

TRANSFORMING POWER ENERGY, ENVIRONMENT, AND SOCIETY IN CONFLICT

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From Love-ins to Logos: Charting the Demise of Renewable Energy as a Social Movement

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Having been a part of the general environmental movement that saw renewable energy as the promise of a new future and now seeing that future being owned by British Petroleum, General Electric, Royal Dutch Shell, and other corporate giants responsible for the devastation wrought by their promotion of fossil fuel and nuclear energy use, it is difficult to regard the emerging sustainable energy era with unbridled enthusiasm. It appears that these corporations can buy renewable energy businesses more easily than homeowners can purchase the equipment. At a time when global energy use is at its highest levels ever and forecast to continue rising (IEA, 2004; UNDP et al., 2000), environmentalists and staid international institutions alike are eagerly anticipating the solar economy (Flavin and Lenssen, 1994; Scheer, 2002; Brown, 2003; World Bank, 2004). Somewhere along the line, renewable energy went from the domain of counter culture to corporate mainstay, from communes to communication strategies, from naturalism to natural capitalism, and from love-ins to logos.

Renewable energy once offered an alternative social future, characterized as the “soft energy path.” Amory Lovins’ 1979 landmark text set the bar for energy sustainability and despite the furnace-load of works on renewable energy since that time, in many respects Lovins’ basic case has not been surpassed.^{1,2} *Soft Energy Paths* provided a clear, thorough, and explicit account of the social values and implications associated with a renewable energy future. Compared to the conventional energy-society order, the alternative promised to be more democratic, less militarized, less hazardous, more flexible, more efficient in its uses of energy and capital, and more open to options and choices in the social sphere. As befits a work of this reputation and influence, many scholars depict *Soft Energy Paths* as the starting point of the renewable energy movement. But this work also marks the onset of the

demise of renewable energy as a social movement, conveniently establishing the division between the “counter culture” movement and the arrival of the “corporate culture” project. Since then, there are precious few considerations of renewable energy as a social initiative. Today, discussion of an energy counter culture is almost completely moribund. Modestly, we seek to give the original idea of soft energy paths its due.

Searching for the Roots of the Alternative Energy Revolution

When the background of renewable energy is being considered, it is often projected as a mostly technical matter. If social influences are admitted, renewable energy is generally understood as a mainstay of environmentalism or as arising in specific response to the global oil supply crises of the 1970s. In this offhand treatment, much about the social implications of renewable energy is made amenable to rewriting.

This received wisdom is misleading, both about environmental thought and specifically about renewable energy. Western environmentalism can trace its roots to diverse places and times—from Romantic poets, eastern philosophy, the arts and crafts movement, communitarianism, and the science of ecology, to the ecological practices of indigenous peoples—all with some legitimacy.³ But there is a tendency to mix social movements with intellectual and conceptual sources in these accounts, and no doubt this author is as guilty as anyone in this regard. However, academic accounts emphasize the intellectual, political, and organizational aspects of this history, while neglecting its social and cultural formation. Only recently, have some accounts begun to filter through, but precious few are interested in these historical dimensions of environmentalism.⁴ In a cultural sense, the conservative charge that the baby boomer generation is obsessed with its own interests and claims for itself social reforms that belong to earlier times may be made to good effect. However, making the environment into an identifiable political theme is unequivocally the product of the era of the 1960s and 1970s. There was no term for ‘environmentalism’ prior to the 1960s because there was no broad social movement that could be identified with this interest. Before the 1960s the public debates were of the preservationist/conservationist stripe and generally applied to public land use. All sorts of important ideas and theories about the environment flourished prior to the 1960s in the developed and developing world, but they simply didn’t register as particularly important in mainstream politics. That panoply of decisions about land use and management that European settlers faced in the New World and modernizers faced in the Old World, and which have largely determined today’s human shaping of the world landscapes, did not involve the type of political disputation to which we have become accustomed in contemporary times. For it was in the counter culture era of social change that the diverse sources of environmen-

talism were mixed and came to influence mainstream political agendas, the formation of environmental interest groups, and established party politics. Indeed, what other period of the twentieth century would have ranged so widely, eclectically, and creatively in considering social alternatives?

Contemporary renewable energy technologies were researched and developed effectively beginning in that era. Much of the early experimentation with sustainable energy was outside the state and corporate spheres, conducted in personal, communal, and academic contexts. A small amount of post-war experimentation was greatly supplemented by an explosion of activity in the later 1960s. The business sector became involved in the development and manufacture of commercial products toward the latter part of this period, most notably where this involved discrete machinery or components (wind turbines, solar cells, and solar thermal heaters). Renewable energy companies were usually small and independent of conventional energy corporations and utilities. Applications of the technology were isolated, small, privately or communally owned, usually domestic or agricultural, and often "hobbyist" in character. Alternative technologies of greatest interest at the time were amenable to investigation and application with low levels of investment: PV, small wind, small hydro, and bio-digestion. On the other hand, technologies such as tidal power and geothermal energy were in the inaccessible "big science" league.

Alternative energy was effectively a subculture in this period, much of it independent of government and corporate involvement. There was widespread information on these technologies through various outlets, including magazines (for example, in the U.S., *Organic Gardening and Farming*, *Environment Action Bulletin*, and *Home Power*) and importantly, through the social network of the counter culture. Much individual experimentation took place and there was great innovation. As with many nascent technologies, amateur curiosity was an initial motivation, and little capital was involved. With the OPEC oil embargo of the 1970s, renewable energy garnered wider attention, and the interest of governments and the scientific establishment validated the potential of this technology as a "solution to the energy crisis." And this same decade essentially marked the end of renewable energy's first phase.

If we allow that technology has social roots (Winner, 1977, 1986; Bijker et al., 1987; McGinn, 1990), and that renewable energy expanded outside obvious corporate and state sponsorship (Butti, 1980), then what social forces and social goals shaped this technology? Renewable energy received its first widespread applications and use in the industrial economies through the followers of alternative lifestyles. Today this phrase invites derision and has been co-opted to serve a number of political interests, but at the time it meant those wanting to live outside the mainstream. Rejecting the confines of conventional life in the developed world, individuals and groups experi-

mented with a variety of alternative social choices in living arrangements, property ownership, farming, material consumption, entertainment, drugs, marriage, education, transport, health, religion, and a plethora of other dimensions of social life. It was always loose, as social movements are wont to be, and difficult to fix in any absolute sense.

So let's begin here by affirming the counter culture movement as the source of the idea that social change in the developed world could be brought about by a shift to alternative energy. Certainly, its ideas about society and nature were drawn from many places, but this social movement forged the concept that alternative energy technology could make modern society afresh.

Breaking Free

Central to the counter culture was the belief that if an individual or group wants to live outside the influence of corporate and state culture, they must separate as many dimensions of their lives from those influences as they can (Roszak, 1995). As well as the better-known rejections of capitalism, sexism, racism, nationalism, militarism and promotion of indigenous rights, racial equality, and equal opportunity, there was an understanding that separation and independence involves making active choices about technology. Partly this course departs from instrumental rationality, for the social benefits of these choices were always multifarious, interlinked, and bound into visions about a coherent social life.

What was so offensive about the conventional energy system? For a start, its ownership and control was in the hands of large corporations and states. In every way, it was of great scale and beyond the comprehension of the general public, capable of being operated only by skilled and elite technicians and employees of these large enterprises. Its interests were not primarily in the public good, but in the profit and power of its owners and controllers. Great social apparatuses were constructed to ensure the security of its facilities and capital, and these security and economic dimensions were part of national governments that were essentially militaristic. Power plants and associated energy facilities were harmful to the environment—especially dangerous in the case of nuclear power—and aesthetically offensive. Conventional energy systems were monuments to exploitative social hierarchies, unresponsive to social needs and uncaring of their environmental impacts, and were part of a rampant industrialism inimical to the human prospect. At its extreme, the counter culture rejected the conventional energy system and, importantly, everything it stood for.⁵

Alternative energy offered a means to escape the state- and corporate-managed energy systems, to tread lightly on the earth, to be independent, to be rooted in a local ecology, to link to other alternative technologies, to offer social benefits, and to be peaceful. It is worth remembering that the move-

ment for renewable energy was driven forward by fear and loathing over the burgeoning nuclear energy industry, which was the epitome of all that the counter culture rejected (Loving and Prince, 1980).

Langdon's Winner's insight that technology is politics (1977) may now be passé, even though it remains accurate. Ownership, design, control, autonomy, and responsibility associated with any technology are not fixed by the character of the technology but reflect social settings. Just because renewable energy was envisaged as part of a program of social reform by the counter culture (although that perhaps formalizes matters excessively), does not mean that these politics are axiomatically transferred when the ownership, production, design, and control of that technology passes from individual and local hands into those of states and corporations. But it does mean that it is unlikely the technology will retain its original politics intact.

Renewable energy technologies were possessed of particular attributes that offered to deliver a different kind of society than the one plugged into the conventional energy system. Lovins suggested five foundations of the 'soft path' (1979: 38-39):

- 1) Renewable energy flows rather than stocks;
- 2) Diverse, modest, and specifically applied sources;
- 3) Flexible and relatively low technology;
- 4) Output matched in scale and distribution to end uses; and
- 5) Energy quality matched to end-use needs.

Central to the social goal of alternative energy technologies was that they conveyed autonomy to their users. Renewable energy held the promise of being 'off the grid,' detached from power lines, pipelines, and 'big oil.' Basically, its users would be able to understand and control their own systems, fix and maintain them using basic skills, create no pollution and impinge on no one else, live free of monthly utility bills and high energy costs, and erode support for the state- and corporate-managed energy system. Soft energy paths were to involve decentralized approaches and diverse forms of technology and energy sources. These technologies were to meet energy needs by matching their scale and aligning energy quality to the task involved. They were to be reliable and adaptable to a variety of tasks and circumstances. And because they were not part of the centralized energy system, they possessed a number of economic advantages over the fossil fuel and nuclear energy system, including much lower capital investment, minimal transmission and distribution costs, no need for reserve capacities, no risks of massive overcapacity or mistimed capacity additions, and no compulsion to organize communities to capture available economies of scale.

Critically, renewable energy sources were not meant as a substitute for conventional energy sources and were not sought as a means to meet the

demands of a mass consumption lifestyle. Rather, renewable energy systems were designed to meet modest needs and small energy services. In this way, the conventional energy system and all that it entailed was to be obviated and in its place an alternative way of meeting energy needs established; sustainable energy systems were meant to wholly replace the conventional energy system, which provided nothing the counter culture needed, and for which there were clear alternatives.

In this way, renewable energy was the technical means to social ends. Renewable energy could satisfy these ends in ways that both pre-modern energy systems and the conventional energy system had failed. Although there was some interest in lessons from the past and from the developing world, the cause of renewable energy in the West was progressive, built on the advances offered by new forms of technology, or by novel applications of existing technologies to provide energy service needs. As a problem of technology and society, renewable energy may have been promulgated by the counter culture as being 'closer to the earth,' but for the most part it promised environmentalism of a modern kind. The utopian claims made for the social advantages of renewable energy were often grounded in technological positivism, anticipating social transformation from technological change. Still, the counter culture was clear that the socially beneficent technology would be built on small scale, locally managed platforms that would not attract multinational corporations, but would instead stimulate an 'eco-economy' of modest size (Brown, 2001, carries forward this idea).

Thinking Globally and Acting Universally

Some energy visionaries saw renewable technology's eventual universal adoption as evolving through small successes until everyone would be using alternative energy. It was an alternative after all, so it made sense to contemplate the complete demise of conventional energy and arrival of sustainable energy. Lovins (1979) had placed a transition zone between the hard and soft energy paths in which fossil fuels, nuclear power, and renewables might coexist. But he was confident this would not last long. Somewhere in the transition, we offer, is where the social promise for renewable energy starts to go badly wrong.

So what is the significance of the global aspirations for advocates of renewable energy? Firstly, advocates such as Lovins challenged the conventional energy system on its own terms, by finding ways to prove renewable energy was cheaper than fossil fuels and should therefore be the sensible choice for states and energy consumers. That it was safer than nuclear energy was also an argument of the day, but one that, in the post-Chernobyl era, drifted away.

Secondly, these advocates sought to make the transition as palatable as possible by suggesting that, while the results of the sustainable energy future would produce utopian expressions of individual freedom, democratic collective action, and environmental responsibility, it would seemingly not require wholesale overhaul of modernity's social institutions. Renewable energy would prompt revolutionary change, but a radical revolution, such as one that would end capitalism, wouldn't be necessary to bring it to fruition.⁶ The justification for renewable energy's superior rationality advanced by Lovins and others was explicitly conservative, expressing a faith in the inherent judgment of economic and social institutions to recognize the virtues of a sustainable future, once freed from government and market failures of various types (Hawken, 1993; Hawken et al., 1999). With loss of demand and removal of the drip of state subsidy, the conventional energy system would wither and the transition to the soft energy path would result from the rationality of the dominant economic and political institutions.

Thirdly, renewables advocates wanted to use the same instruments that created the fossil fuel and nuclear energy system to promote the renewable energy system, especially state assistance for renewable energy. To their credit, these advocates usually combined the arguments for renewable energy with the causes of improved energy efficiency and energy conservation. But although such market governance had failed to protect community and ecological values in its design of the conventional energy system, it would be essential for introducing a renewables-based economy (and indeed, this has proved to be the case).

Embedded in these strategies were a number of implications.

- For renewable energy to be widely taken up without disrupting existing state and corporate power, existing utilities and fossil fuel companies would have to be the purveyors of renewable energy. States would have to oversee and manage this process. Either that, or there would have to be a proliferation of small firms willing to resist the appeal of economies of scale.
- If renewable technologies were going to be used in this way, then renewable energy had to become part of the existing system. The matter of phasing and integrating them into the existing system became an economic and technological problem of great complexity. This transition, therefore, implies a hybrid system that features the use of both conventional and renewable energy.
- State decisions would effectively become the tool for controlling the characteristics of the emerging system, principally in determining the ways and the rate at which it would support renewable energy technologies.
- Renewable technologies are given the role of an alternative fuel source within the conventional energy system and are assessed on criteria related to fuel sources. In order to fulfill their role as fuel source, renewable tech-

nologies would additionally meet requirements to efficiently integrate into the existing system.

Following David Nye (1999), we are reminded of the extent to which technological determinism has influenced our ways of considering the energy system. Surely, much of the optimism about the possibilities of a renewable energy transition was caught up in this mindset. The counter culture invested socially transformative power in the technology of renewable energy and gave less attention than it should have to the role of culture in creating, spreading, and developing technologies. Still, it was the transition thesis that created the possibility of a corporate- and state-brokered renewable energy future, not the counter culture's technological optimism.

Here Comes the Sun (Incorporated)

Into this scenario enters the political economy of conventional energy. Large fossil fuel corporations began buying renewable technology companies. Their leaders talked of a future beyond oil. Proving that life can be stranger than art, British Petroleum dubbed itself "BP – Beyond Petroleum," a move that some environmentalists found beyond perfidy.

Environmentalists divided over this development according to their ideologies. Pragmatists, for example, welcome the support that the renewables-based economy would receive from giant energy corporations, taking these developments as proof of the efficacy of the renewable energy cause (Flavin and Lenssen, 1994; Brown et al, 1991; Brown, 2004). On the other hand, skeptics have doubted that corporations will genuinely promote a renewables-based economy, and speculate that the corporate elite may even use their influence to slow its arrival (Scheer, 2002). All environmentalists accept that corporations are responding to the profit motive in their industry investments. Caution by both parties may be necessary at this stage, for although the energy giants have made considerable expenditures on renewable energy, these amounts are minor in their overall budgets and operations.⁷

More than the actual scale of corporate investment, at stake is what to make of a renewable energy future steered by corporate strategy and state policy. It is offered here that this development represents the "ecological modernization" of renewable energy.⁸ While the state has dabbled in renewable technologies for quite some time, these efforts have been highly publicized *and* generally of little significance. Almost no national energy system in the developed world has managed to get beyond a couple of percent of its energy supplies or meet any significant portion of its major energy service needs from renewable sources. Yet, with the entry of large energy corporations into the field, the responsibility of the state is changed and its provider role for the interests of "capital-in-general" is evoked. Now the state will

work more assiduously to provide the regulatory, policy, and political settings that will assist the development of the renewables-based economy. Doubtless the state's task of easing the way for renewable energy is made politically gentler if the conventional energy corporations also own the renewable energy enterprises.

One hallmark of ecological modernization is the cooperation between states, corporations, and arguably, NGO advocates. Some environmentalists and progressive corporations have taken to proclaiming the benefits of cooperation, and governments can often be found applauding the maturity of these decisions. Certainly, in renewable energy there has been plenty of "working together." A marriage of interests has always been likely between elements of the corporate sector and those environmentalists seeking national policy changes, because many environmental groups concentrating on national politics have mostly abandoned any prospect of widespread change through "bottom-up" civil society actions (Gottlieb, 2005). Reform of the energy sector has meant "solving the economic problem," and the solution has been to pursue economies of scale in production of renewable energy units, invest in technological improvements, and hack away at subsidies given to conventional energy or to acquire access to high subsidies for renewables. These strategies can be pursued simultaneously with civil society mobilization, but this nevertheless requires bringing the interests of the state and corporations to bear on the problem.

Technology Fine and Society Wrong?

Perhaps no cliché in contemporary renewable energy circles is more persistent and misleading than the saw that the technology problems have been solved, and the problems remain in social, political, and economic realms. This misunderstanding is responsible for an important part of the misdiagnosis about renewable energy. For a start, the formulation has it that the two dimensions of technical and social can be taken as compatible, that they can exist on common ground and concern the same world, as it were. Such an argument might have applied to the original goal for alternative energy, namely that it be part of a social goal, but that is not the case now.

Technically, the renewable energy problem that has been solved is how to meet isolated energy service needs at very modest scales, basically domestically or at the village level, without using or relying on fossil fuels. This was, if you like, the first goal of renewable energy and an array of technologies has been developed that meets this need. PV, very small wind turbines, micro hydro, solar thermal heating, biogas digesters, and passive solar design were essentially mature technologies at least two decades ago. This social solution is specifically workable for those in the counter culture willing to go

“off-grid.” But what about the middle-class—the dominant stratum in modern societies?

The current technology problem for renewable energy is one that focuses on the middle-class. What is that problem? Making renewable energy technology a substitute for the conventional energy system without disrupting the middle-class penchant for consumption. Optimists and promoters for renewable energy will immediately cite the rapid growth of wind energy, and describe how effectively large-scale wind turbines are being plugged in to meet the needs of baseload supply for regional electricity grids. A contrary view holds that what is being revealed more than opportunities for the technology are its limits; there are actually relatively few places with the kinds of wind characteristics suitable for large-scale units. Wind energy, the dashing prince of renewable technologies, turns out to realize an economy of scale in only a few places (often those of great scenic beauty both on- and off-shore), and has a disinclination to work everyday. Moreover, wind’s arrival tends to upset some middle- (and upper-) class neighborhoods if it is thought to be obtrusive (see a special issue of the *Boston College Environmental Affairs Law Review*, 2004, for a review of opposition to the Cape Wind project).

For PV, the problems have been about designing systems that are indistinguishable from grid-derived electricity. Accordingly, the challenges have become not how to rig up an array of PV cells, but how to arrange the metering so the system is integrated into the existing grid and how to work out systems of accounting to capture its benefits. In this way, the applications for PV are supplemental to a grid connected user.⁹ Ingenious as these solutions have been, they are essentially adaptations to make PV technologies perform in ways to meet the criteria set by grid-based electricity planners.

Scaling up renewable energy technologies to meet the demands of a conventional energy system has not been very successful for most sources. Renewable energy has its place in the conventional energy system, such as wind farms and building-integrated PV, but technologically it is a long way from meeting the primary energy needs of the developed world. When basic calculations are completed for the number of wind turbines or PV arrays needed to replace the world’s coal-fired power stations, the resulting scenarios verge on nothing less than the bizarre.¹⁰ Meeting current energy needs will necessitate the maturation of technologies, such as tidal power and various large-scale forms of solar concentrators, and the development of other technologies that are currently far from viable. And yet the renewables-based economy continues to be premised on the assumption that we have the available technology to meet global energy demands (see, e.g., Scheer, 2002).

For the technologically optimistic, the problem is social (taken to also include issues with political and economic dimensions). To reach a renewable energy future, therefore, requires a social setting in which today’s residential, commercial, industrial, and transport demands for energy will be met

by renewable energy sources. It is expected that renewable energy will serve as a substitute for existing energy services in every way. Renewable energy must be cheap, reliable, and safe, not polluting in ways that its consumers are likely to notice; it must be as abundant, available, and simple for consumers to use as existing energy systems.¹¹ Whatever is favored and desirable about fossil fuel energy systems, renewable energy must also meet, and hopefully exceed. No energy user today is expected to significantly change their patterns or levels of energy use in the new (but nevertheless modern) order.

Nearly every social, economic, and political problem diagnosed for the transition to a renewables-based future by moderns stems from this technological ideology. Firstly, there is the question of the reliability of supply (often associated with the problem of efficient energy storage). Renewable energy technologies for the most part are frequently characterized by intermittent or fluctuating levels of supply. For the counter culture's idea of renewable energy, reliability was not much of a problem as not all energy service needs are continuous or resolutely fixed in some way; most are flexible in a number of ways. But satisfying the middle-class brings forth the need to leave energy demands high and growing.

The counter culture's idea of renewable energy was for it to meet an energy service need and there can be a number of ways to meet any particular service, so that a user might have a choice of technologies that could be applied. That an energy source should be available continually in full and abundant supply may be an industrial requirement, but that is hardly the case for the smaller demands envisioned by the counter culture. Expectations that energy is always available, virtually without limit, without fluctuation, and without cessation is a system requirement of the conventional energy regime serving an insatiable middle-class thirst for energy.

Secondly, there is the thorny issue of the retail price of renewable energy. High costs for the production of energy from renewable sources seemingly reflects the immutable laws of economics, and so, renewable energy has to cross the price thresholds set by competing conventional fuel sources. A vast literature attests to the effect of supply and demand for renewable energy—most of it irrelevant to the central problems of the new economy. For renewable energy as a counter culture solution, the basis for comparison is not the cost of the energy, but the cost of the service that energy provides. But since the conventional energy system provides the criteria by which renewable energy is assessed in a middle-class society, we often don't compare the costs of energy services and energy users don't receive this information.

Even if we could carry out this comparison, it would be a concession that an economic comparison of price reflects a fair comparison of costs. Such a presumption is mostly absurd from the point of view of the counter culture. Uncounted costs of the conventional energy system include historical and current subsidies for fuel sources, environmental damage, social costs due to

health threats, safety and security risks, and so on. What is considered as ‘the market’ for conventional energy fuels is an artifice reflecting only relatively minor and residual questions of marginal price after substantial state subsidies and historical support have worked their effect. Only from the viewpoint of the corporate- and state-managed energy system, replete with subsidy, must renewable energy beat the costs of conventional energy.

Thirdly, there are environmental protection requirements. For the counter culture’s conception of renewable energy, this simply is not a major problem as none of the technologies are likely to be of great scale or involve especially toxic materials or processes. In order to meet the demands as a fuel source for the conventional system, however, renewable technologies must be large (as per the dictates of economy of scale), and must at the same time comply with environmental regulations. For example, large-scale hydro-power isn’t environmentally acceptable, even though it is the largest renewable energy source within the conventional energy system (McCully, 2001). In another case, one might examine the issue of the coastal locations of large wind turbines. By displacing conventional power plants and possibly nuclear facilities, wind turbines are an environmentally more desirable technology. Yet, socially and ecologically there can be objections to sources of our energy which redefine the landscape. When we make renewable energy match the needs of the conventional energy system, whatever social or ecological issues that need to be resolved for these technologies increase in scale along with the size of the units involved. That there could be environmental problems arising from the original generation of renewable energy technologies is contrary to their design imperatives, but entirely consistent with the consequences of large centralized renewables-based systems in service to modern society.

Fourthly, there is the issue of energy efficiency. Renewable energy can be highly efficient when applied directly to the energy service task as there are no distribution and transmission losses, less conversion losses from energy to task, and few reserve capacity requirements as energy is only used when needed. But when used as a fuel source in a centralized energy supply and distribution system, renewable energy is made as relatively inefficient as fossil fuels. Most of the advantages of renewable energy are lost when it fuels the conventional energy system and is built with excess capacity, transmitted with high losses, and so on. Several implications arise from this: for a start, renewable energy is hardly cheap when used inefficiently.

Renewable energy is currently in the process of being overhauled as a technology. Much of what was developed at the small scale is of no commercial use for large energy supply companies. A new generation of technologies is now being developed to serve quite different ends. Associated with the introduction of this technology is a new set of social issues. What renewable energy advocates seem to have overlooked is that the social and environmen-

tal benefits of the old technology are not necessarily characteristic of this new generation. These new technological developments have effectively closed off meaningful advances in the old technology in the developed world, so that designing technologies that people could buy and operate for their homes, farms, small factories, and commercial centers is no longer being pursued. Renewable energy technology is held in a cycle of perpetual disadvantage, whereby every successive advance to make it fit better into the conventional energy system creates a further set of obstacles that erode its original advantages over fossil fuels.

Why We Can't Get There From Here

Some might argue that the current energy order is actually a combination of corporate, state, and societal demands representing a practical (and effective) compromise. Contemporary conditions, in this way of thinking, would represent the precursor to a soft energy future—a kind of “third way” of energy politics, resolving the right wing (hard path) and left wing (soft path) orthodoxies through sensible compromise.¹² But this is a misleading formulation that papers over essential problems that the trend toward a “hard path renewable energy system” cannot resolve.

For a number of reasons, today's trends should not be taken as constituting a trajectory that will conclude in the achievement of a sustainable energy era. Firstly, the coming corporatist version of a soft energy future is premised on the view that renewable energy must meet all conventional energy needs—only better in nearly every way—and that we have the technology to do this. There is real doubt as to whether renewable energy technologies can meet existing and future energy needs of a corporate-led, middle-class-focused economy (which presumably include the commitment to economic growth). Total energy demand levels are high and efficiency is generally low in the developed world, and, in these circumstances, renewable energy cannot replace fossil fuels. Only by permanently curbing demand and greatly improving efficiency can there be any hope of a genuine renewables-based economy. The growth in size and efficiency of wind turbines, for example, will matter little if the overall growth in energy demand continues. Clearly then, the prospects for a soft energy future are tied to the prospects for a steady-state economy (or for those that don't follow Herman Daly,¹³ an economy that can develop without increasing its material demands and waste products). Part of the problem here is that the corporate energy system is designed to promote growth and that renewable energy has been conscripted into this cause.

Second, the closer renewable technologies come to meeting this need of a substitute fuel source, the more they will replicate the problems of conventional energy. This paradox is an uncomfortable reality for environmentalists, but what are we going to say when someone proposes a mile-high wind

turbine? There's a bind here in that meeting current energy needs under the conventional paradigm using renewable energy means big installations and plenty of them, and this just can't occur without significant social and environmental costs. Decisions over trading off large hydroelectric schemes for large coal-fired power stations might not offer a clear environmental choice, but these are the types of prospects looming in a corporate energy system that seeks to expand its renewables base. It is unclear, then, whether the new energy order will have the full support of mainstream environmentalists.

Third is the issue of the falling social barriers, particularly that of cost (or more precisely, retail price). Of course, if there were any reasonable accounting for the costs of conventional energy, then all sorts of options for renewable energy would already be widespread. Our prediction is that cost will prove to be a chimera and that lower prices for renewable energy will not result in its widespread adoption. Price is just one of many factors that have to be addressed in making renewable energy an acceptable fuel source for the corporate energy system; and in isolation, it will not prove decisive. In the history of the energy system, politics explains a great deal and price tends to reflect political decisions and circumstance, not vice versa. Thus growth in wind energy is often associated with its falling retail price, but governmental promotion of renewable energy created the market and made investment in wind energy secure, leading to economies of scale that have subsequently reduced the price. Using price to explain the condition of the energy system is simply "economism," with its absurd assumption of "perfect markets." Conventional wisdom holds that renewable energy has to compete with the costs of fossil fuels and nuclear energy, while it is offered here that costs merely reflect political decisions, so that when there is widespread political support for renewable energy, then it will be of an acceptable price (because politics, to put it crudely, decide what costs are counted). High costs of renewable energy serve as a rationale that, in turn, evokes a passive economy that serves to disguise an active set of political decisions.

I Can See for Miles and Miles

Hermann Scheer, Amory Lovins, and other pundits of a soft energy future, joined as they are by such august bodies of official energy wisdom as the IEA, are riding the wave of the ever-popular and optimistic field of future studies. Slightly off-putting is that the drumbeat for the forthcoming renewable energy revolution has been continuous since the 1970s oil crises, appearing in virtually every alternative energy journal every year in some form. As such, much of the talk of the forthcoming energy paradigm shift is propagandist and self-serving.

This apparent continuity in the faith of soft energy advocates held over these decades masks a basic discontinuity in the very character of that much

portended future. How far renewable energy now seems from its roots in the counter culture and how little remembered this heritage has become. By consigning the counter culture to oblivion and wiping history clean of its imprint of an energy transformation carrying forward a program of social reform, these origins have been cast aside with other populist condemnations of the counter culture as hedonistic, utopian, and socialist.¹⁴ Renewable energy today presents itself as the epitome of respectability, tied closely to professional cadres of technicians, scientists, and engineers, promoted by everyone from government agencies to business councils, and funded by shareholders and government grants. In effect, renewable energy has gone mainstream in every sense, transformed from a radical agenda to a conformist condition.

Having abandoned its romantic William Morris-esque stance, renewable energy's self-image is now that of high modernism, of the sleek white blades of wind turbines and the cool azure circuitry of the PV cell. Renewable energy has become the sort of high-technology modernism proposed by R. Buckminster Fuller (1971) and others within the "operating manual for spaceship earth" school of environmental managerialism¹⁵ that in retrospect seems to share much with contemporary "ecological modernization." A contemporary generation could be forgiven for assuming that renewable energy was another benevolent product of those socially conscious corporations whose logos now adorn the "green" energy machinery of our time.

In that collection of generalizations about renewable energy as a social solution were concerns about: an increasing interdependency in society, its growing complexity and the need for greater social management, its vulnerability to failures, the need for increased security of centralized systems, rising social and economic risks of these big systems, the alienation of people from decisions that shape their lives, and the inefficiency and precariousness of large systems. Oddly, while the smaller and easier environmental concerns have tended to be swept up in state-sponsored ecological modernization, the social concerns of these nascent energy system critics withered. A possible exception to this generalization is the decline of nuclear energy in the developed world; despite an enormous effort by state powers to arrest decline, the industry barely made it out of the 1970s. This decline, however, was hardly motivated by the wider social implications of the industry; rather, the technology proved to be too dangerous and its energy outputs too expensive despite the staggering levels of public sector subsidy and vigorous efforts to convince the public of the industry's safety.¹⁶

That the use of renewable energy is increasing should not blind us to the fact that we are no closer to an alternative energy future than when the concept was promulgated almost three decades ago. Because the prospect of a vibrant and expanding nuclear energy industry was so appalling to environmentalists that the dilapidated condition of this completely state-subsidized

industry has thrown the character of the fossil fuel component of the conventional energy system into lighter relief. And perhaps because some radical parts of the counter culture became transfused into wider social practice it is reasonable to consider that society took from these reformers those lessons that were most amenable and practical, and left the rest behind. Or it might be that vested interests allowed a degree of social and economic reforms in order to subvert more fundamental disruptions to political and economic elites (Byrne and Rich, 1983). And it may be that the transformation to an alternative energy system was a vision only suited to those who considered a revolution necessary.

Many explanations are possible, but one cannot escape the rude fact that no major changes to the conventional energy system occurred through these years of challenge. Deregulation? Privatization? System benefits charges? Renewable portfolio standards? These changes are minor, even inconsequential, administrative measures that the interests of the corporate energy system have accommodated. So far, reformers have managed to eke out such small concessions for renewable energy, and little else.

Before leaving this argument, the reader should not be under the impression that the political economy of corporate energy has exerted an iron grip over the attitudes, choices, and collective behavior of western society. Somewhere into this argument, and there is insufficient space here, we need to place renewable energy into the types of social change that have occurred, including changes to the broader economy and to lifestyles. On this count we risk technological determinism, but it is unavoidable. Corporate-managed, middle-class-based, consumer societies employ technologies to provide an array of services within the home, workplace, and in institutions. Modernization is more than the technologization of life, it also shapes social life toward the private, the insular, and the individual consumptive act. Yet this insularity for keeping comfortable, for earning a living, for entertainment, education, and whatever else, is often mistaken for independence. Such pseudo-independence is consumptive in nature, and the means for its production is outside the realm of consumption. Consumers in modern society, by definition, don't create the products and services they consume—they buy them.

A major misunderstanding about the contemporary effort to usher in sustainable energy systems lies in a failure to understand the basic interstices of corporatism, middle-class life, and consumerism. The middle-class has no interest in production and certainly does not equate the virtues of independence with being free to provide their own goods and services in energy or any other commodity. For the counter culture, the test of independence was whether the energy service is 'off the grid.' But the consumer-residents of corporate-managed societies are embedded in grids of an immense variety and complexity as necessary conditions of having access to mass consump-

tion goods and services, of which electricity is but one. In this case, the growth of private consumption is made possible through the growth in the corporate economy, and the middle-class obliges by celebrating the greater opportunities to consume.

The Alternative Energy Logo

Here, then, is where renewable energy as a social solution has been doomed; renewable energy can be a productive technology that provides a service, but who in corporate-managed society wants independence in production? Almost no one in the developed world, it appears. To consider that there is a place for independent production of energy is completely counter to the mass consumption impulse of modernity. Provision of services by third parties, usually corporations and contractors, is the efficient (and profitable) preference of the contemporary order. Are we seriously considering that families who have service contracts for their water heaters and appliances, who have garages to service their cars, who use thermostats to control household temperatures, who use televisions and VCRs for entertainment, who operate computers and telephones in order to communicate with people and read items of interest, want to operate their own energy systems?

Crossing the divide of fossil fuel energy requires using the bridge of energy conservation and reduced consumption to reach a genuinely renewable energy-based society on the other side. Such a transition means tackling contemporary society's preference for abundance over sufficiency, for waste over frugality, for replacement over repair, and for frivolity over utility. Because a transformative renewable energy future cannot be premised on normal economic activity, the viability of the strategy rests on converting some of the core attributes of society. To date, the advocates of renewable energy have tended to look past this sociological condition and argue their case entirely on technological, economic, and ecological virtues.

In contrast, the renewable energy proposal seems essentially premised on consumer sovereignty when the dominant consumer preference is for mass consumption. Advocacy of a soft energy future embedded in current society seems to take the economic rationality of the individual consumer as the motive force for change, when attention should have been directed at collective scales of transformation.

So what is the current prospect for renewable energy on the broad scale for industrialized economies?

- Renewable energy systems will likely be owned by oligopolies (state and private) that control the world's fossil fuel, electric, and nuclear energy systems.

- Renewable energy, in its logo-friendly format, will be made compatible with the corporatist, neo-liberal ideology of the developed world and will become part of the process of economic globalization.
- Renewable energy will become part of the centralized system of energy production and distribution in which energy users' choices will be those dictated by consumer sovereignty; i.e., they will be completely dependent on the corporate-organized and -defined market for 'green energy' and the like.
- Renewable energy technologies will aspire to technological sophistication and will soon be understood and serviceable only by experts and managed by professionals.

Today, I cannot readily buy or order renewable energy systems suitable for my home. They are not offered for sale in the building supply superstores and my local builder doesn't know anything about them. After thirty years of advocacy, renewable energy is still a niche product. Yet what will be the transforming effect if, in the not too distant future, such systems are easily ordered (perhaps from the Internet)? Is anything more to be expected from the corporate vision of soft energy?

All through the landscape of modernity are textbook examples of urban sprawl, yet of this multitude of new housing estates, few homes, if any, exhibit a solar orientation or passive solar design or evidence of other renewable energy applications. Wherever the renewables-based economy is meant to be happening, there is not sign of it, except in utility-scale wind farms, industrial agriculture's development of biofuels, and giant office blocks ornamented with PV. Something has gone terribly wrong with the vision for a soft energy future. We passed the crossroads to a socially progressive alternative energy future some while ago. It was a small thoroughfare, poorly signposted, with an uncertain destination, and we were in a hurry at the time. We are at the point where renewable energy's future looms and we can still remember where that alternative pathway was, but few, it seems, are interested in looking back. It is almost laughable that some of us believed that alternative energy could usher in a convivial society, the conservator society, or the alternative society (Illich, 1980; Henderson, 1988).

Our soft energy future now shows every sign of being big, corporate-managed, state-subsidized, high technology-based, with modest amounts of renewable energy mixed with plenty of fossil fuel use. As befits the mass consumption mentality, citizens will neither own, control, understand, nor maintain the technology that produces this energy. They will not be considered responsible for its ecological effects, nor are they likely to reduce energy consumption or greatly increase the efficiency of its use; but they will be able to buy the logo of "green energy" from the same corporate governors who have traditionally managed energy affairs on their behalf. And who, in modern life, could want for anything else?

Notes

1. Discussion of the forthcoming renewables-based economy focuses on non-transport energy, and that of the hydrogen-solar economy includes transport. Advocates for hydrogen applications and integration of this technology into the solar economy represent perhaps the most obvious expression of the argument being advanced here, but with a critical difference: while there are available renewable technologies to satisfy one version of a sustainable energy future, the transport sector has never enjoyed widely-accepted technological alternatives to the fossil fuel-burning internal combustion engine. For this reason, our discussion is confined to energy use that for the large part does not concern transportation.
2. Although Lovins' account remains the best-known, many other contemporaneous reports and publications argued that the decline of the oil era was in sight (see, e.g., Stobaugh and Yergin's (1979) *Energy Future* for the Harvard Business School).
3. A number of excellent studies on these sources might be consulted (see, e.g., Dobson, 1990; Dryzek et al., 2003; Glacken, 1976; Ponting, 1993; O'Neil, 1993; and Pepper, 1996). Largely missing from these is the counter culture as a source of theory or practice. While philosophies and ideologies are easily amenable to representation and study, social movements and cultural phenomena are not. Unfortunately, environmental ideas have become fixed in family trees of ideology and derivation and divorced from their social context and the social movements that gave them meaning. This is not to say that the character of the counter culture didn't contribute to this problem, as it was so diverse and eclectic in its environmental views—to the extent that it may only be the amalgam of its views that is distinctive, rather than the creation of anything original.
4. Exceptions are Taylor (1995) and Gottleib (1997, 2005) on environmental movements.
5. Lovins' (1979: 148) original list of conventional energy's ill effects is a good representation of this rejection, albeit of a more somber and responsible cast, including among the conventional energy system's key problems its strong central control, bypassing of traditional market mechanisms, encouragement of suburbanization, distorted political structures and social priorities, increased bureaucratization and alienation, compromised professional ethics, reinforcement of national and international wealth inequity, militarization of civilian life, increased social and economic risks, eroded federalism, and elitist technological orientation that diminishes democracy.
6. Barry Commoner's (1977) *Poverty of Power: Energy and the Economic Crisis* certainly identifies capitalism and the profit motive as major causes of the U.S. crises in energy, economic performance, and environmental damage in the 1970s, and concludes by advocating the investigation of more central planning in energy, seemingly along the lines of some Western European nations. This, however, was about as far as Commoner ventured into the social realm and the work had surprisingly little content on renewable energy technologies.
7. Dunn and Flavin (2002: 41) report that "BP's \$100-million annual investment in clean energy equals only about 1 percent of the company's overall expenditures of \$12.5 billion."
8. After Hajer (1995), ecological modernization describes state activity to reconcile industrial economic functions with the protection of ecological values, and is exemplified by such initiatives as environmental protection laws and agencies.

9. Off-grid applications are often cited as a major opportunity for PV, which is a perfectly reasonable claim, but one that overlooks the fact that the overwhelming majority of PV-supplied electricity services provided to date are met within grids.
10. In 2002, the US consumed 3,858 TWh of electricity (IEA 2004). For the sake of argument assuming a solar array output of 1 MW over 10,000 square meters (with 12% module efficiency and service corridors of 1,700 square meters per MW) and that 1 MWp in U.S. on average produces around 1,600 MWh per year, some 24,000 square kilometers—an area the size of New Hampshire—would be required for 2,411 TWp PV. For wind, 200,000 square kilometers—an area the size of South Dakota or Nebraska—would be required, assuming 1 MW wind turbines with annual output of 3,416 MWh per turbine and with an area of 0.18 sq km per 1 MW wind (5.5 MW per sq. km). In the case of wind, North Dakota could supply U.S. electricity needs, but only if a massive transmission and distribution system covered the state. And then, the wind energy system would aggregate conversion losses greater than the existing system, a dubious indicator of progress.
11. Byrne and Rich (1983) long ago noted this basic conundrum in the modernist idea of a renewable energy future.
12. Apologies to Anthony Giddens (1998) *The Third Way: The Renewal of Social Democracy*.
13. Daly's case (1973, 1996) for the 'steady state economy' is well known in environmental politics and environmental economics.
14. Indeed, within the ranks of conservative pundits, this activity has seemingly kept many in gainful employment sheeting home all manner of social ills, from drug abuse to single motherhood, to a social movement whose members who never controlled any major corporate, educational, or government entity, major political party, or other major social institution.
15. For a while, 'spaceship earth' was a popular metaphor, used famously by Kenneth Boulding (1966), but also by Paul Ehrlich (1968), Barbara Ward (1968), and others. Fuller's own words in expressing the ethos of this approach cannot be improved upon (1971:120): "While no politician or political system can ever afford to yield understandably and enthusiastically to their adversaries and opposers, all politicians can and will yield enthusiastically to the computer's safe flight-controlling capabilities in bringing all of humanity in for a happy landing. So, planners, architects, and engineers, take the initiative. Go to work"
16. Perhaps the most obvious example is the U.S. nuclear power industry's reliance on the federal Price-Anderson Act that limits the public liability of nuclear plants in the case of an accident. Without this public subsidy to shoulder the potential costs of an accident above the nominal cap set by the Act, the industry simply couldn't afford insurance. In effect, the state acknowledges that the costs of an accident could exceed the value of the nuclear industry. For a fulsome discussion of these issues see Byrne and Hoffman (1996).

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