Rehab for Energy Addicts

A doubling of the lifespan of a product decreases the energy consumption and pollution of its production, distribution, and disposal by half minus increases in production costs. A doubling of the efficiency of its use decreases the energy consumption of its use by half. If we find a way to not need it or want it, then it isn't made, it produces no pollution, and consumes no energy and resources. If the goal is to make monetary profit, none of these options are profitable. If the goal is to make the human community a better place to live, all of these are necessary. We can easily increase the efficiency of consumption at least fourfold, thereby reducing energy consumption and pollution for production, freight, use, and disposal fourfold. All that stands in our way is the momentum of ignorance and greed. Greed is rooted in the fear of losing the energy that is our individual leverage against entropy. Those of us who lack courage or the senses of empathy and community, to varying degrees, tend to hoard and spend in ways of personal empowerment that are not conducive, and are often dangerous, to the survival of the community. As we gain the knowledge of population control, efficient lifestyle, and ways to use alternative sources of energy, fear will no longer sustain greed, and those of us with wisdom, courage, and sanity can enable the alternate technology and changes in lifestyle necessary to sustain us. Just some of us if we don't act quickly. Maybe none of us if we blow it.

In the advertising of the energy sellers and in the media, one often hears the phrase 'the energy we need', when the reality of what they're talking about is mostly the energy we want. It's the biggest lie we've told ourselves in a long while. The balance point between austerity and gluttony has drifted far towards gluttony, we're careening over the edge of sustainability, and we're about to crash. We're caught in a very addictive obsession with consumption.

In this age of gluttony and finite energy, waste is the ultimate crime, and needs to acquire a social taboo. When a trucker picks up a load of orange juice in California, hauls it to Florida, turns around and picks up a load of orange juice and hauls it to California; when billions of people use a whole paper towel when a half sheet is plenty; when we use twice the soap that it really takes to get it clean; when we get the morning paper and only read ten percent of it; when the car that delivers our pizza burns more fuel than it took to make the pizza; when 90% of the energy of cyberspace is frittered away in play, spam and idle chatter; when two thirds of our mail is junk advertising that we throw in the dump unread; when a simple miss-type on a computer program causes thousands of replacement parts to be produced and distributed to hundreds of parts houses and they don't fit; when billions of people leave the lights and computer on; when billions of people spend an hour at work to get the money to buy a labor saving device that will only save ten minutes before it breaks and gets thrown in the dump; when billions of people can't contribute to the community because they never learned to do anything useful for the civilization from which they draw their sustenance; when billions of people are looking for

a paycheck instead of the work that needs to be done; when billions of people measure success by how much a person can consume; it's then that we see the waste that determines our headlong rush to oblivion. The cumulative little waste that accounts for easily half of our total consumption can be addressed, but it takes the awareness of a large percentage of the population to make the difference.

Unfortunately, increasing the efficiency of our consumption will not be enough to save us. There just isn't enough time. We're far beyond the limits of sustainability. If our current civilization is to maintain enough health and energy to convert the technology that sustains us to other energy sources, we need to consume much less immediately. It's easy to talk about efficiency, but talking about forgoing any of our comforts and pleasures, or doing without some of our toys, borders on blasphemy. We have a desperate need to discipline our consumption, but comfort, convenience, and pleasure are extremely addicting. Once again, it's the addiction of power that we need to address. Energy abuse is rapidly becoming a debilitating and deadly disease for this civilization.

There are many factors that contribute to the immense waste of the current feeding frenzy that can be changed and there are alternative power sources. The energy in all fossil fuels is concentrated sunshine, captured and stored by photosynthesis. Once it's gone, we'll have to concentrate it ourselves.

There are a multitude of misguided fantasies in common belief about potential energy sources. There are, however, a number of viable options for weaning our civilization off of fossil fuels.

Without the gravity of a sun to contain it, cold fusion is probably just a parlor trick, and if it is feasible, the time frame for its development to scale is much longer than our consumption of fossil fuels will sustain us.

Mirrors in space is a nice pipe dream, but we have neither the time nor the tether.

Shale and tar sand oil extraction are heavy polluters. They produce several times more carbon dioxide and other toxins in their production than other fossil fuels. They destroy a lot of land, water, and air for the amount of energy they produce.

Clean coal is wishful thinking encouraged by the industry's need to look clean. The energy consumption and pollution involved in creating and maintaining the infrastructure necessary to clean up burning coal just causes more energy consumption and pollution and most of the pollution wouldn't really be cleaned up, it would only be swept under the rug. As we dig ever deeper into lower grade deposits, the levels of pollution will steadily rise.

Most biofuels, especially those made from corn, soybeans, sugar beets, and sugar cane, eventually even much of what can be made from switch grass or other cellulose, are made with topsoil farmed with fossil water and fossil fuel. Much of their true cost is hidden by political and environmental subsidies. As topsoil and aquifer and glacial water are depleted, this is not sustainable. Most [but not all] biofuel sources are in direct competition with our ability to grow food. Corn is probably the worst of them. GM and ADM and a lot of others

have invested billions in the technology to burn tomorrow's dinner so we can drive to the store today.

A few of the biofuels are very good additions to our energy portfolio, but I doubt that their sustainable volume is anywhere near as large as is presently assumed. We take the concentration of energy in fossil fuels very much for granted.

Algae are relatively efficient at capturing solar energy. They're a very simple organism that can live in brackish water, and the nutrients that sustain them are minimal, easily reclaimed, and readily available. The fuel derived from algae is carbon neutral and can be used directly as existing oil refinery feedstock.

Geothermal energy can contribute a bit to our energy supply and it seems to be a relatively low polluter. Energy consumption in Hawaii could probably be almost completely geothermal.

Small scale photovoltaics often require more energy consumption in their production, installation, maintenance, and disposal than the electricity they produce in their lifespan. Large arrays are more energy efficient, but all photovoltaics are fossil fuel dependent, they don't last very long, they produce a lot of toxic residue, and they're often getting in the way of cleaner, much more durable systems of solar energy gain. Solar thermal systems based on stainless steel mirrors are environmentally cleaner and, with maintenance, could last for many thousands of years.

By a wide margin, the most efficient investment in solar energy is the direct, on site heating of water and living space. Passive systems tend to be much more long-term efficient and dependable than active systems. Keep it simple. Money can't buy a better solar water heater than some recycled water heater tanks and some recycled glass.

Glass and stainless steel mirror are good energy investments. They're the key to most of our solar energy potential.

Our estimates of fossil fuel reserves substantially underplay the diminishing efficiency of deeper and lower grade deposits and the increased production of pollutants needed to exploit them. The amount of oil burned and carbon dioxide and other pollutants produced to pump and process a barrel of oil is steadily increasing and, if we're foolish and desperate enough, will eventually approach the point where it takes a barrel to produce a barrel. The ever increasing environmental costs of extracting and refining fossil fuels are not sustainable.

The investment in alternative energy sources for transportation in anticipation of the end of oil is focused on personal transportation and it seems like a problem we can engineer ourselves out of, but oil hauls the freight. All of it. In the developed world, everything in our daily lives comes to us on a truck or a train or a ship or a plane. We haul more freight every hour than was hauled in the entire nineteenth century. We'll haul more freight today than was hauled by all the humans that ever lived before the 20'th century, and most of it is in the dump within a few months. Per capita, we haul about a half a million times more each day than a person who lived before the industrial revolution. To think that we can or should spend the fossil energy to convert our entire freight

system to some mystical alternative energy source in order to continue a very dangerous addiction to consumption is madness. We'll soon be hauling much less freight and we'd best be ready.

The most accurate place to measure our gross domestic product is at the entrance to the landfill. It is fast becoming the place where most of the world's natural resources are. Unfortunately, they are so fragmented, polluted, contaminated, and homogenized that reusing or recycling them is too energy intensive to be practical.

Present systems of recycling are very energy intensive. In most cases, primary manufacture consumes less energy than recycling. The focus of recycling needs to change from remanufacture to reuse. In order to do this we have an immediate need to redesign primary production to enable products and their components to be reused. The energy savings and pollution reduction of reuse versus conventional recycle are as much as 90%.

In the meantime, for those of us not involved in industrial design, there is plenty that we can do. First and foremost is to buy less and buy quality. It will soon become obvious that cheap and disposable has been a very disabling addiction for the human community. Since the current economic system has let quality fall through the cracks, reestablishing feedback between consumer and producer will be necessary if we are to have anything of quality to buy.

Next is to prepare the infrastructure of the local landfill for a system of local reuse and recycle. In the past, waste disposal was simple and straight-forward. Their was plenty of room out back. Out of sight, out of mind. There was lots more where that came from. As population density increases and the toxicity, volume, and durability of our waste multiplies, and as resource and energy reserves decrease, it takes more and more energy to keep the waste stream flowing and keep it out of sight. In places of great poverty, the waste pile is picked clean of reusable and recyclable material. In places of great wealth, no one bothers. In places of more even polarization of rich and poor, the poor are usually prevented from scavenging, driving them even deeper into poverty. As we consume the last of the energy and resources that afford us our convenience and comfort, if we fail to get organized with our efforts to reuse and recycle, an ever increasing portion of us will eventually end up in poverty, scrounging the dumps because that's where the resources are. We have many opportunities to avoid such a fate, but, as for anything worthwhile, it will take awareness and effort.

Glass bottles are too heavy to efficiently haul back to the bottling plant or glass factory unless it's quite close, so bottling plants need to be local. Crushed glass makes better concrete than crushed rock, but, as with most methods of recycling glass, the process is presently compromised because every bottle has a label. A first step would be to require water soluble glue, but because of the toxic inks and binders that the labels are made of, a redesign of the labels themselves is the next step and the discontinuation of labels on individual bottles is better yet. Not drinking the unhealthy, addictive junk that comes in most of them would be best.

Most of the plastic we manufacture is used for frivolous play. The bottles are mostly full of sugar and water. The children's toys are quickly in the landfill and teach little but the culture of consumption.

Aluminum cans are mostly recycled, but the process relies on a lot of fossil fuel. The large majority of aluminum cans contain either addictive, unhealthy drugs [alcohol or sugar-caffeine combos], or frivolous tongue toys [since diet sodas contain no calories, vitamins, or minerals, they're not even food]. The sinister joke of artificial sweeteners is that they increase appetite. Let's overcome some bad habits.

Present recycling of cars and trucks is to crush them, haul them, shred them, and then sort out the crumbs. This is an extremely energy intensive and toxic process. If cars were designed to be simply disassembled at the end of their useful life, their usable components reused, and the rest recycled or remanufactured, then the energy consumption and toxicity of their production and recycle could be very substantially reduced. The primary impediment to this is the lack of design for easy disassembly. The second impediment is the lack of generic parts. The third impediment is the lack of quality parts. The redundancy of individual component design and manufacture could easily be reduced by 90%, with substantial increases in quality, durability, safety, drivability, and environmental cleanliness.

Since every dime we spend buys energy, resources and pollution, the easy measure of a car's environmental impact is total cost per mile, including much of the true costs of driving that are hidden in the future.

The evolution of the automobile over the last hundred years has been the cumulative effort of millions of people, each with their own skill sets. Early on, it was the tinkerers and inventors who created the car, but as the size and complexity of the automotive industry increased, the innovation has gradually shifted from invention to engineering. The result has been the mindless repetition of thousands of different starters, alternators, engines, transmissions, brake systems, heaters, fuel injection systems, windshield wipers… Amongst all these different designs, some work well, some don't. Some pollute more, some pollute less. Some are durable, some are not. If we take the top one percent most cost effective systems and retool to produce the best, we could drastically reduce the environmental impact of the automobile. If automobile components were generic and of the highest quality, we could cut the cost of driving by about half.

There's a balance and a compromise between environmental cost and performance. Only a few component designs are good at both. The most efficient, durable, drivable engines have been the straight sixes. The simplest, strongest, most durable, best performing suspension is the 1950's vintage Volkswagen Bug. The carburetor can once again be the best gasoline fuel system if we make it jetless. Generic lighting systems are cheap and durable. You can build a complete system from generic parts at the local parts house for less than the cost of an average taillight lens, and they are much stronger and more dependable. A further evolution of 1950's race car style tubular steel cage, aluminum skinned bodies could put most ambulances out of business. The

1960's vintage Volkswagen Buses had the strongest, safest front bumpers because they were round and well connected to a good crush zone. Just don't hit anything above the bumper.

The complexity of the automobile has increased exponentially through the years. Today's cars have thousands of times more parts than a car from the 1950's. Since their overall cost of driving is an accurate reflection of their environmental impact, it's obvious that new cars are no more environmentally friendly than the best of what we had sixty years ago. They produce less noxious tailpipe gasses and particulates, but they produce much more other toxins, mostly in their manufacture and disposal. The most talented older mechanics drive refurbished and redesigned old cars and look upon much of new technology with distain.

The costs of vanity surrounding our personal transportation are immense. Easily half of our true driving costs are about fashion. Frivolous fashion is an addiction we can ill afford.

Looking ahead, we need fundamental alternatives to the massive inertia of the automobile industry. The primary departure needs to be a move away from the completely sheet metal, frameless body. The present obsession with the slow crush, spot welded, sheet metal body to protect the occupants has fundamental flaws. It has very little real strength compared to a tubular steel body cage with the crush zones around it. This change alone could eliminate most crash injuries and almost all deaths. Not just to people, but to the cars themselves.

Instead of crude seatbelts, the seat itself should protect the occupant. Single shoulder belt seatbelts severely twist the spine in a front end collision. Airbags are an absurdly expensive, unreliable, and ineffective alternative to a seat that contains and restrains a person's body. The trick to a safe seat is in its ability to decelerate at a survivable rate. The trick to an accepted and convenient seat is ease of use.

Carbon fiber composites suck. We won't find this out for a hundred years or so when the resin and plastic binders degrade and release the highly toxic and very durable carbon fibers into the general environment.

Our obsession with high tech has drastically increased the environmental impact of contemporary personal transportation. This won't become evident until we recycle them. Throughout the high tech industry, the pollution of their recycle and disposal is poisoning millions of people, and will continue to do so for the foreseeable future.

Throughout the automotive design industry there is a strong flavor of cocaine. Just because you can doesn't mean you should. The technology to build cars that are many times more environmentally friendly has been available for many years. The problem isn't technology, it's our vanity, our obsession with speed, and our dependence on a capitalist system that forces competition instead of cooperation.

Current automotive insurance and registration laws seriously inhibit the specialization of vehicles necessary for efficient driving. Everybody knows that liability insurance should cover the driver instead of the car, but few people see the real waste and pollution caused by current laws that coerce the poor and

middle class into driving compromised, inefficient, one size fits all vehicles. The cost of registration and insurance is often the reason we drive the SUV or pickup because it's not cost effective to keep a second efficient little commuter car. The cost of the bureaucracy is more than the cost of extra fuel. Because they influence consumer buying trends, current automotive insurance and registration laws are a major detriment to the production of efficient cars.

For a large percentage of the community, it's not cost effective to commute to work in the snow. The cost of the time, energy, and resources involved in driving is greater than the productivity of the work. The snow plows, the salt, the extra fuel, the rusted and broken cars, the body shops, the insurance companies, the hospitals, the doctors, the lawyers… The wasted time and energy isn't worth what gets done on the job. Relax. Take some time to play in the snow.

When you figure the time we spend on personal transportation [working to make the money to buy a car, fuel it, insure it, maintain it, repair it, recycle it, repair the environmental damage it causes, and pay the medical bills associated with the pollution, stress, and sedentary lifestyle it causes, as well as actual driving time], in relation to the miles we drive, except for the open highway, it's much faster to cycle, skate, or walk, and avoids the associated energy consumption and pollution almost entirely. The primary reason we tend to motivate ourselves as much as possible with fossil fuels instead of human power is that we think we don't have time to go any slower, when we're really just driving around in circles.

At the present time, we have almost no roads for human powered transportation. Bike lanes are better than nothing, but they're dangerous and envelope you in car exhaust. Very few people use them. Separate roads with separate lanes for pedestrians, rollerblades, and cycles would dramatically increase the use of human powered transportation. A consumer tax on bicycle sales to build independent bike paths and roads for human powered transportation would surely help. A tax on energy consumption for the same purpose would be much faster, but would meet with much more ignorant resistance amongst voters. Increased awareness of the true cost of driving is necessary to facilitate the conversion to a sustainable personal transportation system.

The human energy wasted on exercise machines that produce nothing but waste heat and the pollution and energy consumption of their manufacture, to no purpose but burning calories in order to not get weak and fat, might produce enough electricity to keep the lights on while you exercise, but could be much better spent doing something useful. In competition with fossil fuel powered machines, one human power seems insignificant, equivalent to about a tablespoon to a cup of oil an hour, depending on the machine and the task at hand, but it's readily available, it's compulsively renewable, and it's necessary for the health of the human body.

Pedaling a bicycle is a very inefficient motion for the human body. It utilizes only a small percentage of the human musculature. The motion that enables the most sustained energy output from the human body is rowing

because it utilizes the most and largest muscle groups. With the simple addition of a connecting rod, the circular motion of pedaling is converted to the linear motion of rowing and now you can put your back into it and make some speed. The motion of rowing can easily be integrated into current bicycle and hybrid technologies. If we carpooled and exercised on the way to work, we wouldn't spend a dime on fuel. With simple, currently available technology we can build human powered monorail systems that would be much faster, cleaner, healthier, and cheaper than any mass transit system currently in operation. In traffic, with pressure sensors in the front and rear airbag bumpers, you could swipe your card and pay or be paid according to how much exercise you cared to get. If the fast lane was open, I would guess that four people working together could sprint across town at close to 100 mph.

As the forces of nature become more extreme, we need to be ready to harvest the aftermath of the destruction. Hurricanes, tornados, windstorms, drought, and forest fires leave behind immense amounts of potential lumber, but it's only harvestable for a very short time. Mobile sawmills need to be ready. Hurricane Katrina probably blew down enough timber to rebuild Mississippi. Almost all of it went to waste. Forest fires kill enough timber to rebuild the nation. Almost all of it goes to waste. Much, and sometimes most, of the building materials left over after a natural or human related disaster are reusable. All it takes is some human energy and a bit less vanity.

The aquifers and glaciers that sustain about two thirds of the world's agriculture are very rapidly depleting. Many may be dry within one generation; many more within a lifetime. Our supply of topsoil is doing much the same. The levels of urban, suburban, and industrial poisons in the floodwaters that flood our riverside farmland pose a long-term health risk as they increase the background levels of poisons in our food. As the climate goes through a time of great turbulence, monocrop agribusiness will become much less effective and much more risky as it becomes ever more vulnerable to disease and steadily consumes the fossil water and topsoil that grow our food. As the oil that we consume to haul food around the world becomes scarce, the evolution of agriculture will become much more local. The need to know how and what to plant where and when will soon be of great importance. The knowledge of farming and gardening will need to be revived and proliferated. We need to convert much of our time and energy and water use away from ornamental plants to plants that we can eat. Plants that we can eat have a much more elegant beauty than ornamental plants. Build soil, foster diversity, and plant as many good seeds as you can.

As the oceans warm and precipitation increases, it's currently mostly warm snow that quickly melts or it's heavy rain, much of which falls on pavement, resulting in flooding rather than the steady melt through the spring necessary for agriculture. We need to utilize different systems for capturing, storing, and using water. Lakes are a very inefficient means of storing water. They're mostly not nearly big enough or numerous enough to handle the volume of contemporary floods. The shallower the lake, the greater the evaporation rate. Increasing the number of lakes only exacerbates the problem. Underground

storage has little evaporation, very high capacity, it doesn't leak, it's cheap, and it's complete and ready for immediate use. We need to think big for this one. This will take a bit of manpower and, for most folk, a leap of faith. Major streambed restoration is necessary to slow the runoff and allow it to penetrate and refill the aquifers, where it's very efficiently stored and readily available. Let's start at the headwaters and meander the streams to hold back the flood waters and put some water back in the wells. Let's clean up the streets so the water we put back in our wells and reservoirs is clean.

There are a number of power sources available that are not in current use because they are intermittent and there are very few systems in place that can use intermittent power. Current research is focused on developing ways to store energy, but using power when it's available is much cleaner and more efficient.

Solar is rhythmic. Overnight storage of solar energy substantially increases its convenience and usefulness, but it requires the energy, resource consumption, and pollution of the storage system. Trough mirror solar systems can run 24-7 because the hot oil can be stored for later use. The automotive industry is finally moving towards fully electric cars. This will eventually be most of our available electric storage capacity. We can recharge our electric cars during the day with solar. The current pervasive mindset of a car that does it all is an extremely inefficient compromise for an electric car. If we are to substantially increase the efficiency of transportation, we need more specialized vehicles. The appropriate niche for fully electric cars is very small, very sporty commuter cars.

Wind is intermittent, but predictable, and is often available to recharge batteries and pump water uphill for hydroelectric at times of low consumption. It is rapidly proving itself to be efficient when buffered with a variety of other energy systems, although currently it can't use the massive power of storm winds and most of its infrastructure is built with fossil fuels and poisonous carbon fibers.

Even the immense power of floods is predictable and harvestable. With a bit of cooperation and planning, we could time much our activity and industry to use power when it's available. We can learn to use focused power.

Two of the very few things of high value we know how to produce that last just about forever are stainless steel and plutonium. We also know how to use the plutonium to poison the stainless steel. The stainless steel poisoned in a nuclear power plant would make enough mirror to supply thousands of families with a solar kitchen that would cook dinner for thousands of years. The stainless steel poisoned in a nuclear power plant would make enough mirror to build a solar power plant that, with simple maintenance, would last many thousands of years. In the immediacy of the moment, harvesting solar energy is less convenient, but stainless steel lasts just about forever and the pollution involved in it's manufacture lasts just a few generations, while a nuclear power plant lasts just a few generations, but its pollution lasts just about forever.

A lot more people need to understand that nuclear energy, the most concentrated energy we've found ways to use, is quite precious, but is currently a very long term risk and a very short term solution to our bulk energy wants

and needs. Contemporary commercial nuclear power violates two of the basic rules of gambling; don't bet to bad odds and don't bet more than you can afford to lose. You can learn all the basics of state of the art technology for the disposal of an obsolete or disabled nuclear power plant by watching a cat take a crap. Every nuclear power plant will need to be dispersed or contained for many centuries. The ones that use plutonium will need to be contained for many ice ages, and the ones that fail will poison everything nearby for at least centuries. In Japan this already means a substantial portion of their best farmland. We have committed ourselves to a formidable task. It will take an awesome amount of resources and energy just to get some concrete over our derelict and damaged nuclear facilities that will only last a few hundred years. We haven't even covered Chernobyl yet. Many of our nuclear power plants will become festering zits on the face of the earth for several ice ages [except for the ones that get ground up by the glaciers and become poisonous smears]. Both short term and long term, levels of background radiation will steadily rise. We've poisoned ourselves and now we have to live with it. It's a strange irony that the increase in radiation exposure will force the increase in mutation rates that will allow us to adapt to a more poisonous environment. The land given back to nature around Chernobyl is our first experiment in life with high levels of background radiation.

A way to help clean up this mess is to find better ways to harvest the very substantial energy still left in spent nuclear fuel. One method for reusing spent fuel rods is already in pre-production development in Germany.