MuseLetter

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What We Are For

Every activist engaged in combating human-caused climate change or specific elements of the current energy economy knows that the work is primarily oppositional. It could hardly be otherwise; for citizens who care about ecological integrity, a sustainable economy, and the health of nature and people, there is plenty to oppose—biomass logging in Massachusetts, mountaintop-removal coal mining in West Virginia, natural gas drilling in Wyoming, poorly sited solar developments in California, river-killing dams in Chile and Brazil, and new nuclear and coal plants around the globe.

These and many other fights against destructive energy projects are crucial, but they can be draining and tend to focus the conversation in negative terms. Sometimes it's useful to reframe the discourse about ecological limits and economic restructuring in positive terms, that is, about *what we're for.* The following list is not comprehensive, but beauty and biodiversity are fundamentals that the energy economy must not diminish. And energy literacy, conservation, relocalization of economic systems, and family planning are necessary tools to achieve our vision of a day when resilient human communities are imbedded in healthy ecosystems, and all members of the land community have space enough to flourish.

Energy Literacy | Conservation | Resilience | Relocalization | Family Planning | Beauty | Biodiversity

Energy Literacy

Energy is arguably the most decisive factor in both ecosystems and human economies. It is the fulcrum of history, the enabler of all that we do. Yet few people have more than the sketchiest understanding of how energy makes the world go 'round.

Basic energy literacy consists of a familiarity with the laws of thermodynamics, and with the concepts of energy density and energy returned on energy invested (EROEI). It requires a familiarity with the costs and benefits of our various energy sources—including oil, coal, gas, nuclear, wind, and solar. It also implies numeracy—the ability to meaningfully compare numbers referring to quantities of energy and rates of use, so as to be able to evaluate matters of scale.

Without energy literacy, citizens and policy makers are at the mercy of interest

groups wanting to sell us their vision of the future energy economy. We hear from the fossil fuel industry, for example, that Canada's oil reserves (in the form of "tar sands") are second only to Saudi Arabia's, or that the United States has over 100 years of natural gas thanks to newly tapped "shale gas" resources. And it's tempting to conclude (as many people do) that there are no real constraints to national fossil fuel supplies other than environmental regulations preventing the exploitation of our immense natural treasures.

On the other end of the spectrum, we hear from techno-optimists that, with the right mix of innovative energy generation and efficiency technologies, we can run the growth economy on wind, solar, hydropower, and biofuels. And it's tempting to conclude that we only need better government incentives and targeted regulatory reform to open the floodgates to a "green" high-tech sustainable future.

Energy literacy arms us with the intellectual tools to ask the right questions: What is the energy density of these new fossil fuel resources? How much energy will have to be invested to produce each energy unit of synthetic crude oil from oil shale, or electricity from thin-film solar panels? How quickly can these energy sources be brought online, and at what rate can they realistically deliver energy to consumers? When we do ask such questions, the situation suddenly looks very different. We realize that the new fossil fuels are actually third-rate energy sources that require immense and risky investments and may never be produced at a significant scale. We find that renewable energy technologies face their own serious constraints in energy and materials needs, and that transitioning to a majority-renewable energy economy would require a phenomenal re-tooling of our energy and transportation infrastructure.

With energy literacy, citizens and policy makers have a basis for sound decisions. Householders can measure how much energy they use and strategize to obtain the most useful services from the smallest energy input. Cities, states, and nations can invest wisely in infrastructure both to produce and use energy with greatest efficiency and with minimal damage to the natural world. With energy literacy, we can undertake a serious, clear-eyed societal conversation about the policies and actions needed to reshape our energy system.

Conservation

The current energy economy is toxic not simply because of its dependence on climate-altering fossil fuels, but also because of its massive scale and wastefulness. A first step toward reducing its global impacts is simply using less energy, a goal readily accomplished through conservation practices that are widely available and cost effective.

Energy conservation consists of two distinct strategies: efficiency and curtailment. Energy efficiency means using less energy to produce a similar or better service. For example, we can exchange old incandescent light bulbs for compact fluorescents or LEDs that use a fraction of the electricity and still enjoy satisfactory levels of indoor illumination.

Curtailment means exactly what you'd think: cutting out a use of energy altogether. In our previous example of indoor lighting, this strategy might take the form of turning off the lights when we leave a room.

Efficiency is typically more attractive to people because it doesn't require them to change their behavior. We want services that energy provides us, not energy *per se*, and if we can still have all the services we want, then who cares if we're using less energy to get them? Much has been achieved with energy efficiency efforts over recent decades, but much more remains to be done: nearly all existing buildings need to be better insulated, and most electric power plants are operating at comparatively dismal efficiencies, to mention just two examples.

Unfortunately, increasing investments in energy efficiency typically yield diminishing returns. Initial improvements tend to be easy and cheap; later ones are more costly. Sometimes the energy costs of retooling or replacing equipment and infrastructure wipe out gains from efficiency. Nevertheless, the early steps toward efficiency are almost always rewarding.

While curtailment of energy use is a less inviting idea, it offers clearer savings as compared with improved efficiency. By simply driving fewer miles we unequivocally save energy, whether our car is a more or less efficient model. We've gotten used to using electricity and fuels to do many things that can be done by well enough with muscle power, or that don't need doing at all.

Conservation helps us appreciate the energy we use. It fosters respect for resources, and for the energy and labor that are embodied in manufactured products. It reduces damage to already stressed ecosystems and helps us focus our attention on dimensions of life other than sheer consumption.

During the latter decades of the 20th century, most Americans achieved a standard of living that was lavish from both historical and cross-cultural perspectives. They were coaxed and cajoled from cradle to grave by expensive advertising to consume as much as possible. Simply by reversing the message of this incessant propaganda stream, people can be persuaded to happily make do with less—as occurred during World War II, when fuels were rationed and billboards promoted recycling.

Many social scientists claim that our consumptive lifestyle damages communities, families, and individual self-esteem. A national or global ethic of conservation could even be socially therapeutic.

Resilience

Resilience is "the capacity of a system to withstand disturbance while still retaining its fundamental structure, function, and internal feedbacks." Resilience contrasts with *brittleness*—the tendency to shatter and lose functionality when impacted or perturbed.

Ecologists who study resilience in natural systems have noted that ecosystems tend to progress through a series of phases: growth, consolidation and conservation, release (or "collapse"), and reorganization. Each turning of this adaptive cycle provides opportunities for individual species and whole systems to innovate in response to external and internal change (i.e., disturbance). Resilient ecosystems (in the early *growth* phase) are characterized by species diversity; many of the organisms within such systems are flexible generalists, and the system as a whole contains multiple redundancies. In contrast, less-resilient ecosystems tend to be more brittle, showing less diversity and greater specialization particularly in the *consolidation* phase.

Resilience can be applied to human systems as well. Our economic systems, in particular, often face a trade-off between resilience and efficiency. Economic efficiency implies specialization and the elimination of both inventories and redundancy (which typically guarantee greater resilience). If a product can be made most cheaply in one region or nation, manufacturing is concentrated there, reducing costs to both producers and consumers. However, if that nation were to suddenly find it impossible to make or ship the product, that product would become unavailable everywhere. Maintaining dispersed production and local inventories promotes availability under crisis conditions, though at the sacrifice of economic efficiency (and profits) in "normal" times.

From a resilience perspective one of the most vulnerable human systems today is the American transportation system. For over seventy years we've built trillions of dollars of transportation infrastructure that is completely dependent (i.e., "specialized") on affordable petroleum fuels, and we've removed or neglected most alternative methods of transport. As petroleum fuels become less affordable, the effects reverberate throughout the system.

Resilience becomes more of a priority during periods of crisis and volatility, such as the world is experiencing today. Households, towns, and regions are better prepared to endure a natural disaster such as a flood or earthquake if they have stores of food and water on hand and if their members have a range of practical self-sufficiency skills.

While the loss of economic efficiency implies trade-offs, resilience brings incidental benefits. With increased local self-sufficiency comes a shared sense of confidence in the community's ability to adapt and endure. For the foreseeable future, as global energy, finance, and transport systems become less reliable, the re-balancing of community priorities should generally weigh in favor of resilience.

Relocalization

A central strategy needed to increase societal resilience is *localization*—or, perhaps more accurately, *re*-localization. Most pre-industrial human societies produced basic necessities locally. Trade typically centered on easily transportable luxury goods. Crop failures and other disasters therefore tended to be limited in scope: if one town was devastated, others were spared because they had their own regional sources—and stores—of necessities.

Economic globalization may have begun centuries ago with the European colonization of the rest of the world, but really took hold during the past half-century with the advent of satellite communications and container ships. The goal was to maximize economic growth by exploiting efficiency gains from local specialization and global transport. In addition to driving down labor costs and yielding profits for international corporations, globalization maximized resource depletion and pollution, simplified ecosystems, and eroded local systems resilience.

As transport fuel becomes less affordable, a return to a more localized economic order is likely, if not inevitable. The market's methods of re-balancing economic organization, however, could well be brutal as global transport networks become less reliable, transport costs increase, and regions adapt to less access to goods now produced thousands of miles away.

Government planning and leadership could result in a more organized and less chaotic path of adaptation. Nations can begin now to prioritize and create incentives for the local production of food, energy, and manufactured products, and the local development of currency, governance, and culture.

Natural ecological boundaries—such as watersheds—bordered traditional societies. Bioregions defined by waterways and mountain ridges could thus become the basis for future re-localized economic and political organization.

Deliberate efforts to re-localize economies will succeed best if the benefits of localism are touted and maximized. With decentralized political organization comes greater opportunity for participation in decision-making. Regional economic organization offers a wide variety of productive local jobs. Society assumes a human scale in which individuals have a sense of being able to understand and influence the systems that govern their lives. People in locally organized societies see the immediate consequences of their production and waste disposal practices, and are therefore less likely to adopt an "out of sight, out of mind" attitude toward resource depletion and pollution. Local economic organization tends to yield art, music, stories, and literature that reflect the ecological uniqueness of place—and local culture in turn binds together individuals, families, and communities, fostering a sense of responsibility to care for one another and for the land.

Family Planning

The human demographic explosion, amplified by rapacious consumption in the overdeveloped world, is at the root of the global eco-social crisis. Virtually every environmental and social problem is worsened by overpopulation. With more mouths to feed—and freshwater becoming scarcer and topsoil eroding—global famine becomes an ever-greater likelihood. An expanding population leads to increased consumption of just about every significant resource, and thus to increasing rates of ecological damage, from deforestation to climate change.

Family planning helps avert those threats. If we want future generations to enjoy a healthy planet with wild spaces, biodiversity, abundant resources, and a livable climate we should reduce fertility now.

But family planning can do more than mitigate future resource depletion; it has direct and in some cases nearly immediate benefits. Some of those benefits are economic. For example, Ireland's declining birth rate in the 1970s is often credited as one of the factors leading to its economic boom in the '80s and '90s. China's one-child policy similarly contributed to its economic ascendancy. The mechanism? In poor societies where family size is typically large, all household income must go toward food and shelter, and none is left over for education and business formation. If the birth rate is reduced, household income is freed up to improve quality of life and economic prospects for the next generation.

Without access to contraceptives, the average woman would have 12 to 15 pregnancies in her lifetime. In contrast, women in industrial nations want, on average, only two children.

It turns out that when women are economically and, this is critical, *culturally* empowered to make decisions about their own fertility, the result is improved health for mother and children, fewer unplanned pregnancies and births, and reduced incidence of abortion. Numerous studies have shown that women who

have control over their fertility also tend to have more educational and employment opportunities, enhancing their social and economic status and improving the well-being of their families.

Beauty

Discussions about energy rarely focus on beauty. But the presence or absence of this ineffable quality offers us continual clues as to whether or not society is on a regenerative and sustainable path, or on the road to further degradation of nature's integrity.

From the time of the earliest cave paintings, human ideals of beauty have been drawn from nature. Animals, plants, rivers, oceans, and mountains all tend to trigger a psychological response describable as pleasure, awe, and wonder. The sight of a great tree or the song of a goldfinch can send poets and mystics into ecstasy, while the deep order inherent in nature inspires mathematicians and physicists.

Nature achieves its aesthetic impact largely through anarchic means. Each part appears free to follow its own inner drives, exhibiting economy, balance, color, proportion, and symmetry in the process. And all of these self-actualizing parts appear to cooperate, with multiple balancing feedback loops maintaining homeostasis within constantly shifting population levels and environmental parameters. The result is beauty.

Ugliness, by contrast, is our unpleasant aesthetic response to the perception that an underlying natural order has been corrupted and unbalanced; that something is dreadfully out of place.

Beauty is a psychological and spiritual need. We seek it everywhere, and wither without it. We need beauty not as an add-on feature to manufactured products, but as an integral aspect of our lives.

With the gradual expansion of trade—a process that began millennia ago but that quickened dramatically during the past century—beauty has increasingly become a valuable commodity. Wealthy patrons pay fortunes for rare artworks, while music, fashion, architecture, and industrial design have become multi-billion-dollar industries. Nature produces the most profound, magnificent, and nurturing examples of beauty in endless abundance, for free.

Industrialism, resulting from high rates of energy use, tends to breed ugliness. Our ears are bombarded by the noise of automobiles and trucks to the point that we can scarcely hear birdsong. The visual blight of highways, strip malls, and box stores obscures natural vistas. With industrial-scale production of buildings, we have adopted standardized materials produced globally to substitute for local, natural materials that fit with their surroundings. But industrialism does not just replace and obscure natural beauty—it actively destroys it, gobbling up rivers and forests to provide resources for production and consumption.

Large-scale energy production—whether from coalmines and power plants, oil derricks and refineries, or massive wind and solar installations—comes at a cost of beauty. While some energy sources are inherently uglier than others, even the most benign intrudes, dominates, and depletes if scaled up to provide energy in the quantities currently used in highly industrialized nations.

The aesthetic impact of industrial processes can be mitigated somewhat with better design practices. But the surest path to restoring the beauty of nature is to reduce the scale of human population and per-capita production and consumption. Returning to a sustainable way of life need not be thought of as sacrifice; instead it can be seen as an opportunity to increase aesthetic pleasure and the spiritual nourishment that comes from living in the midst of incalculable beauty.

Biodiversity

The family of life on Earth is very large: more than a million species have been identified and formally described by taxonomists, and estimates of the total number of species on the planet range between three and one hundred million. We humans depend for our very existence on this web of life of which we are a part. Indeed, it is part of us: each human is inhabited by hundreds of species of microbes that enable digestion and other basic functions. Yet through our species' appropriation and destruction of natural habitat we are shredding microbial, forest, prairie, oceanic, riparian, desert, and other ecosystems. Habitat loss, overharvesting, climate change, and other results of human numbers and behavior endanger untold thousands of species with extinction.

Extinction is nothing new: it is an essential part of the process of evolution. Throughout the billions of years of life's history, life forms have appeared, persisted for thousands or millions of years, and vanished, usually individually but occasionally in convulsive mass events triggered by geological or astrophysical phenomena. There were five ancient extinction events so catastrophic that 50 to 95 percent of all species died out.

Today humans are bringing about the sixth mass extinction in the history of life on Earth. While the normal rate of extinction is about one in a million species per year, the extinction rate today is roughly 1000 times that. According to recent studies, one in five plant species faces extinction as a result of climate change, deforestation, and urban growth. One of every eight bird species will likely be extinct by the end of this century, while one third of amphibian and one quarter of mammal species are threatened.

As species disappear, we are only beginning to understand what we are losing. A recent UN study determined that businesses and insurance companies now see biodiversity loss as presenting a greater risk of financial loss than terrorism—a problem that governments currently spend hundreds of billions of dollars per year to contain or prevent.

Non-human species perform ecosystem services that only indirectly benefit our kind, but in ways that often turn out to be crucial. Phytoplankton, for example, are not a direct food source for people, but comprise the base of oceanic food chains, in addition to supplying half of the oxygen produced each year by nature. The abundance of plankton in the world's oceans has declined 40 percent since 1950, according to a recent study, for reasons not entirely clear. This is one of the main explanations for a gradual decline in atmospheric oxygen levels recorded worldwide.

Efforts to determine a price for the world's environmental assets have concluded that the annual destruction of rainforests alone entails an ultimate cost to society of $4.5 trillion—$650 for each person on the planet. Many species have existing or

potential economically significant uses, but the value of biodiversity transcends economics: the spiritual and psychological benefits to humans of interaction with other species are profound.

Most fundamentally, however, non-human species have intrinsic value. Shaped by the same forces that produced humanity, our kin in the community of life exist for their own sake, not for the pleasure or profit of people. It is the greatest moral blot, the greatest shame on our species, for our actions to be driving other life forms into the endless night of extinction.

Want to add to this list? We hope so! Please add your voice and **share what you stand for, in the comments online**.

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