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Relocating Energy in the Social Commons

Ideas for a Sustainable Energy Utility

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Climate change, rising energy costs, and other dilemmas raise the prospect for major change in energy-ecology-society relations. Two prominent proposals for change include: a nuclear power renaissance; and mega-scale renewable energy development. Both suggest that modern society will receive a rising stream of less CO2-rich kilowatt-hours, so that increased energy consumption and economic growth can continue. The article doubts these CO2 claims and finds both options lead to deepening unsustainability and environmental injustice. A third approach is proposed. A new institutional and community strategy called a Sustainability Energy Utility. The SEU looks to reduce energy use and seeks to support remaining energy needs by community-scale renewables. To accomplish deep energy change, the authors show how an SEU can move society from an energy commodity to energy commons regime. Commonwealth economy and community trusts are key means to significant change: a future commons is offered as the more appropriate strategy.

Keywords: *energy policy; energy commons; sustainable energy; commonwealth; ecological justice*

In an October, 2008 *New York Times* article, journalist John Tierney argued that recent discussions about energy futures ". . . have a certain vintage quality. They've revived that classic debate: the hard path versus the soft path" (Tierney, 2008). His reference to Amory Lovins' dichotomy (1977) is important. Part of Lovins' criticism of hard path energy strategies (oil, gas, coal, nuclear power) cited the likelihood of rising costs, adverse environmental impacts, safety concerns, and weapons proliferation. His and others' predictions about the safety, cost, and polluting effects of fossil fuels have largely proved accurate. But a central feature of the soft path alternative was that it envisioned a nonnuclear future.[1] Citing a recent pronuclear power book by Tucker (2008) advocating a *rebranding* strategy for the technology, Tierney rejects the nonnuclear idea, echoing instead the proposal of many in the current energy debate for society to reconsider this "proven technology that doesn't spew carbon dioxide into the atmosphere" (Tierney, 2008).

Interestingly, Tierney (and all but one of the article's 114 commenters) missed a key aspect of the soft path critique. Lovins' (1977) soft path calls for the "rapid development of renewable energy sources matched in scale and in energy quality to end use needs" (p. 25) By design, hard path systems supply, rather than match, needs and intentionally disregard social definitions of scale and quality in favor of technical and, when it suits, certain environmental factors. In this way, hard path strategies ignore what soft paths insist on—a significant rethinking of the *social relationship* to energy (Byrne & Toly, 2006).

Whether the response to our energy and climate challenges should be nuclear or some other option, contemporary debates about these issues have almost entirely focused on them as technology questions. With a looming climate crisis caused in large part by the energy sector,[2] one might hope that social concerns would rival technical ones. But so far, this has not been the case. Instead, technology fixes of various kinds appear to have the momentum. An unexpected ally supporting technology-based answers has emerged in middle class environmentalism. Backed by the Sierra Club and others who have partnered with renewable energy business lobbies such as the American Wind Energy Association (AWEA), mainstream environmentalism is calling for a renewable energy version of the Manhattan Project (see, e.g., AWEA, 2008; Wilson,

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2008). Although the choice of technology differs, the prescriptions of Tierney and large environmental organizations agree on several points. There is consensus that a quick end to modern use of fossil fuels is necessary; the sooner, the better. As a business proposal, this naturally spells good news for the two industries. A second shared belief is that the new energy order must represent a dramatic shift to electricity, powering everything from home heating to factories and vehicles with electrons. A third component of the shared ideology is to construct the new Manhattan Project on the foundations of the modern electric grid. Ubiquitous, sophisticated, and, above all, centralized in architecture from technical design to management, the grid represents our best hope, according to the renewable energy and nuclear power proponents, for speedy, large action. Other strategies are thought to be impractical and costly if they require a different infrastructure; time and money are in short supply, precluding a solution before environmental and, now, economic calamity hits.

As the two industries vie for primacy in creating a *green* energy system, many see a cause for celebration. Whoever wins, a low-carbon future sustained by *green jobs* and a *green economy* of consumption and production awaits. Indeed, a breathtaking confidence bubbles forth as the global financial meltdown *and* ecosystem collapse are both forecast to be overcome. In the hearts and minds of enthusiasts, there can be no excuse for inaction (compare AWEA, 2008 and Tucker, 2008).

For all the celebration, though, there is a disconcerting feature: the energy revolution summoned by the two camps appears to proceed without serious social change. The hard path preference to supply energy rather than transform society-energy relations informs the new vision. Curiously, the leaders of the revolt are to be the same actors who built the modern (now disgraced) energy scheme. Huge electric utilities, megatechnical companies such as Siemens and General Electric (making nuclear plants and giant wind turbines), and finance mammoths like Goldman Sachs and J. P. Morgan Stanley (who have been equally prepared to underwrite nuclear and renewable energy monuments as long as the dollar amounts are in the billions) are to save the planet, maintain economic growth, and, of course, make money.

The prospect of yet another corporate-led technology revolution (alongside the "dot.com," "information highway," "biotechnology," and "microelectronic" revolutions of recent times), in this instance to decarbonize the energy sector, is welcomed by some and skeptically viewed by others. Still, momentum rests with the oddly allied proponents of the new energy order. Why? Embedded in the urgent call-to-action is a shared, near-desperate sense that without a "Manhattan Project for 2009" (Wilson, 2008), collapse is certain. One might think this would lead to an expectation of social sacrifice. However, the middle class roots of the call-to-action work against such a result, shifting attention instead to technology as the source of salvation. As discussed below, the modern energy system gained and has retained political power through this promise.

In combination, a curious mix of social fatalism and technological positivism define the current aspiration for an energy revolution and its search for *the answer* that can avert ruin . . . and yet also forego major social change.

"Living Well": Growth Without End

Since the industrial revolution, social progress has been measured by material affluence. In turn, assuring wealth and its increase has been the responsibility of a set of institutions capable of planning for and (hopefully) delivering a boundless frontier of expanding production and consumption. Indeed, *living well* in modern times means an existence assured of a free and constantly rising flow of goods and services delivered conveniently and, ideally, at low cost.[3] Perpetual acts of buying and selling adorn daily life as moderns dedicate time and imagination to shopping at levels unknown in human history. This commitment to the search for and absorption of *more* represents a "cornucopian" predisposition embedded in the micro- to macro-scales of modern life—from the personality of the modern individual to the culture and political economy of modern society (Byrne & Yun, 1999).

Making this feature of modern life work in real time is no easy task. It requires unending engineered change in products and production and in parallel, continual change in consumption preferences designed by advertising. Production and marketing techniques shape and serve, on a grand scale, an ethos of unconstrained producing, shopping, and buying. Planned obsolescence is a necessary practice, applied to all goods, from toys to automobiles to computers to buildings, and even to social relationships and personalities;[4] all have designed shelf lives when they are to be discarded for new and improved versions. In this manner, market demand grows synergistically with the modern hum of progress. More than 50 years ago, a market analyst could readily describe the economic and technological logic underpinning modern success (Lebow, 1955).

> Our enormously productive economy demands that we make consumption a way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfaction, our ego satisfaction, in consumption. We need things consumed, burned up, replaced, and discarded at an ever-increasing rate. (p. 5)

The lubricant for successful obsolescence is a finance system able to supply (and profit from) a wide range of credit facilities from installment buying to capitalized production. These facilities ensure that buying can keep up with producing, even if there is not enough money ready at hand.[5] Growth without end is, in this way, institutionalized as a permanent goal of modern society.

By the last quarter of the 20th century, the complex system of ceaseless growth had proved to be so successful that moderns could reason that the reality manufactured by human institutions is palpably superior to the one embodied in natural existence.

> From the thermostatically controlled air-conditioned, centrally heated and equably humidified colonial farmhouses in the city, we may bowl along limited access highways in our private air-conditioned maximum visibility bubbles at 60 miles per hour, accompanied by a full orchestra, and arrive in the parking decks of our multi-deck air conditioned, pedestrian/traffic segregated urban centers, for work, education, shopping or culture, without ever venturing into the open air! (Lewis, 1969, p. 311)

A life involving less and less interaction with the natural world has quickly become a hallmark of *living well* as nearly 90% of the 24-hour day is now spent indoors (Fisk, 2000). Norms of "efficiency, rationality, optimizing and 'time-saving' behavior" justify the organization of human life beyond the confines of suboptimal nature (O'Hara & Stagl, 2001, p. 540). Separation from the natural world is facilitated and reinforced by technological advancements which collapse the boundaries of space and time enabling social transactions without natural limitation. In fact, the middle and upper classes of wealthy societies have little or no need to venture *outside*. The resulting social alienation from nature leaves mostly the poor to witness the environmental consequences of endless growth. Only their livelihoods are immediately and significantly threatened by the "normal pollution" of modernity (see Byrne, Glover, & Martinez, 2002). Until pictures, video, and text on environmental harm are found online, the middle class cannot *experience* it. And this is (partly) why middle class environmentalism seeks redress in technological positivism. The everyday of indoor life is protected and nourished by technology; so why shouldn't this work for the outdoors as well?

Energy Obesity

The commodification of human life and nature are the foundations of the modern thrust. Together, these forces changed the direction of human and natural history, creating the distinct era in which life, in all forms, now transpires.

But the modern era needed and continues to need a special ingredient—energy. This was recently confirmed by the chairman of the U.S. Federal Reserve Board (Bernanke, 2006).

> At the most basic level, oil and natural gas are just primary commodities, like tin, rubber, or iron ore. Yet energy commodities are special, in part because they are critical inputs to a very wide variety of production processes of modern economies. They provide the fuel that drives our transportation system, heats our homes and offices, and powers our factories.

For modern life, energy is the one commodity always needed to make and use anything. In this respect, energy supply is what enables the pursuit of boundless growth; because of modern energy, we can aspire to produce and possess everything.

The modern energy system epitomizes its age. Lovins and others roundly criticized its evolution on the ground that its scale and volume are poorly matched to the often much smaller scales and volumes of energy use. But the criticism misses a key point: the mismatch is, in fact, by design; it is essential for modern society to reproduce itself. After all, the potential for incessant growth can only be exploited if an ever-present capacity to fuel such growth exists. Having *just enough* energy presumes the nonsensical idea of *just enough* growth; there is never enough growth in the modern era.

Lewis Mumford's thoughtful, in-depth analysis (1934, 1961, and 1970) explains why energy is special in our time. Modern energy systems only come in *extra large* sizes because "quantitative production has become, for our mass-minded contemporaries, the only imperative goal: they value quantification without qualification" (Mumford, 1961, p. 57). Volume and scale of output are the standard bearers of *serious* energy options because these are the shared metrics of the *alliance of science, capitalism, and carbon power*. All three run on the principle that *more is better*; more knowledge, more power, and more commodities are signs of progress. As a Mumford contemporary has observed, excessive accumulation of energy sustains the modern "social metabolism" (Martinez-Alier, 2006):

> Energy is not a "sector" of the economy. On the contrary, the market economy as a whole is only one part of the human ecology that must be characterized in terms of the human influence on the flows of energy and materials and interference in the biogeochemical cycles (for instance, in the carbon cycle, with the enhanced greenhouse effect). (p. 37, 55)

The wealth-energy association and its concomitant environmental needs has produced a feedback loop: the physical processes that produce material wealth are reliant on energy regimes which foster continued growth of output; increased growth in resource use and consumptive demand (through planned obsolescence and advertising) create and reinforce social norms and obligations to increase consumption; increased demand encourages expansion of the physical processes that produce material wealth; and so on. Perpetuation of this self-sealing logic is a defining characteristic of the modern energy regime, with little distinction between public and private operations. For example, critiques of the centralized energy monopolies and oligopolies from "big oil" to "giant" electric utilities (Pinchot & Ettinger, 1925; Yergin, 1991) were answered by public replicas of the large, complex, and hierarchically managed energy systems: the Tennessee Valley Authority, the Bonneville Power Administration, and the Rural Electrification Administration. These public programs reinforce, rather than oppose, the structures of energy obesity.

Much like biophysical obesity, energy obesity is driven by the need to expand without regard to quality of life. Its motive is the commodification of human life and the environment so that growth without end can be served. Thus, *living well* rests, in the modern case, on the antihealth ideal of energy obesity, and climate change represents, in scale, its most extensive threat to life in all forms.[5]

The Abundant, Carbon-Free Energy Machine[6]

With obesity as the energy system's core design principle, acceptable solutions to the *necessarily* ever-present condition of energy shortfall is to search for bigger and more machines. Technologies that can deliver energy obesity, namely, "abundant energy machines" (Byrne & Rich, 1986), have priority in modern life. It is important to reiterate that this priority is not dependent on empirical conditions of shortfall. Rather, a forecast of future insufficiency of present machine capacity is all that is needed. Because such a forecast is always available in a society seeking growth without end, the demand for bigger and more abundant energy machines is relentless.

In a sense, the risk of climate change is the earned problem of societies dependent on energy obesity. With energy production and use as the source of over 75% of the greenhouse gases contributing to climate change, the oxymoron of sustainable growth (Daly, 1990) has been demonstrated in an atmosphere saturated with the consequences of energy obesity.

And so, the search is on for a remedy of the problem of climate change. Although the challenge has stimulated a measure of rethinking of the underlying paradigm, presently two of the most warmly embraced options are solidly *inside the box*—nuclear power and industrial scale renewable energy.[7] Both share the qualities of titan technology: they are very large in energy terms and in the scales of investment they require; they reinforce the centralist architecture of the modern energy system, adding high doses of supply to feed the system requirements of continuously growing demand; and both options are predicated on corporatist, technocratic politics that assigns power to the values of the energy system and its needs, with the expectation that society's members will adapt.[8]

Regarding nonhuman nature, the titan technology proposals commonly share an interest in power generation without carbon emissions. Yet both are also complicit in a program of reengineering the atmosphere to ensure its *efficiency* in relation to the modern project (see Byrne, et al., 2004; Byrne & Glover, 2005; Byrne & Yun, 1999). In order to support endless growth, the ecological footprint of society will necessarily expand. To guarantee that the consequences of this expansion are not odious either to modernism or nature, their interaction must undergo new management that is global in scale and technically precise in character. Neither too little nor too much carbon is the system mandate. Nature, like society, must be designed to sustain modernism, and nuclear power and industrial scale renewable furnish potent tools for the new management scheme.

NuclearPower—"Extra-Large" Energy Technology

When the United States began its post–World War II search for a new abundant energy machine, it is important to note that there was no imminent shortage of electricity supply. War conditions had led to a large increase in power plant construction to meet the needs of the weapons industry. As demand from the weapons industry receded, it would have taken decades before significant additions would have been required. However, national and state policy preempted this pathway by two actions. First, with the support of the electric utility industry (who stood to profit handsomely), the national and state regulatory apparatus promoted so called declining block rates, which reward growth in electricity with lower unit prices (Hirsh, 1989). Additionally, the real price of electricity was encouraged to fall annually through subsidies (Hirsh, 1989; Nye, 1999). Technology improvements played a role as well, but R&D investments which brought them into being were significantly influenced by policy guarantees of fast-growing demand (Byrne & Rich, 1986; Hirsh, 1989). Policy—not demand per se—created favorable conditions for electricity demand to rise quickly. Of course, modern business and the modern consumer welcomed and took advantage of the opportunity. Nuclear power would play a pivotal role in this trend.

In the 1950s, when preparations for nuclear power development were laid, it was the national policy decision to civilianize the nuclear technology industry that mattered far more than growing electricity demand. With considerable coal reserves and improving boiler and other technologies related to electricity generation, the U.S. electricity industry had no need to create a new power plant. And, in fact, the industry did not create what one of nuclear power's American designers called "a marvelous new kind of fire" (Weinberg, 1972. p. 28).

Instead, a concerted 30-year, nationally funded R&D program, in combination with a portfolio of laws and rules favoring its development and use, created the most abundant energy machine in human history—the fleet of *extra large* nuclear power plants that would dominate the U.S. utility sector. Indeed, no technical idea had ever received more R&D and subsidy attention (Lovins, 1977; Martinez, 1990). Dwarfing competitors in capacity and generation volume by a factor of 1.5 to 2.0, the nuclear giants were technically impressive. Yet the utility industry hesitated for nearly two decades to plug them in. As a result, the initial versions of this titan technology were bought and paid for by the American taxpayer and turned over to a reluctant industry to operate. Although heralded as "too cheap to meter" (Strauss, 1954), lift-off for the nuclear energy era was, at times, halting, as utility executives worried about the "what ifs" of nuclear plant accidents and disposal of highly hazardous materials.

The industry's fears proved correct when Three Mile Island Unit 2 suffered a partial core meltdown on March 28, 1979, after plant personnel failed to halt the loss of coolant in the containment vessel. The accident hobbled American development of the technology as no new plants ordered after the accident have been completed. The financial meltdown in 1983 of the Washington Public Power Supply System's effort to build five nuclear plants, resulting in a default on $7.0 billion in bonds and nearly $24.0 billion in associated interest (Byrne & Hoffman, 1996), closed the first nuclear era for the United States.

International pursuit of this option continued until 1986, when, 4 weeks after the editors of *The Economist* declared nuclear plants to be as "safe as chocolate factories," an explosion at Chernobyl No. 4 reactor triggered a global collapse of the industry. Only a handful of countries have continued to invest in the "revolution" that was originally depicted as "the solution to one of mankind's profoundest shortages" (Weinberg, 1956, p. 299).

This is slated to change as a Nuclear Renaissance is planned in and beyond the United States. This time, though, the nuclear power solution is not only to guarantee economic growth but to do so in a carbon-constrained world. The key promise of rebranded nuclear power is that it (and, possibly, it alone) allows humanity to remain in perpetual growth mode while halting the prospect of climate change. Conceiving nuclear power as a renewable source, Huber and Mills (2005) forecast "a nuclear furnace that . . . shines as bright as the sun itself" (p. 180). Extolling "the virtue of waste," these authors diagnose the problem of modernity in classical terms—civilization needs to assure ceaseless growth through technological advance. Conservation is depicted as defeatist, a perspective that accords precisely with the energy obesity regime of the last 150 years. The approach is reminiscent of President Nixon's observation (1973):

> We use 30 percent of all the energy . . . That isn't bad; that is good. That means that we are the richest, strongest, people in the world and that we have the highest standard of living in the world. That is why we need so much energy and may it always be that way.

Thirty years later, Huber and Mills could not agree more. Their proposal is for a hypermodern energy solution—more, indeed much more, not less, energy, especially in the form of nuclear power, in order for a super-charged prosperity to be enjoyed.

Nuclear power's proponents cast climate change as a grave threat to modernity. If it is not addressed aggressively, societies might cut energy levels and send society hurdling backward into, literally, the dark ages (Huber & Mills, 2005). Responding to global warming will reverse centuries of progress unless a new furnace is designed which reduces carbon emissions while also accelerating global economic activity. In this formula, it is the fear of social retrogression, rather than environmental protection per se, which motivates the argument. When concerns are raised about the social and environmental consequences of *living well* with nuclear power, a dismissive response often follows: "if you believe global warming is a planetary crisis that must be addressed immediately, should you really be obsessing about hypothetical dangers near one mountain in A.D. 1,000,000?" (Tierney, 2008).

Others acknowledge problems of plant safety, weapons proliferation, and radioactive waste storage, but ultimately adopt what they believe is a necessary policy position in light of global warming. This includes leading environmentalists. Thus, a senior attorney of a large American environmental organization, the National Resources Defense Council, explains that once concerns about plant safety and other matters are addressed, "there could be a greater role for commercial nuclear power that we would support" (Geoffrey Fettus quoted in Little, 2005). The Environmental Defense Fund (U.S.) offers that "we must thoroughly consider every low-carbon option for generating power" and calls for a "rigorous" and expanded federal nuclear research program (2008). A trustee of the British Friends of the Earth is more direct: "I have now come to the conclusion that the solution [to global warming] is to make more use of nuclear energy" (Hugh Montefiore quoted in Little, 2006). British biophysicist James Lovelock (2004), author of the Gaia hypothesis, proclaims that "nuclear power is the only green solution" for a "civilization in imminent danger". But, perhaps the strongest endorsement by a leading environmentalist for a nuclear future is provided by Greenpeace cofounder Patrick Moore (2006), who admonishes critics of the technology, proclaiming that "if we banned everything that can be used to kill people, we would never have harnessed fire."[9] He quit Greenpeace because of its unwillingness to embrace nuclear power when the world is in the midst of its greatest environmental crisis.

In sum, the threat of climate change is leading a growing number of activists and experts to justify restarting nuclear power development. A key element of the effort is to paint nuclear power, once more, as a scientifically sound approach and, in this way, to harness modernity's high regard for science and engineering, calling for trust in them to solve any outstanding problems. The issue, for adherents of the nuclear power promise is the one that the first chairman of the U.S. Atomic Energy Commission (1949) pronounced: "atomic energy [is] not simply a search for new energy, but more significantly a beginning of human history in which . . . faith in [scientific] knowledge can vitalize man's whole life" (p. 145). Interestingly, climate change—a problem recognizable only through complex scientific modeling and measurements—is defined as the authoritative reason for a Nuclear Renaissance, using a technology invented by particle physics.

Green Titans

The threat of global warming has propelled renewable energy from policy Siberia to policy priority. Its impressive rise to prominence has been swift and, also, puzzling. While renewables lack the industrial heft of nuclear power, they nevertheless have left the engineering garage and are now courted in the boardrooms of big industry and big finance. Their recent success has been aptly described as a passage "from love-ins to logos" (Glover, 2006). Power and profit projections once reserved solely for the globally integrated fossil fuel system now extend to include renewable energy markets as well. Industry proponents and market analysts project billions of dollars in growth in the renewable energy market over the next decade. Wave, wind, solar, and hydropower are all considered essential technologies to address energy demand in a carbon-constrained world.

Reminiscent of the institutional alliances that led to the creation of the industrial mega-energy systems that have dominated modernity, the call for public and private investment in renewable energy has the political ring and economic ka-ching normally reserved for the overlords of the modern energy scheme.

The corporate renewable energy movement has studied the tactics of its competitors and adapted them to their needs. Appropriating the symbols of technology triumphalism of nuclear power (Byrne, Glover, & Alroe, 2006, p. 16-17), corporate renewable energy has launched a campaign for, fittingly, a "Manhattan Project" that can vault Big Wind and other renewables with extra-large size ambitions to a new level (Wilson, 2008). The new order is visualized with imagery suggesting the benign nature of giant wind turbines in pastoral settings. To secure the support of technologically minded moderns, these same turbines are applauded for their complexity and scale—far larger than the Statue of Liberty, built with the exotic chemistry of composites, and aerodynamically designed with highly sophisticated computer models, the technology readily earns *hi-tech* status (Parfit, 2005).

Contesting the imagery is difficult. Big Wind resisters cite noise, bird mortality, and the industrialization of heretofore largely untrammeled land and seascapes in their arguments against Big Wind farms. But supporters counter with scientific evidence offered by experts ranging from ornithologists to acoustics specialists and underscore the larger threat of global warming in defense of these carbon-free alternatives. Importantly, the green energy case pits one set of environmental values against another, and depends on the priority of climate change to win out. But equally important, the environmental case for green energy fails to challenge the affluence-based development path secured by earlier energy systems. Rather than questioning the underlying premise of modern society to produce and consume without constraint, contemporary green energy advocates warmly embrace creating "bigger and more complex machines to spur and sate an endlessly increasing world energy demand" (Byrne & Toly, 2006, p. 3) Marketing slogans originally justifying fossil energy-based obesity can be revamped to suit the new green energy agenda: *choosier mothers choose renewables* and *better living through green energy* will motivate the postclimate change consumer to do the right thing. Yet the green energy agenda will not change the cause of the global warming threat (and so many other environmental harms), namely, unlimited consumption and production. In this sense, large renewable energy systems, touted as saviors of the planet, actually appear mainly to save modernity.

A final problem specific to an extra-large green energy project is the distinctive environmental alienation it can produce. The march of commodification is spurred by the green titans as they seek to enter historic commons areas such as mountain passes, pasture lands, coastal areas, and the oceans, in order to collect renewable energy. Although it is not possible to formally privatize the wind or solar radiation (for example), the extensive technological lattices created to harvest renewable energy on a grand scale functionally preempt commons management of these resources.[10] Previous efforts to harness the kinetic energy of flowing waters should have taught the designers of the mega-green energy program and their environmental allies that environmental and social effects will be massive and will preempt commons-based, society-nature relations. Instead of learning this lesson, the technophilic awe that inspired earlier energy obesity now emboldens efforts to tame the winds, waters, and sunlight—the final frontiers of he society-nature commons—all to serve the revised modern ideal of endless, but low- to no- carbon emitting, economic growth.

Paradigm Shift

Shedding the institutions that created the prospect of climate change will not happen on the watch of the *green titans* or *extra large nuclear power*. The modern cornucopian political economy fueled by abundant, carbon-free energy machines will, in fact, risk the possibility of climate change continually because of the core properties of the modern institutional design.

Although the abundant energy machine originated and matured in the United States and industrial Europe, the logic of unending growth built into the modern model has promoted its global spread. Today, both extra-large nuclear power and industrial-scale renewables are at the forefront of the trillion dollar clean energy technology development and transfer process envisioned for the globe (International Energy Agency, 2006). Nuclear energy is seen as offering unlimited potential for rapid development in India and China, while large-scale renewables seamlessly fit into existing international financial aid schemes. A burgeoning renewables industry boasts economic opportunities in standardization and certification for delivering green titans to developing countries.

If institutional change is to occur, if energy-society relations are to be transformed, and if the threat of global warming is to be earnestly addressed, we will have to design and experiment with alternatives other than these. Given the global character of the challenge, *cookie cutter* counter-strategies are certain to fail. Often, *outside the box* alternatives may not be sensible in the modern context. Like a paradigm shift, we need ideas, and actions guided by them, which fail in one context (here, specifically, the context of energy obesity) in order hopefully to support the appearance of a new context. The concept and practice of a *sustainable energy utility* is offered in this spirit.[11]

The sustainable energy utility (SEU) involves the creation of an institution with the explicit purpose of enabling communities to reduce and eventually eliminate use of obese energy resources and reliance on obese energy organizations. It is formed as a nonprofit organization to support commons energy development and management. Unlike its for-profit contemporaries, it has no financial or other interest in commodification of energy, ecological, or social relations; its success lies wholly in the creation of shared benefits and responsibilities. The SEU is not a panacea nor is it a blueprint for fixing our energy-carbon problems. It is a strategy to change energy-ecology-society relations. It may not work, but we believe it is worth the effort to invent and pursue the possibility.

There should be little doubt about the difficulty of the task. Regimes develop through the interplay of technology and society over time, rather than through prescribed programs. They alter history and then seek to prevent its change, except in ways that bolster regime power. Of specific importance here, obese utilities will not simply cede political and economic success to an antithetical institution—the SEU. That is why change is so hard to realize. Shifting a society towards a new energy regime requires diverse actors working in tandem, across all areas of regime influence. Economic models, political will, social norm development, all these things must be shifted, rather than pulled, from the current paradigm.

The SEU constructs energy–ecology-society relations as phenomena of a commons governance regime. It explicitly reframes the preeminent obese energy regime organization—the energy utility—in the antithetical context of using less energy. And, when energy use is needed, it relies on renewable sources available to and therefore governable by the community of users (rather than the titan technology approach of governance by producers). In contrast to the cornucopian strategy of expanding inputs in an effort to endlessly feed the obese regime, the SEU focuses on techniques and social arrangements which can serve the aims of sustainability and equity. It combines political and economic change for the purpose of building a postmodern energy commons; that is, a form of political economy that relies on commons, rather than commodity, relations for its evolution. Specifically, it uses the ideas of a commonwealth economy and a community trust to achieve the goal of postmodern energy sustainability. The meanings of *commonwealth*, *community trust*, and *commons*, relevant to a SEU, are explored below.

Commonwealth

To realize this antithetical context, the SEU creates the conditions for a commonwealth economy that can prosper only by investing in the sustainability of a community and its lifeweb. The commonwealth arises from an ongoing mutual promise to share the costs of building an energy scheme that uses less; and, when use is desired, it supplies energy from renewable sources organized locally by and for the community. The economic benefits of needing less to fulfill social purposes can be directly valorized and shared in the form of lower community costs deriving from less use. In this manner, shared benefits pay for shared costs. The choice of renewable supplies enables preservation of local resources and ecosystem services. By paying together to promote sustainability, collective gains ensue: from improved public health and biodiversity to recovered natural experience. Using the same basic method as the case of conservation, the renewable energy case borrows from the benefits it brings in order to build an enduring commonwealth.

The infrastructure of energy sustainability is thereby built practically, in the everyday of SEU shared savings/shared benefits transactions. The utility in the new regime invests in less use, for example, by funding the entire difference in community costs between waste and conservation. If it costs more to conserve (which is not always the case, by any means), the community's utility (again in contrast to the producers' utility of the obese energy regime) draws from the commonwealth, composed of pledged community shared future savings, to cover the higher cost. Investments in renewable resources are likewise drawn from the commonwealth, which in this case can be in the form of pledged community-wide obligations to purchase *renewable attributes*.

In both instances of commonwealth investment—conservation and renewability—a community can forego the costs of endlessly building abundant energy machines (power plants, oil, coal, and gas extraction facilities, refineries, distribution networks, etc.), which harm human and ecosystem health. The community is also able to avoid endless construction of infrastructures of remediation and restoration (i.e., human and biosphere health care systems) that societies with obese utilities require to cope with the consequences of energy obesity. Even modernity's accountants and investors recognize the growing costliness of the obese energy infrastructure and advise the wealthy to practice at least a measure of moderation (see, e.g., McKinsey Global Institute, 2007; Stern, 2007).

The SEU provides a vehicle for moving away from the economics of obesity and toward those of sustainability. Although it will take time to evolve, the SEU commonwealth eventually makes it possible to end accommodation of the obese utility altogether, assigning its existence to the history books.

Community Trust

The SEU emphasizes governance by community rather than technocratic institutions and values. Shared use of and collective responsibility for the health of renewable energy and other ecosystems defines the politics of the new energy commons. This definition conforms with two critical elements of a commons regime. First, the SEU offers a means by which energy decisions are based on streams of common benefits for the community; secondly, the SEU emphasizes the social governance of energy in order to protect the community's interest rather than the interests of energy producers (as obese energy utilities are designed to do). The SEU can recalibrate society's energy diet and balance energy consumption to serve qualities of life sought by communities. In this way, community values, instead of commodity values, determine policy direction.

A community using an SEU to govern energy-society relations evolves differently from its modern counterpart. It must earn the trust of members that sharing costs will improve their collective condition; that borrowing from future benefits will result in equitable and sustainable future development. Unlike the producer's utility, the SEU operates without mandate for social participation. Members decide whether to enter the sustainability space of the SEU. In essence, an SEU is at the mercy of its community's judgment. This naturally leads to an emphasis on social, not technical or economic, evaluation of the energy regime. An SEU confronts the energy challenge by embedding decision making in the community itself. Uses of the commonwealth are decided by community members, who govern the SEU in the institutional sense of setting goals, monitoring performance, and enforcing rules. But there is also the personal and interpersonal sense of governance in which the meaning and practice of sustainability and equity are created and continually revised. A relationship based on reciprocity is made available in which the interest of individual and community are symbiotic, not competitive, and embodies community responsibility for members individually and collectively. Members' efforts to secure commonwealth commitments lead to the interplay of the institution, the individual and groups around practical problems of how to use less and how to match social needs and renewable energy availability. When this interplay expands sustainability and equity as practical outcomes, interest in contributing to the SEU grows. When the reverse occurs, that is, when sustainability and equity are threatened, the SEU loses the trust of the community and, therewith, its ability to remain viable as an institution.

A commons-based politics is by no means without conflict. Differences inevitably arise and must be confronted. But in the case of the obese energy regime, the remedy is always cornucopian: *more* will, eventually, remove the conflict. Of course, such a remedy destines modern society to travel unsustainably and inequitably through time. In this regard, the difference between the politics of the commons and that of cornucopia is not the relative presence or absence of conflict, but the presence or absence of community trust. When conflict arises in the case of the SEU, resolution must come from a restoration of trust through sharing of resources and responsibilities.

> Regardless of the specific characteristics of the shared resources, commons regimes must address the relation between different aspects of common use—different users and usages can conflict in various ways . . . Although the allocation of natural resources usually evokes concepts of conflict, the history of commons finds an expression of social cooperation in a multitude of forms for the successful resolution of these problems. (Byrne et al., 2006. p. 71)

In this way, the SEU functions politically as a community trust. Sustainability and equity can be expected because the SEU must rely on cooperation and resource sharing to be viable on an ongoing basis. In contrast, the obese energy regime governs without trust, committing society to a treadmill of *more* to overcome conflict. Limits to growth are a modern *non sequitur*—ending growth in energy use and supply is to be feared in the era of energy obesity as risking the prospect of falling behind.

Acting on the fear of falling behind, the cornucopian politics of modernity can only promise a politics of unsustainability and inequity in energy and climate affairs.[12] Communities are pitted against each other to produce better, cheaper abundant energy machines; quantification without qualification. The SEU can travel a different path in which community success enhances the health of the lifeweb, locally and regionally. Built on a politics of cooperation found in commons practice, the SEU prospers by the expansion of shared benefits and responsibilities, in contrast to the cornucopian politics of destructive action to make way for growth, with communities "in the way" treated as the necessary victims of progress.

A Note on the Idea of the Commons

A tragedy occurred in the latter half of the 20th century when moderns tried to understand the idea of the commons. Garret Hardin began the process in a famous paper whose title mourned the result of social use of the idea: he was certain that growing environmental harm could be explained by its use and he offered a gloomy forecast if we did not quickly replace commons practice with modern practice (see Hardin, 1968). His paper conceived the commons as a natural resource bundle or physical area, and commons management was defined as the informal social scheme evolving out of growth in and greater proximity of human settlements to one another, to govern access and use of resources or environmental space. He regarded the scheme as leading to virtually unregulated access and use because enforcement, due to the informality of the scheme, was weak. Moreover, there would be little interest in enforcement of restrictions on access or use for environmental reasons. The fate of commons management, he concluded, would be environmental plunder. Only by the conversion of commons areas to privatized commodities or publicly regulated zones with strong economic incentives and penalties to guide access and use, could tragedy be averted.

A large body of research literature formed around the proposition, most of it confirming that commons management is an out-of-date idea. However, in our view, the tragedy lies not in the commons, but in the modern idea of it and of the human personality that moderns regard as *normal* or, at least, *practical*. The tragedy of the commons is conceived by Hardin and others from the perspective of a cornucopian political economy in which profit, unlimited production, and unstoppable demands for higher and higher per capita material wealth dominate nature-society relations. In this regard, the argument assumes a reality of commodity-based relations. The personality that would experience nature through this lens is similarly assigned standing as *real*. Indeed, it is presupposed that human beings who strive for wealth without limit are *rational*, leading many researchers to search for solutions to the tragedy by using sophisticated *rational actor* models.

Yet when checked in real time, many report the existence of commons management schemes built around cooperative arrangements that work (e.g., Byrne & Glover, 2002; *The Ecologist*, 1993; Ostrom et al., 2003). The differences are telling about why the tragedy may be conceptual, rather than social. First, empirical studies regarding the tragedy are mixed in their findings (Ostrom et al., 2003). This means that the actuality of overexploitation of nature may not significantly reside with commons management. But perhaps more important, a good portion of the research literature on commons tragedies is not empirical: often, researchers pose hypotheticals, lay out assumptions, refer anecdotally to how at least some of the assumptions made in their work appear to match reports in cited case studies, and then reach conclusions of a tragic character about the hypothesized life in the commons (see Byrne et al., 2002; Ostrom et al., 2003). In our view, such hypothetical studies tell us more about what moderns would do if they fell on a commons than about commons history per se. Modern hypotheses may be correct that moderns cannot be trusted in the commons, but this begs the question: should we abandon commons ideas because modernity is real (although, admittedly, suffering from unsustainability and inequality, on a grand scale)?[14] Or should we replace the modern mentality and ideology with one more suitable for commons governance—and, possibly solve the hitherto entrenched problems that cornucopianism and energy obesity cannot?

Obviously, we have chosen to explore the latter option. Although commons institutions do not in and of themselves guarantee eradication of environmentally exploitive practices, they do offer elements for recovery of political agency in the formation of choices regarding energy and environmental futures and the foundation for a normative reconstitution of the good life. Diverse human populations have demonstrated that commons governance can provide for long-term environmental sustainability. In fact, 200 years of industrialization and the attendant commodification of nature supported by the obese energy regime could be conceived as the tragedy in the historical record.

Postmodern Energy and Climate Political Economy

In some respects, the daunting challenge of conceiving a path beyond the modern one is reflected in the politically tepid naming of that hoped-for space as *postmodern*. Political economy and regime theory flinch at the task because, in fact, it is hard to imagine: "an encroaching *autonomy of technique* (Ellul, 1964: 133-146) replaces thinking about modern life with an awed sense and acceptance of its inevitable reality" (Byrne et al., 2006, p. 20). In the case of energy change, the difficulty is heightened by its special status in the modern metric.

> Since the industrial revolution 200 years ago, mankind has depended on fossil fuel. The notion that this might change is hard to contemplate. Greens may hector. Consciences may nag. The central heating's thermostat may turn down a notch or two. A less thirsty car may sit in the drive. But actually stop using the stuff? Impossible to imagine. (*The Economist*, 2008)

While the editors of this widely read magazine meant the above introduction to challenge readers to consider "doing without the stuff," the text of the special issue on alternative energy actually underscores the depth of the problem. Readers of the issue learn that the editors found hope, not in taming cornucopian predilections, but in the promise of several technology elixirs on the horizon, saving us from the terror of having to go without.

Rather than elixirs, even carbon-free ones, we suggest the onset of human-induced climate change wrought by 200 years of modern energy practice should spur us to try earnestly to shift the paradigm. Tools such as the SEU have the potential to dismantle energy obesity. Through a resurgent community voice seeking to govern energy-ecology-society relations, it may be possible to render a very different energy future. Choosing community governance over technocratic orders, we have the chance to do something impossible in the era of energy obesity: relocate energy-ecology-society relations in a commons space. Learning from the tragedy of globalization, and the poisonous politics of obesity, communities can build antithetical energy schemes from the modern point of view, namely, sustainable energy utilities. Using commons tools such as the commonwealth economy and the community trust, we can place new values above speed, quantity, *extra large* and growth; energy sustainability and energy justice can be secured as the proper outcomes of energy-ecology-society relations.

Jacques Ellul (1964) famously observed that in modern society, justice is little more than "a slogan" (p. 282). No wonder that societies without a compass for finding justice would risk the disaster of climate change. Equipping them with carbon-free technologies can have no impact on their aspirations to colonize the atmosphere, threaten social and biological diversity, and burden the future with the consequences of their commodity lust (Agarwal & Narain, 1993 ; Dorsey, 2007). Sustainable energy utilities can hardly be expected to solve all dimensions of the problem. Their use, however, may enable communities to begin the process of finding their compass.

Notes

1. A nonnuclear future was the specific hope of the 1977 volume, expressed in its subtitle, "toward a durable peace." The follow-up 1980 book which Lovins coauthored with John Price explicitly announced this goal in its title.

2. Approximately 70% to 80% of national greenhouse emissions among industrial countries are due to energy production and consumption (IPCC, 2007).

3. When the Berlin Wall was breached in 1989, Western television new media reported the event as an expansion of freedom. Their visualization of freedom in this case was video loops of East Berliners, with shopping bags on their arms, streaming to West Berlin shops to enjoy what Soviet style, not-so-modern (as it turned out) socialism could not assure.

4. The rise of Facebook, YouTube, MySpace, and other tools for virtual existence make it possible for social relationships and personalities to join everything else as temporary objects with recycle-bin destinies.

5. The condition of antihealth is evidenced by the annual per capita emissions of nearly 21 tons of CO2 by modern industrial societies. In the Hopi language this represents Qoyannisqatsi – a state of life that requires another way of living; life out of balance; a crazy life (Foley, 2009). Alternatively, a healthy planet carbon budget was calculated by the Center for Energy and Environmental Policy based upon two factors: a sustainability condition based on IPCC assessments of the CO2 reductions required to mitigate climate change; and an equity principle in which the atmospheric carbon store is shared equally among the planet's population. This societal carbon budget is equivalent to 3.3 tons of CO2 per person per year at 1990 population levels, or 2.0 tons per person-year at projected 2050 population levels. (See Byrne, et al. 2008; Byrne, et al.1998).

6. The intricate balance that must be maintained is acutely evident when this condition is not met, as the financial and economic chaos currently underway globally demonstrates. The 2008 recession, which is stretching into 2009, underscores the dangerous nature of modernity without a credit card in *good standing*.

7. In this section, reference is often made to American exemplars but it should be noted that the commitment to abundant

energy technology is shared by Europe, Japan, and many others in the community of nations. In the case of nuclear power, France, South Korea, and Japan actually supply a much greater percentage of their electricity sales from this technology than the United States. And development of industrial scale renewable energy in Europe is well ahead of that in the United States. To meet the limits of article length for the *Bulletin*, we focus here mainly on U.S. cases to illustrate our points.

8. Other inside-the-box candidates include electricity production with *clean coal* technology and *clean* natural gas, and the development of *clean* biofuels, and hydrogen for vehicle and other uses.

9. Modern energy advocates promote an energy regime which promises environmentally cleaner technologies while preserving the production, distribution, and consumption of *bigger* and *more*. Byrne and Toly (2006) note that, while nuclear and renewable energy are exemplars of the new energy mandate, all modern energy technologies align with the principles and objectives of the abundant energy machine. Proposals for R&D and industrial expansion of *clean coal*, natural gas, biofuels, and hydrogen embody the same technocratic and corporatist politics of nuclear and large-scale renewables.

10. Moore offers an interesting comparison between nuclear power and a much simpler technology: "Over the past 20 years, one of the simplest tools—the machete—has been used to kill more than a million people in Africa, far more than were killed in the Hiroshima and Nagasaki nuclear bombs combined."

11. A recent report from an American government-industry collaborative organized to think in *extra large* terms concludes that offshore wind farms alone could soon power all U.S. electricity needs. A stunning 200,000 turbines (assuming an average unit size of 5 MW) are needed for this awesome industrial marine project (OWCOG, 2005). An engineer at the National Renewable Energy Laboratory anticipates the launch of this newest version of *giant power* in 10 to 15 years (Musial, 2005). European estimates are less giddy about the prospect of painting large swaths of ocean surfaces with mammoth wind turbines having wingspans greater than Boeing 747 jumbo jets, but occupying 5% of the North Sea's surface to supply one-fourth of the European Union's electricity needs is regarded as reasonable (European Wind Energy Association, 2007).

12. Colleagues at the Center for Energy and Environmental Policy (CEEP), University of Delaware, developed this concept over several years. The effort bore fruit with the passage in 2007 of legislation in Delaware creating the first formally designated *sustainable energy utility* (SEU; see Delaware SEU Task Force, 2007; also Chang, 2008). Since Delaware's action, the U.S. capitol, Washington, D.C. (with the assistance of CEEP researchers), passed into law the second SEU. As well, the City of Seoul, South Korea commissioned a study to explore applications of the concept in its boundaries (see Byrne et al., 2008). Many local and a few national governments (e.g., Dale, 2008) have expressed interest in the idea over the past year.

13. A penetrating analysis of the interrelation between Western energy obesity and climate injustice is found in the work of Anil Agarwal and Sunita Narain. See, for example, their classic paper, "Global Warming and an Unequal World: A Case of Environmental Colonialism" (1993).

14. For critiques of modern institutions and the challenges of environmental sustainability in capitalist society see *Is Capitalism Sustainable?* (O'Connor, 1994).

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