Energy: A Front Burner Issue

Principia College
By Rachel Crandell

We stand here on this beautiful chapel green overlooking the mighty mother of waters looking out across fertile farmland. We should look quick! It won't stay this way forever. There are so many changes afoot at this period that no one knows for sure how fast they will come, but they are already coming. Climate change has been accelerating for the last hundred years and now at an ever quickening pace.

Energy and climate are two words that go hand in hand today. Since most of the world's energy and certainly most of our energy is the result of burning fossil fuels, we are most certainly releasing increasing amounts of carbon dioxide into our atmosphere, creating an ever thickening blanket that holds in the heat and warms our planet. Almost everyone now acknowledges that this accelerated warming is human-induced. Of course, there are natural causes of warming, volcanoes, El Niño, but beyond those, new evidence that human-induced effects are changing our climate has come from the National Oceanic and Atmospheric Administration and the Scripps Institute of Oceanography at the U of California at San Diego. Dr. Barnett of Scripps said that the "fingerprint" of human influence on the warming climate is "so bold and big that you don't have to do any fancy statistics to beat it out of the data. It's just there." (St.Louis Post-Dispatch, April 13, 2001 AP) And "American cars, factories, and power plants emit 25% of the heat-trapping gases in the atmosphere making the US the world's biggest producer of greenhouse gases." (Amicus Journal, Spring 2001, p.8)

Global temperatures are believed to have risen about 1.1 degrees over the last century. According to UN: Intergovernmental Panel on Climate Change's most recent predictions, global temperatures will rise 2.5 to 10.4 degrees in the next 100 years. Let me repeat that. Temperatures have risen 1.1 degrees in the last 100 years, and are predicted to rise between 2.5 and 10.4 degrees in the next 100 years. That is unnatural acceleration! Instruments became available in the 1950s that made it possible to measure the amount of CO_2 in the atmosphere and monitor it around the world. In an article entitled "Fiddling While the World Burns" (Amicus Journal Spring 2001) George Woodwell writes, "Suddenly data were available showing a year by year accumulation of CO_2 and powerful evidence of the importance of the interactions between the atmosphere and natural ecosystems: an annual cycle of rising and falling carbon dioxide concentrations following the seasonal metabolism of northern hemisphere forests. Woodwell writes in Amicus Journal, "my colleagues and I could see the carbon dioxide concentration in the atmosphere fall every summer as forests of North America took up carbon, and rise every winter as respiration dominated over photosynthesis and the forests released carbon. It was clear that the forests have a very large role in determining the composition of the atmosphere. Such a thought was heresy at the time, but is now universally accepted." Another idea that is gaining acceptance is that of "ecosystem services". Wetlands purify water free of charge. Insects pollinate crops free of charge. Forests moderate climate free

of charge. (Nucleus, Winter 2000-2001 p. 12) Yet these ecosystem services are very valuable and costly to duplicate if the natural process no longer functions due to destruction. When we begin to value the bio-capital, we do our economics on a different scorecard.

In the 60s scientists increased their warnings, Congressional hearings were held, solar panels were installed on the White House as an example for the nation. Subsidies for alternative fossil fuels were strengthened. We were on a path, but under Reagan the solar panels were removed, the subsidies and initiatives canceled. "Two decades of delay ensued." (Amicus, Spring 2001 p.31). More recently the meetings in November at The Hague failed, and now our president has refused to sign the Kyoto Protocol. Where are we now? The CO_2 content is 33% higher than it was 100 years ago and rising daily. And our government is still stuck on trying to get by without curbing anything. We have been pushing for emissions trading, credits for forests in other countries that absorb CO_2, investing in emissions reduction programs in foreign countries while taking little action at home and doing business as usual. The new energy policy doesn't talk about conservation at all. They have taken away half of the appropriations for alternative energy research and are pushing for more domestic development of fossil fuels, which will only increase CO_2 emissions.

"The total release of carbon from burning coal and oil and gas is now about 6.5 billion tons annually. There is an additional release of carbon from the destruction of forests, about 1.6 billion tons annually. Of that sum about 3 to 4 billion tons accumulate in the atmosphere annually." (Amicus Spring 2001) p.31) That CO_2 blanket causes rapid continuous warming of the earth. It causes changes in precipitation patterns. It causes migration of climatic zones at a rate of one to several kilometers per year. It causes the melting of glaciers. It causes an accelerated rise in sea level. It causes an increased range and frequency of climatic extremes including large storms. "These changes are not hypothetical. They are measurable now and accelerating." (p. 31) Can you remember when the summers were milder and the winters colder and snowier? When I ask friends in Central America or South America when is the rainy season, they invariably answer, "Well, it used to be that..."

"The potential for further warming... will take the world far beyond the range of reliable predictions." For example, "Just what are the implications of an Arctic Ocean that is consistently open in summer, no longer a cold, reflective white surface of ice, but a warm, black surface of open water, free to absorb the heat of a 24 hour summer sun through evaporation? Since the global climate is driven by the latent energy of water vapor, what will be the effects of a large new source of this energy entering at the polar extreme? At what point in the disruption of the global climatic system will the circulation of the oceans suddenly shift, altering the flow of the Gulf Stream, which now carries heat to northern Europe and keeps coasts ice-free in the north? What are the costs around the world to 6 billion people when continental centers become progressively arid and increasingly subject to climatic extremes?" (Amicus Journal, Spring 2001 p. 32) What will happen to

islands and coastal cities when the sea level rises and floods them? What will happen to fertile lands that become so arid that they can no longer be our "bread baskets"?

The biophysical stability of the human habitat is dependent on the stability of the functions of natural ecosystems. That just means that plants and creatures, us too, depend on relatively stable temperatures to live in and produce our food. "Destabilization leads the world down the slippery slope of biotic impoverishment." Haiti is an example of a thoroughly impoverished landscape and concomitantly a thoroughly impoverished people. (p.32) Do we want to go there?

Are you aware that much of our fossil fuels are dug, drilled or mined from places were indigenous people are not consulted, and their lands are laid waste and altered for all time? The U'wa Amerindians of Colombia have threatened to all just step off the cliff en masse if Occidental Petroleum drills any further into their tribal lands. That has got to be a desperate posture to assume. Mass genocide. They have seen the results of oil exploitation to neighboring tribes, and they will not endure it. The Cofan, Huaorani, the Secoya and now the Shuar in the Amazon regions of Ecuador have all felt the terrible crush of oil destroying their forests, their homes, their rivers and their hunting grounds. Even on our own US soil the Dineh or Navajo people are watching the underground aquifer be pumped at a rate of 1 billion gallons a year by Peabody Coal so that a slurry for pulverized coal can be piped to a nearby power station in the Mojave Desert. Where water is precious, should our energy demands suck the desert of indigenous people and their pastures dry after we have stolen their land in the first place and now their water?

And that brings us to the desire of some to drill for oil in the Arctic National Wildlife Refuge. ANWR is the undisputed pristine wilderness left in North America. It is the calving ground of a caribou herd that migrates up the Porcupine River from northwest Canada into the northeast corner of Alaska. Indigenous Gwi'chen people whose lives revolve around the caribou would have their culture wrenched from them. When you read that Alaskan natives are in favor of drilling for oil on the coastal plain, they are talking about the Inuit people who gain their livelihood from the Arctic Ocean. Obviously they wouldn't be as concerned about caribou if their living comes from whales. If we all inflated our tires on our cars to reduce friction for maximum efficiency, we would save as much gasoline as we would ever be able to drill for in the ANWR, about 5.4 billion gallons in 50 years. Can't we do that instead? Do we have to destroy yet another culture, a people, a habitat that is irreplaceable for a few extra gallons of oil that we will have to give up on pretty soon when we run out anyway.

I have heard it said that it would be as smart to drill in the ANWR for oil leaving it pock marked and disrupted, and then have to find new fuel eventually anyway when that oil runs out, as it would be to not have enough fuel and decide to burn the Mona Lisa to keep warm and then have to find another fuel anyway. Why not switch now and save the treasures like the ANWR and the Mona Lisa?

"What is to be done? We hold the chart and the possibility of rescue." Woodwell suggests, "The first step is for the US to develop its own plan for encouraging first the conservation of fossil fuels and then their displacement as the main source of energy driving industrial society." (p. 32 Amicus Spring 2001) Many studies point to great economic advantages as well as environmental stability coming with this transition. "The issue is a global emergency, a disaster underway. It is not a potential threat. It is with us now and gathering costs, immediate and future, daily..."We the wealthy of the US, are the worst carbon culprits, and the billions of the whole world will pay the costs of our scandalous neglect." (p.32) And at least 20% to 30% of the electricity Americans use today is simply wasted - an obscenity, on a warming earth. We need to do something now!

We are doing several things, but we need to do much more. For instance, Department of Energy is holding to the tougher standards for energy efficiency in home washing machines and water heaters. The new standards will cut water use by 10.5 trillion gallons by 2030 and save enough electricity to light all US homes for more than 4 years. Although not as high a standard as the last administration set, DOE is requiring a 20% increase in energy efficiency for home central air conditioners and heat pumps. These energy savings will equal the output of 37 power plants or enough electricity to light all US homes for 2 years. (Nucleus Winter 2000-2001)
That's a start!

Natural gas buses are already on the streets in many cities beginning to curb the plumes of pollution emitted by diesel buses and trucks. Zero emission buses running on batteries or fuel cells are beginning to show up. Over a thousand transit buses running on natural gas now operate in cities from New York to Los Angeles. The environmental costs of natural gas are far less than those of diesel, about 40% less smog producing pollutants. Natural gas emits about a tenth as much soot as diesel buses, but it is not the ultimate solution. Fuel cells give full environmental protection because they emit no pollutants, no toxins, no greenhouse gases. Only water comes out the tail pipe! "Fuel cells produce electricity directly from the reaction of hydrogen and oxygen. Oxygen is taken from outdoor air. Hydrogen can be stored on the vehicle in its pure form, or it can be extracted from other carrier fuels such as methanol." (Nucleus p.6) When a bus company begins to use natural gas buses, they are on the path to building an infrastructure for future fuel-cell buses. Many of the changes in facilities necessary to accommodate natural-gas fuel will be useful for hydrogen.

Some may say that switching all the gasoline tanks in all the gas stations in America is too big a task, but who uses typewriters anymore? We have made big switches when we found a better way to do business over and over in the past. How many blacksmiths do you know? And now we need to make this switch, too, from fossil fuels to alternative cleaner burning fuels, so that we can have a safer and cleaner future. With cleaner fuels, there will be less maintenance. In hybrid buses that switch back and forth between electric and gas, there's no transmission. The buses handle better, ride smoother. (Nucleus p.7) That not only means for mass transit, but for family cars. We need to vote for

congressmen and women who will support clean energy. We also need to vote with our dollars by buying products that are energy efficient.

Did you know that not only do sport utility vehicles (SUVs) get abominable gas mileage, but also they are not regulated for emissions like cars? They are exempted from clean air rules and are allowed to get by with the poor standards that trucks are allowed. If you drive an SUV, you may want to think about it some more. It is quite possible to drive a car that gets 40 to 50 miles per gallon or better. I do. I have for the last 10 years. It's nothing new. And it can get a lot better if we would all vote with our dollars and buy cars that are energy efficient. We influence the market! California approved a measure ordering carmakers to offer thousands of electric and other advanced- technology vehicles beginning in 2003 with a requirement to surpass 50,000 over the next decade.

Energy news from the Farm: "Wind developers are installing large turbines on farms and ranches. By 2020, wind energy could provide farmers and rural landowners with $1.2 billion in new income and 80,000 new jobs," writes Eric Wesselman in the Union of Concerned Scientists recent issue of Nucleus. (p. 10)"A wind turbine uses only a quarter of an acre of land and can earn royalties up to $2000 a year. Iowa now requires 2% of electricity sales be from renewable resources." That is a start, but wide-open farmland in the Midwest could provide a lot more power from the wind. Some larger projects already pay ll5 landowners $640,000 each year. They also add $2million a year to the tax base." (Nucleus p.10) Since when is energy efficiency not good business? Did you realize that organic vegetables require less fertilizer (a product of oil), no pesticides or herbicides, and fewer trips around the field in a tractor that guzzles oil? Eat organic!

A farmers' co-op in Iowa planted 5,500 acres in switchgrass to be burned with coal in a large power plant. If successful, the project will increase ten times and plant 50,000 acres producing 200,000 tons of switchgrass each year supplying 5% of the plant's fuel. Tripling biomass use could provide $20 billion in new income for farmers and rural communities and reduce heat-trapping emissions causing global warming by the same amount as taking 70,000,000 cars off the road. Another farmer is generating power from cow manure. His digester heats the manure to 100 degrees F and the methane gas produced powers the turbine that generates enough electricity for his farm and 50 homes. The other good thing is that this process eliminates carbon and methane emissions, which are both greenhouse gases. Farmers also are using the sun to dry crops, heat buildings, power water pumps, making farms more economical and efficient. (Nucleus p. 10)

As of last month a bipartisan group of US senators and representatives introduced the Clean Power Act of 2001. This legislation will require dramatic reductions in power plant emissions of four pollutants by 2007 and will encourage the development of renewable energy facilities and energy efficiency programs. You could urge your senators and representatives to co-sponsor the Clean Power Act of 2001. Do you know whom your senators and representative are? If not, check it out online. The four nasty pollutants it aims to cut emissions of are:

1) nitrogen oxides which cause smog by 75% from 1997 levels,
2) sulfur dioxide, which causes acid rain, by 75% from levels, set by Title II of the Clean Air Act
3) carbon dioxide, which contributes to global warming, to 1990 levels and
4) mercury, which contaminates fish and threatens human health by 90% from 1999 levels. (Nucleus Spring 2001 p.12)

Here's another good sign. In 1999 the NY Attorney General sued some of the dirtiest power plants around the nation - the first time a state has directly sued out-of-state power plants for violating the Clean Air Act. Since then, two companies have come forward to negotiate settlements. One company will spend $1.4 billion to slash smokestack pollution, and another will spend $1.2 billion and cut pollutants by 70%. , Both of these companies burn coal whose emissions cause acid rain in New York. (Amicus Journal, Spring 2001 p.7) Money talks. You might as well clean up and save, rather than stay dirty, get caught, and pay anyway to clean up.

"As heat records continue to be broken and extreme weather events intensify around the world, the reality of global warming is sinking in - everywhere it seems like, except Capitol Hill. At the 1998 World Economic Forum in Switzerland the CEOs of the world's 1,000 biggest corporations surprised organizers by voting climate change as the most critical problem facing humanity," reports Ross Gelbspan. (Sierra, May June 2001 p.63) "European countries are planning drastic reductions in their CO_2 emissions while growing numbers of corporate leaders are realizing that the necessary transition to highly efficient and renewable energy sources could trigger an unprecedented world wide economic boom." UK is committed to 12.5% cuts by 2010 and 60% by 2050. Germany is working toward 50% reduction. Holland who is worried about being flooded by rising sea levels is planning to slash their CO_2 emissions by 80% in 40 years. British Petroleum is investing in solar power and likes to be called BP - Beyond Petroleum now. Shell has created a $500 million renewable-energy company. Ford and DaimlerChrysler have invested $1 billion in a join venture to put fuel cell powered cars on the market in 2004. Even William Clay Ford recently declared "an end to the 100 year reign of the internal combustion engine." (Sierra, May June 2001) But we have a way to go...

A concept called the Natural Step has caught on in Scandinavia and is spreading through Europe and starting in the US. The idea is that companies who realize the economic advantages to being ahead of the game in efficiency and resource management will gain far more than they invest in research to create products that use less water, emit no toxins, use no fossil fuels, and are willing to be responsible for recycling the product after it is used cradle to cradle and reused so that there is nothing to throw away! For example, Electrolux in Sweden realized that the growing economy in China was going to enable millions of people to own washing machines. But if all the Chinese wanted to wash in machines like the ones we have, there wouldn't be enough water in China to do it. So they invented a washer that used about 1/3 as much water. No other company was ready

with such an innovative machine and when the Chinese wanted washers, guess who led the market and made millions? Taking $$ and time for research to create a more efficient product also made $$. Efficiency and economy and environment are the three Es that go together. They are not mutually exclusive.

Tom Wigley of the National Center for Atmospheric Research estimated that "the world must generate half of its power from wind, sun and other non-carbon sources by the year 2018 to avoid quadrupling of traditional atmospheric carbon levels which would most certainly trigger catastrophic consequences." His team suggested "researching, developing and commercializing carbon-free primary power technologies...with the urgency of the Manhattan Project or the Apollo Space Program." (Sierra, May June 2001)

Cliff Foerster, husband of a Principia Trustee, Maggie Foerster, is on the board of Alternative Energy Institute. You can check them out on their website, www.altenergy.org. They have worked to encourage, disseminate, facilitate and connect inventors, scientists, and investors interested in all kinds of alternative energy. The best ideas get shared faster and more widely through Alternative Energy Institute and made practical. That is an angel message.

Another example of an alternative energy that a Principia graduate is engaged in is UEK Technologies: Green Clean Power. Wayne Hawkins is Vice President of Finance and Operations of UEK which produces a device that can take free-running river or tidal flows and, without a dam or other obstruction, use these flows to drive a turbine and generator to make electricity. Imagine no dam. No flooded habitat. No displaced people. No sacred sites lost. No warm water killing fish below the dam. The turbine blades revolve slowly so fish passage is not an issue, but with great torque to produce the power. California is short of electricity. Many developing nations are in need of power. This system can deliver power from the day it is installed, no pollution, no emissions; no blocking of the river for transportation or fishing and for much less cost than building a dam. There is tremendous power in flowing waters. Why not harness it? They have. That is another angel message.

A global energy transition will require a great deal of money, but not nearly as much as ignoring the problem. Building and maintaining the necessary new energy facilities will take an army of skilled workers that organized labor can provide. More jobs, not less. That old Global Climate Coalition made up of oil companies and auto manufacturers who hired scientists to say that global warming wasn't real has collapsed. Texaco and Mobil Exxon were the last holdouts. But the world is waking up and so must we.

We have an impact on the planet. Everyone does. There is a way to measure impact; a formula that helps put things in perspective. It is I=PAT. That is impact equals population times affluence times technology. In other words one nation's impact might be less even though their population was large, if they were not affluent or didn't have much technology. On the other hand you might not have a very big population, but if you were

an affluent nation with lots of technology, you could have a huge impact. Guess where we in the US stand? Our impact leaves massive footprints since we love gadgets and convenience, have plenty of money to buy them, and we waste a lot.

The question remains what are we doing individually to help, to wake up, to change our old bad energy habits? Dr. Jane Goodall, who will be visiting this campus in a few weeks, believes that the individual is important. Instead of thinking, "What can just one person do?" and not doing anything, she asks what if all 6 billion of us did a little something in the right direction? That would be a lot! We can purchase simple technologies that will lighten our stomp, or our step, maybe even help us tiptoe on the planet. For instance do you have low flow shower heads on your shower? Do you use compact fluorescent bulbs in your light fixtures? Does your family's water heater have an insulated jacket? Do you have your own tire gauge to check inflation pressure regularly for maximum efficiency while driving? Do you have timers on your thermostats that can be set to automatically lower the heat during the night and turn it back up just a little in the morning? Timers that turn on and off hot water heaters and air conditioners only at the hours you need them? Do you recycle everything you possibly can? Do you know that in the phrase "throw it away" there is no away? Do you "close the loop" by buying recycled products whenever possible? We help create the demand. Are you purchasing the most energy efficient appliances? Is good gas mileage a priority when you buy a car? Do you consistently do all the things your teacher told you to in grade school about turning off the water while you brush your teeth, taking a 3 minute shower, deciding what you want in the fridge before you open the door and shutting it as soon as you are through, and turning off lights and TV when leaving the room, and writing on both sides of the paper, and only printing from the computer when essential? Do we carry our own bags to the grocery store? Are we willing to ask store managers if they could please carry recycled products? Do we ask ourselves "How much is enough?" Do we weigh mere convenience with true needs? Are we willing to break some of our wasteful habits? Can we eat lower on the food chain? Remember "a penny saved is a penny earned?" How about a gallon saved is a gallon not drilled. So many things we can do to help!

Since forests play such a big part in regulating climate I have a bit of good news. Over the last 3 decades a huge experiment has been taking place in the tropical dry forest of Costa Rica. Dr. Dan Jansen and many others have been working to restore the forest, and they have done it! Where forests were routinely burned to clear the land for cattle ranching and agriculture, once again lush green native vegetation covers the northwest portion of Costa Rica called Guanacaste. William Allen, the award winning environmental writer for the St. Louis Post-Dispatch, has just come out with a book “Green Phoenix: Restoring the Tropical Forests of Guanacaste, Costa Rica”.
Bill will be speaking May 5 in St. Louis at the Missouri Botanical Garden at 7:30 p.m. Saturday night. The evening is free, the slides will be beautiful, the information amazing, and the company inspiring. You can purchase his book and get it signed then, or you can do it today at the table marked St. Louis Rainforest Advocates right over there. The hardback is $35 and worth every penny. We need success stories like the one Bill tells.

Everyone is invited on May 5th. You might even want to arrange carpools and cut down on your CO_2 emissions!

Here's another happy note. The Wilderness Society recently announced that more environmental organizations were integrating spiritual and moral values into their missions and messages. They are encouraging dialogue that will transform the environmental movement. Their plan promises to bring a new level of idealism to their work. They are discovering within themselves and sharing with others the meaning of concepts such as spirituality, faith, morality and values. They wrote, "Our plan of enabling and encouraging spiritual thought and expression in environmental work can improve our conservation work, strengthen our resolve and help others to understand our message. By making more individuals aware of the connections between spirituality and environmental preservation, we can only improve the quality of all conservation work. We are ready to help bring those connections to light for everyone working to protect the Earth."

I loved reading that. And I loved receiving the letter to Alumnus last fall from Dr. Moffet. He wrote that employers around the country note that "Principia provides an educational experience that, because it trains its students to be critical thinkers, excellent communicators, and globally alert citizens, is more important than ever before." I hope we are turning out Principians that are all of those things, but the one that stood out to me was when George pin-pointed "globally alert citizens." We sure do need to be that! And best of all we know how to pray! We can be expecting that useful solutions will be seen. For example, recently scientists at the U of Florida discovered that a common fern has the capacity to soak up arsenic from the soil without keeling over dead. Once the plant has pulled arsenic from the soil, it can be harvested safely. It could be planted in contaminated soils to help with cleanup from farm chemicals and wood preservatives. Who would have thought? That is an angel message, too.

Scientists, voters, politicians, CEOs, citizens, "consumers" can all be receptive to ideas that bring solutions. Some may be surprising. Remember Elisha's solution to the lost ax? He threw a stick into the deep river where the ax had sunk and "the iron did swim." Even though the idea defied physical laws, Elisha was obedient to God's angel message, and the solution was at hand. We, too, can be willing to listen for and follow angel messages that will lead us to be gentler to our planet home.

In closing I want to share some of my favorite quotes, ideas that caution me, inspire me, and keep me hopeful:

> "Man has gone to the moon, but he does not yet know how to make a flower, a tree or a bird song. Let us keep our dear countries free from irreversible mistakes which would lead us in the future to long for the same birds and trees."
>
> *Felix Houphouet-Boigny, President of the Ivory Coast*

"Nobody makes a greater mistake than he who does nothing because he could only do a little."
Edmund Burke, British Statesman

"What you think or know or believe is of little consequence. In the end the only thing of consequence is what you do."
John Ruskin

"The last word in ignorance is the man who says of an animal or plant: "What good is it?" If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota, in the course of eons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering."
Aldo Leopold, Naturalist

"Never doubt that a small group of thoughtful committed citizens can change the world. Indeed, it's the only thing that ever has."
Margaret Mead, Anthropologist

I invite you to be not a just a consumer, but that committed citizen and help us change the world!

And finally in the sixth section of this week's lesson, Mary Baker Eddy reminds us that "The devotion of thought to an honest achievement makes the achievement possible." (S&H 199:21-22)

About the Author

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