The Energy Transition: Religious and Cultural Perspectives

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INTRODUCTION TO "THE ENERGY TRANSITION: RELIGIOUS AND CULTURAL PERSPECTIVES"

by Larry L. Rasmussen, Normand M. Laurendeau, and Dan Solomon

Abstract. Energy typically is discussed in terms of science, technology, economics, and politics. Little attention has been given to fundamental religious and ethical questions surrounding the upcoming transition to renewable energy. The essays in this thematic section seek to redress that deficiency. This introductory essay raises some key questions and summarizes various presentations on energy and religion, as these were held at the 2010 conference of the Institute on Religion in an Age of Science (IRAS). Some presentations described the energy landscape and provided data and perspectives needed for sound policy. Others raised ethical and religious considerations for energy decisions as the transition from nonrenewable to renewable sources is faced. Some posed the challenges of the energy transition to religion itself. Yet others offered examples of sustainable energy use and/or promising sources for meeting future needs sustainably. At the conclusion of the conference, presenters crafted a common "Statement on Energy and Climate Change" that includes a "Call to Action." The "Energy Statement" follows as an appendix.

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Energy and climate change typically are discussed in terms of their associated science, technology, economics, and politics. Little attention, however, has been given to fundamental religious and ethical questions surrounding the upcoming transition to renewable energy. The Institute on Religion in an Age of Science (IRAS) has sought to redress this deficiency by holding its fifty-sixth summer conference in August 2010, on the timeliest of topics—energy. This conference may have been the first in the United States to consider fully the significant connections between energy and religion. In explanation and elaboration, the Conference Statement (IRAS 2010, inside cover page) stated:

> We are entering a period of monumental transition as we encounter the inevitable shift from fossil to renewable fuels. Fossil fuels are being depleted while we pile up nuclear wastes, yet renewable alternatives, such as solar, wind, and biomass, are not significantly in place. As for any technological transition of this magnitude, ultimate success will require good ethics and religion, as well as good science and technology. Unfortunately, religious pronouncements to date have been largely dismissed owing to their feeble consideration of accompanying scientific and technological realities. Nevertheless, religious perspectives have the advantage of highlighting ultimate values, regardless of economic and political pressures. The time has thus come to bring together scientists, engineers, ethicists, and theologians to help effect a sustainable energy future.

The attention of the conference was given to (1) ethical and religious perspectives that can be used to guide future energy choices and (2) energy choices that, in turn, might challenge ethical and religious perspectives. A set of questions framed this double focus.

(1) How will human values be challenged by the coming energy transition?

(2) What are the ethical implications of heightened competition for energy resources?

(3) How might religious perspectives help foster renewable energy for transportation or electrical power?

(4) What strategies can be used to provide affordable energy for low-income citizens?

(5) Can cultural values, as espoused by religious communities of simplicity, help humanize energy markets?

(6) What role should religion play in reducing consumption and building sustainable global communities?

(7) How are religious communities dealing with alternative energy policies and engaging realistically with those political processes needed to plan our energy future?

(8) How might theological and religious understandings of energy contribute to a viable energy future?

(9) How can religious institutions become better prepared to deal with human suffering on a global scale should we not plan well for a peaceful energy transition?

An Energy Primer

Normand Laurendeau, conference co-chairperson and Bailey Professor Emeritus of Combustion, School of Mechanical Engineering, Purdue University, led off the presentations with an "Energy Primer: From Thermodynamics to Theology"; see also his contribution in this issue (Laurendeau 2011). He presents the key problems to be focused on as those of oil depletion and of climate change, and the possible solutions as enhanced efficiency, reduced consumption, and new technologies. He also describes two cultural tensions that will need to be addressed in solving these problems. First, ethical claims of equity and justice require us to note that both problems and solutions must be considered with regard to disproportionate effects on the poor. Second, possible tensions must be addressed between material solutions presented by science and cultural solutions represented by religion.

Laurendeau provides a concise foundation for discussions on the energy transition via the laws of thermodynamics, relating useful work done by a system to changes in the internal energy of a system. Alternative sources of usable energy, such as wind, solar, and fuel cells, can "bypass the second law of thermodynamics" in that they do not involve heat engines, and so do not lose internal energy through heat loss. Still, practical problems with these alternatives result in their current low availability and high costs.

Technological fixes aim to minimize the need to reduce energy use, and hence lifestyle changes, but at increasing cost. The "social fix" of decreased consumption could go a long way toward resolving the resource and climate problems. Indeed, the fact that the United States uses twice as much energy per capita as Europe and Japan shows that we have much room for improvement. Studies show that countries with per capita energy use much lower than that of the United States are already approaching the highest levels of human development, as measured by the UN's Human Development Index. For countries at the highest development levels, large increases in energy use produce little or no gains in development.

Social fixes, however, require a change in values. While the facts and options are provided by science and technology, it seems that scientists are not the most credible messengers. In the United States, at least, a religious approach seems more promising. Some specific ethical principles

that Laurendeau mentioned as being of relevance, both within his own Catholic tradition and in general, are stewardship, participatory decision making, prudence, fairness, and justice. He talked about an "Ethic of Responsibility" and concluded by suggesting a primary role for religion in providing hope.

Catholic Social Teaching

Drew Christiansen, S.J., Editor-in-Chief of *America*, had prepared a series of six talks on the theme of Catholic social teaching touched on by Norm Laurendeau. Unfortunately, Fr. Christiansen was too ill to attend the conference in person. His written reflections were presented by conference volunteers; see also his contribution in this issue (Christiansen 2011).

Christiansen's talks introduced Catholic Social Teaching as a collection of statements by individual Catholic leaders and groups of leaders on contemporary social issues. Fundamental here is a communitarian, not individualistic, ethic; "ideas can't be separated from the communities that generate and carry them out." But, we must balance the individual with the social, as "any being is most itself in relationship." Following a period during which human rights had been overshadowed in the Catholic Church's teachings by nationalism and capitalism, the Church became a foremost voice for human rights, beginning in the early 1960s with Vatican II and Pope John XXIII's (1963) encyclical *Peace on Earth*. Now the favored end of all political authority is the promotion and protection of human rights.

The recent Pastoral Letter, "Renewing the Earth," carried Catholic Social Teaching into environmental issues and underscored the planetary common good. This letter noted that "in this shrinking world, everyone is affected, and everyone is responsible," and counseled against the false choice between a decent environment and a decent life. Christianity should motivate a love of creation and action to protect it. Unfortunately, sacrifice seems to be a nonstarter in the United States, but it will be required to make the changes necessary.

Christiansen closed his remarks by describing how Teilhard De Chardin's thought combines the scientific and religious, speaking to those who cannot separate thought and spirit. Teilhard challenges the notion that spirituality comes only from contemplation, and draws three relevant lessons from science: (1) it reveals the diversity and complexity of the material world; (2) the habit of research disciplines the scientist; and (3) there is no resting from where we have been. Deep mysticism requires an appreciation for the variety, complexity, and richness of the Cosmos. While knowledge of the real comes from scientific study, it also comes from understanding the different ways of human knowing, such as religious and spiritual disciplines. Teilhard noted that scientific research involves forgetting oneself, so as to devote attention to the object of research. Therefore, science is a quintessentially spiritual discipline.

Technology, Travel, and Fuel

The plenary sessions continued on Sunday morning, with John Abraham of the School of Mechanical Engineering, Purdue University, discussing "Transportation: Beyond Oil to Synfuels and Biofuels." Abraham is an associate editor of the international journal *Combustion Science and Technology*. Building on the primer provided by Norm Laurendeau, Abraham compared alternatives to the internal combustion engine (ICE), which is currently used for most transportation in the United States. Such engines use gasoline because it is the cheapest fuel per amount of power provided. In diesel engines, fuel ignition is caused by compression rather than a spark plug, and the compression ratio is greater. This provides up to 30 percent higher thermal efficiency, but it comes at the cost of higher particulate emissions. In any case, theoretical and practical limits mean that, with a lot of work, technological advances in ICE design might improve the efficiency by 25 percent.

A further improvement is the use of regenerative braking to recover energy from an ICE and store it in a battery. These ICE-electric hybrids are already in successful commercial production, as witnessed by the Toyota Prius. Another possibility is the fuel cell, which produces electricity like a battery, but requires an external source of fuel. The fuel is typically hydrogen, which combines with oxygen to produce electricity, plus water as a waste product. Fuel cells can be much more efficient than ICEs, but they are currently limited by the expensive materials required.

Abraham then turned from efficiency to the other side of the energy issue, that of carbon emissions. Diesel and gasoline both result in over 80 g of CO_2 emissions per megajoule generated, though diesel can produce other harmful emissions. Biofuels produce only 24–41 g/MJ of CO_2; and biofuel from waste oil produces only 13 g/MJ (net). Other types of engines can have much lower CO_2 emissions, but cost and availability are still problems for their use. Since the entire cycle of energy production must be considered, it can be difficult to directly compare the different options. For example, emissions arising from plug-in electric vehicles must include that of the source of their electricity.

Abraham concluded that the problems we are discussing are exacerbated "for the love of the car." In general, consumers do not care about thermal efficiency or CO_2 emissions; what matters to them is price, comfort, and reliability. Beyond this, social attitudes can affect the very need for a car. Research, as described in this talk, can present the options, but it falls to society to ensure that all factors are considered in choosing among them.

Susan Leschine, Professor of Microbiology at the University of Massachusetts, Amherst, combined her passions for microbes, the environment, and social justice in her plenary, "The Future of Biofuels: Science, Economics, and Ethics." She began by reviewing the basic facts of

global warming, the need to reduce emissions of CO_2, and the need to find alternatives to petroleum-based energy. Though there are many possibilities, the only renewable liquid fuel available now for transportation is biofuels.

Questions have been raised about the supposed "negative energy output" for biofuels, but the real issue is the practical effects of using any particular energy source in terms of CO_2 footprint, cost, national security, and jobs. For example, not only can biofuels replace nonrenewable petroleum-based fuels, but biorefineries can also produce replacements for other petroleum-based products. Of importance is how biofuels are being produced. Using coal energy to make corn ethanol, for example, will not result in lower overall emissions. If done properly, the United States could sustainably produce enough fuels from biomass to replace about 30 percent of our petroleum consumption.

Leschine's particular focus is the production of cellulosic ethanol, whose use of all components of biomass, including cellulose and hemicellulose, results in less competition with food production. Leschine and her colleagues have used a novel bacterium, the Q microbe, to develop a simplified technology called Consolidated Bioprocessing (CBP). The Q microbe's marvel is to perform not only the final step of producing ethanol from preprocessed material; it is also uniquely capable of doing the preprocessing itself. It does this by fermenting the various components of biomass into the form it needs to make ethanol. Finally, it can tolerate the resulting ethanol, thus surviving and continuing the process.

Leschine concluded that biofuels will not solve all our energy problems. There are no single "silver bullets," only "silver wedges" that can help to provide part of the solution. Particularly important will be conservation, necessitating lifestyle changes. Her sense that nature is sacred, and that all life is interrelated, requires us to take action to save our planet. Religion provides hope and sustained energy to help enact the needed changes.

Energy for Communities: India and the United States

R.V. Ravikrishna, of the Department of Mechanical Engineering, Indian Institute of Science, Bangalore, continued the technology focus of the conference in his talk on "Sustainable Energy Choices for Rural India: Scientific and Philosophical Perspectives" (see also his contribution to this issue, Ravikrishna 2011). In a wonderfully appropriate twist, he began with a Vedic hymn: "let noble thoughts come to us from all directions." He followed this with a survey of relevant ideas from the "Sanatana Dharma," the "Eternal Religion" that Westerners call Hinduism. Generally speaking, far less conflict has occurred between Hinduism and science than has been manifest between science and religion in the modern West.

Ravikrishna pointed to the philosophical temper and inward bias in Hindu thought as its unique contribution to religion and philosophy. This is exemplified in a quotation that intersected the dual focus of IRAS and this conference that "the mystery of the outward world only deepens if the mystery of the inner world is not tackled." Thus, in Hindu thought, science and religion are complementary ways of dealing with the basic unity of the universe. In this unified view, with no clear distinctions among matter, energy, and spirit, or between humanity and nature, sustainability is the very life-breath of traditional Hindu Indian culture.

From this perspective, Ravikrishna brings his work at the Indian Institute of Science to bear on improving the lives of rural people. He notes that there is a correlation between development and energy use at these levels of development (as opposed to the leveling out of the correlation that Laurendeau (see Laurendeau 2011) described for higher levels of development. The goal is to provide simple, affordable, efficient, sustainable, and environmentally sound energy, using resources available in poor rural areas.

One resource that is readily available in rural environments is biomass. Ravakrishna described family-sized designs for biogas plants, which convert cattle dung and other biomass into fuel and compost. The biogas produced by these "digesters" can be used to power small engines, such as those used for two-wheeled vehicles. Another source widely available in rural areas is solar power. Ravakrishna described a larger scale project in the holy town of Shirdi, where solar energy produces steam used in cooking meals for 50,000 people per day! He concluded by emphasizing the need for governments to set policies that make the most socially beneficial use of the results of scientific and technological research. "Earth has plenty to satisfy every man's need, but not every man's greed" (Gandhi).

In his talk on "Renewable Energy for Sustainable Communities: Credits and Offsets," George Hoguet, developer of energy marketing for *Native* Energy, Inc., explained how governments, companies, private organizations, and individuals can be encouraged to follow socially beneficial practices in the production and use of energy. The basic idea is to trade off environmentally beneficial but more costly uses against more harmful but cheaper ones. He began by distinguishing mechanisms for dealing with two issues: carbon offsets for reducing CO_2 emissions and renewable energy credits (RECs) for promoting the use of renewable sources of energy.

The idea of an REC is that a wind farm, for example, produces not just power, but also a "green" benefit. As with any power plant, the producer receives money for the energy provided to the power grid. In addition, a quantity of RECs is received, based on the amount of replaced nonrenewable energy (i.e., fossil fuels). The RECs may then be sold on

the open market, so the producer is compensated for possibly higher costs of renewable energy production. In many states, power companies using nonrenewable sources are required to buy RECs as compensation. Private organizations and individuals may also buy RECs to help promote renewable energy.

Carbon offsets deal with the other big fossil fuel problem, that of greenhouse gas (GHG) emissions. Like an REC, the carbon offset is a financial instrument that is typically mandated by government to be purchased by an energy producer in proportion to the amount of GHG emissions. A variety of means may be used to offset the emissions—not just renewable energy sources, but also reforestation and conservation, for example.

From offsets and credits, Hoguet shifted to a broader focus on how to get people, especially in the United States, to make the changes that will be required to solve energy problems. Hoguet suggests how Europeans can maintain a standard of living as high as ours, while using half as much energy. As Bill McKibben said, it is "not because they have better technology. It's because they have better communities." Hoguet asks "how can I 'be' in such a way as to help foster community?" He has found some answers in Buddhism, though he cautions that "if you say you're a Buddhist, you're probably not!" He closed with a quotation from Thich Nhat Hanh: "The path of brotherhood and sisterhood is more precious than any ideology or religion."

From Gluttony to Frugality?

Charles "Chuck" Kutscher of the National Renewable Energy Laboratory, Golden, Colorado, accented the big picture in "The Urgency of Climate Change and the role of Renewable Energy." Kutscher edited the American Solar Energy Society (ASES) report, *Tackling Climate Change in the U.S.*, and writes a monthly column on climate change for *Solar Today* magazine. Beginning with a dramatic Frank Capra film clip from 1958, about the apocalyptic consequences of climate change, he continued with the bold statement that "if you're not spending every waking hour working on this, you're probably not spending enough time on it." In reiterating the unequivocal evidence for human-caused climate change, he debunked the "outright falsehoods" of climate change skeptics. The problem is that such misleading information is effective, just as the tobacco industry's campaign against the evidence connecting smoking with cancer was effective for a time. But the evidence now is overwhelming. As climate models improve, they consistently confirm the effects that were predicted by simpler models. The famous "hockey stick" curve of drastically increasing temperature with time is being replicated in many studies and in many effects. Furthermore,

following the precautionary principle, we should prepare for worst cases, not just the already bad, most likely case.

Repeating that "we're running the planet in the danger zone," like a car "running in the red," Kutscher went on to discuss options for the required reductions in CO_2 emissions. Number one is efficiency, which can have an additional benefit of saving money. Alternative sources and technologies that could contribute to the solution are concentrated solar energy, wind energy, and cellulosic biomass (as described by Susan Leschine). Finally, nuclear energy must be considered since "the more you understand climate change, the more reluctant you are to take any option off the table." One study has shown that inaction is the most expensive option, costing 520 percent of world GDP, while the required actions enacted soon would cost about 1 percent of world GDP. In answer to a question, Kutscher noted that one thing we need to do is to recover the "older American traditions of frugality and re-using, which haven't been in evidence lately," but which are still recoverable.

Frugality is fundamental in the work described by Anne Perkins, Director of Home Ownership Programs for Rural Development, Inc., Turner Falls, Massachusetts, in "Conservation: Zero Net-Energy Homes for Low-Income Families" (see also this issue, Perkins 2011). From her start as a carpenter building her own cabin, Perkins has focused on ways to be energy efficient. She described the development of a village of 20 zero net-energy homes in Massachusetts, guided by her "mantra": first, lower energy need; next, increase passive solar gain; last, add necessary renewable energy sources. Since "it takes a village to make a village," work on the project began with Integrated Design Team Meetings, which included not just the designers and engineers, but also the homeowners, builders, and all others involved.

Lowering the need for energy meant designing for a northern climate, where heat would be needed most of the year. For example, windows were sized depending on whether they would be sun-facing or not. Even the habits of the residents were part of the design, with air distribution aided by keeping doors within the structure open most of the time. This resulted in very low heating needs, with just a single natural gas room heater sufficient for an entire house, supplemented by an electric heater for the bathroom. Electricity and hot water were provided by solar systems, with a natural gas backup system for water heating.

Perkins concluded by discussing the results, in terms of the very good scores achieved by these homes on a Home Energy Rating System (HERS). Such claims for energy efficiency need to be verified, and she discussed how this was currently being done. Crucial to the measurements, and to maintaining high efficiency levels, was continued communication with the residents.

William Irvine, Professor of Philosophy, Wright State University, brought ancient Stoic ideas to bear on contemporary life in "Overcoming Energy Gluttony: A Philosophical Perspective" (see also this issue, Irvine 2011). Appropriately, he used no PowerPoint slides or other visual aids, and began by thanking the Atlantic Ocean for making Star Island possible. He explained that energy gluttony is not a conscious craving for energy *per se* but is due to the craving for material goods, perhaps derived from social desires. Controlling these desires is one of the keys to reducing our demand for energy. Our inherited wiring favors habits furthering reproductive success, not happy lives, so we should be suspicious of our desires, rather than embracing them.

The Stoic approach begins with taking ownership of each desire, treating it suspiciously as one would the offerings of a salesperson. In particular, we must recognize and counter the tyranny of stuff; that is, the fact that we have too much and that it can control us just by being there. Expensive but popular items, as with the recent craze for granite counter tops, do not enhance our lives to the extent that the monetary and environmental costs warrant. The obesity epidemic, which is spreading from the United States to the rest of the world, is "a crisis of desire," and is to public health what global warming is to the environment.

Conventional solutions to these problems include (1) education—just tell them it is bad (this may or may not work); (2) political—outlaw or punish the undesirable behaviors; and (3) technical—avoid or treat the consequences. Irvine instead offers a philosophical solution. If we can overcome the desire for social standing, we might reduce our desire for material things. We need to distinguish between things we have control over, and those we do not. As the Stoic Roman Emperor Marcus Aurelius said, the main thing we have control over is our character, and self-control is a prerequisite for character development.

Irvine pointed out that, contrary to the common image of the Stoics, they did not believe in repressing all emotion, only negative ones. Being in control of emotions does not mean eliminating them. The aim is tranquility, with no anxiety and no envy. This approach is not unique to the Stoics, and Irvine said that he began by trying Zen Buddhism, before finding that Stoicism worked better for him. There are many other examples in philosophy and religion of compatible approaches; one of these was described by R.V. Ravikrishna (see Ravikrishna 2011). In responding to questions, Irvine elaborated on how beauty and delight can be found nonmaterially. To start with, "you are your own greatest work of art." He advocated practices of "inconspicuous consumption" such as bird-watching and learning science. Religion can have an important role if it focuses on necessary self-transformation; all too often it fails to do so.

Religious Voices and Values

James Martin-Schramm, Professor of Religion, Luther College and the author of the recently published *Climate Justice: Ethics, Energy, and Public Policy* (2010), presented a concrete example of how religion can help, in "Ethical and Religious Values in Energy Policy." The Ethic of Ecological Justice, growing out of discussions at the World Council of Churches (WCC 1974, 1994), proclaims "an obligation to preserve the health and integrity of the biosphere while providing for the fulfillment of basic human needs." Taking account of the differing needs of developed and developing countries, the aim has been to unite social ethics and environmental ethics in one framework. Economic solutions cannot be implemented without considering environmental costs, or environmental solutions implemented while ignoring human social needs.

The Ethic of Ecological Justice can be expressed through the four norms of sustainability, sufficiency, participation, and solidarity. While Martin-Schramm drew on Judeo-Christian sources for his explication of these norms, he pointed out that they seem to represent universal human values. They provide a common moral vocabulary.

Sustainability, the long-range supply of sufficient resources to meet basic human needs and the preservation of natural communities, emphasizes concern for future generations and the planet as a whole. It leads us to balance actions that we take to enhance our current quality of life with their effects on future prospects. The value of sufficiency focuses on the claim that all forms of life are entitled to share in the goods and goodness of creation. Unlimited consumption, hoarding, and the inequitable distribution of Earth's goods all undermine sufficiency and its values of frugality and generosity. The biblical writers generally link sufficiency and abundance in the conviction that righteous living redounds to the well-being of all.

The norm of participation seeks to remove social, economic, and political obstacles to participation in decision making and emphasizes open dialogue. A respect for all forms of life and the inclusion of their welfare in human decisions rests in the affirmation of the goodness of creation and the call to justice. Finally, the norm of solidarity expresses the kinship and interdependence of all forms of life as well as the inclusion of marginalized human communities. "Relationality is the foundation of solidarity."

Perhaps the inclusive norm for these four—sustainability, sufficiency, participation, and solidarity—is justice. While it is a norm standing on its own, it also gains greater specificity for energy policy by elaborating on the four norms sketched above.

Guided by this Ethic, Martin-Schramm helped write a statement by the Presbyterian Church on environmental and social issues. The document included specific recommendations such as internalization of social as well

as of environmental costs in the use of fossil fuels, changing of government subsidies and standards to ensure responsibility, and encouragement of decentralized sources for power generation.

Fletcher Harper, an Episcopal priest and Executive Director of GreenFaith, also discussed action by religious organizations, but he moved to a more local focus in "Putting Belief into Action: Religious Leadership on Energy and the Environment" (see also his contribution to this thematic section, Harper 2011). Specifically, he described the work done by GreenFaith, an interfaith environmental coalition. The goal is to inspire, educate, and mobilize diverse religious communities for environmental leadership. He sees more religious communities now coming together to find "common ground" in environmental action.

Three core values drive this work: (1) "spirit" teaches the religious basis for protecting the earth, for example, by fostering meaningful experiences of the natural world; (2) "stewardship" recognizes that all religious traditions include teachings about care for the Earth; and (3) "justice" mobilizes people of faith to create a healthy environment, especially for creatures, human and other-than-human, who bear the brunt of society's failings.

Programs provided through GreenFaith include speaking engagements, retreats, and education. While Harper is an Episcopal priest, he has been joined by representatives of other Christian denominations as well as a rabbi and a Hindu scholar presently in residence. This interfaith approach allows people to get in touch with their own spiritual experiences through engagement with nature, and to understand what their own tradition has to say regarding nature.

The primary focus of GreenFaith is on issues that directly impact people, largely by way of the Environmental Justice movement. For example, the Coalition for Healthy Ports works for better maintenance of trucks near ports to reduce emissions, which in turn involves working to improve employment scenarios discouraging these necessary steps. The Healthy People, Healthy Planet Tour provides information on environmental health issues, such as lead, asthma, and food, to engage urban religious communities. Another important program promotes energy audits for homes and institutions. These can identify simple ways to save energy, such as reprogramming the thermostat and using compact fluorescent light bulbs.

In conclusion, Harper said that the battle of religious ideas has largely been won, in that most congregations do recognize the need for action. What is sorely needed now is implementation. The experience of groups such as GreenFaith has taught us that "relationships trump information," that this is what changes behavior. It has also demonstrated the need to recognize the (seemingly obvious) importance of money and time. Savings should be promoted, but the scarcity of people's time must also be recognized as a limiting resource.

Conference co-chair Larry Rasmussen, Reinhold Niebuhr Professor Emeritus of Social Ethics, Union Theological Seminary, concluded the plenary talks with "Energy Policies and Religious Values: The Reciprocal Challenges" (see also this thematic section, Rasmussen 2011). His theme was that, just as the Axial Age 2,500 years ago was a period of great change and creativity, our modern age is another of history's hinge times. We must make a transition that we are not prepared for, in the words of Thomas Berry, from the "Technozoic Age" to the "Ecozoic Age" (Berry 1999, 8). Along with our technological challenges, we need to discern the needed strains of Earth-honoring religious faith.

The sharp increases in CO_2, temperature, and related measures have been mentioned in previous talks, but Rasmussen notes that we see these "hockey sticks everywhere." All manner of measures show the same pattern of unprecedented growth during modern times: investment, water use, population, McDonalds restaurants, paper use, and on and on. Much of this reflects unlimited economic growth as our secular religion and strategy for wealth generation. We need to enter a phase where we measure religions and other belief-and-value systems by their contribution to Earth's well-being. This will be harder for some religions than for others. In particular, the "People of the Book" have religions that seem to prescribe that nature is rightly reconfigured when it redounds to human benefit. On the other hand, the "Peoples of Nature" and "Peoples of the Cosmos" represent many indigenous religions; they address the local, often with remarkable records of sustainability, but do not address the global.

What should we expect from religion? The first attempt at change always tries to fit the new into old patterns. Even "eco-moderns" do this, by maintaining the old human/nature duality in talk about resources, and in advocating the need to "change your bulbs and plumbing," but not your life. Rasmussen thinks that the change must go deeper, to the substantive deep traditions shared by most religions. The first of these is asceticism, fostering the kind of self-discipline discussed by Bill Irvine (2011). Sacramentalism is another common tradition, whose recognition of the miracle of life and its continual renewal are the antithesis of modern views of the plasticity and commodification of the natural world. Mysticism and contemplation are counters to modern alienation and denial, and can bring us into touch with the heart of the living world as the great union to which we belong, body, mind, and soul. The justice focus of prophetic-liberative traditions is actually creation justice, justice for all life. Finally, common wisdom traditions, with their prudential orientation, resist the multiple folly that subjects the planet to an uncontrolled experiment.

We need to craft a new life and role for humanity, a gospel of belonging to a community that nurtures us in the context of caring for the community of all life. In response to a question about the seeming hopelessness of the situation, Rasmussen noted that history shows that successful transitions

often rely on "underground" traditions at the margins, which come forward in a crisis. Electronic globalization might allow for a quick global change of consciousness. Ultimately, it will be the push of necessity, the arrival of the realization that "we've got to do something," as this simultaneously allies with the lure of a salvific vision and "anticipatory communities" that already practice it in microcosm.

Wrap Up

The conference concluded with a panel of the speakers. Norm Laurendeau began with the contention that "action can lead to contemplation, and vice versa: an 'aha' experience can literally 'change your mind.'" Larry Rasmussen noted that we need integrated policies, an "eco-economics" rather than siloed solutions for individual problems.

Bill Irvine commented that these talks were preaching to the choir, and that we all need to think about how to bring this point of view to others. He suggested that we think about how we came to these views, and wait for the rare moments in a conversation when we know that the other person is really listening.

Fletcher Harper echoed an old "Far Side" cartoon in saying that we "have the know-how; but do we have the know-why?" Typically, we hope for leaders other than ourselves to solve the problems. However, we are in an era where we are all called upon to lead, in a nonegotistical sense, to move toward a truly better future.

During the discussion period, former IRAS president John Teske committed to personally reducing his carbon footprint by 10 percent by 10/10/10, "World Action Day." At his suggestion, most of those present stood to join him in this pledge. George Hoguet mentioned several websites with information about how to do this. Bill Irvine recommended vegetarianism as one path.

There was more discussion on how best to change people's minds. Laurendeau said that people are more likely to listen to experts within their own religious community. Hoguet argued that "being on the edge" between secular and religious communities "is where leadership happens." Rasmussen finished by telling us to "do it in a community and have a good time doing it."

While there was much more to the conference than this summary—many workshops, much conversation and merriment—the foregoing offers the context within which the following essays found their home. Essays by all presenters were precluded by other commitments, including publications elsewhere. Those that follow are original essays by Laurendeau, Irvine, Perkins, Ravikrishna, Harper, Christiansen, and Rasmussen.

"The Energy Transition: Religious and Cultural Perspectives" did not end with the conference, however. Plenary speakers undertook a "Statement

on Energy and Climate Change" after the ferries had sailed from Star Island. It went through numerous iterations until there was consensus. While the Preamble duplicates portions of the Conference Statement (see above), the Petition and Call to Action mirror the conference discussions and sense of urgency. We close this Introduction with the Statement's full text.

Statement on Energy and Climate Change following the Fifty-sixth Annual Summer Conference sponsored by the Institute on Religion in an Age of Science (July 24–31, 2010) concerning The Energy Transition: Religious and Cultural Perspectives

Co-chairs: Norm Laurendeau and Larry Rasmussen

Preamble

Energy and climate change have typically been discussed in terms of their associated science, technology, economics, and politics. Recently, more attention has been given to fundamental religious and ethical questions surrounding the inevitable shift from fossil to renewable energies. As for any technological transition of this magnitude, ultimate success will require consideration of ethics and religion as well as of science and technology. Religious perspectives also possess the unique advantage of highlighting ultimate values, regardless of economic and political pressures. For these reasons, the time has come for theologians and ethicists to join with scientists and engineers in promoting a sustainable energy future. The following petition and call to action reflects this approach, as developed through our conference deliberations.

Petition

Whereas solving global issues of energy availability and climate change within the next generation will require unprecedented levels of commitment and sacrifice by governmental and social institutions;

Whereas peak oil and global warming will disproportionately affect the most economically vulnerable members of our global community;

Whereas many ecosystems will suffer from large-scale disruptions that could displace species and force ecological change at a far greater than natural rate;

Whereas religious and ethical institutions are uniquely capable of addressing such contentious intergenerational challenges; and

Whereas only cooperative efforts among the scientific, technical, ethical, and religious communities can forge the moral leadership needed to achieve workable solutions on difficult energy issues;

We claim that the time has come to recognize that:

(1) All people have a right to sufficient energy for sustaining life, health and work.

(2) Basic energy needs account for a significantly greater percentage of living costs for the poor as compared to the rich.

(3) The majority of environmental refugees arising from climate change are currently and will continue to be the global poor.

(4) Rich nations can reduce their per capita energy consumption by 50 percent with little or no loss in quality of life by decreasing energy use, increasing energy efficiency, and investing in renewable energy.

(5) A modest doubling in per capita energy consumption can dramatically improve the quality of life for the poorest 25 percent of people across the Earth.

(6) Alternative fuels must be developed to replace oil for transportation so as to avoid the onset of substantial economic dislocations associated with peak oil and climate change.

(7) The preferred liquid fuels are those that are carbon-neutral and can be generated from nonfood biomass, such as agricultural residues, vegetable oils, algae, switch grass, and waste wood products.

(8) A strong market for cellulosic ethanol requires removing limitations on the amount of ethanol that can be blended with gasoline and producing more vehicles able to run on high-ethanol fuels.

(9) Energy efficiency and a wide range of renewable energy technologies (e.g., wind, solar, hydroelectric, biogas, geothermal) can provide carbon-free electricity or even carbon-free transportation.

(10) Safer technologies for nuclear power (e.g., modular/gas-cooled designs, thorium fuel) should be pursued, but only if reliable strategies are available for securing any high-level nuclear wastes.

(11) Natural gas is a preferred low-carbon transition fuel for heating and manufacturing, but its new exploration and development must be done in ways that are socially and ecologically sustainable.

(12) There is no one-stop solution to the complexities of peak oil and climate change.

Call to Action

To meet basic energy rights for all people, especially the poor, efforts must be anchored in the traditional moral values of human communities, as promoted by the world's religions. These universal human values include loving all human beings, cherishing all forms of life, and fostering spiritual aspects of science and technology. On this basis, we call upon religious and spiritual leaders across the globe to cooperate with scientists and engineers in helping to find solutions to our common energy problems by:

(1) Educating the public on energy issues, particularly regarding climate change and peak oil;

(2) encouraging reliable information from laity with scientific/technical expertise in energy;

(3) recognizing that 60 percent of personal energy use arises from automobiles and home heating/cooling;

(4) assessing energy options using moral norms—sufficiency, sustainability, participation, and solidarity;

(5) developing energy policies that reduce CO_2 while seeking energy security and economic vitality;

(6) motivating personal and societal lifestyle changes needed to promote energy equity/conservation;

(7) favoring energy prices that minimize both energy subsidies and market externalities;

(8) working toward a pricing mechanism for carbon commensurate with its ecological impacts;

(9) supporting federal tax rebates and municipal financing that foster energy conservation;

(10) promoting energy-use displays that encourage consumers to reduce energy consumption;

(11) advancing the construction of zero-energy buildings, whether residential or institutional; and

(12) using faith-based facilities as model structures for reducing carbon footprint and energy costs.

For further information on the conference leading to this energy statement, see www.iras.org. Endorsed by the conference presenters:

John Abraham	William Irvine	James Martin-Schramm
Drew Christensen	Chuck Kutscher	Anne Perkins
Fletcher Harper	Norm Laurendeau	Larry Rasmussen
George Hoguet	Susan Leschine	R.V. Ravikrishna

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