Unit 14

Climate, Energy, and Earth Process

by Ed Dreby, with Kim Carlyle

Purposes of this unit

1. To state and illustrate briefly what scientists know, understand, and project about climate change and its effect on Earth process.
2. To describe and illustrate briefly the policy and lifestyle challenges for society at large and for Friends.
3. To help Friends educate themselves about what they already understand and what they need to learn more about.

Sacred texts and other inspirational readings

For they sow the wind, and they shall reap the whirlwind.

—Hosea 8:7

The earth dries up and withers, the world languishes and withers, the heavens languish together with the earth. The earth lies polluted under its inhabitants; for they have transgressed laws, violated the statutes, broken their everlasting covenant. Therefore a curse devours the earth, and its inhabitants suffer for their guilt.

—Isaiah 24:4–13

Why do you look at the speck of sawdust in your brother's eye, with never a thought for the great plank in your own? First take the plank out of your own eye, and then you will see clearly to take the speck out of your brother's.

—Matthew 7:3,5

It would go a great way to caution and direct people in their use of the World, that they were better studied and known in the Creation of it. For how can Man find the Confidence to abuse it, while they should see the Great Creator stare them in the Face, in all and every Part thereof?

—William Penn (1644–1718)

Hymns and songs

Water, Air, and Soil Make Life

(To the tune of "Aura Lee," adapted by Jack Phillips)

Water, air, and soil make life, with the help of light.
Water, air, and soil are rife, with a human blight.
Protect the earth! Restore the earth! Oh, Humanity!
Let us change destructive ways, and then restore the earth.
Africa, America, Asia, Europe too,
Hindu, Muslim, Christian, Jew, Let's share and care for Earth.
Unity! Unity! One Humanity!
Men and women of the earth, cooperate for life.

Now Is the Cool of the Day. *Worship in Song, A Friends Hymnal,* #308.
For the Beauty of the Earth. *Worship in Song, A Friends Hymnal,* #10.
Turn Back, O Mortal. *Worship in Song, A Friends Hymnal,* #194.

Issue presentations

Introduction

BY WAY OF INTRODUCTION, we should perhaps explain how we came to focus on climate change as an important aspect of our commitment to seeking an earth restored. Ed and Kim met through Quaker Earthcare Witness (formerly FCUN) in 1999, and became colleagues in creating Quaker Eco-Witness for National Legislation (QEW-NL).

Ed: "From an early age I came to believe that life's purpose was to participate in God's purpose as manifested in Jesus' teachings. Between 1966 and 1987, through teaching middle and upper school social studies in three Friends schools, I learned quite a bit about food, energy, and the growth of human population, technology and pollution. In 1993, while running a housing rehabilitation crew for homeless families, I began to read then-Senator Albert Gore Jr.'s *Earth in the Balance*. I came to an abrupt and powerful realization that we humans, through excessive affluence made possible by our use of fossil and nuclear energy, were putting the miracle of life as we know it at risk, and that there could be no greater sacrilege than this. As a member of John Woolman's Monthly Meeting, I felt immediately a clear leading to work with and through the Religious Society of Friends. From 1997 to 2002 I represented Philadelphia Yearly Meeting on the Eco-Justice Working Group of the National Council of Churches (NCC) at a time when addressing climate change as a religious issue became a priority. I assisted the NCC staff person in developing educational materials on climate change and energy stewardship, and provided leadership for the interfaith climate campaign of the Pennsylvania Council of Churches."

Kim: "I have always had a strong concern for the well-being of our fellow creatures, an awareness that many human activities were harmful to the natural world, and a sense that human culture had become ignorant and unappreciative of its dependence on both creatures and nature. My activism began after I learned through a newspaper article that emissions of pollutants from a local electrical power plant were measured by the ton! As I learned more about the problems of energy production, I also noticed how wasteful our society is of energy, and of other resources. Several things became clear to me: 1) If our culture could regain its lost connection to the Creation, this wasteful, polluting way of life would change. 2) This reconnection could only occur with a spiritual transformation. 3) Air quality, energy use, and global climate change are closely linked together and are linked to the problems of water quality, species extinction, and other environmental ills. 4) All these things are linked to human concerns for human rights, justice, and peace. For the last several years, I have worked with people of faith (the North Carolina Council of Churches' Climate Connection, and Quaker Earthcare Witness) towards peace with Earth and peace on Earth."

In 2001, Ed and Kim co-authored a *Quaker Eco-Bulletin* article on climate change, which has provided some of the foundation for this unit.

Article 1

Global Warming, Climate Change, and Earth Process

OVER SEVERAL BILLION YEARS, living organisms have evolved from single cells to highly complex creatures, drawing matter from the earth and energy from the sun. Life has steadily transformed both itself and the earth as a whole toward miraculously greater diversity and complexity. While many cycles and processes contribute to this "Earth process," two are relevant to our topic:

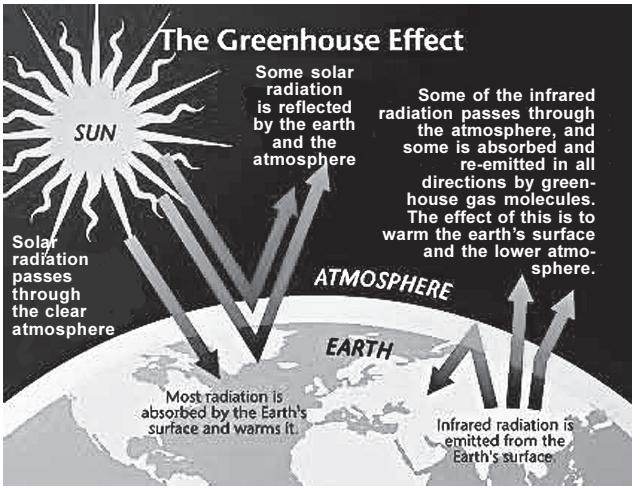
Geological process involves changes in the earth's crust over long periods of time. Through the geological process, the earth's atmosphere, oceans, and living creatures have interacted to create and sustain conditions in which life can flourish. Substances that are essential to life—water, carbon, nitrogen, and others—circulate between the biosphere (the zone where life exists) and the earth's mineral crust in such a way that life adapts to and helps to stabilize the physical and chemical characteristics of the biosphere.

Ecological process involves the relationship of plants and animals with one another and with the earth as they transform matter and energy to meet their needs. We humans, through technology and social organization, have disrupted the ecological process by increasing our use of matter and energy far beyond our basic needs. Until the 19th century, most of the energy used by humans came from the ecological process—from fire, plants, other animals, water, and wind. Then one human culture (our own) began extracting buried organic deposits that had been created over millions of years—first coal, and then oil and natural gas. Our burning of large quantities of these "fossil fuels" has changed the chemical composition of the atmosphere. Vast amounts of carbon that had been taken out of the atmosphere by plants and stored for eons underground are being put back into the atmosphere in a very short time. As a result, a vital mechanism that has helped to regulate the planet's temperature for millions of years, the "greenhouse effect," is being thrown seriously out of balance.

What is the greenhouse effect?

THIS TERM "greenhouse effect" comes from the way a greenhouse can maintain a tropical climate, even when the weather is cold outside. Much the same thing happens inside a car that is parked in the sun with the windows rolled up.

Scientists explain the "greenhouse effect" in this way: The energy of sunlight, which has short wavelengths, easily passes through glass. After it warms the objects inside the greenhouse, the energy is converted into longer-wavelength heat radiation, which cannot pass as easily back through the glass, so the greenhouse traps the heat.



How high a greenhouse temperature rises depends on many factors. For example, if there is more dense matter ("thermal mass") inside to absorb heat, the temperature rises and falls more slowly; and as the difference between inside and outside temperature increases, heat is lost to the outside more quickly. As a result of these and many other factors in combination, the actual temperature changes toward an equilibrium temperature, at which the heat coming in is in balance with the heat going out, or until the factors change. If things get too hot inside for the plants growing there, the greenhouse may have to be shaded or ventilated to shift the equilibrium temperature downward.

After greenhouses came into use, scientists discovered that the earth's atmosphere works a lot like greenhouse glazing—admitting shorter wavelength light waves while trapping longer wavelength heat radiation. There are several gases in the atmosphere, particularly carbon dioxide (CO_2) and methane, that make the earth's equilibrium surface temperature about 60 degrees Fahrenheit higher than it would otherwise be, which makes life possible. Without the presence of these "greenhouse gases," all fresh water and most of the oceans would be frozen.

How does the greenhouse effect relate to climate?

BECAUSE of the earth's rotation, the tilt of its axis, the size and location of continents, and numerous other factors, the weather created by heat stored in the atmosphere, oceans, and land surface is different everywhere and constantly changing. However, the average temperatures, winds, rainfall, and growing season in any one place have been remarkably stable over many thousands of years. The stability of the greenhouse gas concentrations in the atmosphere are largely responsible for this.

Climate change occurs naturally over very long periods of time, due to periodic changes in the intensity of the sun, the position of the earth in relation to the sun, and the shape and location of continents. When climates change very gradually, plant and animal species are able to evolve to adapt to new conditions. The relative *stability* of climate has made possible the evolution of more complex forms of life, and the development of agriculture and civilization.

What is global warming, and how does it relate to the greenhouse effect and climate change?

CLIMATE SCIENTISTS have learned that both greenhouse gas concentrations and the earth's *average temperature* have been rising steadily for the past half century. Human activities are adding greenhouse gases to the atmosphere. This creates an "enhanced greenhouse effect," and thus the earth's equilibrium temperature is being shifted upward.

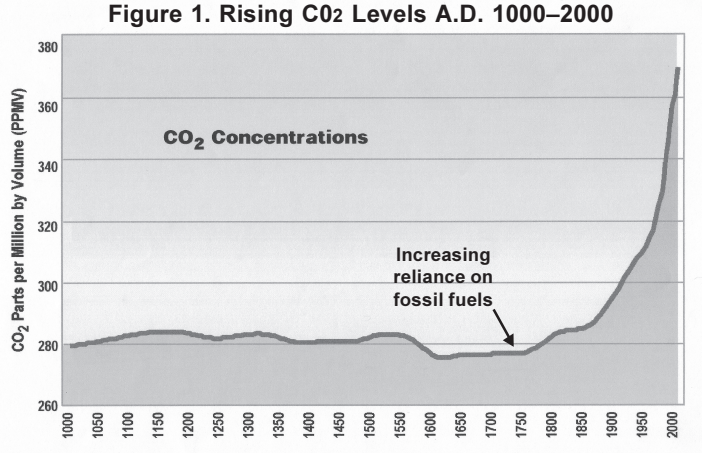
We who inhabit this global greenhouse are beginning to experience significant changes in the weather and climate. Because of all the factors that affect climate, many regions are getting warmer, while some are getting colder. But climate patterns are changing everywhere, weather is becoming more variable, and extreme weather events are increasing. Scientists are concerned that continued global warming may cause abrupt changes in ocean currents or sea level that would have major effects on agriculture and large human populations.

What scientists know

1. ***Global warming/global climate change is being caused by human activities.***

   a. Carbon dioxide (CO_2) has increased about a third (from 280 parts per million to 368 ppm) since 1750. About 80 percent of the increase is from the burning of fossil fuel and 20 percent from deforestation (trees which would capture CO_2). The atmosphere can retain excess levels of CO_2 (that which is not absorbed by natural means) for over 100 years.

Figure 1. Rising $C0_2$ Levels A.D. 1000–2000

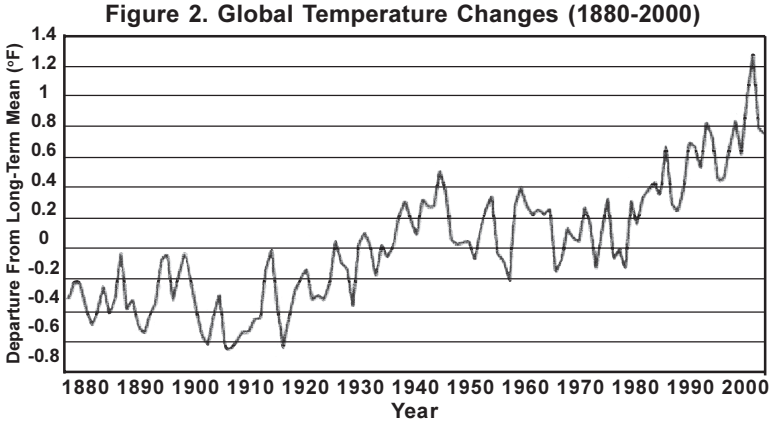


   b. Methane has increased about one and a half times (from 700 parts per billion to 1,750 parts per billion). Methane comes from burning fossil fuel; from decomposing plant matter in swamps, bogs, and rice paddies; from digestive processes of animals like cattle and termites; and from landfills. The atmosphere retains excess levels of methane in the atmosphere for only about 15 years, but methane traps much more heat than CO_2.

   c. Synthetic industrial gases (such as chlorinated fluorocarbons or CFCs) have accumulated in the past 50 years. They are beginning to have a significant effect because they trap even more heat than methane, and several persist in the atmosphere much longer than CO_2.

2. ***The earth's average surface temperature increased*** about 1 degree Fahrenheit in the 20th century, which appears to be the largest and steadiest change of any time in recorded history. This seemingly small change creates large changes in regional climate and weather patterns. Much of the increase has been in the last 20 years. The 10 warmest years on record have all been since 1990. Temperatures have warmed more at higher latitudes, more at night (meaning there are fewer frost days), and more over land than the ocean.

Figure 2. Global Temperature Changes (1880-2000)



Source: U.S. National Climatic Data Center, 2001

3. ***Average rainfall increased*** by 5 to 10 percent between 1900 and 2000. Rainfall patterns are also changing, with increases in the frequency and severity of both droughts and storms.

4. ***Average sea level has risen*** 1 to 2 milimeters a year since 1900 (6 to 10 total inches) — mainly because the volume of water increases as it warms.
5. ***Snow and ice cover have decreased.*** Snow cover has decreased about 10 percent since 1960. The period that ice covers lakes and seas has decreased by about two weeks in the past century. Arctic sea ice has thinned by 40 percent and decreased in extent by 10 to 15 percent since the 1950s. Many glaciers are retreating, some quite rapidly.
6. ***Flowering, growing, and breeding seasons have lengthened.*** In the Northern Hemisphere, growing seasons have increased from 1 to 4 days per decade in the last 40 years, and habitat ranges for plants, birds, fish, and especially insects are shifting toward the warming poles and higher elevations.
7. ***Loss of life and property due to weather-related events has increased.*** The increase has been dramatic during the past ten years, although growing populations and economies are also contributing factors.

What scientists understand and project

1. ***The global climate system is exceedingly complex, and has many interacting features.***

   a. Self-regulating features *(negative feedbacks) limit change. An example is the tendency of plants in warm conditions to grow faster, absorbing more carbon dioxide and reducing the greenhouse effect (with a reverse effect in cold conditions).*
   b. *Destabilizing features* (positive feedbacks) amplify change. An example is that warming conditions increase the amount of water vapor in the air, which traps more heat, which creates warmer conditions.
   c. *Unpredictable features* are feedbacks that may be positive or negative. An example is the increase in clouds in warmer conditions which, depending on how they form, may reflect more sunlight or may trap more heat.
   d. *Natural fluctuations* are features that vary from place to place and year to year, like temperature, rainfall, and sea level. These make overall change difficult to determine, which is one reason that scientists report their findings as a range.

2. ***Only a few features of the climate regime in the past can be measured directly.*** Air bubbles trapped in ice cores in Antarctica and Greenland indicate the level of greenhouse gases in the atmosphere over 160,000 years. But historical temperatures, sea levels, ocean currents, and ice and snow covers must be estimated from biological and chemical evidence. Still, some features are now clearly understood:

   a. Global temperatures and greenhouse gas levels have risen and fallen together over time. In the past, temperature began to change due to geological process, and the destabilizing features of biological process accentuated the change by increasing or decreasing the natural greenhouse effect. Now human activities are adding carbon directly and creating the enhanced greenhouse effect.
   b. Oceans absorb and release heat much more slowly than air or land, so there is a *delay* of 50 to 100 years between a change in greenhouse gas levels and the change in global temperature. Also, because carbon dioxide remains in the atmosphere for up to 100 years, it will be a long time after greenhouse gas emissions are reduced before the global temperature adjusts and the climate begins to stabilize.

3 ***In the past, climate usually changed gradually, but occasionally rapid changes have occurred,*** such as a shift in the ocean currents that increased ice cover in northern Europe in less than a decade. While rising greenhouse gas levels can be expected to increase global temperature and sea level gradually, at some point a major shift in the whole system may lead to “surprises” of either more rapid warming, or a reversal into rapid cooling.
4. The long term effects of global warming are totally unpredictable. Even for the shorter term, scientists cannot make specific predictions because of the size and complexity of the system, and above all the unpredictability of future human activity. But highly sophisticated computer models enable them to make projections, based on different scenarios, from which they conclude, with a high level of certainty, that by the end of the 21st century:

a. With no surprises, average global temperature will rise a minimum of 2½ degrees Fahrenheit, and, in the worst case, 10½ degrees Fahrenheit.
b. Sea level will rise 10 to 30 inches.
c. Precipitation will increase at least 1 percent for every 1 degree Fahrenheit rise in temperature, with more extreme weather events.
d. The likelihood of a major "climate surprise" due to unforeseen events or a combination of events will increase.

The effects of these changes on climate and weather, ecosystems, people, and economic costs will be caused not as much by the averages as by the *extremes* of heat waves, droughts, storms and flooding; to fewer freezes that determine the ranges of insects and diseases they carry; to changes too rapid for trees and other plants on which animals depend to evolve or migrate; to societal crises, requiring more energy and water when less is available and costs are higher.

For these reasons, in 1990 climate scientists strongly urged governments to adopt policies that would reduce greenhouse emissions as quickly as possible. Since 1990, new knowledge suggests that climate changes will be greater than was expected then, especially because greenhouse gas emissions continue to rise. Climate scientists estimate that ***emissions will have to be reduced 60 percent or more from 1990 levels before the atmosphere will begin to stabilize.*** It will be long after that before global temperature stops rising unless there is a shift in ocean currents or some other dramatic change. Those who say we can wait until we have better science don't seem to understand the limitations of science, the irreversibility and unpredictability of the changes, and potential severity of the consequences for life as we know it.

Article 2

Global Warming and Public Policy

Why has there been controversy about what the climate scientists know and project?

by Ed Dreby, with Kim Carlyle

THE EARTH'S climate system is exceedingly complex. Determining global temperature and sea level is not a simple matter. Determining how one factor affects others is more difficult and subject to differing standards of evidence and interpretation.

Predicting what will happen in the future is even more complex and basically not possible. This is partly because predictable changes will have unpredictable effects. For example, higher air temperatures will lead to more clouds, but it is not possible to know in advance whether more clouds, which both reflect light and trap heat, will hasten or slow the warming trend. The biggest uncertainty is not knowing about consequences of future human activity.

The International Panel on Climate Change (IPCC) makes its projections in numerical ranges because areas of known uncertainties make more specific predictions unwarranted. A number of large corporations have opposed the conclusions of the IPCC as "unscientific," and have helped fund and publicize the work of a very few scientists who challenge its findings. News reports that present "both sides" make it seem as though there is much more disagreement among climate scientists than really exists.

What has happened about global warming in international diplomacy?

A U.N. FRAMEWORK Convention on Climate Change was adopted by more than 160 nations at the 1992 U.N. Conference on Environment and Development (the "Earth Summit") in Rio de Janeiro. It set a goal of stabilizing global temperature and provides for annual conferences to negotiate agreements until this goal is reached. The U. S. President signed and the U.S. Senate ratified the Framework Convention in 1993.

At the 1997 conference in Kyoto, Japan, the industrialized nations adopted the Kyoto Protocol, an amendment to the Framework Convention, in which they each agreed to make specific emissions reductions by 2012. The U.S. reduction is to be 6 to 7 percent below its 1990 level, which is about 30 percent below the level of U.S. emissions otherwise projected for 2012. At Kyoto, some important decisions about implementation were postponed. At the Hague Conference, which took place shortly after the 2000 U.S. presidential election, the European Union (E.U.) insisted that every nation should reduce its domestic emissions. The U.S. did not agree. The U.S. also continued to press developing nations to limit their emissions as a condition for U.S. ratification. The developing nations, led by China and India, insisted that the industrialized nations begin making reductions before they would consider limits.

Soon after taking office, President George W. Bush stated his opposition to the Kyoto Protocol on the grounds that it could hinder the U.S. economy. This position has generated a great deal of negative publicity in the U.S. and in Europe. In the summer of 2001, the other 178 parties to the U.N. Framework came to final agreement on the terms of the Kyoto Protocol without the U.S. Enough of the industrialized nations have now ratified the Protocol so that it will take effect without U.S. participation if Russia ratifies it (which seems likely at this time).

Can the Kyoto Protocol work if the developing countries don't participate?

OPPONENTS OF THE KYOTO TREATY in the U.S. have repeatedly insisted it "won't work" because developing countries "don't participate." This assertion is based on a distortion of the Framework Convention and ignores the prior agreements that led to the Kyoto Protocol. All nations that signed the Convention must inventory their domestic emissions, create pilot programs to limit them, and participate in the international efforts to reduce global emissions. Most developing countries have done these things. In 1996 it became clear that the industrialized nations' 1992 agreement to reduce greenhouse emissions voluntarily wasn't working. That year in Berlin, all parties, including the U.S., accepted the principle that agreeing to binding reduction targets for the industrialized nations should come first, and then limiting emissions from the developing nations would follow.

U.S. per-capita energy use is about twice that of western Europe and Japan, 12 times that of China, and 20 times that of India. Simple justice requires industrial nations, and the U.S. in particular, to take the first steps to slow global warming. It is the U.S., not the developing nations, that is failing to keep its agreements, and it is the U.S. whose participation will be essential if goal of reducing greenhouse emissions on an equitable basis is to be reached. Let us begin to remove the plank from our own eye so we can see more clearly how to help our neighbors consider the speck of sawdust in theirs.

What is happening in national policy and politics?

IN 1997, before the Kyoto conference, the U.S. Senate passed a resolution stating that it would not ratify an agreement that might harm the U.S. economy or one that did not include participation by developing nations. The Global Climate Coalition, a lobby for certain coal, oil, and auto interests, strongly promoted this resolution and has lobbied the U.S. and other governments against a climate treaty.

Soon after taking office, President George W. Bush reversed a campaign pledge to begin limiting CO_2 emissions from coal plants. In the spring of 2001, the President released his energy plan, which focuses on increased production of fossil fuels and a renewed commitment to nuclear power. The plan largely disregards energy conservation and offers little support to promote energy efficiency and renewable technologies. It has been estimated that the Bush Administration's proposals would result in an increase in U.S. greenhouse gas emissions of as much as 35 percent *above* 1990 levels.

Acting on this pressing issue until reducing greenhouse emissions becomes a priority of U.S. public policy, especially an energy policy is of primary importance. This is a reality that our leaders and our people must come to understand and accept before global warming can begin to be slowed and eventually stopped.

What are the alternatives to our present energy system?

AN ESSENTIAL first step is to replace less efficient equipment and technologies now in use with more efficient equipment and technologies that are already available.

Natural gas is less polluting as a fuel than coal or oil, but it still adds both CO_2 and methane to the atmosphere. Nuclear power is not a direct cause of greenhouse emissions, but as with fossil fuels, the fuel supply is limited, and as with global warming, the problems and risks of radioactive contamination are incompatible with caring for the earth as a sacred trust. Both natural gas and nuclear power may help make a transition away from our present system, but neither is ecologically sustainable.

Wind turbines already produce electricity at a cost that is competitive with fossil fuels. Photovoltaic (solar) cells already produce electricity directly from sunlight and would be much more widely used if the cost of using fossil fuels increases.

Fuel cells are being developed to produce electricity without combustion, using hydrogen as a fuel. Hydrogen can also be used in a combustion engine with only water as an exhaust. Many people are coming to think a solar/hydrogen energy system can be a solution to our present dilemma, but it takes energy to create usable hydrogen. Electricity from solar, wind, or other renewable sources can produce hydrogen, but if hydrogen is produced with fossil or nuclear energy there is little net benefit. This is why public policy decisions to hasten the development of a practical energy system based on renewable sources are so important.

Even with renewable energy, any technology used on a large scale will disrupt natural ecosystems. The more that population and affluence increase, the more disruptive human impacts will become. Creating a culture in which all people can find fulfillment using less energy and fewer of the earth's physical resources is both possible and essential for sustainability.

Would complying with the Kyoto Protocol cost jobs and hurt the economy?

PREDICTIONS by critics of the Kyoto Protocol that it would hurt the U.S. economy are based on unwarranted assumptions about public policy and economics. The National Academy of Sciences found the U.S. can reduce energy use by 20 percent at a net economic benefit. Eight Nobel economists and 2,400 of their colleagues concluded that cutting greenhouse emissions would increase efficiency; add jobs; and reduce costs, wastes, and oil imports. Compliance with many existing environmental regulations, including recent reductions in sulfur emissions, has cost much less than the industries involved had predicted.

However, the Kyoto targets are just a first step. The large reductions needed to stabilize the atmosphere—which is what must be done to deal with global warming,—will cost money and will change the way we live our lives. There will probably be more jobs in a solar/hydrogen economy, but they will not be the same jobs. We should not expect it to be easy, and we must be sure that the burdens of change do not fall primarily on the poor and those who are most directly affected. We should also understand that the longer we wait to deal with global climate change, the more harm will occur and the more will be the human and economic costs for our children and grandchildren. Faithfulness to God means that we must protect God's earth and God's people, regardless of cost.

To whom much has been given, much will be required.
—Luke 12:48

Article 3

The Dark Side of Our Dependence on Fossil Fuels: Time for Quakers to Take a Stand

by Sandra Lewis and Kim Carlyle

(Adapted from the *Quaker Eco-Bulletin,* Volume 2, Number 2, March-April 2002)

MOST OF US have reaped the benefits of an economy powered by fossil fuel. There is no need to list the wonders, comforts, conveniences, and prosperity wrought by this century-long dependence. But we can no longer ignore the extreme costs. We are on a collision course with ecological reality. It's time to recognize how our dependence puts us in direct conflict with core values embodied in the Quaker Testimonies of Integrity, Peace, Simplicity, Equality, and Com-

munity. Events of recent months shed glaring light on the dark side of our nation's dependence on fossil fuel. The World Trade Center towers' destruction is, perhaps, its most dramatic expression to date.

Unacceptable costs of dependence

Seeds of war

U.S. FOREIGN POLICY is now driven largely by our dependence on oil. We maintain a global military presence to ensure the flow. We make deals that support oppressive governments and overlook gross violations of human rights to feed our habit—slave labor to build a UNOCAL pipeline in Burma, for example. To ensure our access to oil, we train and arm factions like the Taliban, and then look the other way when these weapons are used to enforce despotic rule.

Gross inequalities of wealth and power among nations fueled by huge disparities in the use of fossil fuels sow the seeds of war. Our Peace Testimony calls on us to work to take away the occasion of war. Ending our dependence on fossil fuel has become an essential expression of this Testimony.

Seeds of corruption

NOTHING ILLUSTRATES BETTER the link between dependence on fossil fuel and corruption in American institutions than the rise and fall of Enron. Enron flourished in Texas, and then nationally, under government policies and subsidies bought and paid for by the fossil fuel industrial complex. While the Bush administration and other politicians try to disassociate themselves from the debacle, the fingerprints of Enron and other corporate interests are evident throughout the administration's energy proposals. These proposals are now embodied in legislation passed by the U.S. House of Representatives.

The Enron story exposes a stunning lack of integrity—blatant and insidious—among leaders in government, industry, financial institutions and the media. It challenges us to confront deep threats to democracy itself that arise from our dependence on fossil fuel. Our Quaker Testimony on Integrity calls us to act against these threats.

Seeds of ecological and social disintegration

OUR USE OF FOSSIL FUELS is devastating the earth, destroying cultures, and endangering human health. To discover and recover oil, roads are slashed through rainforests, drilling sites contaminate fresh water and soil, leaky pipelines spill millions of gallons of crude oil on wildlife and pristine tundra, and indigenous people are pushed to the brink of extinction. The temporary influx of cash upsets economies, corrupts governments, and concentrates wealth among a few. Oil refineries pollute the air, soil, and water of the impoverished communities that surround them. The extraction of coal devastates entire communities as it removes mountaintops, destroys watersheds, and leaves behind hundred-million-gallon toxic slurry ponds.

The combustion of coal and oil are responsible for soot, ground-level ozone, acid rain, and an increase in climate-changing atmospheric carbon dioxide. The air pollution exacerbates respiratory illness especially for asthmatic children and the elderly, contributes to the decline of our eastern hardwood forests, and has poisoned most of the lakes in the northeast U.S. With less than 5 percent of the world's population, the U.S. contributes 25 percent of the climate-changing gases, and yet the U.S. government has withdrawn from international negotiations to address world-wide human-induced climate change.

The true costs of fossil fuels are staggering and cannot be measured in dollars. The administration's proposals to expand fossil fuel production and increase our dependence on them are politically corrupt, ecologically and economically dangerous, and morally bankrupt.

Toward sane energy policies

NOW IS THE TIME for Quakers to speak out for energy policies that are environmentally sound, socially just, and economically feasible. Such policies would explicitly aim at eliminating our dependence on fossil fuels and would include strategies, timetables and investments required to achieve this goal. As a nation, we need to pursue this with the urgency and priority of other great national goals such as landing a man on the moon.

Clean, renewable technologies (such as wind and solar) are currently available and emerging technologies (such as hydrogen fuel cells) are on the verge of being ready for general use. Renewable sources of energy should be phased in through promotion and subsidy for clean power, increasing emissions restrictions, and decreasing support for dirty power. The policy must provide for a transition to these new technologies that would include retraining of work forces and education of the general public.

Sane policies must account for the environmental, social and moral consequences of the energy we use. It is up to us to hold our political leaders accountable for enacting such policies.

Renewable energy can stimulate the economy

A number of studies have shown that energy conservation and the use of renewable energy has the potential to stimulate economic prosperity:

1. A World Wildlife Fund study indicates that energy efficiency policies and development of renewable energy resources could result in 750,000 new jobs nationwide over the next nine years and 1.3 million new jobs by 2020. See this study at <*http://www.worldwildlifefund.org/climate*>.
2. A report from the Environmental and Energy Study Institute (EESI) entitled "The 2002 Farm Bill: Revitalizing the Farm Economy Through Renewable Energy Development" shows that developing our nation's on-farm renewable energy resources (bioenergy, wind, solar, and geothermal) has the potential to boost farmer income, create jobs in rural communities, diversify our nation's energy market, and protect our environment.
3. A Department of Energy study reports that a government-led program to encourage energy efficiency could reduce growth in electricity demand by 20 to 47 percent in the U.S.—a savings equivalent of 265 to 610 300-megawatt power plants.

In fact, if our country does not invest in the new technologies, we are likely to be left in the technological development dust as other countries cash in on the boom.

What can Friends do?

JOIN THE INTERFAITH CLIMATE CHANGE NETWORK (ICCN). ICCN <*http://protectingcreation.org*> is a new initiative of the National Religious Partnership for the Environment to coordinate interfaith lobbying activities on climate and energy. The Partnership's goals for energy legislation in this session of the U.S. Congress are to:

- ❖ Raise vehicle fuel economy across the board in the shortest feasible time-frame, and require sport-utility vehicles (SUVs) and minivans to meet the same standards as passenger cars.
- ❖ Support the development of hybrid-electric, fuel cell, and other promising clean technologies, and provide incentives to help individual consumers purchase them.
- ❖ Increase funding for intercity rail and metropolitan mass transit.
- ❖ Invest more resources in renewable energy research and development with a focus on wind, geothermal, solar, and biomass technologies.
- ❖ Apply the strictest feasible energy efficiency standards to consumer products, including air conditioners.
- ❖ Increase funds for the Low Income Energy Assistance Program and other programs to alleviate economic hardship on low-income people.

Questions reflection and suggestions for discussion

Article 1: Global Warming and Earth Process

a. Individual reflection and group sharing

- ❖ What changes have you experienced or heard about because of climate change?
- ❖ What are your expectations for the future about climate change?
- ❖ What things that you care about deeply will be affected?

b. Group discussion of:

- ❖ Graphs of Northern Hemisphere temperature and carbon dioxide concentrations emissions.
- ❖ List of known ecological effects of climate change (from Article 1).
- ❖ Graphs of temperature, carbon, and methane over time, and of IPCC projections.
- ❖ List of possible consequences and uncertainties related to climate change (from Article 1).

Guiding question: what do we understand about this information?

c. Questions

- ❖ What does this information mean to you? What do you need to learn more about?
- ❖ How can you draw on your faith and spiritual experience to discern what you should do in response to what scientists know and anticipate? How should the Meeting respond?

Article 2: Global Warming, Public Policy, and Friends Testimonies

a. Questions for reflection and sharing

- ❖ Are you aware of the controversies about climate change? Why do you think there is so much criticism of the science on which the IPCC assessments are based?
- ❖ What is your opinion about the strong recommendation the IPCC scientists made as long ago as 1990 that governments should act as quickly as possible to begin reducing greenhouse gas emissions?

b. Queries

- ❖ What are the spiritual consequences for us, as individuals and as a religious community, of knowing that human activities in which we are involved are changing the composition of the atmosphere and will affect the global climate in ways that no one can predict?
- ❖ What does this knowledge require of us in our households, Meetings, and communities?
- ❖ What is our responsibility as citizens of nations that are not making the reduction of greenhouse gas emissions a policy priority?

Illustrative activities

Role play on climate negotiations

THE FOLLOWING role play can be done by assigning negotiating teams to nations, providing time for the negotiating teams to meet, and then for negotiations to occur, or by asking individuals to make their own decisions based on what they think is best, and then to discuss the reasons for the decisions. There is no right answer. The purpose of the role play is primarily to identify and discuss the practical, political, and ethical challenges involved in coming to agreement on this very important and complex issue.

The Challenge of International Climate Negotiations

IT IS FEBRUARY 2008. New records for global temperature were set successively in 2006 and 2007. Food and energy prices are up sharply, and food shortages are spreading in Asia and Latin America.

In July 2007 the heads of state of many nations held an unprecedented summit at U.N. headquarters in Geneva without United States' participation, to demand action by the United States to reduce greenhouse emissions. As a result, both presidential candidates ran on platforms calling for major reductions, and unspecified action is favored by large majorities in both houses of the new Congress.

In her State of the Union address, the new U.S. president called for negotiations by the largest polluters, China, the E.U., India, Japan, and the U.S., to serve as the basis for achieving global reductions of 25 percent below projected annual emissions for 2010 by 2020, and 50 percent by 2040. However, the U.S. made no commitments about its own reductions within this target, and negotiators are now meeting to determine the reductions each nation will make by 2020.

To achieve the global reduction, the negotiators must cut the total by 1,200 million tons before 2020, and another 1,800 million tons by 2040. The projected 2010 emissions, in millions of tons, are:

China —1471 E.U. —861 India — 426 Japan —258 U.S. —1332

What reductions (totaling 1,200 for 2020, and an additional 1,800 for 2040) should be assigned to each nation?

By 2020 China _____ E.U. _____ India _____Japan _____ U.S. _____
By 2040 China _____ E.U. _____ India _____Japan _____ U.S. _____

Comparative demographic and economic projections

	China	E.U.	India	Japan	U.S.
Population (millions)	1,322	361	1,082	127	287
GDP per person	$1,600	$30,000	$700	$38,900	$38,500
CO_2 per person (tons/person)	1.1	2.6	0.36	2.5	6.2
Carbon intensity (tons/$1,000)	0.07	0.09	0.51	0.06	0.16
Births/1,000 pop	14.1	9.1	21.4	8.9	12.8
Life expectancy	72.4	74.8	66.2	82.4	78.4
2010 CO_2/person	N/A	+.4	N/A	+.6	+1.8
in excess of Kyoto target		2.2		2.5	4.4

Questions for reflection

1. Should nations with higher carbon intensity that have not yet begun making reductions be expected to make bigger reductions sooner, or should they be given more time to adjust to making changes?
2. Should nations with higher populations and high birthrates face fewer reductions, or should nations with lower birth rates benefit from having reduced their population?
3. Should nations with higher life expectancies be recognized as having greater energy needs, or should nations with lower life expectancies be recognized as having greater energy needs?
4. Should consideration be given to the ease or difficulty with which a government can make decisions that its citizens may not like or support?

Responsive reading

Leader The land mourns, and all who live in it languish. Together with the wild animals and the birds of the air, even the fish of the sea are perishing. Why do the land and its creatures suffer?

People Swearing, lying, murder, and stealing break out. Bloodshed follows bloodshed.

Leader But why should such terrible things happen?

People Because there is no faithfulness or loyalty, and no knowledge of God in the land.

Prayer

Dear God,
We know that we too often make choices that separate and destroy. Forgive us our selfish ways. Help us to be servants of justice, to do your will, and to walk humbly with you as we seek a life that is more simple and centered on you. Help us to join joyfully in your continuing purpose of bringing life and love to a broken world.