

erty, and the economy - all must be sacrificed to save the diminishing trees and wildlife in American forests. But what are the facts?

Figure 7 shows the growth rate of timber in the American Northwest as a function of time during the past 40 years. Figure 8 shows the total amount of soft and hard wood timber in all American forests during the same time period. Our forest trees are not decreasing; they are increasing at an accelerating rate. The United States has about 60 tons (120,000 pounds) of growing forest trees for each man, woman, and child and that quantity is increasing at a rate of over 600 pounds of trees per person per year.

Part of this rapid growth of American forests may be due to forest management practices, but part is undoubtedly due to increases in CO₂ levels in our air as a result of the burning of coal, oil, and gas. The total amount of carbon stored in our forests has increased by 30% during the past 40 years. In large part, this extra carbon has been made available through its release by the burning of coal, oil, and natural gas.

At their "Earth Summit" 30,000 earth and animal worshipping pseudoenvironmentalists gathered to bewail the end of "mother earth's" plants and animals and to call for an end to the release of carbon dioxide that they claim is damaging the earth's environment through global warming and ozone destruction (like chlorine, CO₂ is now being cast as an enemy of the ozone). The only solution to all of this (they say) is to transfer vast economic, political, and social power into their hands, so that they can save "mother earth" through totalitarian and bureaucratic controls.

The remarkable fact is that their program of CO₂ control would achieve an opposite effect on plant and animal life. Plants and animals would die (or never live in the first place) as a result. The pseudoenvironmentalist program is based upon pagan religions that were discredited thousands of years ago and upon pseudoscientific claims that are entirely false.

Just as it did in Old Testament times, the religion of the pagans - the worship of earth, animals, and trees instead of God - leads to death.

All they that hate me love death. Proverbs 8: 36

QUALITY OF HUMAN LIFE

It is an essential obligation of scientists to do all that they can to optimize the quality of human life. This optimization requires, in part, the minimization of diseases and the maximization of vitality and lifespan for all individuals within the human population.

Other than the indirect effects of more vegetation, more food, more animals, and a more lush natural environment, what are the direct effects of higher CO₂ levels upon the quality of human life? Will higher CO₂ levels in our environment cause us to grow larger, live longer, have less disease, and generally have higher quality lives, or will higher CO₂ have no significant direct biological effect upon us - or even have negative, harmful effects?

The answers to these important questions are unknown. There are several reasonable arguments that suggest that higher CO₂ may be good for us. For example, since we now know that the quality of life for individual plants is optimized at higher CO₂ levels, it seems sensible to expect that this will be the case for animals, too. And, generally speaking, optimum biochemical conditions for higher animals are optimum for humans. It is, however, essential that we obtain direct answers to these questions.

Until now scientists have usually assumed that the quality of individual animal life was unaffected by low level changes in CO₂ concentrations. Negative effects have been observed at concentrations of 10,000 to 20,000 ppm in the atmosphere, but this is entirely different from the 360 ppm in the atmosphere now and the possibility of 600 to 1000 ppm.

If 600 ppm CO₂ were found to be beneficial for our health, we might take advantage of this now by simple design changes in our buildings to maintain CO₂ at this concentration. We would not need to wait several generations for the atmosphere to change.

Here at the Oregon Institute of Science and Medicine we are now undertaking an experimental program to measure the health effects on several species of animals from higher CO₂ levels. If we are able to acquire and maintain the necessary financial resources for this work, the answers to these questions will be obtained during the next few years.

FIGURES

Figure 1 - Reprinted from Herman, J.R., McPeters, R., Stolarski, R., Larko, D., and Hudson, Journal of Geophysical Research, Vol. 96, No. D9, p. 17298 (1991).

Figure 2 - Plotted by Zachary Robinson from the data given in Figure 1.

Figure 3 - Reprinted from Access to Energy, Box 2298, Boulder, CO 80306, May (1992) - as reproduced from Scotto, J., Science, 12 February 1988.

Figure 4 - Reprinted from Idso, S.B., Carbon Dioxide and Global Change: Earth in Transition, IBR Press, p. 49 (1989).

Figure 5 - Reprinted from Two Environmental Issues, George C. Marshall Institute, p.13, (1991).

Figure 6 - Reprinted from Two Environmental Issues, George C. Marshall Institute, p.15, (1991).

Figure 7 - Plotted by Zachary Robinson from Forest Statistics of the U.S., U.S. Forest Service (1987).

Figure 8 - Plotted by Zachary Robinson from Forest Statistics of the U.S., U.S. Forest Service (1987).

Our conventional forces have been primarily deployed in other countries for use in wars on foreign soil. It has been evident for a long time that American conventional forces alone cannot defend the United States itself. First, they are too weak in comparison with those that could be brought against our country from elsewhere in the world. Second, in the nuclear age, conventional forces are only a secondary level of force - a force that has only a secondary effect on the outcome if nuclear weapons are being used.

3. Tactical nuclear weapons. These are weapons that have been built to overcome the fundamental weaknesses of our conventional forces. From nuclear hand-held bazookas, to nuclear torpedoes, nuclear artillery shells, and neutron bombs, these small nuclear weapons make American military forces competitive in a world in which they are outnumbered and in which nuclear weapons are a superior force level to conventional arms.

Moreover, these are weapons that can be used to defend America itself. First, they are small enough to be safely deployed near defensive forces and near civilian centers. Second, in small nuclear weapons, radiation is a more important part of the destructive element than it is in large nuclear weapons. Therefore, small weapons like the neutron bomb can be designed. These bathe attacking armies in lethal radiation for a few seconds while leaving the surrounding countryside largely free of blast effects and long term radiation.

4. Strategic defense. America has almost no strategic defense capability whatever. We should have installations to monitor and track airplanes and missiles. We should also have deployed technologies to destroy air and space borne weapons before they can kill the American people. Our engineers have devised excellent strategic defense systems that can be built very inexpensively, but our politicians have made deals over the last few decades that included promises not to provide America with a strategic defense.

5. Civil defense. America has no civil defense whatever except for a nationwide set of secret, stocked bunkers that are reserved for politicians and bureaucrats. In case of war, the American people will have no emergency supplies or equipment - no food, no water, no shelters, no medical supplies - but they will be very well supplied with bureaucrats and politicians.

America's continued national independence depends upon the war fighting capabilities of her armed forces. Since America is a small part of the world with respect to population and a diminishing part with respect to industrial strength, she cannot be defended without recourse to the highest military force level - tactical nuclear weapons. Although strategic nuclear weapons may continue to deter strategic attack, they do not realistically deter military invasion, especially by nations armed with their own strategic weapons and an ability to respond in kind to an American attack.

The only thing that effectively stands between America and the three horrors of surrender, defeat or mutual assured destruction is her armory of tactical nuclear weapons - the battlefield equalizers that could defeat any attempt at armed invasion of the United States itself. That is - until now!

George Bush, President of the United States, has unilaterally ordered - without treaty, without congressional approval, without effectively informing the American people - the complete and total destruction of America's tactical nuclear weapons. All of these weapons have been withdrawn from deployment with American air, sea, and land forces. At this time all of our tactical nuclear weapons are being physically destroyed.

Moreover, since these weapons are very expensive to produce, since the industry to make them is being phased out, and since the patriotic American scientists and engineers who built them are older and are retiring from active work, it would be virtually impossible for America to reproduce these crucial defensive weapons in time of national crisis.

The American government just will not, it seems, fulfill its constitutional responsibilities to provide for the common defense of the United States. Politicians have talked for decades about a strategic defense, but have not built one. Now they are talking about building one with the Russian political leaders - the nice people who murdered tens of millions of their own citizens and kept the remainder in slavery for 75 years. American politicians have not built any civil defense. And now they are destroying our last realistic technology for workable homeland defense - our supply of tactical nuclear weapons.

Will Americans choose to join the "New World Order?" Will they agree when United Nations troops are deployed to enforce world laws entirely different than those allowed by our republican nation as governed by constitutional restraints and representative government? Will Americans have any choice at all?

The current rush to unilateral disarmament will assure that America cannot preserve her sovereignty, cannot follow the will of her own people, and cannot continue the cherished way of life that has been made possible by the sacrifices of so many patriotic men and women over the last three centuries. If we have been unilaterally disarmed, then we will have no control over our destiny. And, make no mistake about it, we are being unilaterally disarmed.

There is a well known vision that George Washington is said to have experienced at Valley Forge. In the vision, it is said, George Washington was told the outcome of the Revolutionary War and was told that America would suffer two more great wars that would threaten her existence - the civil war and a war yet to come.

I considered reprinting the Washington vision in this newsletter, but Laurelee cautioned me about reprinting revelations other than those in the Bible itself. Many such things are not what they seem to be. She was right, so I will not reprint the Washington story here. However, the last paragraphs of that story come horribly to mind in the context of unilateral disarmament.

It is said that, in a vision of events not yet come to America, Washington was shown most of America in flames and with most of her people thrown back or killed before the onrush of a coalition of invading armies from many different countries all over the world.

This last year we saw a coalition of invading armies from countries all over the world turn the country of Iraq into a sea of flames, horror, and death. The mechanism to produce such coalition armies is in place. Are we sure that it will never be turned upon us? And if it is turned upon us, will we be able to resist? The current, quiet unilateral destruction of our tactical nuclear weapons goes a long way toward making the answer to that question - No!

Maybe, in time of national peril, we can buy weapons from Iran. There are increasingly credible reports that the Iranians are buying tactical nuclear weapons from entrepreneurs within the Soviet military. The Iranians and the Russians - all such nice people with impeccable records of responsible behavior - into whose hands unilateral disarmament is delivering the future of the American people.

CORRUGATED STEEL SHELTERS

The most cost-effective means of providing permanent, high protection civil defense shelters is with cylindrical steel rooms that have flat ends and are buried at depths that permit effective earth arching. Other construction methods such as concrete or fiberglass are very much more expensive for the same level of protection and the same number of people.

There are two sorts of steel construction that can be used for cylindrical steel shelters - smooth, heavy-walled steel such as is found in fuel storage tanks and corrugated, galvanized, light-walled steel such as is found in culvert pipes. Either of these materials can be used to make a very protective, high quality, cost-effective shelter.

If a national shelter system were ever built, it would probably use corrugated steel tanks. Corrugations give the steel much greater strength per unit thickness. Therefore, where the tooling to stamp out shelter units can be amortized over large numbers of shelters, corrugated steel is less expensive, because it uses less steel. Moreover, corrugations give the shelter a little better characteristics of bending at maximum stress. Most shelters will never be stressed to the buckling point. If this happens, however, a corrugated cylinder is less prone to catastrophic buckling failure.

There is also a specialized application in which corrugated steel has an added advantage. Swiss military cylindrical steel shelters are designed for burial by troops in the field and are constructed of bolt-together corrugated plates. This allows the entire shelter to be stored and transported as a light weight, compact, palletized package and assembled very quickly by a small group of soldiers.

So why have most of the shelters built by supporters of Fighting Chance and other knowledgeable people during the past few years utilized the smooth, heavy-walled steel design? There are two reasons.

First, the attack being conducted against service stations by government bureaucracy has made available a large supply of free heavy-walled fuel tanks in excellent condition. Two man-days of effort with a sandblaster and airless paint sprayer can turn one of these tanks into a first-rate shelter room that, depending upon size, would cost \$5,000 to \$10,000 to duplicate with new materials.

Second, industries that are in place at thousands of locations all over the United States primarily manufacture smooth, heavy-walled tanks or corrugated steel culverts. The tanks are water-tight, the culverts usually are not. Moreover, mixing the two types of construction is not favored by welding shops, since galvanizing gives off toxic fumes during welding.

Culverts are made by rolling ribbons of galvanized steel sheeting in such a way that there are many seams that are not inherently water-tight. This difficulty would not be encountered in a national shelter program where forming machines would stamp out large parts of the shelters in seamless units. It can also be overcome at present by rolling gaskets into the seams as the culvert is formed. Gaskets can also be used to solve the difficult leakage problems that can develop where entryways are attached.

Ideally, the relative merits of these two methods of making steel shelters can be best evaluated in a location where both methods are routinely being used under the direction of the same people. This is especially true if those same people are successfully motivating the members of their community to build shelters and are working on a volunteer, non-profit basis, so that profit margins in the various designs do not enter into their decisions. There is one such place in the United States - Salt Lake City, Utah.

Sharon Packer, Paul Seyfried, and their coworkers are, through their outstanding work, causing the construction of about one shelter per week in the Salt Lake City area. Some of these shelters are rudimentary, expedient structures, but many are permanent cylindrical steel shelters. They are successfully building both types - corrugated and smooth steel.

Moreover, they are showing what experience can do for costs. They report that 8 ft. by 32 ft. shelters suitable for about 40 shelter occupants are being built and buried for a cost of about \$8,000. (A Swiss chemical and biological air filtration system for such a shelter costs an additional \$5,000 if purchased directly from the factory.) This cost of \$8,000 is considerably less than the \$12,000 to \$15,000 which is typical for similar shelters that have been built by many people over the last few years on a one-of-a-kind basis without previous experience.

Sharon Packer and Paul Seyfried have written an excellent 70 page booklet, Practical Sheltering Concepts, filled with photographs and diagrams describing their experiences. It is available from either of the authors, Sharon Packer, 1950 E. Forest Creek Lane, Salt Lake City, UT 84121 or Paul Seyfried, 201 East - 7570 South, Salt Lake City, UT 84047.

Sharon and Paul first built good civil defense shelters for their own families - one was corrugated and one was smooth steel. They then built a vibrant grass-roots civil defense movement in the Salt Lake City area.

One method that they have used to recruit participants is to show each year in the Utah State Fair the mobile civil defense shelter display that was built by Fighting Chance for the State of Utah. Annual attendance at the fair is about 300,000 and each year about 10% of these people actually walk through the 9 foot by 24 foot mobile display shelter. Some of these people then join their civil defense organization, attend regular meetings, and become a part of the growing civil defense movement in Utah.

If you are going to build a shelter, there is a wealth of information in the Fighting Chance shelter plans, video tapes, and back issues of this newsletter that can be of help. Many people have provided excellent protection for their families on the basis of that information alone and occasional phone calls to Fighting Chance at (503)592-4142.

If you are going to build a shelter, however, you also would be very wise to contact Sharon Packer and Paul Seyfried. Their enthusiasm and experience can save money and time that you might otherwise spend by relying on published materials alone.

OPTIMUM LIFE VS. MINIMUM SUFFERING

There are two fundamentally different approaches to the evaluation of efforts intended to improve the human condition. When an individual or group undertakes an effort that is honestly intended to improve human lives, they usually adopt, consciously or unconsciously, one of these two approaches.

One of these approaches is based upon the principle of the "minimization of human suffering." It basically accentuates the negative. While assuming that there is some positive reason to live, this system assumes that the best way to improve people's lives is to minimize the suffering that they bear in life. This can include suffering from disease, suffering from war, suffering from unhappy personal relations, and suffering from the many negative factors and circumstances that affect the basic human condition.

The other approach is based upon the principle of the "optimization of the quality of human life." It accentuates the positive. Life is viewed as a collection of experiences of differing value. The length of life (and therefore the number of experiences) and the value of these experiences gives a measure of the summation of the quality of human life.

Laurelee and I once founded a research institute with a senior colleague who held to the principle of the minimization of suffering, while we held to the principle of the maximization of the quality of life. Since we couldn't resolve this difference, we put both principles into the statement of goals of our research institute.

This is not a trivial philosophical difference! This is a very, very important difference that is at the heart of many of today's nation-wide and world-wide difficulties.

Civil defense provides an example. Suppose that shelter conditions and living conditions during and immediately following a nuclear war were known to be so horrible that the quality of life during that period was very negative.

Minimum suffering says "Don't put people through this. Don't provide civil defense. We would rather be among the first to die."

Maximum quality says "Build the shelters. Sure things will be bad for a while. However, the post-war world will gradually improve, so the overall value of the lives of people saved by shelters will, over the full course of their lengthened lives, be substantially higher."

Here are two more examples - and remember I am discussing the motivations of well-meaning people without another overriding agenda such as power or money. The power-seekers are always with us - ready to manipulate both groups to their own advantage.

1. Consider the mass murder of tens of millions of people by the Soviet Union. To many Communists this was justified in that those who were dead were no longer suffering, whereas those who were alive would, they theorized, suffer less as a result of the increased growth of Communism made possible by the mass murders.

If it serves their purposes, an elite can kill nearly everybody - that minimizes suffering. Does this seem extreme? I assure you that I have known powerful, smart people who think exactly this way. The optimization of human life requires, of course, that each death be counted as a loss. It could not condone the killing.

2. Consider now the terrible mass murder of one-third of America's children by abortion. How can this possibly be justified?

One argument by the abortionists is that the children are not wanted or are wanted by unsuitable parents. Many adults seek to adopt these children but are prevented from doing so by a bureaucracy that busies itself with deciding which potential parents are suitable.

How can it be argued that a child should be murdered, because someone believes it will not have a good enough life? Isn't some life better than no life at all?

"No", say those who would "minimize human suffering." If the child is killed, it will not suffer at all. If it lives, both the child and the parent may experience some suffering. Killing at the whim of the elite is justified. The dead do not suffer, while the living (assuming the elite is wise) will suffer less.

Optimization of the quality of human life, however, leads to an entirely pro-life decision. It is very unlikely, even in the worst of conditions, for any human life to be without net positive value. Even the starving babies in the third world laugh and play for a little while. (And were it not for the maneuverings of the international power elite, they would not be starving either.)

Throughout my professional life, I have been guided by the principle of the optimization of the quantity and quality of human life. As an idealistic (and naive) young scientist I could not have imagined that others would not share this principle. I have learned that the majority of those who have shaped national and world affairs during my lifetime do not.

In medical research, this principle led us to spend ten years in the development of methods of metabolic profiling that were designed to markedly increase the quality and quantity of life for most people. This research was successful, but we have not had the resources with which to extend it and see it made available to large numbers of people. Most medical research resources flow instead in the direction of the minimization of suffering, and it is tools for that purpose (no matter how impractical and expensive) that are primarily available in medicine today.

We have found civil defense to be the same kind of issue. How is it possible to argue that the American people should be unnecessarily exposed to mass deaths from accidents, terrorism, war, or natural disasters? This exposure is entirely unnecessary.

This argument is possible, because the dead are not counted. They are not suffering. Therefore, the government spends its money on shelters for the politicians and bureaucrats, so that they will be able to maintain "continuity of government" for the survivors. They are just not interested in increasing the number of "suffering" survivors.

But what about the American people? What about those whose potential deaths are counted as the end of a problem rather than the problem itself? Cannot they be made to understand? Many do. That is why, regardless of the incessant barrage of humanist propaganda in the media, about 50% of Americans still oppose abortion. That is why 80% of Americans still passively favor civil defense.

The propaganda tells us that "All is relative. There are no absolutes. Do things by consensus, by encounter group, by compromise. The dead are no longer suffering. Killing is a simple solution."

But the absolutes *are* there. The Bible lists them with devastating clarity. Whether or not the victim is an unborn baby, a child killed in war, or a woman who dies because the best technology for health profiling is not available, death ends the positive experiences of life.

Thomas Jefferson said:

I have sworn upon the altar of God eternal hostility against every form of tyranny over the mind of man.

Surely the unprevented death of any human mind is such a form of tyranny.

The Bible teaches us that the unprevented death of the human spirit or soul is an even greater tyranny. It also teaches that, while we are here on earth, each of us has a duty to conduct ourselves in such a way as to optimize the quality and quantity of human life.

DDP MEETING

This year's annual meeting of Doctors for Disaster Preparedness was outstanding. If it had a rival, it was last year's DDP meeting. Audio tapes of the meeting are available by writing to DDP, 2509 N. Campbell, Box 272, Tucson, AZ 85719 - telephone (602)325-2680. A listing of the principal presentations is enclosed with this newsletter.

Among many excellent presentations were those by:

- Petr Beckmann - America's foremost advocate of nuclear power and a remarkable scientist who is currently doing theoretical work that challenges the preeminence of Einstein's Theory of Relativity. Dr. Beckmann picked up where Dixie Lee Ray left off last year and gave a very entertaining analysis of the pseudoenvironmentalists of the "Green Religion". If the media would put this man on national television for a few weeks, the pseudoenvironmentalist movement would be set back 20 years.

- Edward Teller - father of the American hydrogen bomb and one of the originators of America's civil defense research program after World War II.

During one of his two talks, Dr. Teller described the technology for low-level satellite surveillance of the earth. If satellites are close enough they can, as he put it, use their "flashlights" for 24 hour per day operation. Laser lights can be used for nighttime viewing and, if a cloud cover is present, radar can be utilized. This is superior to high altitude satellites that must depend upon reflected daytime light from the earth for their pictures.

Dr. Teller pointed out the potential for good in such a system as the eyes of an SDI system and as a weather data system. No doubt this technology will come and will have many beneficial uses. As was pointed out during the discussion, however, it can also be used as a 24 hour a day surveillance system by governments to abridge the privacy and freedom of their people.

- Sam Cohen - inventor of the neutron bomb and one of the developers of America's tactical nuclear weapons. Punctuated with anecdotes from his remarkable career, Sam Cohen's talk provided a thoughtful analysis of sensible American policy in the nuclear age. There is probably no other American scientist more worth hearing and heeding than Sam Cohen.

Calling our current SDI research program "immoral", he pointed out that the defense of the American people with anything less than the best technology is immoral and that SDI is not using the best technology when, for political reasons, nuclear warheads are not allowed on the interceptor rockets.

As to our best policy in the nuclear age, Sam Cohen's message is essentially the same as that in George Washington's farewell address - with the analysis modernized by one of

our top designers of defensive nuclear devices. Essentially the advice is to defend ourselves with the best technology, build the best civil defense that we can, and then stay out of the quarrels and affairs of other nations. In Washington's day it was imprudent to entangle ourselves in the affairs and squabbles of other nations - in the nuclear age such entanglement may well prove fatal.

The patriotic American scientists and engineers who have kept America free for the last 50 years are gradually passing from the scene. This talk was an opportunity to listen to one of the best.

•Edwin York - one of America's foremost designers of military and civilian shelters. A unique aspect of Ed York's talk was his presentation about the actual design of nuclear weapons. He produced two objects that he represented to be of relatively benign isotopic composition - until they were moved together which caused them to emit radiation so dangerous as to be fatal to everyone in the room. As the talk proceeded, he gradually moved the masses together while giving a dispassionate description of the increasingly interesting (and fatal to him and the audience) nuclear chemistry taking place in the two hemispheres.

Ed actually had most of the relatively sophisticated people in that room - including scientists who have known him for a long time - nervously worrying about the possibility that he wasn't kidding. One interrupted to say that the hemispheres seemed too light to be plutonium, but this reassurance did not break the pall that had settled over the room.

After all, if anyone in the room could get the materials he claimed to have on the table, it was Ed. He actually used one such object - the real thing - as a doorstop during the Manhattan Project. His talk could be easily expanded into a great mad scientist movie.

•Conrad Chester - biological weapons expert and director of the Oak Ridge National Laboratory civil defense project. Dr. Chester's talk was a continuation of his bone-chilling presentation at last year's DDP meeting about the potential for terrorist use of biological weapons. This is information that every informed American should hear.

There were many other excellent talks as are listed in the enclosed flier. The complete set of audio tapes is an excellent value. It is important to support the series of DDP annual conferences.

As I mentioned during my talk, there are only three organizations in the United States that are actively promoting civil defense. These are Doctors for Disaster Preparedness, the American Civil Defense Association, and Fighting Chance. All three are tiny compared to the problem they hope to solve, and all are being weakened by the current misguided political programs and propaganda emanating from Washington, D.C.

It is important that all three be kept alive and strengthened as much as possible. The question is not *if* Americans will ultimately need the information and programs that they have to offer. The question is *when*.

EMERGENCY ELECTRICITY

There are many ways in which to generate electric power during an emergency or for self-sufficiency during normal times. Many people ask about the generation of power for ventilation systems, lighting, and other uses in their civil defense shelters and for self-sufficiency or post-disaster use. Some of the possibilities are these:

1. Gasoline electric generators - as are found in most large hardware stores and discount equipment stores.

For short power outages and for portable power needs during normal times these have some advantages. The units are relatively inexpensive, light-weight enough to be easily portable, and require the same gasoline (sometimes with oil added) that is used in most automobiles. These generators are not, however, suitable for long term use. They have poor fuel efficiency and are not well enough constructed to give reliable service in continuous use. Moreover, gasoline is dangerous to store and has a short storage life. These disadvantages could be overcome, but there are better alternatives available.

If you can afford a small gasoline generator, buy one. You will probably find many uses for it. Do not, however, think of it as a civil defense power source or as a potential tool for electric self-sufficiency.

2. Solar Power.

Solar power should be the method of choice for home generation of electric power. If the roof of an ordinary home is shingled entirely with solar panels, in most cases this will provide plenty of electricity for all household uses other than heating. In many cases, it will also provide enough power for a family electric car. These panels and the associated inverters, switches, and other required attachments are available now. So why are we building homes with shingles instead of solar panels covering the roofs? Why are we still connecting our homes to the power grid and paying high electric bills?

We are doing these things because of the ridiculously high cost of solar panels. The cost of these panels which convert sunshine into electricity at low but quite usable efficiencies is approximately \$6 per watt. Although energy requirement varies with climate, usage, and other factors, solar panels for a modest American home would cost about \$30,000 or more. One large refrigerator can consume the power generated by \$10,000 worth of solar panels.

This high cost is probably not necessary. For many years there have been production techniques available that experts estimate should allow the marketing of solar panels at \$1 per watt or even \$0.50 per watt. At these prices, each new home could simply be shingled with solar panels and never connected to the power grid.

Alternatively, homes could be connected to the grid but would put power into the grid as well as removing it. On months when you use lots of power, you would need to send a payment to the power company. On months when you use less power, they would send a payment to you.

There are, however, large industrial interests that would lose business to energy independence at the individual level. There are also powerful political interests that prefer to keep people dependent upon centralized power. These people appear to be controlling the price of solar panels. At \$6 per watt and during normal times, solar power is only a self-sufficiency option for those who use very small amounts of electricity and for those who have lots of extra money to spend on a solar power hobby.

What about emergency and civil defense use? For emergency supplies, solar panels along with one or more deep discharge batteries are excellent. Since they are fragile, some or all of the solar panels should be stored until the danger of destruction by an initial disaster has passed.

For example, a nuclear shelter that is in a location away from the power grid might be equipped with one or two exposed solar panels in order to keep the emergency batteries charged and ready for use. In addition, spare solar panels should be kept in the shelter. These would be exposed after the dangers of attack have passed, in order to provide a source of post-attack electricity. They would provide a charged battery for lights, radio, and other low power uses and perhaps for the occasional starting of an automobile or other large engine. Solar power is not practical for large emergency requirements such as shelter ventilation air pumps or cooking. With only solar power available, the ventilator would be hand operated and cooking would be postponed until cooking fires outside of the shelter are practical. In any case, cooking inside a closed shelter space is not wise and often not safe.

3. Steam Turbines.

Fifty years ago, steam boilers and turbines were commercially available in household sizes. An engineering textbook that my father used at Iowa State University in the 1930's lists several commercial sources for household-size steam turbines. (It also gives the engineering information to build such turbines, but this requires machinery and skills that are not available to most of us.)

A steam turbine with an attached electric generator would be an excellent long-term emergency power source. Boiler maintenance and other inconveniences would be tolerable under emergency circumstances. The ability to generate large amounts of electric power by burning coal, wood, or any other convenient combustible material would be very valuable.

If we could buy a wood-burning boiler, turbine, and generator combination in the 10 kilowatt range such as those that were off-the-shelf items in the 1930's, we would make many sacrifices to acquire one. Unfortunately, I do not know of any commercial source for

these. Some are still in existence as antiques. Some of these may still be safe to operate. This is an important consideration, since steam can produce very dangerous explosions.

4. Wind power generation.

Except in special circumstances, this is more expensive and more inconvenient than solar electric power. Before rural electrification, many farms used windmills for the generation of small amounts of power. Solar electric cells were not available in those days.

Today, one sometimes sees windmills still in use for the mechanical operation of wells in remote locations for stock watering. There are also locations where government money has made possible test projects with hundreds or even thousands of windmills in single arrays. Taxes extracted from Americans are used in many wondrous ways.

If you are serious about emergency power, this is probably not a hobby in which you will want to participate.

5. Hydroelectric Power.

If your location happens to have a water course that lends itself to a small hydroelectric generator, then this is an excellent possibility for ordinary and emergency use. Once built, hydroelectric generators require very little maintenance and the cost of operation is almost zero.

The cost of installation for hydroelectric generators is much lower for locations that have available a high head pressure - where the natural fall of the water from, for example, a mountain stream can be used, so that the water is diverted high above the generator. Low head pressure installations can be built where only a few feet of fall is available. These are inherently more expensive, since they must handle large amounts of water to make up for the low pressure.

There are pitfalls in hydroelectric power that can be avoided by reading available literature and seeking help from experienced individuals. The two most common difficulties are underestimations of the amount of water and fall required to generate useful amounts of electricity and misconceptions about the deteriorated state of private property rights in today's United States.

Many people see a small stream with a few feet of fall and, without calculation, decide they are now in the power business. This should be avoided. Any good high school physics book (How many of these remain in our public schools?) should contain enough knowledge to convert the amount of flowing water and the distance it falls into an equivalent amount of electricity. Since hydroelectric generators are quite efficient, you can safely assume that about two-thirds of the energy will be converted into electricity.

If you have a potential hydroelectric power source, why not ask a passing high school student to do the calculation for you? After all, you probably are paying large amounts of property taxes to give him this ability. After this fails, try doing it yourself from an old text. If you can't work it out, you probably don't want to undertake the rest of the project.

From the bureaucrats, however, I can offer no protection. About 100 feet from the desk where I am writing this newsletter is a 30 kilowatt hydroelectric generator that I built (with the help of two friends and a local machinist) when we moved to this farm 12 years ago. The generator is fully operational and capable of providing heat for our 100 year old, uninsulated Oregon farm house in the winter. It is built into the irrigation system on the farm and is designed to use about 5% of the water flowing in the stream through this farm in the winter. This generator has not generated a watt of useful power in over 10 years.

After the generator was built and operating, state bureaucrats appeared and explained to me that we must buy a license from them to operate it - a license they would be happy to sell us. When we applied for the license, however, another set of bureaucrats, from a different agency, decided to refuse to allow the first set to sell us the permit.

Two years later, after the same sort of bizarre nightmare that Americans are increasingly experiencing with their "public servants", we gave up. The generator is only of use as a large power source in case of an emergency so severe that it eliminates the bureaucrats. Even the worst of disasters may have a silver lining. If you are thinking of hydroelectric power, think about the bureaucrats before you build anything.

6. Diesel Electric Generators.

For self-sufficient power and for long-term, high-capacity emergency needs, this is definitely the method of choice - at least until someone breaks the price barrier of solar cells. The advantages of diesel power have been subjected to careful scientific test. There is a substantial research literature in which the practical aspects of various types of power generation for civil defense are evaluated. Diesel generation is the easy winner in all of these evaluations.

Diesel fuel, with an appropriate additive, can be safely and inexpensively stored without significant deterioration for periods of over 20 years. Also, diesel engines are commercially available in models that can operate as long as 50,000 hours or more without significant maintenance. With the right engine and routine attention to oil changes and simple maintenance, one can have a source of large amounts of electricity at costs far below those of the least expensive power grids. Although diesel engines have a reputation for noise, that noise can easily be suppressed to unnoticeable levels.

The illustration shows an 8 kilowatt diesel generator that is installed in a surplus service station fuel tank. This generator was purchased from China Diesel in Jamul, California. Their telephone number is (619) 669-1995. The proprietor's name is Hardy Day. He has been importing these engines for many years.

This engine is a 50 year old German design which is so simple that literally anyone can work on it without experience. It comes with a complete rebuild kit, but, with careful maintenance, you may never get to use it. There are factories all across China manufacturing this same engine. Current prices are about \$1,000 for the engine or \$2,000 for the engine, mounting platform, and electric generator combination.

Whether or not you buy one of these, there is a book that you definitely should read. It is entitled "More Power to You" by Skip Thomsen. The delivered price is \$11.95 from Oregon Woodworks, P.O. Box 514, Manzanita, Oregon 97130. In this book, Mr. Thomsen gives detailed instructions for the installation and use of the 8 kilowatt China diesel. The book is based upon his experiences during 10 years of use of this generator as the sole power source for his home and business.

One-third of the energy in the diesel fuel is released as electric power, one-third is released as heat in the cooling water, and one-third is released as heat in the exhaust gases. All three of these forms of energy can be productively used.

The easiest to use, besides the electricity itself, is that in the engine cooling water. Since it is already in a heat exchanger (in the case of the China diesel just a barrel of hot water), it is a simple matter to run the home hot water line through the heat exchanger, too. This provides very large amounts of hot water and eliminates the need for a hot water heater.

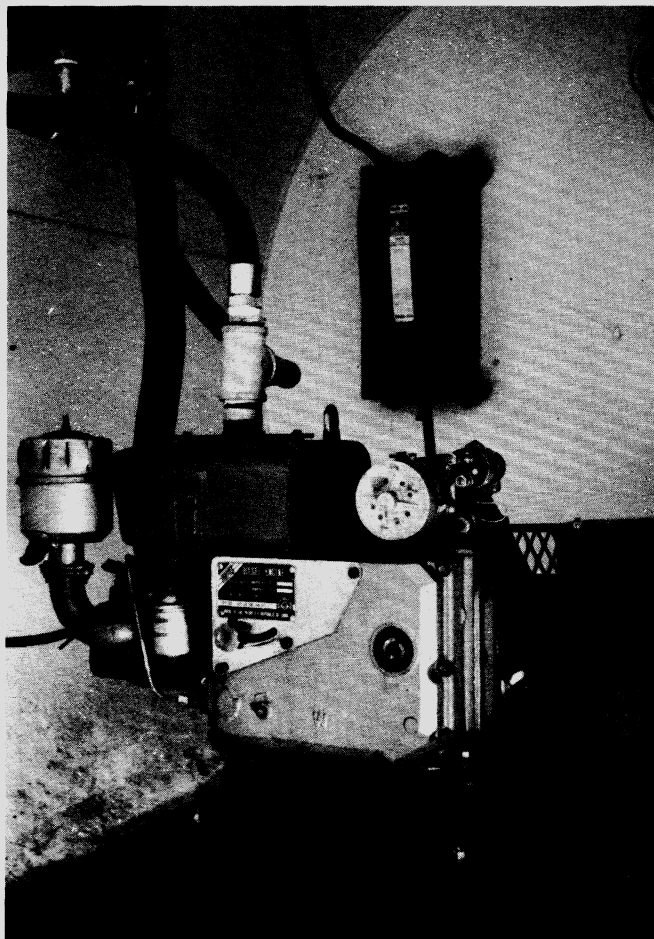
Utilization of the exhaust heat requires the building of another heat exchanger. This is often not needed, because the cooling water alone provides more hot water than most people ordinarily use. If, however, the exhaust heat is utilized for home heating, then the extra heat exchanger is quite worthwhile.

An 8 kilowatt generator produces about 70 amps of electricity at 110 volts. Each circuit in the usual home is designed for about 20 amps except for the electric stove, clothes drier, and hot water heater. None of the circuits, however, are normally used to capacity. In effect, if the hot water heater is replaced by the generator cooling system, then you can run anything in a normal home. You may find that it is not possible to use both the stove and clothes drier simultaneously. If this bothers you, there is a larger China diesel that will let you run everything at the same time. With respect to building heat, the exhaust heat from an 8 kilowatt generator is equivalent to 5 large, 1500 watt floor heaters turned on high.

If you build one of these installations and take the extra step of putting the thing in a surplus steel tank a few feet underground, you can forget about electric bills and have essentially unlimited electric power in any civil defense emergency. For safety reasons, the generator room must be separate from any human shelter.

Once again, however, there is a special bureaucratic risk. This is associated with the campaign against underground fuel tanks by the pseudoenvironmentalist bureaucracy.

Some of our urban centers are beginning to look as though they have been subjected to a low intensity bombing campaign. Where there were fuel stations, there are now gaping holes in the ground. The bureaucrats have also established ridiculous soil contamination standards that require the costly disposal of large quantities of allegedly contaminated dirt. "Cleanup" bills on the order of \$100,000 are not uncommon. This attack upon underground fuel tanks is wrong, but it is real. And, unfortunately, diesel fuel will not keep well



unless it is stored underground with a preservative. Above ground storage subjects the fuel to high summer temperatures that markedly reduce its storage life.

At present, the laws are relatively benign for storage tanks of less than 1,000 gallons, but this could change. For normal home use, you are safer with a small above-ground tank that is refilled periodically. Before you bury a fuel tank for emergency fuel storage, consult carefully with your local bureaucrats. Even then, you may have unforeseen difficulties.

You do not need an electric generator for an excellent survival-based civil defense shelter. The ventilation system, even the best Swiss machinery, can be hand-operated quite effectively. Where funds are limited, they should be spent on extra shelter space, additional long term food supplies, and other essential items that will increase your capability to provide not only for your family, but also for other families in your community.

If, however, you are going to provide your own electricity, in most cases the best choice is a few solar panels for low-level special uses. If you decide to build a capability for large scale generation, then a diesel generator is probably the method of choice.