### 1AC Micro-Generation Adv

**Contention 1 is Micro-Generation--**

**Energy and electricity are *intangible* and *taken for granted*--We are distanced, geographically and emotionally, from the sources of electricity --- this is a result of the centralized energy system**

Pierce 10 [James Pierce, Eric Paulos, researcher and Cooper-Siegel Endowed Chair at the Human-Computer Interaction Institute, Carnegie Mellon University “Materializing energy”, <http://www.paulos.net/papers/2010/MaterializingEnergy_DIS2010.pdf>]

THE INTANGIBILITY OF ENERGY A common observation among designers and researchers interested in sustainability and energy is that energy is “invisible”. A number of research, design, and art projects have attempted to render “invisible” energy “visible” with a goal of promoting “energy awareness” and motivating energy conservation behavior (see, e.g., [22]). It has been argued that energy invisibility and energy unawareness are in fact two major consequences of material progress within the last century [28]. However, the energy we use daily to power our devices, homes, and cities is not simply perceptually invisible but also intangible. We are unaware of energy largely because it does not have (and is not designed to have) a strong tangible presence in our lives. The various material technologies that provide us with energy effectively distance us from the material production of energy and even the consumption of energy in many ways. Our relationship to electricity, for example, is limited primarily to plugging a cord into an outlet. Our relationship with energy as well as most infrastructural technologies supporting it may said to be constituted in what philosopher of technology Don Ihde describes as a background relation[10]. Through background relations, technologies are present to us only to the extent that they help shape the context of our experience; we do not directly and consciously experience them. In the remainder of this section we develop this notion of energy as intangible by investigating diverse conceptualizations of energy. Emerging through these investigations we propose the notion of *energy-as-materiality* and further outline a simple framework for designing interactions with energy-asmateriality involving *collecting*, *keeping*, *sharing*, and *activating* energy.

**The intangibility of energy creates an *untenable relationship* between society and the environment—prioritizing energy over the environment causes warming, biodiversity loss, and resource wars**

Byrne 6 [John BYRNE Director Center for Energy and Environmental Policy & Public Policy @ Delaware AND Noah TOLY Research Associate Center for Energy and Environmental Policy ‘6 in Transforming Power eds. Byrne, Toly, & Glover p. 1-3]

From climate change to acid rain, contaminated landscapes, mercury pollution, and biodiversity loss ,2 the origins of many of our least tractable environmental problems can be traced to the operations of the modern energy system. A scan of nightfall across the planet reveals a social dilemma that also accompanies this system's operations: invented over a century ago, electric light remains an experience only for the socially privileged. Two billion human beings-almost one-third of the planet's population-experience evening light by candle, oil lamp, or open fire, reminding us that energy modernization has left intact-and sometimes exacerbated-social inequalities that its architects promised would be banished (Smi l, 2003: 370- 373). And there is the disturbing link between modern energy and war.3 Whether as a mineral whose control is fought over by the powerful (for a recent history of conflict over oil, see Klare, 2002b, 2004, 2006), or as the enablement of an atomic war of extinction, modern energy makes modern life possible and threatens its future. With environmental crisis, social inequality, and military conflict among the significant problems of contemporary energy-society relations, the importance of a social analysis of the modern energy system appears easy to establish. One might, therefore, expect a lively and fulsome debate of the sector's performance, including critical inquiries into the politics, sociology, and political economy of modern energy. Yet, contemporary discourse on the subject is disappointing: instead of a social analysis of energy regimes, the field seems to be a captive of euphoric technological visions and associated studies of "energy futures" that imagine the pleasing consequences of new energy sources and devices.4 One stream of euphoria has sprung from advocates of conventional energy, perhaps best represented by the unflappable optimists of nuclear power who ' early on, promised to invent a “magical fire” (Weinberg 1972) capable of meeting any level of energy demand inexhaustibly in a manner too c heap to meter” (Lewis Strauss, ctted tn the New York Ttmes 1954, 1955). In reply to those who fear catastrophic accidents from the "magical fire" or the prolifera~ ion of nuclear weapons, a new promise is made to realize "inherently safe reactors" (Weinberg, 1985) that risk neither serious accident nor intentionally harmful use of high-energy physics. Less grandiose, but no less optimistic, forecasts can be heard from fossil fuel enthusiasts who, likewise, project more energy, at lower cost, and with little ecological harm (see, e.g., Yergin and Stoppard, 2003). Skeptics of conventional energy, eschewing involvement with dangerously scaled technologies and their ecological consequences, find solace in "sustainable energy alternatives" that constitute a second euphoric stream. Preferring to redirect attention to smaller, and supposedly more democratic, options, "green" energy advocates conceive devices and systems that prefigure a revival of human scale development, local self-determination, and a commitment to ecological balance. Among supporters are those who believe that greening the energy system embodies universal social ideals and, as a result, can overcome current conflicts between energy "haves" and "havenots." 5 In a recent contribution to this perspective, Vaitheeswaran suggests (2003: 327, 291 ), "today's nascent energy revolution will truly deliver power to the people" as "micropower meets village power." Hermann Scheer echoes the idea of an alternative energy-led social transformation: the shift to a "solar global economy ... can satisfy the material needs of all mankind and grant us the freedom to guarantee truly universal and equal human rights and to safeguard the world's cultural diversity" (Scheer, 2002: 34).6 The euphoria of contemporary energy studies is noteworthy for its historical consistency with a nearly unbroken social narrative of wonderment extending from the advent of steam power through the spread of electricity (Nye, 1999). The modern energy regime that now powers nuclear weaponry and risks disruption of the planet's climate is a product of promises pursued without sustained public examination of the political, social, economic, and ecological record of the regime's operations. However, the discursive landscape has occasionally included thoughtful exploration of the broader contours of energy-environment-society relations. As early as 1934, Lewis Mumford (see also his two-volume Myth of the Machine, 1966; 1970) critiqued the industrial energy system for being a key source of social and ecological alienation (I 934: 196): The changes that were manifested in every department of Technics rested for the most part on one central fact: the increase of energy. Size, speed, quantity, the multiplication of machines, were all reflections of the new means of utilizing fuel and the enlargement of the available stock of fuel itself. Power was dissociated from its natural human and geographic limitations: from the caprices of the weather, from the irregularities that definitely restrict the output of men and animals. By 1961, Mumford despaired that modernity had retrogressed into a lifeharming dead end (1961: 263, 248): ... an orgy of uncontrolled production and equally uncontrolled reproduction: machine fodder and cannon fodder: surplus values and surplus populations ... The dirty crowded houses, the dank airless courts and alleys, the bleak pavements, the sulphurous atmosphere, the over-routinized and dehumanized factory, the drill schools, the second-hand experiences, the starvation of the senses, the remoteness from nature and animal activity-here are the enemies. The living organism demands ali fe-sustaining environment. Modernity's formula for two centuries had been to increase energy in order to produce overwhelming economic growth. While diagnosing the inevitable failures of this logic, Mumford nevertheless warned that modernity's supporters would seek to derail present-tense7 evaluations of the era's social and ecological performance with forecasts of a bountiful future in which, finally, the perennial social conflicts over resources would end. Contrary to traditional notions of democratic governance, Mumford observed that the modern ideal actually issues from a pseudomorph that he named the "democratic authoritarian bargain" ( 1964: 6) in which the modern energy regime and capitalist political economy join in a promise to produce "every material advantage, every intellectual and emotional stimulus [one] may desire, in quantities hardly available hitherto even for a restricted minority" on the condition that society demands only what the regime is capable and willing to offer. An authoritarian energy order thereby constructs an aspirational democracy while facilitating the abstraction of production and consumption from non-economic social values. The premises of the current energy paradigms are in need of critical study in the manner of Mumford's work if a world measurably different from the present order is to be organized. Interrogating modern energy assumptions, this chapter examines the social projects of both conventional and sustainable energy as a beginning effort in this direction. The critique explores the neglected issue of the political economy of energy, underscores the pattern of democratic failure in the evolution of modern energy, and considers the discursive continuities between the premises of conventional and sustainable energy futures.

**Warming is real, anthropogenic, and reversible**

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The Earth is Warming We know the planet is warming from surface temperature stations and satellites measuring the temperature of the Earth's surface and lower atmosphere. We also have various tools which have measured the warming of the Earth's oceans. Satellites have measured an energy imbalance at the top of the Earth's atmosphere. Glaciers, sea ice, and ice sheets are all receding. Sea levels are rising. Spring is arriving sooner each year. There's simply no doubt - the planet is warming (Figure 1). Global Warming Continues And yes, the warming is continuing. The 2000s were hotter than the 1990s, which were hotter than the 1980s, which were hotter than the 1970s. 2010 tied for the hottest year on record. The 12-month running average global temperature broke the record three times in 2010, according to NASA Goddard Institute for Space Studies (GISS) data. Sea levels are still rising, ice is still receding, spring is still coming earlier, there's still a planetary energy imbalance, etc. etc. Contrary to what some would like us to believe, the planet has not magically stopped warming. Those who argue otherwise are confusing short-term noise with long-term global warming (Figure 2). Foster and Rahmstorf (2011) showed that when we filter out the short-term effects of the sun, volcanoes, and El Niño cycles, the underlying man-made global warming trend becomes even more clear (Figure 3). For as much as atmospheric temperatures are rising, the amount of energy being absorbed by the planet is even more striking when one looks into the deep oceans and the change in the global heat content (Figure 4). Humans are Increasing Atmospheric Greenhouse Gases The amount of greenhouse gases in the atmosphere - particularly carbon dioxide (CO2) - has been rising steadily over the past 150 years. There are a number of lines of evidence which clearly demonstrate that this increase is due to human activities, primarily burning fossil fuels. The most direct of evidence involves simple accounting. Humans are currently emitting approximately 30 billion tons of CO2 per year, and the amount in the atmosphere is increasing by about 15 billion tons per year. Our emissions have to go somewhere - half goes into the atmosphere, while the other half is absorbed by the oceans (which is causing another major problem - ocean acidification). We also know the atmospheric increase is from burning fossil fuels because of the isotopic signature of the carbon in the atmosphere. Carbon comes in three different isotopes, and plants have a preference for the lighter isotopes. So if the fraction of lighter carbon isotopes in the atmosphere is increasing, we know the increase is due to burning plants and fossil fuels, and that is what scientists observe. The fact that humans are responsible for the increase in atmospheric CO2 is settled science. The evidence is clear-cut. Human Greenhouse Gases are Causing Global Warming There is overwhelming evidence that humans are the dominant cause of the recent global warming, mainly due to our greenhouse gas emissions. Based on fundamental physics and math, we can quantify the amount of warming human activity is causing, and verify that we're responsible for essentially all of the global warming over the past 3 decades. The aforementioned Foster and Rahmstorf (2011) found a 0.16°C per decade warming trend since 1979 after filtering out the short-term noise. In fact we expect human greenhouse gas emissions to cause more warming than we've thus far seen, due to the thermal inertia of the oceans (the time it takes to heat them). Human aerosol emissions are also offsetting a significant amount of the warming by causing global dimming. Huber and Knutti (2011) found that human greenhouse gas emissions have caused 66% more global warming than has been observed since the 1950s, because the cooling effect of human aerosol emissions have offset about 44% of that warming. They found that overall, human effects are responsible for approximately 100% of the observed global warming over the past 60 years (Figure 5). There are also numerous 'fingerprints' which we would expect to see from an increased greenhouse effect (i.e. more warming at night, at higher latitudes, upper atmosphere cooling) that we have indeed observed (Figure 6). Climate models have projected the ensuing global warming to a high level of accuracy, verifying that we have a good understanding of the fundamental physics behind climate change. Sometimes people ask "what would it take to falsify the man-made global warming theory?". Well, basically it would require that our fundamental understanding of physics be wrong, because that's what the theory is based on. This fundamental physics has been scrutinized through scientific experiments for decades to centuries. The Warming will Continue We also know that if we continue to emit large amounts of greenhouse gases, the planet will continue to warm. We know that the climate sensitivity to a doubling of atmospheric CO2 from the pre-industrial level of 280 parts per million by volume (ppmv) to 560 ppmv (we're currently at 390 ppmv) will cause 2–4.5°C of warming. And we're headed for 560 ppmv in the mid-to-late 21st century if we continue business-as-usual emissions. The precise sensitivity of the climate to increasing CO2 is still fairly uncertain: 2–4.5°C is a fairly wide range of likely values. However, even if we're lucky and the climate sensitivity is just 2°C for doubled atmospheric CO2, if we continue on our current emissions path, we will commit ourselves to that amount of warming (2°C above pre-industrial levels) within the next 75 years. The Net Result will be Bad There will be some positive results of this continued warming. For example, an open Northwest Passage, enhanced growth for some plants and improved agriculture at high latitudes (though this will require use of more fertilizers), etc. However, the negatives will almost certainly outweigh the positives, by a long shot. We're talking decreased biodiversity, water shortages, increasing heat waves (both in frequency and intensity), decreased crop yields due to these impacts, damage to infrastructure, displacement of millions of people, etc. Arguments to the contrary are superficial One thing I've found in reading skeptic criticisms of climate science is that they're consistently superficial. For example, the criticisms of James Hansen's 1988 global warming projections never go beyond "he was wrong," when in reality it's important to evaluate what caused the discrepancy between his projections and actual climate changes, and what we can learn from this. And those who argue that "it's the Sun" fail to comprehend that we understand the major mechanisms by which the Sun influences the global climate, and that they cannot explain the current global warming trend. And those who argue "it's just a natural cycle" can never seem to identify exactly which natural cycle can explain the current warming, nor can they explain how our understanding of the fundamental climate physics is wrong. There are legitimate unresolved questions Much ado is made out of the expression "the science is settled." The science is settled in terms of knowing that the planet is warming rapidly, and that humans are the dominant cause. There are certainly unresolved issues. As noted above, there's a big difference between a 2°C and a 4.5°C warming for a doubling of atmospheric CO2, and it's an important question to resolve, because we need to know how fast the planet will warm in order to know how fast we need to reduce our greenhouse gas emissions. There are significant uncertainties in some feedbacks which play into this question. For example, will clouds act as a net positive feedback (by trapping more heat, causing more warming) or negative feedback (by reflecting more sunlight, causing a cooling effect) as the planet continues to warm? And exactly how much global warming is being offset by human aerosol emissions? These are the sorts of questions we should be debating, and the issues that most climate scientists are investigating. Unfortunately there is a there is a very vocal contingent of people determined to continue arguing the resolved questions for which the science has already been settled. And when climate scientists are forced to respond to the constant propagation of misinformation on these settled issues, it just detracts from our investigation of the legitimate, unresolved, important questions. Smart Risk Management Means Taking Action People are usually very conservative when it comes to risk management. Some of us buy fire insurance for our homes when the risk of a house fire is less than 1%, for example. When it comes to important objects like cars and homes, we would rather be safe than sorry. But there is arguably no more important object than the global climate. We rely on the climate for our basic requirements, like having enough accessible food and water. Prudent risk management in this case is clear. The scientific evidence discussed above shows indisputably that there is a risk that we are headed towards very harmful climate change. There are uncertainties as to how harmful the consequences will be, but uncertainty is not a valid reason for inaction. There's very high uncertainty whether I'll ever be in a car accident, but it would be foolish of me not to prepare for that possibility by purchasing auto insurance. Moreover, uncertainty cuts both ways, and it's just as likely that the consequences will be worse than we expect as it is that the consequences won't be very bad. We Can Solve the Problem The good news is that we have the tools we need to mitigate the risk posed by climate change. A number of plans have been put forth to achieve the necessary greenhouse gas emissions cuts (i.e. here and here and here). We already have all the technology we need. Opponents often argue that mitigating global warming will hurt the economy, but the opposite is true. Those who argue that reducing emissions will be too expensive ignore the costs of climate change - economic studies have consistently shown that mitigation is several times less costly than trying to adapt to climate change (Figure 7). This is why there is a consensus among economists with expertise in climate that we should put a price on carbon emissions (Figure 8). should US reduce emissions The Big Picture The big picture is that we know the planet is warming, humans are causing it, there is a substantial risk to continuing on our current path, but we don't know exactly how large the risk is. However, uncertainty regarding the magnitude of the risk is not an excuse to ignore it. We also know that if we continue on a business-as-usual path, the risk of catastrophic consequences is very high. In fact, the larger the uncertainty, the greater the potential for the exceptionally high risk scenario to become reality. We need to continue to decrease the uncertainty, but it's also critical to acknowledge what we know and what questions have been resolved, and that taking no action is not an option. The good news is that we know how to solve the problem, and that doing so will minimize the impact not only on the climate, but also on the economy. The bottom line is that from every perspective - scientific, risk management, economic, etc. - there is no reason not to immeditately take serious action to mitigate climate change, and failing to do so would be exceptionally foolish.

**Warming causes multiple scenarios for extinction**

**Brandenberg 99** (John & Monica Paxson, Visiting Prof. Researcher @ Florida Space Institute, Physicist Ph.D., Science Writer, Dead Mars Dying Earth, Pg 232-233)

The ozone hole expands, driven by a monstrous synergy with global warming that puts more catalytic ice crystals into the stratosphere, but this affects the far north and south and not the major nations’ heartlands. The seas rise, the tropics roast but the media networks no longer cover it. The Amazon rainforest becomes the Amazon desert. Oxygen levels fall, but profits rise for those who can provide it in bottles. An equatorial high-pressure zone forms, forcing drought in central Africa and Brazil, the Nile dries up and the monsoons fail. Then inevitably, at some unlucky point in time, a major unexpected event occurs—a major volcanic eruption, a sudden and dramatic shift in ocean circulation or a large asteroid impact (those who think freakish accidents do not occur have paid little attention to life or Mars), or a nuclear war that starts between Pakistan and India and escalates to involve China and Russia . . . Suddenly the gradual climb in global temperatures goes on a mad excursion as the oceans warm and release large amounts of dissolved carbon dioxide from their lower depths into the atmosphere. Oxygen levels go down precipitously as oxygen replaces lost oceanic carbon dioxide. Asthma cases double and then double again. Now a third of the world fears breathing. As the oceans dump carbon dioxide, the greenhouse effect increases, which further warms the oceans, causing them to dump even more carbon. Because of the heat, plants die and burn in enormous fires, which release more carbon dioxide, and the oceans evaporate, adding more water vapor to the greenhouse. Soon, we are in what is termed a runaway greenhouse effect, as happened to Venus eons ago. The last two surviving scientists inevitably argue, one telling the other, “See! I told you the missing sink was in the ocean!” Earth, as we know it, dies. After this Venusian excursion in temperatures, the oxygen disappears into the soil, the oceans evaporate and are lost and the dead Earth loses its ozone layer completely. Earth is too far from the Sun for it to be the second Venus for long. Its atmosphere is slowly lost—as is its water—because of ultraviolet bombardment breaking up all the molecules apart from carbon dioxide. As the atmosphere becomes thin, the Earth becomes colder. For a short while temperatures are nearly normal, but the ultraviolet sears any life that tries to make a comeback. The carbon dioxide thins out to form a thin veneer with a few wispy clouds and dust devils. Earth becomes the second Mars—red, desolate, with perhaps a few hardy microbes surviving.

**No impact defense—the environmental costs of centralized energy are massive and unaccounted for and renewables cant be able to compete against cheaper, dirty sources of energy**

Sovacool 9 [Benjamin, Energy Governance Program, Centre on Asia and Globalisation, Lee Kuan Yew School of Public Policy, National University of Singapore, Singapore. Also, knocked Herndon out of the NDT his junior year. On vagueness. Siiiiiiiick. “Rejecting renewables: The socio-technical impediments to renewable electricity in the United States” Energy Policy 37 (2009) 4500–4513]

3. Economic impediments

While renewable power sources have social benefits, they are not without costs, and the existing system prices electricity in a manner that tends to favor conventional options. For most of its history, the American electric utility sector has focused on making electricity abundant and cheap with the assistance of regulators and politicians, who subsidize all forms of energy to shield consumers from the true costs of extraction, generation, distribution, and use. The environmental and social costs inherent with the existing system, therefore, have also become less and less noticeable. Many utilities endorse fossil and nuclear plants because they are able to pass most of the costs from these polluting power systems directly onto consumers and society at large. Renewable power sources, in contrast, provide public benefits that are not yet valued in the electricity market.

Because of this non-alignment between electricity's cost and price, utilities reject renewables and continue to rely on less efficient and more damaging generators that guarantee them future profits. When the principles of neoclassical economics were being formulated by Marshall (1890) and Pigou (1920), one of their central arguments was that all costs from a transaction had to be internalized (or taxed, to use Pigou's language). Otherwise, firms would always exploit the system to shift as many costs as they could to the public. About five decades later, Garrett Hardin developed the term “tragedy of the commons” to refer to how people (and firms) rationally externalize as many of the costs associated with their activities that they can. Examples of “the commons” for Hardin included agricultural grazing lands, the National Parks, free parking meters, and a thief robbing a bank. The commons in each instance – grass, land, parking spaces, other people's money – had a tendency to be exploited because the benefits of abusing them accrued to a small group of individuals, whereas the costs were distributed to everyone. Or, as Hardin (1968, p. 1245) noted, “we are locked into a system of fouling our own nest, so long as we behave only as independent, rational, free-enterprisers.”

This situation has very real implications for the American electric utility sector. Fossil fuel and nuclear power plants are the nation's second largest users of water, produce millions of tons of solid waste, emit mercury, particulate matter, and other noxious pollutants into the atmosphere, and cause social inequity by exacerbating poverty. Yet in the current system, they do not have to pay for most of this damage. If they did have to fully internalize the costs of transportation, air pollution, water contamination, and land use (and, when applicable, damages such as injury and death), coal generation would cost 19.14 cents per kilowatt-hour (¢/kWh) more; oil and natural gas generation 12 ¢/kWh more; nuclear power 11.1 ¢/kWh more ( [Sovacool, 2008a] and [Sovacool, 2008b]) (see Fig. 3). Given that the average residential price of electricity in the United States for 2007 was about 10 ¢/kWh, the damages from these energy systems currently outweigh the amount that customers pay for them.

Put another way, in 2007 fossil fueled and nuclear power generators exacted about $420 billion in damages – excluding possible damages from climate change – that were not reflected in electricity prices, an amount $143 billion more than the $277 billion in revenues the American electricity industry reported for the same year. Consequently, forcing renewable power technologies to compete against conventional generators when the prices are so skewed in their favor is much like racing a tricycle against a Ferrari.

### 1AC Plan-Text

**The United States federal government should issue a revenue ruling establishing that locally-planned solar power production is a real estate investment trust qualified asset class**

### 1AC Solvency

#### Contention 2 is Solvency---

#### Micro-generation is key to preventing widespread environmental catastrophe

Rifkin 12 [Jeremy Rifkin is president of the Foundation on Economic Trends and the bestselling author of nineteen books on the impact of scientific and technological changes on the economy, the workforce, society, and the environment. His books have been translated into more than thirty five languages and are used in hundreds of universities, corporations and government agencies around the world. His most recent books includeThe Third Industrial Revolution, The Empathic Civilization, The Hydrogen Economy, The European Dream, The End of Work, The Age of Access, and The Biotech Century. Jeremy Rifkin has been an adviser to the European Union for the past decade and is the principle architect of the European Union’s Third Industrial Revolution long-term economic sustainability plan.. “The third Industrial Revolution”. Feb 14th. <http://www.makingitmagazine.net/?p=4514>]

Our industrial civilization is at a crossroads. Oil and the other fossil fuel energies that make up the industrial way of life are dwindling, and the technologies made from and propelled by these energies are antiquated. The entire industrial infrastructure built on fossil fuels is aging and in disrepair. The result is that unemployment is rising to dangerous levels all over the world. Governments, businesses and consumers are awash in debt, and living standards are plummeting everywhere. A record one billion human beings – nearly one seventh of the human race – face hunger and starvation.

Worse, climate change from fossil fuel-based industrial activity looms on the horizon. Our scientists warn that we face a potentially cataclysmic change in the temperature and chemistry of the planet, which threatens to destabilize ecosystems around the world. We may be on the brink of a mass extinction of plant and animal life by the end of the century, imperilling our own species’ ability to survive. It is becoming increasingly clear that we need a new economic narrative that can take us into a more equitable and sustainable future.

A new convergence of communication and energy

By the 1980s, the evidence was mounting that the fossil fuel-driven industrial revolution was peaking and that human-induced climate change was forcing a planetary crisis of untold proportions. For the past 30 years, I have been searching for a new paradigm that could usher in a post-carbon era. I came to realize that the great economic revolutions in history occur when new communication technologies converge with new energy systems. New energy regimes make possible the creation of more interdependent economic activity and expanded commercial exchange, as well as facilitating more dense and inclusive social relationships. The accompanying communication revolutions become the means to organize and manage the new temporal and spatial dynamics that arise from new energy systems.

In the 19th century, steam-powered print technology became the communication medium to manage the coal-fired rail infrastructure and the incipient national markets of the First Industrial Revolution.  In the 20th century, electronic communications – the telephone and later, radio and television – became the communication medium to manage and market the oil-powered auto age and the mass consumer culture of the Second Industrial Revolution.

An “energy Internet”

In the mid-1990s, it dawned on me that a new convergence of communication and energy was in the offing. Internet technology and renewable energies were about to merge to create a powerful new infrastructure for a Third Industrial Revolution that would change the world. In the coming era, hundreds of millions of people will produce their own green energy in their homes, offices, and factories, and share it with each other in an “energy Internet,” just like we now create and share information online. The democratization of energy will bring with it a fundamental reordering of human relationships, impacting the very way we conduct business, govern society, educate our children, and engage in civic life.

#### Start your evaluation of the debate from an integrated, socio-technical perspective---Politics, technology, economics, and society form a co-productive, interactive web---Their arguments about “impossibility” or “technical failure” or “inevitability” take minor contingent facts and treat them as immutable---the plan is a change at every level that can radically alter our relationship to technology and the world

Sovacool 9 [Benjamin, Energy Governance Program, Centre on Asia and Globalisation, Lee Kuan Yew School of Public Policy, National University of Singapore, Singapore. Also, knocked Herndon out of the NDT his junior year. On vagueness. Siiiiiiiick. “Rejecting renewables: The socio-technical impediments to renewable electricity in the United States” Energy Policy 37 (2009) 4500–4513]

By laying out these impediments as “economic,” “political,” and “behavioral,” the author did not intend to suppose that demarcations between the three sets of obstacles really exist in separate classes. For instance, the repeal of the Public Utility Holding Company Act of 1935 (PUHCA) in 2005 removed incentives for utilities to engage in collaborative research and development (R&D) and oriented them to focus more on short-term goals and rapid profits. Whether this is an example of an economic or political barrier is unclear. The Reagan Administration's reduction of federal subsidies for renewable power in the 1980s caused a large number of firms to go bankrupt, creating a social stigma against renewable technologies such as wind and solar. Is this obstacle behavioral, economic, or political? Dividing the “social” from the “technical,” or even the “economic” from the “political” is counterproductive, since it misses the point that such impediments exist in an integrated nexus, and it is done here only to make such obstacles easier to identify.

In viewing the electric utility system in this manner – as a set of social, cultural, economic, and political interests fused together with technology, rather than a “black box” of generators – this article differs from most scholarship on electricity and energy in four crucial ways.

First, viewing renewable energy generators as part of a socio-technical system rejects the distinction between the technical and the social. Technologists and policymakers have often attempted to describe technological development by sharply demarcating “technical” concerns from “social” ones. Yet sociologist Latour (1986, p. 22) suggests that “technology and society are two artifacts created by the analyst's duplicity.” Sociologist Law (1992, p. 38) concurs, and argues that such descriptions frequently supplement technical discussions with a list of the “social” factors that influenced development, as if “one is presented with a balance sheet with society (or the economy, or science, or politics) on the one hand and technology on the other. Analysis becomes the study of transfers between columns.”

Energy reports from the US Energy Information Administration (EIA) and International Energy Agency (IEA), however, tend to sharply demarcate “technical” and “social” factors in their analysis. Their reports, for instance, focus primarily on estimating generation capacities, projecting fuel costs, and predicting the environmental impacts of particular energy technologies, but rarely include social-scientific approaches and remain wedded to narrow disciplinary boundaries. The exemplar among these types of reports for the United States, the EIA's Annual Energy Outlook, projects current trends of energy consumption to provide perspective about future incomes and prices, but it does not anticipate future policy changes, discuss consumer attitudes and values, or provide policy recommendations. The report assumes the existing configuration of the industry, and thus restricts consideration to a very limited range of alternatives.

Second, revealing the socio-technical impediments to renewable power makes visible patterns of electricity production and use, patterns that have become all but invisible to American consumers in the past century. Historian and philosopher Edwards (2003) has remarked that one of the most salient characteristics of modern industrial systems such as telephones and power networks is the degree to which they are not salient for most people, most of the time. These systems reside in a naturalized background, as ordinary to most of us as “trees, daylight, and dirt.” Historian Williams (2001) argues that once some technological landscapes are in place, people fold them so completely into their psyches that those very landscapes become removed from consciousness. Americans are therefore generally unaware about electricity, with the Department of Energy (DOE) reporting that only about 12 percent of people can pass a “basic” electricity-literacy test (US Department of Energy, 2008, p. 8). Most people have become so enfolded into the vast technological network of the electric utility system that they do not even realize such a system exists. Identifying the socio-technical barriers to renewable energy is a way to make the system visible again, an instrumental exercise if more sustainable forms of electricity supply are to be understood and implemented.

Admittedly, this article is not the first to emphasize the socio-technical dimensions of electricity. Yet those studies that do attempt to provide a rich, contextualized approach tracing social, historical, and institutional factors in the acceptance of energy technologies have not tended to focus on renewable power technologies in the United States. Hughes (1983) and Nye (1990) limit their analysis from the 1880s to the 1940s. Nye's (1999) other influential book dedicates only a chapter to electricity and only a few paragraphs to renewable energy generators. The work of [Hirsh, 1989] and [Hirsh, 1999] on the managerial practices and technological choices facing the American electric utility industry provides excellent insight into how large scale and centralized fossil fuel generators lost both technical and social momentum throughout from the 1960s to the 1980s, but does not emphasize the importance of social factors and their relationship to the electricity industry much after that period. Melosi (1985) and Smil (1994) provide well written and thorough cultural histories of energy systems in the US and the world, but conclude their investigation with the oil crises of the 1970s. In other words, none of these excellent works focus on changes affecting renewables in the electric utility sector in the past 10 to 20 years.

Third, exploring the underlying socio-technical dimensions of electricity technologies recognizes the contingency of technological development. Socio-technical systems are constructed out of chaos, conflict, diversity, and negotiation. System builders, it follows, must overcome a complex milieu of socio-technical obstacles. As sociologist MacKenzie (1987, p. 197) put it, “systems or networks should not be taken simply as given, as unproblematic features of the world; nor should the use of the term ‘system’ be taken to imply stability or lack of conflict. Systems are constructs and hold together only so long as the correct conditions prevail.” Emphasizing the contingency of technical development reminds us that the current electric utility system, with its 17,000 conventional generators, 250,000 miles of high voltage transmission lines, thousands of substations, expansive natural gas pipelines, hundreds of coal mines, and dozens of spent nuclear fuel storage facilities—was and is by no means inevitable. Instead, each system component was the product of social negotiation and compromise. Since the current system was chosen and elaborated upon by actors, it can also be changed by human participants as well. Making apparent the contingency of the electric power grid allows us to study and analyze the factors that make current technologies socially acceptable. In other words, it helps show us what social conditions are necessary for a given technology (or set of technologies) to succeed, at the same time such conditions may make other technologies unacceptable.

Fourth and finally, this article challenges notions of technological failure and failed technology. Many assessments of technology continue to understand technological failure as a purely technical phenomenon. The work of Perrow (1984) provides excellent case studies into how the “interactive complexity” and “tight coupling” of socio-technical systems like those used at chemical plants, nuclear weapons laboratories, and air traffic control, will inevitably produce accidents. Woodhouse (1990) comments that since technological endeavors are incredibly complex, new technology can be expected to respond to their environment in unforeseeable ways, a problem further compounded by significant lag time between the introduction of new technologies and discovering their inherent risks. Lipartito (2003) notes that technical explanations of failure are often deployed to clarify the non-acceptance of the electric vehicle, the Beta videotape system, and early metal airplanes. The case of renewable energy technologies, in contrast, highlights how any such notion of “technological failure” must include both the technical and social dimensions of a given technology. The question of whether a technology works – whether it remains “lost” and “marginalized” – cannot be answered prior to its adoption.

**The politics of fossil fuel scarcity sustains the centralized energy system---the plan is key to a sustainable economy**

Barry 12—John Barry, Reader Politics @ Queen’s University (Belfast) [*The Politics of Actually Existing Unsustainability* p. 204-207]

BEYOND THE 'SCARCITY' PRINCIPLE: TOWARDS AN ECONOMY OF SUSTAINABLE DESIRE That a post-growth economy is one characterized by 'abundance', pleasure, and desire, is not something that is immediately obvious or self-evident. Unfortunately it is ascetic notions of less unsustainable lifestyles, and the deliberate misrepresentation of a sustainable society in terms of sacrifice, loss, regress, and totalitarianism, that tend to dominate discussions. Against these negative portrayals, I here argue that a post-growth green economy can be an economy of pleasure. Situated between the affluenza of modern consumerism and the puritanical self-denial of some visions of a sustainable economy lies what could be called an economy of sustainable desire.17 A reason for so characterizing a post-growth economy based on green political economic principles is to directly challenge and offer an alternative to what Steigler terms the 'libidinal economy of capitalism' (Steigler, 2008). To Steigler, 'Capitalism needs to control conduct and in order to achieve this, it develops techniques of capture or captation' (Steigler, 2008: 12). To counter this, strategies to 'release' people from this consumer discipline are therefore required. One strategy to counter this consumer-driven capitalist economy of unsustainable desire, it is proposed here to replace it with an economy of sustainable desire. Rejecting the disciplining notion of neoclassical economics which makes 'scarcity' the organizing principle for the economy, an economy of sustainable desire is characterized by abundance and possibilities for pleasurable, life affirming living. This economy of desire harks back and is explicitly built on the arguments greens and others made in the 1960s onwards to the effect that consumerist culture was not only not appreciably adding to human well-being and quality of life, but in many areas was positively detrimental to human well-being. An economy of abundance is based on the very simple notion that

 pleasure, life-affirming experiences and practices, do not have any necessary connection with either individualized and/or maximizing material consumption. The best things in life do turn out to be free after all in that it is meaningful relation~ between people not possessions or income, that are the major determinate of human flourishing. The subjectivities created in and through these post-material forms of pleasurable living are necessarily different from the passive consumer subjectivities created by an increasingly obsolete carbon-fuelled consumer capitalism. It also begins from the (rather obvious) contention that 'scarcity', much like 'abundance', is socially created and politically negotiated, that is, neither are 'given' but both are 'created'.18 As Xenos succinctly notes, 'The simple fact of finitude of anything does not necessarily constitute a scarcity of that thing' (Xenos, 2010: 32). What 'transforms' finitude into 'scarcity' (and associated issues of rarity, price, use-value, possession, allocation, distributive mechanism, and desire) are social relations, how human beings 'see', relate to, and 'value' that which is finite. For the ancient Greeks (and contemporary greens) the problem in politics was not 'scarcity' in the sense of finitude and what orthodox economists would call 'limited supply', but rather the proliferation of desire beyond the satisfaction of need. Hence, the solution of the ancients was to limit desire and acquisitiveness, not to 'overcome' scarcity as it was for modernity (Xenos, 2010: 33).19 The modern economic mobilization of a power/knowledge discourse of 'scarcity' is vital to understanding both contemporary orthodox economics and modern capitalism. As Illich reminds us, 'Economics always implies the assumption of scarcity. What is not scarce cannot be subject to economic control. ... Scarcity .. . now seems to affect all values of public concern' (Illich, 1980: 123; emphasis added). Within modernity more generally, and under capitalism in particular, we find a similar situation in regards to scarcity as we did in relation to inequality as discussed above. That is, capitalism seeks not to eradicate scarcity in the sense of abolishing it as a concept (as the ancient Greeks did). Rather, it seeks to institutionalize scarcity as a permanent condition, as a 'management tool' to create and govern docile bodies (Sahlins, 1972: 4). It is the permanency of scarcity as Xenos points out that explains the paradox of highly affluent societies (the most materially affluent societies ever seen), also being characterized by the discipline and presence of 'general scarcity'. 20 'Scarcity' (and related ideas of maximization, efficiency, productivity, inequalities as incentives, zero-sum games etc.) has to be created and maintained for it to have its disciplining power as deployed through orthodox economic policies and internalized forms of 'commonsense' economic thinking and acting. For Deleuze and Guattari, 'Lack is created, planned and organized in and through social production ... It is never primary; production is never organized on the basis of pre-existing need or lack. ... The deliberate creation of lack as a function of market economy is the art of the dominant class. This involves deliberately organizing wants and needs amid an abundance of production; making all desire teeter and fall victim to the great fear of not having one's needs satisfied' (Deleuze and Guattari, 2004: 29-30; emphasis added). This fixation on scarcity is one of the main reasons orthodox economics and public policies based on it are skewed towards 'supply side' solutions (Goodin, 1983). Take the energy debate. The orthodox approach is to present this as largely an issue of the security of supply of low-carbon energy with support for nuclear power justified on the grounds that renewable sources of energy leave a dangerous 'energy gap', as the UK government energy report in chapter 3 demonstrated. Nowhere in this narrative is the simple point made that perhaps the issue is not so much a shortage of supply but an excess demand that is, we may be using too much energy rather than not having enough energy. While there is usually some obligatory reference to 'energy efficiency' and 'energy conservation' as important, this framing of the public policy debate over energy futures does not include a space for reducing consumption or considering 'energy descent' as a possible and viable option (Barry and Ellis, 2010). This way of framing the debate would at one stroke enable us to see 'energy scarcity' for what it in fact is-an artificially and asymmetrically created 'gap' based on locking society into a perpetual struggle with exponential rising energy demand. The latter is viewed as 'given' and therefore depoliticized, and so we are presented with a 'Malthusian' situation of energy demand always outstripping (or better still 'threatening' to outstrip) energy production, which 'must' keep up. In short, in the energy debate as elsewhere, the idea of scarcity as the organizing principle of industrial capitalism has to be manufactured and constantly reproduced. Simply put, not to do so would undermine the imperative for continual expansion and economic growth.21 The opposite of scarcity is not material abundance and productivity, as the neoclassical dogma has it. Rather, as Zadak has suggested in his book, An Economics of Utopia, it is 'a liberation from the constraints imposed on our understanding by social, political, and other factors' (Zadak, 1993: 239). And I would suggest, going back to the concepts of sufficiency and 'redundancy' outlined in previous chapters, that these concepts are central in any liberation from the discipline of 'scarcity'. Sufficiency, making 'enough' rather than 'more and more' a central feature of economic activity, does not, as some might suggest, imply a diminution of desire and pleasure. They denote other desires and other ways of meeting and satisfying our desires. And notions of sufficiency and enough-ness, redundancy, sub-optimality, and so on are consistent with a claim that regular and temporary withdrawals from fulfilling desires, such as fasting, frugality (Cato, 2004), voluntary simplicity (Alexander, 2011), refusing to consume and buy and instead making or doing it oneself or with others, public holidays and festivals and other rituals of nonconsumption (Astyk, 2008: 33), or simply slowing down (Berressem, 2009), can actually serve to liberate desire, and in so doing create a new post-scarcity, sustainable economy of desire.

**Momentum exists for change in our energy system. Our policies need to stop supporting centralized elite, technocratic, corporate solutions and empower local community movements by encouraging smaller-scale generation and distribution of energy.**

**An *overt political challenge* is a necessary component of this strategy. The plan’s confrontation with status quo energy galvanizes and lends legitimacy to environmental movements.**

Scrase 9 [Ivan SCRASE Science and Technology Policy Research @ Sussex AND Adrian SMITH Science and Technology Policy Research @ Sussex ‘9 “The (non-)politics of managing low carbon socio-technical

Transitions” Environmental Politics 18 (5) p. 722-724]

Political strategies for transitions In the reflexive spirit TM calls for, it is worthwhile questioning the assumption in TM [transition management] (and this volume) that analysts should guide governments towards policies that avoid political fallout. Deciding between options remains, after all, a political calculation. Moreover, insights from the socio-technical transitions literature could equally be directed at entrepreneurs, consumers, communities, pressure groups and/or investors interested in low carbon transitions – governments will make few emissions cuts themselves: it is how they seek cuts by others that matters. Indeed, ‘government’ needs to be unpacked. One needs to consider, for example, whether a political strategy for transitions is to be developed by a political party while in office or opposition. Winning office on a platform that included low carbon transitions as a central political project would lend significant legitimacy to subsequent efforts. Approaching low carbon transitions as a political project suggests familiar strategies and tactics, such as creating large, powerful and well-funded institutions with a remit to pursue the project’s aims. Other institutions’ power might have to be curtailed, for example the power of government departments that have a close client relationship with powerful regime incumbents such as fossil energy companies. Steps could be taken to tie future governments into continuing the political project (Pierson 2000). The Climate Change Act in the UK, for example, commits UK governments to legally binding cuts in greenhouse gas emissions over the period up to 2050. This all implies a certain drive and readiness for conflict that bears little relation to TM’s implicit model of politics. The electricity regime in typical affluent democracies since the 1980s has had regulated competition as its main driver and organising principle. This is now perceived as problematic, and alternative agendas are being seriously considered (Scrase and MacKerron 2009). If the market model is rejected, governments face two options. They can either take a top-down policy approach that forces a transition to a low carbon society, or they can facilitate bottom-up momentum for change by empowering people to make their homes, communities and lifestyles sustainable. The former might take the form of a corporatist strategy in which governments accept that energy services will be supplied by a small number of large firms and try to enrol these firms to support and implement low carbon policies. Under such arrangements, however, governments would be under pressure to defend the interests of large energy companies, which implies that low carbon transition pathways are more likely to proceed by subsidising nuclear power and CCS than by supporting renewables. In contrast, the alternative pathway, which would make much greater use of distributed and micro-generation, implies breaking up the large energy companies and reducing dependence on the national grid for electricity supplies. This route would presuppose a groundswell of popular concern about climate change and a readiness to use new technologies to cut emissions, combined with policy frameworks that enable this rather than making local pioneers continually face impossible odds. The corporatist strategy would derive its power base from industry and experts, while the decentralising strategy would be based on popular engagement and democratic support. Despite TM’s emphasis on ‘niches’, in terms of political strategy it appears more closely aligned with corporatism than with radical decentralisation. The decentralisation pathway might make use of transitions analysis, but quite differently from the ways sketched above. Transition analysis would be directed at making it as easy as possible for individuals, families and communities to invest, organise, link into low carbon networks of one kind and another, and so on. It is difficult to square that with policy generated in technocratic arenas through appraisal and foresight exercises. Moreover, it implies high levels of political commitment to pressure energy regimes accordingly. This kind of political project, underpinned by choices between contending green pathways, lies beyond TM. Conclusion One can argue that TM is a procedural tool that can be put to use by many different players. Yet no tool is neutral, and we have to consider whether the nature of TM renders it susceptible to capture. Does emphasis on consensus amongst an elite vanguard, a niche-based momentum for change, and reliance on integration with more powerful policy domains, really challenge the structures that TM hopes to transform? Even though TM proclaims participatory and reflexive processes, the narrow power base of its transition arenas, coupled with a limited and largely implicit political strategy, forces it towards technocratic strategies. In principle, the open nature of TM and flexibility in purpose means that it might be possible to use it in ways that help empower people and facilitate a groundswell of bottom-up sustainability initiative (Seyfang and Smith 2007). There is certainly much to commend a multi-level, socio-technical analysis of how our needs are realised and how sustainable pathways might be realised in more democratic ways. But this would require a concomitant redistribution of resources to support the numerous, distributed and context-sensitive niches that would explore those visions and pathways. TM has been a remarkable success in casting existing policy measures in an informative new light. However, in the context of the typical affluent democracy it is difficult to avoid the conclusion that the political strategies and tactics it advocates are inadequate for the task it has set itself. Yet the history of environmentalism reminds us that groups in society are perpetually trying to develop niche alternatives and pressure incumbent regimes in many different ways and with differing levels of agency and influence. A messy, informal transition politics already exists. In our view, this suggests possibilities for mobilisation in a political programme for low carbon transitions.

#### Developing an emotional relationship with energy through microgeneration is key to sustainability---criticisms of this connection ignore the fact that the current system is unsustainable

Pierce 10 [James Pierce, Eric Paulos, researcher and Cooper-Siegel Endowed Chair at the Human-Computer Interaction Institute, Carnegie Mellon University “Materializing energy”, <http://www.paulos.net/papers/2010/MaterializingEnergy_DIS2010.pdf>]

Designing for energy as material and symbolicProposing a more explicit treatment of the design of energy as both material and symbolic is certainly not without problems. On a very pragmatic note, the fact that energy is “consumed”—its materiality-at-hand degrading and eventually dissolving entirely—may suggest longevity and endurance as inappropriate notions to apply to the design of everyday interactions with energy. How and why should the symbolic value of energy endure if its materiality does not? In terms of sustainably re-designing our ßeveryday interactions with energy and energy consuming products, the notion of care of energy may be more appropriate than that of attachment to energy. We might design for caring for our energy in the same ways that one cares for the materiality of food when gardening or preparing an elaborate meal. As a more concrete example, it may be worthwhile to design microgeneration technologies in ways that promote a form of emotional attachment to or care for energy. Indeed evidence from interviews with residents using domestic microgeneration technologies points toward forms of attachment to energy based on the introduction of these technologies, even among those that did not commission their installation. For example: “The advantage with [solar power technologies installed in his home] is that it makes you think about your energy use more. You value it more…” and “I want to feel that as much electricity as I can use is my own electricity.” [7, p. 51-53].

Perhaps **more problematic is that** designing energy to more explicitly enter into the symbolic realm of consumption may lead to the increased material consumption of energy by way of its being increasingly sought after as an unsustainable object of desire.**6** Criticism of such a “reification of energy” must be taken seriously, yet we must also acknowledge that all material and immaterial technologies are already symbolically consumed, including energy technologies such as solar panels. The material symbolic value of energy and energy technologies can be considered or ignored by designers as well as manipulated in ways working for or against goals of sustainability. Whatever the case, the symbolic value of energy and energy technologies is always to some extent present. As such, we argue it is imperative that designers aim to sustainably redefine (or “recode” [12]) our understandings of and interactions with energy through careful attention to the material-symbolic value of emerging as well as commonplace energy related technologies and the energy they materialize. The Energy Memento may be viewed as a way of materializing the concept of the material-symbolic value of energy. Bequeathing an heirloom Energy Memento, for example, seems quite unlikely to ever become a common practice but nonetheless serves as useful counterpoint to the current undifferentiatedness of energy and offers an alternative to our currently unsustainable situation in which energy is merely “something to”— something undemanding and undeserving of our sustained care and attention.

Solar REITs are being increased through private rulings, but the plan is key to certainty and investor confidence

Herndon 1/21/13 [Andrew, Solar Costs to Fall as REITs Emerge as Source of Funding, <http://www.bloomberg.com/news/2013-01-21/solar-costs-to-fall-as-reits-emerge-as-source-of-funding.html>, nrbontha]

A San Francisco startup may win approval as soon as this month to become the first firm allowed to raise money for solar-power projects as a REIT, the financing vehicle used in $640 billion of U.S. property ventures. [Renewable Energy Trust Capital Inc.](http://www.renewabletrust.com/), led by a former Moody’s Investors Service chief executive officer, has asked tax officials at the U.S. Internal Revenue Service to classify solar farms as the type of “real property” that may be included in real estate investment trusts, or REITs. A ruling is imminent, according to Kelly Kogan, an attorney with Chadbourne & Parke LLP, which advises financiers on REITs. A favorable decision may open the U.S. photovoltaic power industry to retail investors at a time when it needs about $6.9 billion a year. REITs, typically formed to develop commercial property like shopping centers and warehouses, returned an average 28 percent in 2012, data on 208 U.S. REITs compiled by Bloomberg show. The format would offer tradable stakes while cutting the cost of capital for developers, according to Felix Mormann, a research fellow at Stanford University Law School’s Steyer-Taylor Center for Energy Policy & Finance. “REITs will significantly reduce the financing cost of solar energy projects and with it, the overall cost of solar electricity,” Mormann said. “They will bring the solar industry a big step closer to subsidy independence.” Standard REITs own and generally operate income-producing property that pays investors dividends. While they’re marketed as more stable than many investment classes, REITs fell along with most equities in the last financial crisis. Retail Investors The 125-member [Bloomberg Industries North American REITs (BBREIT)](http://www.bloomberg.com/quote/BBREIT%3AIND) index, which excludes mortgage-related trusts, returned a negative 47 percent during 2007 and 2008. That’s more than the 34 percent loss including dividends in the same period for the 1,611-member MSCI World Index of global equities. The REIT format was authorized by Congress in 1960 to give retail investors a way to get into commercial real estate. REITs are [required](http://www.reit.com/REIT101/REITFAQs/BasicsOfREITs.aspx) to pay at least 90 percent of their taxable income to shareholders, according to the industry’s Washington-based trade group Nareit. Most are traded publicly and there were 172 REITs registered with the Securities and Exchange Commission and trading on U.S. exchanges at the end of last year, with a combined market value of $603 billion, according to Nareit. The market value of the 208 U.S. REITs tracked by Bloomberg is $640 billion, with the median at $1.35 billion. The average dividend yield is 4.6 percent, and most are invested in real estate. REITs owned about $850 billion in real estate, as of December 31, according to Nareit. The market value of traded equity REITs was about $332 million in 1971. New Industries The format has evolved to provide funding for other industries including timber, data centers, mobile-phone towers, power lines and natural gas pipelines. The common denominator is that all are tangible assets that generate steady income over a long period of time, and photovoltaic power plants fit that mold, according to Renewable Energy Trust’s Chief Financial Officer Christian Fong. “Solar PV could be next,” Fong said. The company, founded in 2011, is led by CEO [John Bohn](http://www.renewabletrust.com/leadership/), who stepped down from the same post at Moody’s in 1996. He’s also served as a commissioner with the California Public Utilities Commission and CEO of the Export-Import Bank of the United States. A solar REIT would own and operate power plants that convert sunlight into electricity, just as standard REITs acquire buildings and other assets. Solar-energy REITs will make it easier for mainstream investors to get involved in renewable- energy generation, Fong said. Congressional Support “There’s no practical way for individuals to vote with their dollars and invest in solar power generation,” Fong said in an interview. “A solar REIT would, for the very first time, give them a way to do that.” The idea has the backing of at least 26 members of Congress, including Senator Lisa Murkowski, an Alaska Republican that’s ranking minority member of the Senate Committee on Energy & Natural Resources. “Minor changes to the federal tax code could provide the renewable-energy industry access to large pools of low-cost capital,” the lawmakers wrote in a letter to President [Barack Obama](http://topics.bloomberg.com/barack-obama/)Dec. 12. They called on the Treasury Department to issue a broad ruling approving the use of REITs for renewable energy. Renewable Energy Trust asked the IRS at least four months ago for a private letter ruling that would grant it permission to become a REIT. It typically takes the IRS about four months to six months to respond to such requests, Fong said. Ruling Imminent The IRS may issue its first decision on solar REITs this month, according to Kogan, the Chadbourne & Parke attorney based in [Washington](http://topics.bloomberg.com/washington/). That’s the only regulatory hurdle Renewable Energy Trust will need to clear and **a favorable ruling will apply only to Fong’s company.** CleanREIT Partners LLC, another San Francisco-based company pursuing solar REITs, submitted a similar request to the IRS last year and later stopped the process while it pursued additional capital, according to co-founder Bill Hilliard. He’s now planning to form a REIT in[Canada](http://topics.bloomberg.com/canada/) to invest in U.S. solar assets, and may pursue an initial public offering on the Toronto Stock Exchange in the third quarter, he said. Conventional REITs typically pay dividends of about 3 percent to 4 percent, according to Hilliard. The first solar REITs may pay more, as much as 6.5 percent to 7 percent, because they are a new format with potentially new risks, he said. Funding Needs REITs paid out about $22 billion in [dividends](http://bit.ly/WABdTV) in 2011, according to the Nareit group. That’s more than triple the estimated [$6.9 billion](http://www.bnef.com/WhitePapers/view/84) that U.S. solar developers will need annually for photovoltaic projects through 2020, according to a June report by Bloomberg New Energy Finance. Most funding for solar projects comes from bank loans or investors that purchase stakes, in part to obtain a share of a 30 percent federal investment tax credit that’s set to fall to 10 percent in 2017, an arrangement known as tax-equity financing. This is an expensive form of capital, according to Hilliard. A key advantage of the REIT format is liquidity, Hilliard said. “Because of the way tax equity works, people are locked into their investments for five-plus years,” he said. “They demand a much higher return than if you had a publicly traded stock that you could buy in the morning and sell in the afternoon.” This new investment format may become an option just when it’s needed, Fong said. Growth ‘Bottleneck’ “This industry desperately needs more capital,” he said by telephone. “Financing has become the bottleneck to growth.” Solar REITs would help resolve that issue, according to Stefan Linder, an analyst with New Energy Finance. “High financing costs are well recognized in the industry as a barrier to growth,” Linder said. “Any structures that allow a wider investor base to get involved, increases liquidity, or lower taxes would be beneficial.”

**There is an oversupply of solar panels—lack of financing equity will ensure a market crash**

**Hinckley 10/18**/12 (Elias. Leads the clean energy practice at Kilpatrick Townsend, Perfect Storm Brewing for Troubled U.S. Solar Manufacturers, <http://www.consumerenergyreport.com/2012/10/18/perfect-storm-brewing-for-troubled-u-s-solar-manufacturers/>)

Three Thoughts on the State of the Solar Market

There has been some upheaval upstream in the solar industry. If you follow the solar business for any reason you know that solar manufacturers are challenged by excess supply and dropping panel prices, just this week rumors that industry stalwart JA Solar was facing possible delisting by NASDAQ surfaced. There have obviously been some high-profile failures of solar manufacturing companies. None of this should have come as a surprise – industry consolidation was expected (or should have been). Consolidation occurs naturally when an industry or technology moves up the adoption curve – new participants, new approaches to technology, new manufacturing techniques, increased scale and competition all accelerate price declines, which inevitably leaves some early industry participants vulnerable because sunk investment forces higher per unit production costs. In the case of solar, a surprisingly rapid drop in prices for photovoltaic panels was further accelerated by significant Chinese government investment in panel manufacturing capacity. The pace of the price drop surprised much of the industry and overleveraged solar manufacturers were caught trying to meet price points that were economically unsustainable. (See more: Wind Tax Credits and the State of Solar: A Discussion With Admiral Dennis McGinn)

So is the industry ready to stabilize? Not quite yet. While longer term the industry looks extremely well positioned for very significant growth, here are three observations about the near-term state of the industry that would keep me awake at night if I were in the business of selling solar panels for the next 12 months.

1) Panel Oversupply is Worse Than You Think

Stories about oversupply and warehouses full of panels are well documented –– but this is not the whole story. At the end of December a number of companies (mostly, but not exclusively, developers) took large positions in panels in an effort to qualify the panels and associated projects under the safe harbor for the expiring 1603 Treasury Grant (allowed project owners to take a direct cash grant from the Treasury in lieu of applying tax credits to a renewable energy project). More than a few companies are still looking to place a lot of these panels (rumors are that more than 1GW — enough to put panels on roughly 200,000 houses — of ‘pre-qualified’ panels are sitting in warehouses), creating a disruptive secondary market and undercutting direct demand for new panels from manufacturers.

The disruption of these ‘pre-qualified’ panels may get worse. As more time lapses, the risk associated with the safe harbor qualification is quite likely to increase. Separation from purchase time to deployment makes the critical project narrative of a purchase attached to a specific project harder to hold together during the 1603 review process. Additionally, there is a real possibility that the scale of the claims made under the safe harbor may force the Treasury to increase scrutiny over safe harbor qualification. (NOTE: if you are considering buying safe harbored panels, do some serious diligence before committing). Also looming is a potential automatic haircut to the value of the 1603 grant in the event no resolution on sequestration is reached by Congress. In any event, as qualification risk increases discounting will become increasingly necessary to find buyers for these panels, creating further pricing disruption. (See more: First Solar May Supply World’s Largest Solar Farm)

2) The Industry is Short on Tax Equity

There is not nearly enough tax equity in the market to support the projected growth in solar deployment in the U.S. market. Tax equity represents an investment in the tax benefits – the Investment Tax Credit and accelerated tax depreciation – applied to a solar installation (tax equity is also used by other renewable energy projects, as well as low income housing and historic rehabilitation developments). These tax benefits are the primary vehicles for federal government subsidy of solar. Tax equity investors generally have low risk tolerance, and expect returns only slightly better than what would be paid for secured debt (really from the investor’s standpoint tax equity is quite similar in character to debt). During 2006 and 2007 there was abundant tax equity available for renewable energy projects, offered primarily by financial institutions. During the financial crisis in 2008 tax equity for energy projects disappeared, slowly returning in 2009, led by JPMorgan, and has grown steadily, albeit slowly through this year. From late 2008 through the end of 2011 the need for tax equity was limited, as the 1603 program was in place to bridge the shortfall in tax equity with respect to the tax credit portion of project finance. Despite some recovery, the return of several tax investors and the emergence of a handful of important new investors, the amount of tax equity available in the market remains far less than necessary to support renewable project development now that the 1603 program has expired.

Without tax equity, there is inadequate project financing capital available in the market and many projects won’t be able to obtain adequate financing and so will not get built (tax equity can provide 50% or more of necessary project finance capital). As of this writing and at least for the near future, the shortage of tax equity represents the most significant bottleneck in the U.S. solar market. The market will naturally expand to accommodate demand over time (and there are several in the industry, including this author, actively educating potential new investors in an effort to accelerate this expansion). However, tax equity investments are complex transactions and as a result the learning curve is steep and adding new investors to the market takes time. This complexity and learning process, combined with the lack of currently active participants is virtually guaranteed to act as a throttle on the pace of deployment over the next 12 to 18 months. Once this imbalance corrects itself, and as the importance of tax incentives diminishes, the extraordinary projections for solar deployment in the U.S. market through the next decade will accelerate.

3) We’re Starting to See Some State Regulatory Targets Met

An example is the market of California investor owned utilities (IOUs) as buyers of renewable energy (last year’s disruption in the New Jersey SREC market would be another). Until recently the California IOUs were an assumed off-taker for the electricity and, specifically the RECs, from a solar project – if a solar developer could get power into Cal ISO the IOUs would offer a PPA with some premium for the power being from a renewable source. Today, none of the three large California IOUs are actively engaging in negotiations for output from new projects generating renewable power outside of the state. There are limits on the amount of renewable power that counts against the state renewable portfolio target that can be procured from outside the state, and between active and committed projects, the IOUs have hit their limits for out of state RECs. The decline in certain state regulatory markets may not represent significant impact for solar growth in the U.S. – there is still market interest for California-based renewable generation by the IOUs and other California buyers are still sourcing outside of the state, while entirely new markets like Georgia are emerging – but it does create near-term challenges and uncertainty for developers, slowing project development and with it the immediate need for new panels.

What Does it Mean?

The secondary market created by 1603 safe harbored panels, the tax equity bottleneck and some potential near-term decline (or uncertainty) in the appetite for new RPS driven utility scale solar are combining to create something like a perfect storm for distressed panel manufacturers despite unprecedented growth in solar deployment. Distressed manufacturers are facing several more months of challenges in the important U.S. market. Regardless of the outcome of the election, the pace of consolidation will stay high and the downgrades, closures and struggles of solar manufacturers will be a regular part of the energy news cycle.

**The plan resolves lack of tax equity and creates a stable market**

**Herald Online 9/28**/12 (Renewable Energy Trust Capital, Inc. New Ways To Finance Solar Power Projects Expected To Lower Cost Of Capital, Cut Electricity Rates, Boost Profits, And Expand Investor Pool http://www.heraldonline.com/2012/09/28/4298569/new-ways-to-finance-solar-power.html)

Renewable Energy Trust Capital, Inc. (RET) is exploring new ways to finance solar power projects. One of those strategies, using the REIT structure, anticipates lowering the cost of capital dramatically, cutting the cost of generating solar power by up to 20 percent. It would also expand the investor pool by giving everyone from individuals to institutions an easy and liquid way to own a piece of the fast-growing solar market.

"We believe this is a chance to use U.S. capital markets to effectively bring the cost of solar photovoltaic electricity down quickly, and to broaden participation in investing in clean energy—and to do it in a way that makes it easier for solar power plants to turn a profit," said John A. Bohn, CEO of RET. Bohn has served as Commissioner of the California Public Utility Commission, president and CEO of Moody's Investor Services, and Chairman and CEO of the U.S. Export Import Bank during the Reagan Administration.

Asset financing for U.S. photovoltaic (PV) projects has grown by a compound annual growth rate of 58 percent since 2004, according to Bloomberg New Energy Finance, which projects about $6.9 billion in annual additional investment through 2020. A McKinsey study also projects continued robust growth, estimating that another 80 to 130 gigawatts of new solar PV generating capacity will come online in North America by 2020.

REITs, which have been in use for decades, are stable and well understood, offering investors significant tax breaks and a guaranteed distribution of 90 percent of a REIT's taxable income. REITs are also liquid, trading on the open market just like mutual funds.

"RET is extending a mature and fully-developed financing mechanism to a new asset class, in the same way REITs have done over and over. Innovation is a normal part of the REIT industry," said Christian Fong, RET's chief financial officer. "REITs became the dominant investment vehicle for commercial real estate, and then evolved to include real estate-dependent sectors from cell phone towers to data centers to energy transmission. And through RET, we believe they can soon be a key investment vehicle for accelerating the growth of solar power."

"It would be the ultimate democratization of funding and support for the solar industry," said Karen Morgan, RET's president. "Individuals can actively invest, knowing their dollars will put up more panels—while buying them a piece of the action in the fast expanding clean energy sector."

The veteran leadership team at RET, based in San Francisco, is dedicated to facilitating the transition to a clean and sustainable economy. RET is sponsored by the California Clean Energy Fund (CalCEF), a leading investor in promising platforms that spur the growth of clean energy generation through advancements in finance, public policy and technological innovation.

"It's well known that the U.S. solar industry's rapid expansion has been limited by financing bottlenecks," said Dan Adler, president of CalCEF. "RET's transformational approach will help un-block capital flows, using proven financial techniques long available in other industries, and accelerate the expansion of clean energy."

**Solar REITs are key to locally-produced energy**

**Aanesen et al 12** [Krister Aanesen is an associate principal in McKinsey’s Oslo office, Stefan Heck is a director in the Stamford office, and Dickon Pinner is a principal in the San Francisco office, Solar power: Darkest before dawn, p. pdf/google, nrbontha]

Secure low-cost financing. Many companies are partnering with other organizations to gain access to low-cost financing. MEMC’s SunEdison joined with First Reserve, a financial provider, to secure a large pool of project equity. SolarCity secured funding from Google to finance residential solar projects, enabling Google to receive tax benefits in exchange for owning electricity-producing solar assets. Other potential innovative approaches include solar real-estate investment trusts,7 which allow retail investors to provide funding for solar projects or offer options that let distributed-generation customers pay for their solar investments via their monthly utility bill. The cost of capital is often the most crucial factor determining returns on solar projects. To succeed in down-stream markets, companies need strong capabilities in project finance—indeed, the entities that structure solar investments often achieve better returns than the companies that manufacture or install modules. Companies are increasingly likely to turn to institutional investors, asset-management firms, private-equity firms, and even the retail capital markets to raise the sums required to finance expected demand for solar, which could add up to more than $1 trillion over the next decade. As the solar investment pool swells, financial institutions, professional investors, and asset managers are likely to be drawn to the sector, since solar projects that are capital-heavy up front but rely on stable contracts will become attractive in comparison with tradi-tional financial products. New types of down-stream developers and investment products will emerge to aggregate low-cost equity and debt and to structure financial products with risk-return profiles aligned with the specific needs of institutional investors.

#### IRS REIT expansion guarantees massive investment—overcomes all alt causes and is key to certainty

Sturtevant 10 – George Washington University Solar Institute

(Josh, J.D. from George Washington University Law School, Legal Associate at Distributed Sun LLC, in-house legal fellow at a renewable energy financing and development firm, "The Solar REIT: A Vision for the Future of German Solar Development," BlawgConomics, 11-10-2010, blawgconomics.blogspot.com/2010/11/solar-reit-vision-for-future-of-german.html, accessed 10-12-12)

Frequent visitors to the site may be familiar with our proposal to allow solar developers to take advantage of the real estate investment trust (REIT) tax structure to stimulate development in the US (an unabridged copy can be found here). It is our belief that providing the tax benefits of the REIT regime and the broader investor base that would come with it would help to **conquer** certain existing **up-front hurdles** **and allow** the **solar** sector **to grow** even in a world **of rapidly changing political and economic realities**. For example, it is not always clear that government created rebates and incentive schemes will be available indefinitely, **adding** certain **risk factors** to the calculations of potential investors. Additionally, it has been noted that during economic downturns, and particularly in the US, investor appetite for funding solar development declines substantially. In light of such factors, our proposal was an attempt to facilitate market-based incentives for solar development simply by affording solar developers the opportunity to use the same tax structures as commercial real estate developers. Though it is unclear whether this is currently possible under US tax law, **clarification from the** Internal Revenue Service (**IRS) would** help overcome any doubt. As part of that proposal, we suggested that developers in other countries might eventually take advantage of such schemes as well, and since the initial posting we even posted a small blurb about the potential for a solar real estate investment trust (S-REIT) regime in Italy (albeit with little to no analysis on how such a change would be facilitated). Today our attention shifts slightly north of the Italian peninsula to Germany, another very logical candidate for S-REIT adoption. Germany currently has a comparatively robust renewables sector, greatly aided by current government regulatory schemes, most notably feed-in tariffs. However, feed-in tariffs are not permanent, and may outlive their useful lives. In this light, and based on the desire of Germany to continue to increase its percentage of energy mix from renewables, developing a more permanent means for facilitating solar development might be an attractive solution. Though this article will not address the exact changes to the German code that would be required to facilitate such a development, it is possible that, similar to the US, all that would be required is clarification from tax authorities. Indeed, as is noted below, the German and US REIT systems are quite similar, as many of the German REIT regulations are borrowed directly from the US model. Of course the political realities of the two nations are vastly different, and it is always tricky business to make broad generalizations (particularly as your author admittedly has limited experience with the German system). However, it is at least possible that any changes adopted in the US would be considered favorably by German officials, particularly with the existence of a poweful green lobby in the latter nation. In any case, with an established and growing REIT structure combined with a clear appetite for solar development, the pieces are already firmly in place if the political will for such a change were to develop. Future development may require further innovative thinking First, a brief description of Germany’s REIT system. German REITs, or G-REITs have only recently come into being. The establishment of the structure was meant to facilitate more tax-effective property ownership. According to the Deutsche Börse Group (the group that runs the main stock exchange for Germany, the Frankfurt Stock Exchange, which is the equivalent to the New York Stock Exchange in America) 73% of German companies own property while only 25% of companies own property in the US. Also according to Deutsche Börse, the largest 65 listed companies in Germany have property reserves of over €80 billion. REITs may allow some of this locked-up value to be realized, a potential boon for German companies and their shareholders. Following are some basics on G-REITs: • Companies pay no corporate income or trade tax. Earnings of G-REITs are paid to share holders and taxed individually. In other words, dividends paid are taxed as investment income for the shareholder. • At least 75 percent of the capital of G-REITs must be invested in property. • 90 percent of earnings must be paid out to share holders • 75 percent of revenue must be from fixed assets. • G-REITs must be listed in an organized market such as the General or Prime Standard. • G-REITs must have their headquarters in Germany. • Finally, G-REITs must have an initial capital of at least 15 million Euro. Those familiar with the REIT structure in the US will undoubtedly recognize that many of the general rules governing G-REITs mirror their American counterparts. While German REITs were only introduced in 2007, foreign REITs have been listed in the country for some time, and over 150 currently trade on the Frankfurt Stock Exchange. There now currently appear to be three German property companies trading as REITs on the Frankfurt including an office REIT, a diversified REIT and a retail REIT. It is clear that the trade of foreign REITs on the Frankfurt has created a familiarity with the structure in Germany. Meanwhile, the recent laws have facilitated the creation of Germany's own REIT structure. This familiarity as well as the proper legal framework indicate that the nation is fully comfortable with the idea of publicly listed firms owning income-producing property, opening the door for broader use of the REIT structure in the future. We now turn to the appetite for solar development in Germany. Incidentally, it is enormous, and it is claimed that Germany is one of the top nations, if not the top nation, for solar development. It is generally accepted that the reason for Germany’s rise as a solar power is a result of its government subsidization scheme, heavily reliant on feed-in tariffs, which has stimulated developers to provide an ever-increasing proportion of the state’s energy mix. The most simple explanation of a feed-in tariff (FiT) is that it is a policy providing for grid access, long-term contracts and methodological pricing via government set compensation rates ( under contracts which usually last from 15-25 years). The goal of such policies is to stimulate development of solar and other renewables in the short-term, and push pricing of these sources toward levels comparable to fossil fuels (a concept referred to as grid parity) in the long-term. This long-term goal is facilitated by technological improvements made by the industry during the subsidy stage. There are several features which make FiTs possible. First, the set prices are usually maintained by passing costs through to consumers, whether directly or through taxes. Though it often takes some political capital to establish this initially, these costs are not typically prohibitive for reasons including the natural decrease in the FiT over time (a concept referred to as tariff digression), technological improvements, and the caps that many jurisdictions place on how much energy can be priced at the set compensation rate. There are also typically government mandates for utilities to provide a certain percentage of their energy supply from renewable sources, similar to renewable portfolio standards. Finally, it is important to note that feed-in tariffs are typically phased out over time as technology is presumed to improve over the life of the scheme, and as grid parity hopefully comes closer to being a reality. In Germany, FiT law underwent a restructuring in 2000 under the Act on Granting Priority to Renewable Energy Sources ('Erneuerbare Energien Gesetz'). Some have claimed that this revamped structure has created the world's most effective policy framework at accelerating the deployment of renewable energy technologies. The major features include: • purchase prices which are methodologically based on the cost of generation from the various renewable energy sources, leading to different prices for different sources and sizes to account for economies of scale; • purchase guarantees which last for a period of 20 years; • the ability for utilities to participate, and; • tariff degression In Germany and elsewhere, such mechanisms have proven necessary in the past as a lack of grid parity has made it difficult for solar developers to achieve solid returns otherwise. Indeed, according to a European Commission report, ‘well-adapted feed-in tariff regimes are generally the most efficient and effective support schemes for promoting renewable electricity.’ According to at least one source, feed-in tariffs are used in one form or another in nearly 60 jurisdictions worldwide, indicating their popularity and possibly proving their worth. FiTs have shown the tremendous appetite many nations, including Germany, have for solar development. However, despite long-term contracts, feed-in tariffs don’t last forever. In addition, political winds change direction often enough that developers, particularly in emerging fields like solar, should rightfully be weary of government-run schemes. Finally, economic developments can often impact the decisions of investors even if tax incentive schemes prove popular and effective. This has been seen in, for example, the US as tax equity investors lost appetite for solar development during the economic downturn. How then, can Germany, and other countries with a desire to continue growth in the renewable sector, ensure that development continues? As noted in the admittedly conclusory introduction above, such nations could use existing REIT laws to help stimulate solar development. Quoting our earlier post on such a proposal in the US: One potential solution would be to use tax structures which already exist and benefit the commercial real estate market to stimulate large-scale solar development. Similar to the benefits that real estate investment trusts (REITs) have brought to both commercial real estate owners and investors, solar real estate investment trusts (S-REITs) could bring solar development to the masses, increase capital flows to the space and incentivize lawmakers give the solar industry the same treatment as fossil fuel counterparts. The S-REIT structure should not be viewed as the exclusive domain of solar developers either. Indeed, Germany's wind sector is, perhaps, even more robust than its solar counterpart, and developers have managed to make wind more cost effective than in the US. Therefore, and particularly in nations with well-developed wind sectors such as Germany, it is possible that other renewable sources could benefit from gaining access to the REIT structure as well. This broader vision would lead to the potential formation of Renewable Energy REITs, providing diversification for investors based on the various geographic, technological, pricing and reliability differences between the various production methods. In the US, the creation of an S-REIT structure unencumbered by tax risk requires clarification on a particular section of the tax code dealing with REITs, §856 of the US Code. Once the IRS moves to clarify this section, and if it grants the proceeds of electric sales contracts the same status as rents under the REIT laws, solar developers will be entitled to benefit from the same tax status as commercial real estate developers. This **will** **ensure start-up capital and a wide investor base** XXXof individuals seeking steady returns, **allowing** the **solar** sector **to** survive any storm,whether politically or economically generated.

**Solar REITs are key to the overall supply chain and fostering innovation**

**R**unyon 12/12/12 (Jennifer, Managing Editor, RenewableEnergyWorld.com and Conference Chair, Renewable energy World North America, Renewable Energy REITs or MLPs Would Unlock Billions for Project Development <http://www.power-eng.com/articles/2012/12/renewable-energy-reits-or-mlps-would-unlock-billions-for-project-development.html>)

According to Richard Kauffman, Senior Advisor to Secretary of Energy Stephen Chu, making real estate investment trusts (REITs) or master limited partnerships (MLPs) available for renewable energy project financing is the key to advancing the industry.

Top engineering, procurement and construction firms gathered to network, learn and do business with corporate-level project developers at the PGI Financial Forum, one of four co-located events taking place in Orlando, Fla. this week. Richard Kauffman, Senior Advisor to the Secretary of the U.S. Department of Energy, gave the keynote address during a luncheon that took place on Wednesday afternoon.

During the luncheon, Kauffman explained to the 100 attendees that as someone who originated from the private sector, in his DOE role he is trying to understand where market forces can be harnessed in order to unleash the flood of investment that is needed to bring about large renewable energy projects.

Kauffman explained what he sees as a disconnect between returns in renewable energy projects compared to returns in other investments. On the one hand, today, renewable energy projects are financed in what he called an “old-fashioned, archaic way” where for the most part, projects rely on private sector money that is looking for high rates of returns, typically around 12-14 percent. On the other hand, money managers, wary of the stock market and its risks, have returned to the bond markets, which offer more steady (but lower) rates of return, in the 5 or 6 percent range. Kauffman explained that this “wall of money” that is looking for a stable rate of return, such as what can be found in the bond markets, could easily invest in renewable energy projects if only the financial vehicle existed that allowed it to. Renewable energy projects with signed power purchase agreements (PPAs) will deliver a healthy rate of return to their investors, one that will be stable for 20 years, exactly what the money managers are looking for.

In other words, he said, there is all this money looking to invest in yield but it can’t flow to where it is needed because the financial vehicles don’t yet exist that would allow it to.

Enter Real Estate Investment Trusts (REITs) or Master Limited Partnerships (MLPs).

According to Kauffman, REITs and MLPs, function like a bond and are currently used in more mature markets for project development. If they were available to renewable energy projects, said Kauffman, they would unlock loads of money for project development. Two separate bills have already been introduced in Congress seeking to allow renewable energy projects to be financed through REITs and MLPs but neither bill has come up for vote yet.

Kauffman asked Financial Forum attendees to imagine for a minute what would happen if MLPs or REITs could be used to finance renewable energy projects. He asked attendees to imagine that they would have a yield of 5 or 6 percent and simply through that yield, the cost of capital would go down by 50 percent (since private sector funding demands returns in the 12 to 14 percent range.)

“But I think it would do five other things,” he explained.

First, Kauffman said that renewable energy REITs or MLPs would accelerate standardization in the contracting process. With so many projects now eligible for project finance, the markets would demand a streamlined contracting process. This would remove more of the soft costs from project development.

Second, these renewable energy financial vehicles would continue to force down solar and other supply chain costs. Kauffman explained that we are good at logistics in the U.S. and if we were funding solar projects at increasing rates, we would improve the logistics in the supply chain. He pointed to the decreasing costs of residential solar customer origination through the explosion in solar leasing as an example of taking costs out of the supply chain.

Third, Kauffman said all of this would then lead to greater market aggregation of smaller projects. Large projects backed by stable project developers already have no trouble finding money to fund their projects. Smaller projects, however, have a much more difficult time finding cash. If there were REITs or MLPs available to renewable energy projects, smaller projects could be aggregated. This would again improve efficiency and unleash funding for smaller projects.

Fourth, Kauffman believes that REITs or MLPs would encourage innovation in the industry. He said that capital markets are much better than banks at assessing risk. If a bank provides debt to a large innovative project and that project is unsuccessful, it’s difficult for the bank to recover from that loss. However, imagine a $100 million fund that holds a portfolio of projects. If one project defaults, the fund would still be able to recover because it would hold many other projects as well. “That’s why the capital markets do a better job at assessing risk,” said Kauffman.

Finally, if REITs or MLPs were available to renewable energy projects, the industry would scale very fast, which would again drive down costs and even open up the possibility of a forward market. Kauffman said that renewable energy is the only energy source that gets cheaper the more you make. So, more projects coming online would help to align the supply chain and create a forward market.

Since renewable energy is all about the upfront costs, Kauffman believes that there hasn’t been enough thought put into how to reduce the cost of capital to finance projects. REITs or MLPs could play a huge role in the future because the way renewable energy projects are being financed today just doesn’t make sense, said Kauffman.

**A solar REIT is key to the democratization of energy**

**Burger 10/2**/12 (Andrew, A graduate of the University of Colorado, teaches English as a foreign, second or other language. How Real Estate Financing Models Can Boost Solar, http://www.triplepundit.com/2012/10/sf-looks-solar-reits-boost-pv-project-investment-lower-cost-capital/)

Financial innovation—particularly at the retail level—is critical to fostering ongoing growth and development of solar and renewable energy projects. To see the triple bottom line potential to be realized, one need only look at the popularity and rapid growth of residential and community solar energy providers using third-party ownership business models by making home solar photovoltaic (PV) energy systems affordable for a much wider range of Americans.

Adapting a well-known and tremendously successful investment vehicle—the Real Estate Investment Trust (REIT)—to finance solar power projects, San Francisco’s Renewable Energy Trust (RET) sees an opportunity to significantly broaden solar energy investment opportunities for individual, as well as professional, investors while at the same time substantially reducing the cost of capital for project developers.

Significantly for solar power project developers, San Francisco-based RET says applying the REIT structure to the solar power industry can lower the cost of capital for solar power development by as much as 20 percent.

Democratizing solar PV project investment

A similar tax-advantaged renewable energy investment vehicle initiative is under way in Washington, D.C. Senators Christopher Coons (D-Delaware) and Jerry Moran (R-Kansas) on June 7 introduced legislation that would extend master limited partnerships (MLPs)—special purpose investment vehicles that oil and gas companies have used to great effect—to renewable energy projects.

Applying the REIT structure to finance solar power projects, “would be the ultimate democratization of funding and support for the solar industry,” stated RET president, Karen Morgan, in a press release. “Individuals can actively invest, knowing their dollars will put up more panels—while buying them a piece of the action in the fast expanding clean energy sector.”

Asset financing for U.S. PV projects—has grown explosively, by a compound annual growth rate (CAGR) of 58 percent since 2004, according to Bloomberg New Energy Finance, which projects that some $6.9 billion in additional capital per year will be invested in developing solar PV projects through 2020. McKinsey & Co. forecasts that another 80-gigawatts (GW) to 130-GW of new solar PV generating capacity will be commissioned in North America by 2020, RET noted.

Opening up tax-advantaged solar projects to individual investors

Required to distribute 90 percent or more of their taxable income, REITs offer investors substantial tax advantages as well as relatively high yields and steady income streams. As they can be listed and traded on the major stock exchanges, they are also liquid.

#### Community-based solutions are essential for both broader adoption of technology and functional distributed generation schemes---decentralization solves dangerous consumption patterns by creating a shared sense of ownership

Wolsink 11 [Maarten, Maarten Wolsink∗Department of Geography, Planning and International Development Studies, University of Amsterdam,” The research agenda on social acceptance of distributed generation in smart

grids: Renewable as common pool resources” Elsevier Journal Renewable and Sustainable Energy Reviews]

4. Community perspective

4.1. Trust

In addition to being physically close, DG increasingly is also at closer ‘social distance’ when users become the owners/managers of the production units and the microgrid. The actors who decide to integrate their DG units in a cooperative microgrid constitute a community. Correspondingly, community acceptance of infrastructure remains crucial, and whereas community involvement in investment in renewables is favouring community and market acceptance, the inclusion of it in a co-operative microgrid is likely to increase acceptability as well. “Because customer characteristics, particularly the flexibility to cost-effective shift power use, are so varied from one place to the next, we can expect the implementation of smart grid capabilities to be geographically uneven” [65, p. 70]. Any effort to construct infrastructure that is uniform and standardised will face huge acceptance problems.

The literature on the deployment of renewables shows the importance of securing a good fit between the energy schemes and the host communities [66]:

(a) Collaborative decision-making on wind power schemes, which employs effective forms of community involvement, has proven to be crucial for successful deployment. (b) Successful projects are usually those the community can strongly identify with, as a result of effective involvement and participation in the siting process or due to high community involvement in the management and/or ownership.

Investments and schemes initiated by community outsiders (e.g., energy companies) are much more likely to face resistance by the community. As wind power shows, how decision-making is organised and how social networks at this level are involved in projects strongly shape the possibilities for all community actors to identify with the project (not primarily restricted to residents). The existing body of knowledge on renewable energy innovation shows that for community acceptance essential factors are how well the new system ‘fits’ into the identity of the community, the perceived fairness of the decision-making process, and the level of mutual ‘trust’ (see Fig. 2) between community members and the investors and owners of the infrastructure [66,67]. To have solid commitment in implementation of renewable energies, it is essential to create trust to foster the involvement of public and private actors. Planning and decision-making overly focused on formal decisional competencies, and therefore without opportunities for meaningful deliberation, generally fuels conflict [68,69]. Community members must have strong conviction that the new energy system will serve their benefit as well as that the organisation facilitating the process will act in their best interest [70]. “Trusting social relationships support and enable cooperation, communication and commitment such that projects can be developed and technologies installed in ways which are locally appropriate, consensual rather than divisive, and with collective benefits to the fore” [71, p. 2657]. Trust and goodwill must be built intentionally through collaborative processes in planning and energy policymaking consistent with theories on building ‘social capital’ [72,73]. The institutional framework – e.g., the planning system – should further such collaborative planning and community involvement in the energy system. Adding the microgrid perspective to these observations on implementation of renewables, the socio-political acceptance of adaptation of planning systems to establish planning practices that include early involvement from within the community at the very first stages of development, becomes an urgent issue.

4.2. Identity factors Implementing a particular energy project is thus, among other things, an ownership and community involvement issue. Community based or community outsider‘s investments and ownership of the assets of the new development (generating units, smart meters, etc.) is a determinant of acceptance. Acceptance of several DisGenMidGrid characteristics is highly dependent upon the composition of the community and its ambiance. Furthermore, acceptance depends upon how the institutional framework allows communities to shape their own DisGenMiGrid in a way that it optimally corresponds with these identity factors (see Fig. 2, left).

4.2.1. Perceived identity of the location Attachment to a particular location and the symbolic values of the site to both residents and non-residents play a significant role in shaping people’s responses to any proposed changes to their surroundings [74]. A major factor in the emergence of co-operation to manage the common resources in a community is the dominant heritage narrative [75]. For wind and other renewable DG alike, the most important factor for acceptability is related to the perceived qualities of the location, regardless whether these are described in terms of qualities of the ‘site’, the ‘landscape’, the ‘environment’ or other place-related terminology.

‘Place attachment’ focuses on individual feelings and experiences; therefore, the creation of community benefits by a renewables’ developer does not simply increase community acceptability and ease planning consent. The significance of benefits – as interpreted by the community – is correlation to the influence the community has over decision-making about the project [76]. The community planning literature emphasises participation and empowerment, but additional studies on community acceptability have revealed that emotional and cultural connections to place is a very important factor [77,78]. Absence of opportunities for meaningful deliberation in decision-making and neglect of the equity and fairness in the distribution of costs and benefits from locally hosted energy developments usually undermines trust. The culturally and emotionally loaded local identity values cannot easily be compensated by benefits to the community, unless these benefits are also connected to local identity variables. The latter is usually not guaranteed if there is no ‘sense of ownership’ or a high level of trust in the project developers.

 The value of a particular location – primarily landscape characteristics of high value to ‘the eye of the local beholder’ [79] – may be threatened by the construction of infrastructures, such as wind turbines, PV units on farmland or rooftops or CHP installations. Landscape is a strong determinant of subjective identities, and renewable energy infrastructure such as wind farms [80] or solar plants [81] affects identities. For example, already in the 1980s wind turbines were generally being labelled in terms of ‘industrialised landscapes’ [82]. This ‘industrialisation’ is being perceived by the community as a major change in the identity of landscape (as seen in recent cases of near-shore wind power siting) [83–85]. M. Wolsink / Renewable and Sustainable Energy Reviews 16 (2012) 822– 835 829

4.2.2. Identity of community members For all types of DG and smart grid developments it will be important how the geographical identity is interpreted and valued by members of the community. Identity is also a key factor for the determination of the kind of actors that will be granted the opportunity to participate in the investments and the establishment of the DisGenMiGrid. Within a community this obviously concerns the option for households to participate, but equally important are other actors that are important for community identity. For example, schools have fairly large rooftop surfaces available and they could be involved in ownership of wind turbines [86]. Another example is hospitals. They usually have existing operating systems that combine distributed generation options such as PV and cogeneration, and they may look at attuning their supply and demand with other community member’s demand patterns [87]. Furthermore, identity concerns enterprises like local retail, small industry, offices built for private and public administration, and – especially in rural areas – farming. A special interaction between the perceived identity of the location and social identity factors is found in communities where a substantial number of members derive their income from tourism [88,89].

4.2.3. Identity of load patterns The essential identity characteristics of communities also concern the specific electricity consumption patterns. Besides the individual member’s interest and possibilities to invest in renewables and to use their space to implement DG, the shape of the member’s load patterns determines the options for DG. The specifics of their individual patterns are significant identity factors in relation to the patterns of the other participants in the DisGen- MiGrid and the supply patterns of the DG units. Furthermore, the identity of the participants determines the flexibility of their consumption patterns. To what extent can these patterns be affected by smart-meter adaptation? The flexibility of households to adapt their energy usage to the variability of wind power is fairly limited [29]. However, the introduction of new types of equipment in combination with smart-meter control devices may generate more flexibility depending on the type of consumer. An important geographic characteristic of a community is local employment rate, responsible for a large part of car use (also including commuting). The impact of electric vehicles on the distribution network will largely be determined by behavioural factors, such as driving patterns, charge timing and vehicle penetration [31].