# ENERGY

## Seeking Alternatives for the Present and the Future

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### THE ENERGY, LIFE, AND CLIMATE LINK

As elegantly expressed by environmentalist David Suszuki, "Without energy, life would not be possible. Life is the organic expression of energy" (Suszuki 2007, 137).

Among living species on our blue planet, Homo sapiens evolved and long ago began the anthropogenic process of environmental interaction and change. Humans have developed a wide variety of complex social organizations, and the means to manipulate and combine matter and energy for purposes believed to be important, or sometimes just merely found delightful. Historically, humans learned to harness energy from the use, domination or domestication of other species such as animals (e.g., dogs, oxen, horses, and chickens), and plants (e.g., trees, grains, grasses, and fruits). Humans also took advantage of natural forces such as sunlight, wind, falling water, currents, or gravity. And finally, humans use other humans as a way of harnessing and using energy to achieve human aims. Human social organization (including political and economic) are reflections of this fact (which unfortunately has included child labor and forms of forced labor, including explicit slavery). The complexity and speed of human activities greatly accelerated with the advent of the Industrial Revolution, beginning in the 19th century, fueled by the discovery and harnessing of fossil fuels. Fossil fuels are the legacies of past organic life on our planet, laid down and covered over by millions of years of geological evolution—a gift to us.

Currently, fossil fuels are the primary source of energy for human activities and organizations, but their supply is finite. Ultimately, humans will have to find and harness alternative sources to attain or maintain anything close to current accepted western lifestyles and quality of life expectations (Elliott 2010; xvii-xxi; Harper 2010, 236-260). Both scarcity and the increasing difficulty of finding, extracting and processing fossil fuels will continue to drive up their relative cost, particularly if the true social and environmental costs of their extraction and use are embedded in their prices.

My essay presumes that energy consumption and global warming (also thought of as climate change) are inextricably linked. Second, global warming is real, is primarily the result of human activity of the last 200 years, and represents a challenging crisis now and for the foreseeable future. The cause of global warming is primarily the burning of great quantities of carbon rich fossil fuels releasing carbon dioxide ($CO_2$) into the atmosphere combined with deforestation of large portions of the planet, and now supplemented by the accelerating release of methane ($CH_4$) and carbon dioxide ($CO_2$) from melting Arctic permafrost and tundra areas, and warming seas, sea beds, and estuaries. The releasing of $CO_2$ and $CH_4$ faster than natural cycles can absorb or sequester them produces an atmospheric greenhouse effect. The warming effect is melting Arctic and Antarctic ice caps, causing glaciers from Greenland to the Himalayan Mountains to recede, raising sea level, accelerating desertification of some arid areas, generally changing weather patterns and climates, and finally, increasing adverse weather event risks. The impacts of global warming are not limited to humans and human settlements. Species extinction and habitat degradation are at record levels and they are accelerating (Kolbert 2014). Third, not all people, places, environments, or life on the planet will be impacted by climate change uniformly or in the same manner or degree. Fourth, addressing the crisis will involve both mitigation and adaptation. Fifth, quick and easy technological and geo-engineering fixes will not be sufficient, but rather human, organizational and institutional behaviors will have to change also. Finally, resolving the crisis presents ethical choices for individuals, organizations, institutions, communities, and nations.[1]

[1] For the science documenting climate change see for example: U.S. Global Change Research Program (USGCRP), http://nca2014.globalchange.gov/downloads. U.S. Environmental Protection Agency (EPA), http://www.epa.gov/climatechange/science/causes.html. See various reports periodically released by the Intergovernmental Panel on Climate Change (IPCC) http://www.ipcc.ch/organization/organization.shtml, http://www.ipcc.ch/report/ar5/wg2/, and http://www.ipcc.ch/report/ar5/wg3/

## WHY ENERGY

Why learn about Energy? The fact that energy is needed for you and me to think, move, breath, grow or regenerate tissue and cells, and to grow and digest our food should be enough to pique our curiosity and concern, but the reasons go far beyond our biological energy requirements and energy processing systems. The energy-climate link makes learning and doing something about energy critically vital.[2]

To see evidence of controversies regarding energy, one only needs to be reminded of the gridlock in Washington and internationally over energy and climate policy, and policy implementation. The battle between climate change "deniers" and climate change "alarmists" demonstrates the breadth and depth of the divide in attitudes regarding energy and climate change. The recent rise of primarily self-interested climate change "opportunists," that wager that humans will fail to mitigate or halt climate change, shows that the divide has grown deeper and more complex. (Funk 2014; Friel 2010; Oreskes and Conway 2010, 169-215)

Different communities and regions can respond differently. For example, British Columbia, despite resistance from the central Canadian government, has embraced a carbon tax, as a way of discouraging the release of carbon dioxide ($CO_2$) and found it to be successful and reasonably accepted. Australia recently eliminated its carbon tax after only two years amid much political controversy and a host of inadequately addressed public misconceptions (Beaty et al. and McGuirk).

## RELATIONSHIP TO OTHER PERSPECTIVES AND ISSUES

Energy and its interaction with matter are at the core of such issues as water, land, food, transportation, recycling, and community environmental engagements. The water cycle is driven by energy. Climate change means that some areas are increasingly dry and subject to drought and water scarcity, while others will be wetter and subject to more frequent and severe flooding and storms. Management of water often requires investments of human produced materials and energy. Energy inputs and changing climate are increasingly considered in how, when and where food is produced and distributed, and how and where land is used, and, in fact, in determining whether a particular area of land is useable for human activities. Climate change is sparking the beginnings of massive human, capital, and even wildlife and plant migration and habitation change. These massive movements induce competition and conflict.

Interest in and expansion of collective recycling programs is and has been driven, not merely by a sense of materials frugality and environmental consciousness, but rather the recognition that production from raw materials is increasingly more expensive. The primary expense changes are due to increasing land, raw material, and energy scarcity.

Energy and the response to climate change play increasingly pivotal roles in determining how we design, build, organize, modify, and use our homes, neighborhoods, and the commercial, industrial, and institutional structures and facilities in our communities. In fact, energy, demographic, and economic forces are even contributing to changing urban and community forms. Even the relationships and roles among communities is changing (rural, city, suburb, exurb), and the sustainability of each is being challenged.

Relatively cheap energy has enabled humans to move themselves, goods, and other species, including invasive pests, great distances and more frequently. Now few humans are confined for life to their village of birth, or to the goods grown or made within a day's walk from their village. Modern transportation is an activity and service in which humans are acutely aware of both the role and cost of energy. Substantial amounts of energy are used not just in transportation vehicles (including cars, trucks, airplanes, trains, ships, boats and barges), but in constructing and maintaining the infrastructure that accommodates transportation vehicles and systems. Let us not forget that energy and energy resources often require transportation (e.g., electrical transmission lines, pipelines, rail tank cars, land and sea tankers). Reducing trips and trip length, shifting to more efficient or greener modes of transportation, and increasing the efficiency of transportation vehicles and systems are all efforts stimulated by increasing awareness of rising fossil fuel energy costs (scarcity) and the environmental harm of using fossil fuels.

[2] To learn more about energy physics and technologies, including renewable energy sources and technologies, see such works as Boyle 2012 and Wolfson 2012.

## ETHICAL DIMENSIONS OF ENERGY ISSUES - CHALLENGES FOR THE FUTURE

Energy can be used for good or evil, and everything between. The human designed and made processes for extracting or capturing energy, and then transforming and harnessing it, can differ in their impacts on both humans and the environment. The benefits and costs are not necessarily distributed evenly or fairly (among or within species or places). Some people and places are and might continue to be winners, while others are or will be losers, and the degree of gains or loses varies and will continue to vary among different people and places. And, what is our responsibility to respect and accommodate other life and habitats on our earth?

Then there is the issue of equity and justice. About a quarter of the earth's population does not have affordable and reliable access to heating, ventilation, cooking, or lighting. More humans lack electricity in their homes than at any time in history (Sovacool 2013, 1–2 and 138–144). Even where it is available, unreliable and insufficient electricity is still a widespread aggravation and development barrier throughout much of the globe (Friedman 2009, 194–209).

Ethics, as we have learned, can be defined as the way people behave based on how their beliefs about what is right and wrong influence behavior (Ethics Resource Center 2014). In the 20th century, as increasing environmental degradation became more evident and widespread, many thinkers began to question the limits of human-centered ethics, and consider more than just how human actions impact humans. Aldo Leopold's "Land Ethic" represents the first implicit, but concrete expression of an ecocentric (or environmentally based) ethic (Leopold 1949, 201–226; Curry 2011, 94–97). Barry Commoner has pointed out the interconnectedness of life and ecosystems, the web of not just all life, but all being (Commoner 1972, 14–32 and 33–41).

One such image that captured the attention and imagination of much of the earth's population was during the first few Apollo moon flights. Sent back to earth were color photographic images of the bright spherical blue earth surrounded by the blackness of space, becoming smaller as the capsule approached the moon, and later with the moon's surface as a stark grey barren foreground. It was at this point in the human experience, that many people, for the first time, realized suddenly that the earth was not only a blue planet, but was indeed our common home.

## CONCLUSION

The way we humans behave, and the way we design, build with, use, and interact with our planetary environment is going to change. The way in which humans extract or capture, transform, transport, harness, and use energy resources is going to change. In 1910, my paternal grandfather, a very successful traveling salesman, was selling buggy whips, harnesses, and rigs, but by 1918, with the increasing societal shift to motor vehicles, he had changed to selling hardware and machinery.[3] Planetary change, whether geological, biological, or ecological, or whether the pace is evolutionary or revolutionary, is inevitable; but, we humans do have the capability and opportunity, not just to adapt to changes, but more importantly, to influence, if not choose, the nature, speed and outcomes of many of those changes. However, we must recognize that both individual and collective change and action are required to meet the global energy and environmental challenges confronting us.

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[3]My grandfather was perhaps influenced by his father-in-law, a physician in a rural small town, whose documented claim to fame for decades, was that he was the first in his community to own and drive a horseless carriage.

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