rise much above 7½ percent; it could even decline. But the dividends from your solar utility company—the money you save on fuel or electricity—are almost sure to rise. Substantially. If fuel bills climbed only 5 percent a year over the next decade, a conservative estimate, then the solar utility that was saving $120 in the first year would be saving $186 by the tenth—or $1,509 in all. Better than three times what you'd have gotten, after tax, from the savings bank.

Yet look at all the people who put money into banks or stocks or bonds without thinking twice, but who wouldn't dream of investing in a fuel-saving installation that didn't pay for itself in three or four years.

(This applies as much to investing in refrigerators or air conditioners, automobiles or extra insulation, as it does to investing in solar heaters. Very often, the appliance or installation that costs a little more up front is *by far* the better investment—both for the buyer himself and for society as a whole. A Harvard researcher compared two refrigerators and found that *even at the pre-embargo cheap-energy rates then prevailing*, the unit costing $67 less up front would cost $354 more to operate over its twenty-year life. He also calculated that if all color-TV purchasers in 1970 had chosen the most efficient unit on the market, roughly a billion pounds of coal would have been saved—along with the attendant costs of strip-mining it and spewing it out into the atmosphere as pollution.*)

As for the fact that you can't very well take your solar heater with you when you move, you should nonetheless be able to recoup your investment. This is one home improvement that will really save the new owner money. The pool that once cost $200 or $400 a season to heat (go ahead, show him the bills) is now heated free. That's worth something.

Furthermore, it's bankable. Banks will make home-improvement loans for solar heaters. And the interest they charge is tax deductible. Your tax-free dividends could easily exceed your tax-deductible interest cost—in which case you could even make a profit without putting up any cash of your own.

Two things more:

First, it is always possible that we will experience interruptions in the availability of fuel or power. Natural gas is already being denied some industrial users. It may be little comfort if the lights are out and the world is falling apart, but with your own solar heater your water is likely to be at least lukewarm.

Second, $1,000 invested in solar panels is really different from $1,000 spent over the years on oil or gas. In the first case, it goes for materials like copper and glass, and for labor; in the second, for irreplaceable fossil fuels. Copper can be recycled; once oil is burned, all that remains is pollution. If we survive, there will always be an abundance of labor (it's jobs that are scarce); but someday the fossil fuels will, for all practical purposes, run out. To say this won't happen for 50 or even 150 years is not only optimistic—it's a crime against future generations.

An investment in solar energy is obviously not without risk. As in any young industry there are bugs to be worked out, shysters to be avoided, ten-year warranties backed by companies that may not be around more than ten months, false claims, honest mistakes, inexperienced installers—and so on. But no 12 or 20 or 40 percent tax-free return is without risk.

Misconception 4

The energy shortage is a hoax. There's plenty of oil, huge amounts of coal, and limitless nuclear energy.

Well, the country used to be overrun with buffalo, too, and look what happened. The difference is that buffalo can reproduce themselves.

Despite the quadrupled price of oil, production in this country is actually falling. Huge discoveries are being made, and will continue to be made, it's true—but more and more of them will be in places like the North Sea, where the cost of exploration, extraction, and transportation is staggering. Not to mention the cost of pollution, which is not reflected in the price.

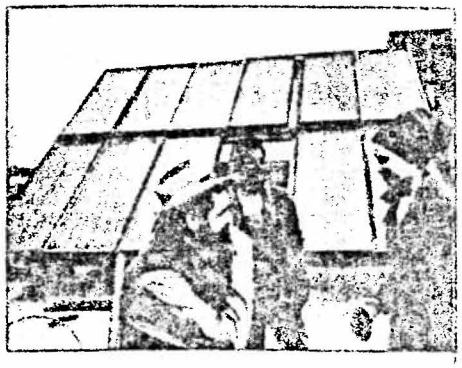
It's not a question of whether we will run out of fossil fuels, only when. The earth is a finite planet. By one estimate, there is enough oil in the ground to last another 31 years. But even if there is really *five times* as much oil down there as we've found for sure, it will still run out in just 50 years if consumption grows at 4 percent a year. Under the same assumptions—five times the known reserves but a 4 percent consumption growth—coal would last 150 years. At which point, even if we had been able to find alternative sources of energy, we would have permanently exhausted the raw materials we need to make plastic, synthetic fiber, and a great range of "petrochemicals."

It is becoming a cliché that with less than 6 percent of the world's population, the United States accounts for better than 40 percent of its fossil-fuel consumption. For the rest of the world eventually to achieve our standard of living—which in many areas, and underlying our foreign-aid program, seems to be the implicit long-term goal—per capita world energy consumption would

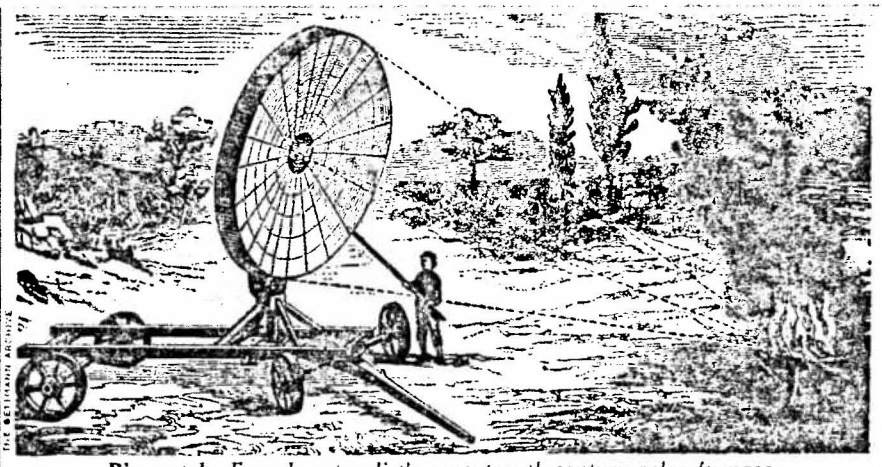
The price of natural gas is federally controlled. If it were not, it would about triple. In the meantime, its use has been banned for heating new swimming pools in New York, and California and Illinois are on the verge of taking similar action.

John Neely, thesis in energy utilization; Harvard University, 1972. As cited in Energy for Survival *(see box, page 37).*

Windfalls, too: *The solar panels atop this remodeled tenement at 519 East 11th Street in Manhattan supply 80 percent of the building's hot water. Extra-heavy insulation, installed by the tenants themselves ("sweat equity"—see below), has cut the heating bill by 60 percent. On an investment of $11,000 for the insulation (which will pay off very fast) and $15,000 for the water heater (which will take longer), the building has cut its fuel bill by $4,000 a year. Designer Travis L. Price, of Sun Harvester Corporation in New York, sees this project not only as a money- and energy-saver, but as a political tool to use in rebuilding a community. On the point of being demolished, 519 East 11th was turned into a co-op. In the process of renovating it, the owners learned salable skills and acquired a real stake in their community. Now three more buildings on the same block are being converted. They will use the sun for space-heating as well as water-heating. And 519 East 11th will soon install a wind-powered electric generator . . . wind, caused by variances in temperature, is a form of solar energy.*



PHOTOGRAPHED BY JON NAAR FROM "DESIGN FOR A LIMITED PLANET" BY NORMA SKURKA AND JON NAAR; BALLANTINE BOOKS



Big match: *French naturalist's seventeenth-century solar furnace.*

Let There Be Light

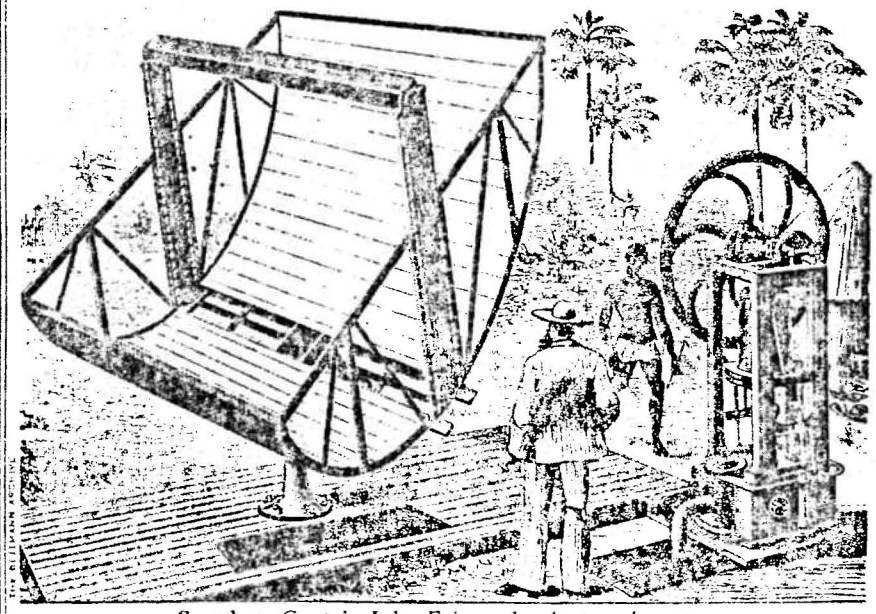
If you want to know why you should care about all this, I recommend *Small Is Beautiful: Economics as if People Mattered* by E.F. Schumacher (Perennial Library, $2.45), the book Governor Brown and others keep referring to. Also *Energy for Survival: The Alternative to Extinction* by Wilson Clark (Anchor, $4.95).

If you want to know how to go about it, try: *Solar Homes and Sun Heating* by George Daniels (Harper & Row, $8.95) and/or *How to Build a Solar Heater* by Ted Lucas (Ward Ritchie Press, Pasadena, California 91105, $4.95). *Build Your Own Solar Water Heater*, with diagrams and complete directions, will be available in June from the Environmental Information Center, 935 Orange Avenue, Winter Park, Florida 32789 ($2.50).

And if you want to know what *other* people's solar houses look like, William A. Shurcliff's *Solar Heated Buildings* (19 Appleton Street, Cambridge, Massachusetts 02138, $9), twelfth edition, describes 220 of them.

Meanwhile, the Energy Research and Development Administration publishes a catalog of the companies in the solar-energy field, with descriptions of what they offer and how many they've actually built. Write ERDA Technical Information Center, Box 62, Oak Ridge, Tennessee 37830, and request Document No. ERDA–75. It's free while it lasts.

Two slim monthlies will keep you abreast of developments and ideas: *Solar Age*, Box 288, Vernon, New Jersey 07462—$20 a year; and *Solar Engineering*, 8435 N. Stemmons Freeway, Suite 880, Dallas, Texas 75247—$10 a year. The February, 1976, *Fortune* contains an excellent piece that surveys the field. The May, 1976, *Popular Science* cover story is on solar water heaters—everything you need to know plus a list of manufacturers.



So what: *Captain John Ericsson's nineteenth-century solar engine did not revolutionize the industrial world.*

have to sextuple. And with millions of little capitas being added to the energy rolls every week, *aggregate* world consumption would have to *more* than sextuple. So what looks like a 50- or a 100-year energy supply might actually last a more developed world just ten or fifteen years. What then?

"It might be said that energy is for the mechanical world what consciousness is for the human world," writes E. F. Schumacher in *Small Is Beautiful: Economics as if People Mattered*. "If energy fails, everything fails." Either we envision a world in which we live one way and no one else is allowed to, or else we change the way we live.

Enter the deus ex machina, a flotilla of 500 nuclear-power plants bobbing peacefully off our shores and, assuming the rest of the world follows our wise lead, eventually 2,500 more bobbing throughout the rest of the world. Beyond their truly monumental cost; beyond the fanciful notion that one of them might someday, accidentally or through sabotage, blow up; and ignoring for a moment that even uranium might someday run out—there remains the problem that these plants would be generating vast quantities of deadly and indestructible wastes. Schumacher quotes Dr. Edward David, once President Nixon's science adviser, as saying: "One has a queasy feeling about something that has to stay underground and be pretty well sealed off for 25,000 years before it is harmless." And there is the problem of nuclear terrorism. It is well known that small atomic bombs are relatively easy to make; the expansion of the nuclear-power industry virtually assures that they will be made. But how can you argue with progress?

Unfortunately, solar energy is by no means a complete answer. But it is part of the answer. Swimming pools aside, water-heating in the U.S. accounts for a full 4 percent of our energy consumption. Two thirds or more of that load could be switched to the sun—a savings in energy that would light every light in the country twice over.

The potential savings in space-heating are substantially greater. About a fifth of all our energy goes to this end. Buildings designed to exploit, not fight, the sun (at no appreciable increase in construction cost), coupled with better insulation of both new and old structures (at very modest cost), could cut the national heating bill by 25 percent or more—a savings in energy sufficient to power every truck, bus, and motorcycle on the road. Solar collector panels and storage systems require more of an initial investment, but would increase the energy savings still further. ■

GPO 909-437

Information from ERDA
Washington, D.C. 20545

VOLUME 2, NUMBER 51 WEEKLY ANNOUNCEMENTS WEEK ENDING DECEMBER 31, 1976

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(Wednesday, December 29, 1976)

ERDA-SUPPORTED STUDY SAYS SOLAR HEATING COMPETITIVE WITH ELECTRIC (BASEBOARD) HEAT

Solar heating can now compete economically with electric baseboard heating for well-insulated new homes in major population centers throughout most of the United States.

This is a conclusion of a new study prepared for the Energy Research and Development Administration (ERDA) by the METREK Division of the MITRE Corporation. The study also suggests that if the cost of solar heating drops 25 percent from the present level, it would then be competitive with fuel oil or electric heat pumps in many areas.

According to the study, a solar system is considered to be "economic" if annual fuel savings exceed annual payments of principal and interest on the solar system within five years, or if it pays for itself through lowered fuel costs within 15 years. By this definition, a solar heating system is now considered economic as a principal replacement for electric resistance (baseboard) heating in each of the 13 cities studied with the exception of Seattle, where electric rates are among the lowest in the nation.

"Our goal," said Dr. Henry H. Marvin, Director of ERDA's Division of Solar Energy, "is a 50 percent reduction in the cost of solar installations by 1980, through market competition, improved performance, reduced cost of equipment and installation, and possibly incentives."

"At that price, solar heating could be competitive with all fuels, including natural gas, in most regions of the country."

The study involves fuel cost and weather conditions and analyzes the cost of ownership in regions of the United States centered at Atlanta; Bismarck; Boston; Charleston, South Carolina; Columbia, Missouri; Dallas-Ft. Worth; Grand Junction, Colorado; Los Angeles; Madison, Wisconsin; Miami; New York; Seattle; and Washington, D.C.

It is assumed in the study that the homes are new and are not old ones being retrofitted; that the homes have a brick veneer, an asphalt roof, storm windows and 12 inches of insulation in the attic; and that the solar system is the primary heating system with a conventional heating system as backup.

Dr. Marvin said: "This study can assist a prospective homeowner in determining whether he can save money by installing a solar system for heating and hot water when building his new home. But it must be used with caution because there are many factors that can change the estimated savings in any specific application."

Chief among these factors are the price the homeowner pays for his solar heating system and a comparison of this cost with operation of increasingly expensive conventional heating systems. Data in the study assume that a typical installed solar system today costs the equivalent of $20 per square foot of flat-plate collectors used in the system. The homeowner must determine how long it will take to repay his capital investment based on his particular interest rate, fuel costs and upkeep. Savings accrue due to the rising costs of gas, oil, or electric heating.

Optimum collector sizes generally range from 20 to 30 percent of the square-footage of the house, depending on local conditions. Thus, the $20 per square foot cost would mean a price of $6,000 to $9,000 for a well-insulated residence with 1,500 square feet of living space.

The present market offers systems at both lower and higher prices than $20 a square foot, and with different levels of performance. The study chose a representative cost and performance.

If a solar system comparable to the study model could be purchased for $15 per square foot installed (a reduction of 25 percent), it would be competitive with electric heat pumps in Bismarck, Grand Junction, Los Angeles, Madison, and New York City, and with oil in Atlanta, Bismarck, Charleston, Grand Junction, Los Angeles, and Miami.

According to the study, if the price drops to $10 a square foot by 1980, solar can be competitive with oil in all cities studied and with natural gas in all except Bismarck, Charleston, Columbia, Madison and Seattle.

Attached is a list of cities studied, with information on potential savings from solar systems costing $20, $15, and $10 per square foot.

The MITRE report will be published soon by the Government Printing Office. Further information on solar heating, including price and instructions for ordering this report, may be obtained from the National Solar Heating and Cooling Information Center, P. O. Box 1607, Rockville, Maryland 20850, or by telephone toll-free from 800/523-2929 (in Pennsylvania 800/462-4983).

SEE NEXT PAGE FOR LIST OF CITIES.

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No. 76-377 FOR IMMEDIATE RELEASE
(Wednesday, December 29, 1976)

SOLAR HEATING AND COOLING PLANNED FOR TWO NEW MILITARY SHOPPING CENTERS

Solar heating and cooling systems will be installed in new shopping centers to be constructed at Bolling Air Force Base, Washington, D.C., and Fort Polk, Leesville, Louisiana.

Under an agreement between the Energy Research and Development Administration (ERDA) and the Army and Air Force Exchange Services (AAFES), ERDA will provide $1 million to cover part of the costs of the solar installations. AAFES will spend $8.2 million for construction of the stores and the balance of the solar costs.

The same cooperative arrangement was followed in the construction of the first two solar heated and cooled exchange services stores. Site work has begun on the shopping center at Randolph AFB, San Antonio, Texas, and the main retail store at Kirtland AFB, Albuquerque, New Mexico. Both projects are on schedule for completion next fall and summer, respectively.

The Bolling shopping center will cover 74,000 square feet and will include a shopping mall, small snack bar and services facilities. It will be built at a cost of $4.2 million in AAFES funds and $500,000 from ERDA.

The project for Fort Polk will include 70,000 square feet of shopping area in the main retail store, services, mall and small snack bar at a cost of $4 million to AAFES and $500,000 from ERDA.

The goal for the solar system at the Bolling and Fort Polk stores is to provide 95 percent of the heating needs and 75 percent of the cooling requirements. In addition, 95 percent of the domestic water to be used in hot water outlets in the snack bar and restrooms will be supplied by solar heating. Initial construction will begin in May 1977, with completion in June 1978.

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YEARS TO POSITIVE SAVINGS AND PAYBACK

Compared to the cost of conventional heating and hot water. The first figure in each column represents years of operation before positive savings,* in comparison to the cost of heating with the fuel system indicated at the top of the column. The figures in parentheses are years to payback.** Blanks indicate unfavorable economics. A solar heating system is considered to be economically competitive with other types of heat if it yields positive savings in 5 years or less, or if it achieves payback in 15 years or less.

	At $20 per sq. ft. of solar collector				At $15 per sq. ft. of solar collector				At $10 per sq. ft. of solar collector			
	Elec. Babrd.	Heat Pump	Oil	Gas	Elec. Babrd.	Heat Pump	Oil	Gas	Elec. Babrd.	Heat Pump	Oil	Gas
Atlanta	3 (14)				1 (12)		5 (16)		1 (9)	2 (13)	1 (11)	5 (16)
Bismarck	4 (14)				2 (13)	5 (16)	5 (16)		1 (8)	1 (11)	1 (11)	
Boston	3 (14)				2 (12)				1 (9)	2 (13)	3 (14)	4 (14)
Charleston, S.C.	1 (11)				1 (10)		5 (15)		1 (6)	1 (12)	1 (11)	
Columbia, Mo.	3 (14)				1 (12)				1 (8)	3 (13)	2 (13)	
Dallas/Ft. Worth	3 (13)				2 (12)				1 (8)	3 (14)	2 (12)	3 (13)
Grand Junction, Co.	1 (12)				1 (10)	5 (15)	4 (14)		1 (7)	1 (10)	1 (10)	5 (16)
Los Angeles	1 (10)				1 (8)	5 (16)	4 (15)		1 (5)	1 (10)	1 (10)	4 (15)
Madison	3 (14)				2 (12)	5 (16)			1 (8)	1 (11)	2 (13)	
Miami	1 (9)				1 (7)		5 (16)		1 (6)	1 (9)	1 (9)	4 (15)
New York City	1 (12)				1 (10)	5 (16)			1 (7)	1 (12)	3 (14)	2 (13)
Seattle											3 (13)	
Washington, D.C.	4 (14)				2 (13)				1 (9)	3 (14)	3 (13)	5 (15)

* Positive Savings - The year when fuel savings exceed annual payments of principal and interest on the solar heating system.

** Payback - The year when cumulative savings equal the remainder owed on the solar heating system.

Square Foot Collector Cost - The total installed cost of a solar system, divided by the square feet of collector area contained in the system.

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