

# *The Spiritual Side of Renewable Energy Work*

*An essay on Global Warming and Climate Change,  
and a call for effective, collectivized action.*

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By Dr. Ben Luce  
Director, Renewable Energy Now!  
[www.renewableenergynow.org](http://www.renewableenergynow.org)  
[info@renewableenergynow.org](mailto:info@renewableenergynow.org)

Near the end of his long life, my dear grandfather, Paul H. Luce, who had been a science teacher, a high school principal, and an ardent worker and champion for Planned Parenthood in Ohio, told me, when I was just a wayward college student, that “The secret to life is being a part of something much bigger than yourself.”

It made sense to me at the time, but I didn’t grasp the full import of his statement until much later, after I had experienced what it’s like to be lost within oneself, and then to have experienced the true power that being a part of something bigger has to bring meaning, stability, and focus to one’s life, and at the same time to transform the world.

I finally experienced this sometime after I was exposed in detail to global warming and climate change science<sup>1</sup>. This occurred when I attended some presentations in the early 1990s by a geophysicist at Los Alamos National Laboratory, where I was employed at the time as a theoretical physicist. Although I am not an atmospheric scientist, my specialty in physics, a field of study formally known as “Nonlinear Dynamics,” a part of which is known popularly as “Chaos Theory” due to a famous book in the 1980s by science writer James Gleick<sup>2</sup>, at least enabled me to readily comprehend the dire predictions being presented. It particularly helped me with appreciating the gravity of how various *nonlinear feedback loops*—a feature of many nonlinear systems—can accelerate the increase of greenhouse gas concentrations. These include the additional greenhouse gas emissions created by forest fires, desertification, bark beetle impacts, melting permafrost, etc. A nonlinear dynamics lens is also suggestive of the potential for the climatic equilibria we’ve been accustomed to over the past 8000 years to become destabilized, potentially leading to rather sudden and dramatic transitions towards new and highly undesirable equilibria. Destabilizing effects include loss of sea ice, glaciers, continental ice sheets, changes in evaporation and precipitation rates, etc. Unfortunately, all of these secondary “knock on” effects now appear to be kicking in earnest. Finally, it was also pointed out in these presentations that it will be difficult or impossible for many or even most species to adapt, due to the extreme rapidity of climate change. Today, these changes are indeed hastening

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<sup>1</sup> Sometimes people debate whether one should say “global warming” or “climate change.” It’s *both*. These are related by not quite the same things, and both important aspects of what is happening.

<sup>2</sup> Gleick, J. (1988). *Chaos: Making a new science*. New York, N.Y., U.S.A: Penguin.

what scientists are now calling the “Sixth Mass Extinction,” wherein a majority of species on our planet are headed for extinction in a relatively short time, including possibly human beings<sup>3,4</sup>.

Because I passionately love the natural world—something I was fortunate to be inculcated with by my parents and do not take for granted—I found the dire import of this information to be quite emotionally devastating, and I’ve lived with various degrees of climate change inspired grief and despair ever since. I’m not sure how any rational and informed person could not, and I’m certainly not alone: there is now wide recognition that “Climate Anxiety” is a rising threat to mental health, and it’s predicted that most Americans, if they don’t already, will eventually struggle with this<sup>5</sup>.

Some groups recommend that those such afflicted work through “the five stages of grief” as delineated in the Kübler-Ross Model, to eventually “achieve acceptance, inner peace, and a commitment to action<sup>6</sup>.” I agree with this, but advocate that people cut right to the chase and start engaging right away with working to transform our energy system, and in close collaboration with others, as both a primary means of hastening and/or easing that anxiety, and to actively contribute to solving the problem as well. Engaging directly can be especially effective I believe at overcoming the sense of helplessness that the problem can otherwise engender.

I have some real-life experience with this approach to share, as I decided to get directly involved with the energy transition very soon after first learning about the climate change problem. This seemed like a good fit for me personally given my background, which included knowledge of things like electrical circuitry, semiconductor physics, and thermodynamics. That said, I stress that having such a background is by no means a prerequisite for this kind of work. In truth, we need people from all manner of backgrounds to be involved and bring diverse skills to bear on this gargantuan task, and it is worth noting that the perception that a special background is required to work in energy development, as people tend to assume for any technical field, is a long-standing barrier to progress that needs to be overcome.

The first step then is to decide to get involved, and to push aside any fears of inadequacy or legitimacy. But this is just the first step. After my own initial decision to get involved, I subsequently experienced a long reorientation process that felt like peeling the layers off an onion, one at a time, only to find another layer below of what I could contribute. I’m still peeling off new layers to be honest, but I’m hoping this essay will assist others in getting through that process a bit more rapidly.

Not having much expertise in energy technology per se, I first undertook a thorough study of various energy resources and technologies, something I still recommend to anyone getting involved with this topic. I also attempted, and still try, to keep a very open mind, so I did my best to set aside any preconceptions or biases and look at all the different types of energy resources and technologies objectively.

One of the energy sources I investigated, and still do from time to time, is nuclear power. Even though I was literally surrounded by physicists who were ardent, and frankly knee jerk, supporters of nuclear, I eventually concluded that a major renaissance of nuclear power would be hopelessly problematic, not just because of the usual nuclear waste issue and accident issues, but

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<sup>3</sup> “Are We in the Middle of a Sixth Mass Extinction?” <https://www.science.org/content/article/are-we-middle-sixth-mass-extinction>

<sup>4</sup> The extinction of humanity is not discussed that often in mainstream media, and may sound alarmist, but there are potential events, such as a global die-off of plankton in the oceans, that could bring that about relatively quickly. For an overview, see <https://mahb.stanford.edu/library-item/human-extinction-play/>.

<sup>5</sup> For example, see the 2012 report by the National Wildlife Federation at: [https://nwf.org/~media/PDFs/Global-Warming/Reports/Psych\\_effects\\_Climate\\_Change\\_Ex\\_Sum\\_3\\_23.ashx](https://nwf.org/~media/PDFs/Global-Warming/Reports/Psych_effects_Climate_Change_Ex_Sum_3_23.ashx)

<sup>6</sup> For example, see: [https://www.joboneforhumanity.org/about\\_job\\_one\\_for\\_humanity](https://www.joboneforhumanity.org/about_job_one_for_humanity)

also because of intractable weapons proliferation issues. I also concluded that, even without these problems, new nuclear generation would likely never be developed quickly enough on a global basis to significantly address the climate problem simply due to cost and development time issues, an opinion that I still hold despite renewed interest in nuclear by some driven by the acuteness of the climate change problem<sup>7</sup>.

At the same time, while looking at things through a physics lens, I noticed that the solar energy resource of our planet—that is, the solar energy impinging on the Earth’s surface every second—is several *tens of thousands* of times larger than the entire primary energy consumption of our civilization. Just utilizing a tiny fraction of that would clearly do us nicely<sup>8</sup>. And given my concerns about nuclear weapons proliferation, I believe that having our civilization depend primarily on renewable energy, and particularly solar energy, intrinsically encourages a more equitable, peaceful, less authoritarian, and stable kind of civilization. (Conversely, this is perhaps why authoritarian minded individuals do not tend to favor renewables.)

I wondered also though why we weren’t making much progress at the time with renewable energy deployment (keep in mind this was in the early 1990s). Might it be that renewables are not really a viable option for technological and economic reasons? Might we need to focus instead on things like carbon sequestration, for example, storing fossil fuel emissions in saline aquifers? Or some combination of these? I therefore began to seek out more and more information about all these options, and not just by reading, but by seeking out people involved with them.

What happened next was fortuitous: At some point I began asking local solar system installers (both PV and hot water) to allow me to help in return for learning. This was extremely helpful in terms of ground-truthing my knowledge, as I’d hoped, and led to some unusual adventures, such as dragging huge solar batteries through the mud and snow in the wintertime up steep mountainsides. But then I quickly discovered, following up on contacts provided these installers, that there was a largely invisible but nonetheless vibrant and diverse community of people out there—many of them right in New Mexico—who have been working diligently *for decades* to make renewable energy a reality. Besides solar energy workers and activists, this highly integrated network includes scientists and engineers, various government policy people, renewable energy and environmental groups, architects and builders, various inventors and tinkerers, and most touching of all, deeply committed homeowners.

The first group of such people I encountered, the New Mexico Solar Energy Association (NMSEA), one of the oldest such groups around, contained *all* these sorts<sup>9</sup>, and had antecedents stretching back to the 1940s. At that time the group was just rebounding from the devastating

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<sup>7</sup> Yes, I know about the new reactor designs, for both fission and fusion. One of my deepest concerns though, and still, is promoting technology that can enable nuclear weapons proliferation, even if just by creating a nuclear industry and supply chain. These issues are just often swept under the rug by proponents of nuclear in my experience, or “solved” by suggesting a worldwide system of control be imposed, but witness the ongoing struggles with Iran over nuclear development, and then imagine that increased a hundredfold. Fusion probably has some real long-term potential now, I agree, but will also certainly open a brand new door to incomprehensibly destructive new types of weaponry, creating yet additional proliferation issues. Unbridled access to energy, clean or otherwise, is simply not necessarily a good thing for the human race.

<sup>8</sup> Land area concerns about solar energy are essentially a red-herring from a fundamental standpoint, although it is still crucial that solar power installations are sited carefully, which is possible to do precisely because the resource is so incredibly large.

<sup>9</sup> Their website, which is not very good at the moment, is presently [www.nmsolar.org](http://www.nmsolar.org): The group is presently trying to rebound again, this time from some recent internal turmoil.

downturn in solar energy development that came about when President Ronald Reagan, a champion of the oil industry, ended federal support for clean energy.

Within this vibrant community I found not just information and collaboration, but a *comradery* that utterly changed my life. There was a feeling there—one that can be found broadly in the clean energy community—of selfless dedication to a higher cause. It was, and is, truly spiritual in feel, if not religious in the metaphysical sense. I’ve developed many deep friendships with people in that community, and had countless and wonderful experiences working with the general public as well. Over time I’ve also watched the results of that work lead to many different types of renewable energy installations, passive solar homes, etc. *This* kind of experience, I suggest, is a truly powerful antidote to climate anxiety.

There is also just something very comforting, and spiritual to me, about working to bring human civilization more in harmony with the natural environment, which it certainly is presently not. I’ve found that working with solar energy in particular can be very spiritual: The Sun is not just another potential source of energy for human’s to exploit. Rather, it’s *the* energy source for Earth’s natural environment, and it has thus played a central role in human affairs and human spirituality for countless millennia. Just as one example, one of the things I especially love about working with people in New Mexico is the deep connection with the ancient cultural traditions of the Pueblo Peoples of that region, who view the sun as a protective deity. The “Zia” sun symbol for example, that graces the New Mexico state flag, is a religious solar symbol originating with and belonging to the people of Zia Pueblo<sup>10</sup>.

One can also interact very directly and intimately with solar energy technology, including with home-scale photovoltaic systems, such as by watching how they function each day via an app, or by experiencing the wonderful living environments of passive solar homes—the adobe versions of which in New Mexico being particularly wonderful to visit!—and finally, fun things like solar cooking. Small solar power systems, unlike large-scale renewable energy systems (although both scales are needed in spades, to be clear), are also very empowering of individuals, and collectively they provide a very real hedge against the domination of society by a number of incredibly destructive and ruthless corporate monopolies.

These various attributes all contribute to creating the sense of comradery that exists in the clean energy community, which I’ve found to be remarkably universal. I’ve encountered it consistently in the various groups I’ve worked with in New Mexico, anti-wind groups I collaborated with in Vermont (more about why I was opposing ridgeline wind power development in Vermont below), my university students, in churches I’ve attended, and in various clean energy groups in Vermont. At present I have a wonderful collaboration with a group of energy experts in St. Johnsbury which is deeply exploring issues of which clean energy policies that Vermont should adopt going forward, and a similar group in New Mexico. And I am now also extending my interactions with the new organization I’ve founded, Renewable Energy Now!, which focuses on both (deep) education about renewable energy, and advocacy work as well.

A key aspect to the “spiritual” aspect of clean energy work as I experience it is that it intrinsically requires a strong outward focus, and a focus on collective action, in ways which I believe can be legitimately categorized as forms of spiritual practice. This contrasts sharply with the general character of American culture, which is very individualistic and self-focused, even

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<sup>10</sup> The use of the Zia symbol by the state is controversial, and some New Mexico businesses actually reimburse Zia Pueblo directly for their reproduction of it on their products. Nonetheless, it is deeply meaningful and respected by New Mexicans of all stripes.

where positive causes like healthy eating are concerned. Popular self-help books abound, for example, but there are few guides about how to provide *world*-help.

One negative manifestation of self-focus in the clean energy realm is the oft-heard complaint that solar power is too expensive (which in fact it no longer is). And yet people making this claim often think little of spending tremendous amounts of money on myriad types of non-essential things, with relatively little dedicated to improving the environmental sustainability of their lives<sup>11</sup>. More recently I've noticed—and this is something that drives me crazy—even those who know that solar is now competitive will hesitate if they find out they aren't going to receiving a huge savings *on top* of breaking even. This leads me to believe that the problem all along has mainly just been one of *priorities*, not intrinsic problems with solar energy costs per se.

Similarly, I've noticed that serious efforts in our society to bring about real change are largely left to those we explicitly and often derogatively label as “activists,” or in their more respectable and professional form, “advocates.” If you've ever been one or both, you'll likely have found that it can be a lonely and sometimes hostile place, at least when you're not enjoying the strong comradery of some like-minded others.

The roots of this are worth looking into. The pervasive individualism in our society is not natural. It's result of, or at least greatly intensified by, a consumer and commodity driven economic system largely guided by corporate advertising and the deliberate encouragement of self-indulgence through the manufacturing of social identity and societal consensus. Consider for the example the way in which the automotive industry explicitly markets inefficient vehicles to men by appealing to their desire to project power.

At the same time, the underlying processes that govern decision making about crucial things like energy sources are largely hidden and inaccessible to the public. Try competing with beavies of full-time corporate lobbyists in the halls of your local state legislature for example. It can be done, but requires a persistent and well-organized effort, and even that is often not enough to overcome the undue influence of corporate lobbying and campaign donations. It's also hard to even see what's going on, even when one is directly involved, as energy companies generally conceal their lobbying agendas, their actual environmental impacts, etc. This may sound like conspiracy theory, but it's absolutely real. Perhaps too real for most conspiracy theorists!

This inaccessibility extends far beyond the legislative branches of government. It's also baked right into the *structure* of the regulatory processes that ostensibly serve to balance corporate and public interest. For example, the deliberative processes at public utility commissions, or “PUCs,” the commissions that regulate utilities, are incredibly difficult for the average person to participate meaningfully in. The world of utilities thus tends to be a very small and effectively closed arena of professional “stakeholders” that requires very large resources and commitments of time to engage with, and only admits participation on very narrowly defined questions for those few deemed to have “standing” on a given issue. Forget trying to bring broad issues to bear in these processes.

These regulatory processes, which purport to protect the public, have in fact provided some real public benefit in the past. The adoption of the Clean Air Act (1970), Clean Water Act (1972), Endangered Species Act (1973), and others were landmark advances in regulation that have provided tremendous public benefits. These advances acknowledged the importance of protecting the “commons” on which we all depend, fulfilling a major goal of the environmental movement. But since the Reagan and Thatcher years regulation of corporations has found itself

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<sup>11</sup> I'm not entirely exempting myself here either – most of us like to, and are quite programmed, to indulge.

under increasing political attack, as has the integrity of governance itself, to the extent that our best opportunity to nip the climate change problem in the bud was missed—a catastrophic failure.

Even though renewable energy is now finally growing by leaps and bounds, these structural problems of governance are still greatly impeding its progress. There is a tremendous amount of work yet to be done, and we are only at the start of it in many ways.

We Americans also have a particularly strong moral responsibility to turn this situation around, and quickly, at least where global warming and climate change are concerned. The United States is the second largest emitter of greenhouse gases, and our per-capita emissions are high as well<sup>12</sup>. More importantly, we possess enormous power to transform the way we obtain energy by virtue of our size and our industrial and scientific might. This is not American exceptionalism, just a fact about our actual capabilities<sup>13</sup>. And finally, our moral duty arises from the fact that our greenhouse gas emissions are having an utterly catastrophic global impact on the world's poorest peoples, as well as on us and everything else.

The good news is, despite the difficult governance issues I described above, the greatest barrier to our turning things around, I believe, is still the overly strong self-focus in our culture, and the corresponding lack of engagement of our citizenry in the technologies and policies by which we obtain energy. At least this is what I've concluded after many years of working on the issue. This is good news because this is something that can directly addressed and changed by individual efforts, church groups, etc. We are not as helpless as I believe we often feel.

The strong self-focus in American culture is not just characteristic of us, of course, but something all human beings have in common to some extent. One can see that clearly in the actions and cultures of many other countries. Most of the world's great spiritual traditions are therefore largely focused on trying to get people to be less focused on themselves, and this is where we can start to draw a line between efforts to address climate change and spirituality.

Two core focal points of Christianity, for example, are personal self-sacrifice in the service of others, and the acknowledgement of God as a higher power. There is also the notion of saving God's Creation. In practice, these have translated into the formation of groups such as Interfaith Power & Light, an organization that directly facilitates energy efficiency and renewable energy initiatives at churches. There is also the Young Evangelicals for Climate Action, which is part of a more general movement in the Evangelical Community that, while unfortunately far from dominant in that community, has somewhat tempered the influence of fossil fuel industry interests in conservative religious circles<sup>14</sup>.

Zen Buddhism, of which I'm personally a strong adherent of, also has a strong focus on de-emphasizing the self, and even denying the existence of it altogether. Zen, which derives from the old Chinese word "chán" for meditation or contemplation, and especially the Japanese school known as "Soto Zen," emphasizes meditative practices that focus one's attention on the world outside—on one's breathing, or all one's perception at once—and allowing one's thoughts to gradually quiet down. This absorption-in-perception naturally and quite automatically leads one to identify one's being with the world<sup>15</sup>, instead of identifying as being a separate self, the latter being regarded in Buddhism as merely an illusion that our dualistic minds construct simply for survival related reasons.

I still personally believe deeply in the Zen path. But instead of meditating much these days, I take the view that my advocacy of renewable energy *is* my spiritual practice now—my Zen

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<sup>12</sup> <https://worldpopulationreview.com/country-rankings/carbon-footprint-by-country>

<sup>13</sup> Other countries with the same capabilities share this responsibility too.

<sup>14</sup> For a discussion of the Evangelical Climate Movement, see <https://grist.org/culture/what-evangelical-christians-really-think-about-climate-change/>

<sup>15</sup> Zen teachers say the effect is like a snowflake melting over a bonfire: it will happen!

practice—because like meditation it requires me to focus *both* outwardly and selflessly. It is the combination of these two aspects then that I think are important. I suspect that followers of other spiritual traditions who are engaged in clean energy work view their efforts similarly. And I can say, happily, that my engagement in clean energy is in fact incredibly spiritually satisfying, to the extent that I no longer experience the longings and sufferings that drove me to pursue meditation and other spiritual journeys in the past. In short, *it works!*

In this vein, I want to emphasize that I'm not talking about satisfaction through *belief* here, per se, but rather *practice*. Practice, just like maintaining an actual meditation practice, requires real and persistent *work*. Persistent work requires time, and that requires prioritizing this practice over many other possible activities, many of which are significantly more enjoyable and/or profitable. And therefore, this practice, despite its rewards, also requires significant sacrifice. Such an effort is precisely what it takes to overcome those difficult problems of governance I alluded to above. I emphasize this because many people consider themselves to be environmentalists inwardly, that is, as a matter of belief and desire, but do little by way of actively engaging in environmental work, day in and day out.

This all said though, sacrifice can be, perhaps ironically, satisfying in and of itself. And so I'm happy with it, and I also tend to feel unhappy whenever I don't feel like I've done much lately.

Although renewable energy work can be very fulfilling, I would be amiss if I didn't acknowledge that it can also be extremely challenging, and discuss exactly why. First, it's challenges include the usual difficulties of working with people, for example egos colliding together (mine included!), disagreements arising from differences in knowledge and viewpoint, personal monetary and power agendas, etc. There are also corporate agendas, political agendas, etc, that strongly effect people's personal behavior. Of course, these kinds of things impact many or even most social activities. But be warned: Because the topic of energy touches so many things, and is so complex and important, there is simply *nothing* like the energy world to bring all these things into play! I still struggle with dealing with these things myself, daily. On the bright side though, one can at least view it as the ultimate training ground for honing one's interpersonal and persuasion skills, and as a spur to get one's life together.

Things can get particularly challenging when one gets involved in *policy* advocacy, that is, directly involved with the "sausage making" processes at state legislatures and regulatory agencies. This is the "big leagues" of energy work, so to speak. Besides the negativity and unbridled greed and ruthlessness that one can encounter in this arena, pursuing policy advocacy can also simply be very boring and uncomfortable at times<sup>16</sup>, and very frustrating. And it can lead to one being caught in very difficult and complicated tangles.

I will now try to provide a picture of just how difficult policy work can be. In my case, after some years of doing mainly public education on renewables, I realized that, due to the high cost of renewables at the time, we simply weren't going to get very far without also getting financial incentives and other policies in place to support renewables. Point in fact, policy work in general can be much more productive than *just* education programs, as a single stroke of the pen can put a new policy into place that rapidly brings about billions of dollars in renewable energy development, as opposed to convincing a handful of people to purchase a solar system.

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<sup>16</sup> Spending day after day waiting to testify in stuffy, crowded committee rooms gets old very quickly. It can also be very difficult to find the time or means to pursue this kind of work. It's no wonder then why so few people get involved with policy advocacy efforts. Education efforts tend to much more fun, immediately satisfying, and feasible for most people.

The difference in effectiveness can be that stark! So, it's well worth doing, even if it takes many years and seems to be going nowhere.

In any case, after realizing just how badly policy changes were needed (another peel off the onion so to speak), I dove into that strange world abruptly, and immediately ran into all sorts of issues. To make matters worse, I happened to dive in in a state that was, and is, largely dominated by the fossil fuel and nuclear industries. Although it has a small population, like Vermont's, New Mexico is the second largest producer of fossil fuels in the United States. As such, the New Mexico State Legislature, and other branches of New Mexico state government, are among the most corrupt in the nation, despite the fact there are also many good legislators and other officials in the state. Secondly, I was a rank novice at policy then, that is, except for the fact that my technical background in renewables was strong. And so, I walked into the proverbial lion's den, so to speak, with a naive smile on my face and a folder full of flyers for renewable energy policies and global warming data graphs.

Fortunately for me, I was able to team up with a savvy group of environmental advocates, who oriented me a bit, and provided me with some supportive comradery, of which I still enjoy. Together we formed the New Mexico Coalition for Clean Affordable Energy, a coalition of initially ten and eventually fourteen environmental groups, some of them quite large, to advocate for clean energy. Although we had very little direct funding from some local foundations—about enough to hire one or two people and some legal help—we at least had a power base and some folks with real expertise.

I became co-director and then director of the CCAE pretty quickly and spent eight long and crazy years working to advance clean energy policies. I ended up going toe-to-toe with fossil fuel industry CEOs and lobbyists, governors, legislators, commissions, and myriads of special interests who all wanted to influence energy policy in one way or another. It was exhilarating work at times, and sometimes hugely rewarding, but also incredibly frustrating. It was also often brutal on a personal and emotional level, as I found myself continuously dragged through the mud by whomever opposed our agenda. On one side there were corporate representatives and elected officials who exhibited extreme arrogance and a highly refined ruthlessness. On the other, there were energy activists who sought to overthrow the utilities completely and who assumed that anyone who would negotiate with utility interests must also be corrupt.

By 2004, however, after six years and a long series of complicated attempts to get various policies in place, we finally achieved a major victory with the passage of the New Mexico Renewable Energy Standard. Things were looking up! And in the following two years we got through a series of other policies, all coordinated into a comprehensive whole, that finally got renewable energy off the ground in New Mexico, and which has spurred many hundreds of millions of dollars of development there since.

As it turned out though, things became unexpectedly and especially challenging in 2006—the worst we had experienced in fact—when the governor we had collaborated closely with on all this, Bill Richardson, decided to run for the Office of the President of the United States. He proceeded to essentially put his office up for sale to the highest bidder to fund his campaign<sup>17</sup>. And unfortunately, many people associated with our coalition were involved directly with him politically in one way or the other, attempting to ride his coattails to personal and/or environmental glory. On top of this, some of the big national and regional advocacy groups who had officially joined our coalition were beginning to push their own agendas independently. This included promoting things like carbon capture and sequestration for coal plants, which I still

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<sup>17</sup> Including having a utility lobbyist officially represent him to legislators while that lobbyist was still in the employ of the utility, an entity who generally sought at every turn to undermine or weaken the policies we advocated for.

consider nonviable environmentally and economically. And in some cases, they deliberately neglected to inform us about what they were up to, despite agreements to the contrary.

The subsequent melee, in which I found myself fighting a somewhat lonely battle just to hang onto the policy gains we had made up to that point, let alone advance them, all but tore our coalition to shreds. This was personally horrific to me as well as terrible for the clean energy movement in New Mexico overall. This then is the kind of thing I mean when I say that policy work can be particularly challenging: it's not just what the bad guys do, it's the internal tangles on your own side as well that can clog things up.

In the end our efforts were ultimately relatively successful, fortunately, in large part due to the heroic resistance of some commissioners of the Public Regulation Commission (Commissioners Jason Marks and Ben Ray Lujan) who stood in solidarity with us.

During this overall period, I also found myself obligated to oppose some decidedly bad renewable energy projects, some of which were unleashed or encouraged by our very progress, that also would have seriously compromised things in New Mexico. These included a proposed biomass-fired power plant that was completely inappropriate for the state, especially given its climate change stressed state, and the failure of its proponents to commit to strict, sound harvesting policies. Another was a proposed 150 megawatt "solar dish" project, pushed largely behind the scenes to the Governor by a collection of powerful interests, that would have committed New Mexico ratepayers to paying hundreds of millions of dollars for an expensive technology with zero track record (and which technology still has no track record, despite attempts to develop it elsewhere since). Opposing these and others came with at a substantial cost to me, on both personal and political levels.

After the smoke from all this had cleared, I could have left it all lie under the hood and continued with rebuilding our coalition<sup>18</sup>, but I had become deeply disillusioned with corruption in New Mexico as its own issue by that point. After thinking about it for a while on a visit to Vermont, I launched an anti-corruption campaign in mid 2007, which I pursued vigorously for about eight months<sup>19</sup>. This was successful in some ways. Via my exposure of some hidden connections between players, it helped put an end to a proposed coal-fired power plant we'd been fighting for several years, and several other unseemly things. But by the end of that I was even more disillusioned, by then not only with the political corruption, but by the apathy of the general public, which enables so much of it to exist.

In the middle of that anti-corruption campaign, I began thinking that I would eventually relocate to Vermont, a place that I have a particular love of and connection with. And I was fortunate to obtain my current job in the Vermont State College System teaching both physics and renewable energy—a perfect combination. But I would encounter more challenges there as well that further illustrate the difficult problems that can arise with energy work.

When I first arrived in Vermont in 2008, I had high hopes that the environment in Vermont would be better in terms of both corruption and support for renewable energy, and I enthusiastically attempted to begin promoting renewable energy development again. But just as I was really getting started the ridgeline wind power controversy began. I had been a strong (and effective) advocate of wind power in New Mexico, and still support wind power development

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<sup>18</sup> The public generally has no idea about actually goes down in the "sausage making" processes at legislatures, in large part because the press conveniently ignores it, classifying it all as just "inside baseball." This is one of the reasons though why so much corruption can persist. Sunlight is really a very good antiseptic, so to speak.

<sup>19</sup> You can find an Associated Press article quoting me, a nod to the fact that the origins of the AP's investigation derived in part from my anti-corruption work in 2007, at the following link:  
<https://www.oklahoman.com/story/news/2007/11/03/lobbyists-open-wallets-for-richardson/61679435007/>

where it makes sense, but Vermont is completely different from the Eastern Plains of New Mexico.

And so I looked into the facts first. I first noticed that resource data published by the National Renewable Energy Laboratory—a very pro-renewable energy and credible entity—indicates unequivocally that the wind power resource, relative to electricity demand in Vermont, and the Northeast as a whole in fact, is extremely small, *hundreds* of times smaller than the solar resource in fact<sup>20</sup>. It also quickly became painfully evident, upon examination of ridgeline wind projects in New Hampshire and Massachusetts, that this particular kind of wind development entails inordinately large environmental impacts, in part because it requires extensive blasting and bulldozing of the ridgelines—places that are exquisitely sensitive and valuable natural habitats and of great aesthetic value to the the state as well—in order to create gradually inclined and well drained industrial strength roads and wide, flat installation sites that utility scale wind power installation requires<sup>21</sup>. It also became clear that Vermont lacked the requisite transmission infrastructure. And finally there were, and are, legitimate issues for wind in Vermont with impacts to raptors and bats, noise impacts to people, truly serious economic issues<sup>22</sup>, etc.

Based on all these facts, I finally decided I was in fact *obligated* by virtue of my knowledge to oppose that kind of renewable energy development in Vermont, both for the good of the state and for the integrity of renewable energy as well. I quickly found myself aligned with a new group of like-minded people, with whom I again found good comradery, although perhaps less common ground on the topic of renewables in general (some were opposed to renewables in general, and differed with my sharply on solar power). I soon found myself traveling around the state to give presentations, wherein I simply layed out the facts described above. This made me a target of personal attacks by both corporate interests and people who stood to personally profit from that kind of development. And so, although we ultimately and decisively won that fight, this proved to be another pretty brutal experience overall, and felt a lot like what had happened in New Mexico.

I nonetheless steadily continued to teach renewable energy, and to promote and assist with various local renewable energy projects, like constructing solar systems with my students at my university, and a community PV system—one of the first in the state—at a local church. But I felt demoralized inside for some time, and had some real difficulties overcoming despair about the prospects for a better world, and I thought for a while that perhaps my more vigorous days of advocating clean energy were over.

After being a bit stuck in this for a while though and focused on some new projects related to preserving the legacy of my father’s life and work<sup>23</sup>, I underwent a profound spiritual awakening of sorts, and so I’m fully back in the game now, fully committed to trying to

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<sup>20</sup> See for example pages 10-12 and 14 of <https://www.nrel.gov/docs/fy12osti/51946.pdf>, either for Vermont, or you can add things up for the Northeast as a whole. Keep in mind as well that the wind estimate here, as tiny as it is, significantly overestimates the developable wind resource, because does not fully take into account many hyperlocal factors that impact development. The solar estimates are less subject to such limitations, for various reasons.

<sup>21</sup> The ridgelines in Vermont are exquisite and complex natural environments full of ephemeral wetlands and home to myriad species, including many that only thrive far from human development. Many Vermonters today, even though the live in the state, have little direct experience with them, precisely because of their remoteness. This led many to assume that opposition to wind was *just* about aesthetics or politics, which it absolutely was not.

<sup>22</sup> Aesthetic issues, for one, is a very legitimate issue in a state whose economy and culture, including its support for environmental protection, is fundamentally linked to the appearance of its “unspoiled, beautiful, mountains,” three words that a state study determined were those that visitors to Vermont most associate with the state.

<sup>23</sup> That I’m still deeply dedicated to completing.

transform the energy system again, and without being bogged down with thoughts or feelings of despair and hopelessness. A key part of this is once again working with others, which has proven to be as empowering as ever.

On a more personal level though, I've also made a new and strong commitment to being more disciplined in the way I live and conduct myself, including radically reforming the way I eat, organize my life, and conduct myself with others, etc. I could write much more about these aspects but suffice it here to say this: I have learned, or learned better, that strong self-control and organization is key to having the freedom to achieve what you want in life, including spiritual happiness. This flies in the face of those powerful American cultural trends that tend to encourage overindulgence, and is quite in keeping with becoming more outwardly focused.

My focused return to clean energy work has been strongly inspired, and buoyed in large part, by two recent outward developments as well, in classic carrot and stick-like fashion:

- First the carrot: The good news is that the renewable energy transition is well under way now<sup>24</sup>. It's finally truly happening, and on a global scale! The current rate of development worldwide is truly astounding—hundreds of gigawatts of renewables are now being installed each year—something unthinkable just a decade ago<sup>25</sup>. So the main goal now is to keep it going, and also to guide it in good directions. Energy storage technology and electric vehicles, two key enabling technologies, are now also achieving critical stages of development and deployment. There is still much to do: A key goal is to electrify everything - heat pumps for heating, electric vehicles, etc, so that we can renewably power everything. But in any case, the Clean Energy Era is finally upon us, and *you* can be a big part of helping with that! That is my “gospel” if you will.
- And then we have the stick: Truly terrible impacts of global warming and climate change are also happening now, and more quickly than the direst forecasts had predicted, because those feedback loops are now fully kicking in<sup>26</sup>. We are in deep trouble. We simply must act *now* to bring about the renewable energy transition. We have no choice about this anymore, or time to dilly-dally. This is my “fire and brimstone,” so to speak, and quite literally meant!

It's also true, sadly, that we will no longer be able to stop many terrible impacts of climate change. I personally believe that our chance for that was actually stolen from us by those who derailed the initial renewable energy push in the 1970s and 80s<sup>27</sup>. But there is at least scientific consensus that supports the notion that we can still hang on to quite a bit of our natural diversity if we push hard now to keep renewable energy development on track, for example, if we can reduce emissions by at least half by 2030<sup>28</sup>. So there is reason for hope!

There is a great deal to know and consider about how the transition to renewable energy should be made. One of the roles of clean energy advocates going forward, besides simply cheerleading for it, is to help *guide* it. My experiences in both New Mexico and Vermont have taught me, and hopefully will serve to convince you, that there are myriad ways in which the transition can go astray. We therefore need lots of well-informed but also ethically uncompromised people to be involved, to help prevent that from happening. Not all renewable

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<sup>24</sup> <https://www.iea.org/news/renewable-electricity-growth-is-accelerating-faster-than-ever-worldwide-supporting-the-emergence-of-the-new-global-energy-economy>

<sup>25</sup> A gigawatt of solar power is enough to power about 140,000 homes in Vermont, factoring in weather and nighttime.

<sup>26</sup> <https://www.science.org/content/article/ominous-sign-global-warming-feedback-loop-may-be-accelerating-methane-emissions>

<sup>27</sup> This fact is not widely acknowledged simply because our media has largely ignored the issue until recently.

<sup>28</sup> <https://news.un.org/en/story/2022/04/1115512>

energy sources are created equal, especially when regional factors are considered. The same applies to emerging technologies such as energy storage and electric vehicles. There is a serious push for fossil-fuel sourced “blue hydrogen” these days, for example, that could interfere greatly with the push for “green hydrogen,” which is produced instead by splitting water with renewable electricity. And there is a push for “carbon sequestration,” which I believe could also end up hampering the renewable energy transition and create a whole new set of environmental legacy problems.

There is also a need to adapt to climate change, and some of that works hand-in-hand with renewable energy development. And there is energy efficiency in general to consider. I want to stress though that although efficiency and conservation tend to be very morally and economically appealing, we much be careful not to allow those to distract us from the task of transitioning the energy *sources*. *All of them*. It should also be kept in mind that our electrical energy efficiency is already very good simply due to technological improvements in lighting technologies, appliances, etc<sup>29</sup>, purely due to economic factors and existing regulation, and steadily improving. And finally, investing in energy efficiency *instead* of renewable energy, say because it seems easier at the time, or morally desirable for its own sake, can reduce the impetus to replace the source of the energy by virtue of the cost savings it provides, and can then, paradoxically, result in greater greenhouse gas emissions in the long run. The best efficiency measures to focus on, then, are those that help enable more renewable energy, for example, those help with electrifying everything. For example, increasing the thermal efficiency of buildings helps enable them to be heated and cooled with heat pumps, whereas just replacing an oil-fired furnace with a more efficient one does not.

I therefore strongly urge those concerned with climate change to focus directly on, and get involved with, advancing the transition to renewable energy. But how to do this? I list ten ways at the end of this essay, as starters.

Please note that, consistent with the contents of this list, it’s *not* all about reducing one’s carbon footprint: there are potentially much more impactful things you can do. In this vein you might also be interested to know that the notion of focusing *mainly* on one’s own carbon footprint was actually a clever diversion tactic promulgated originally by the oil giant British Petroleum, starting in the early 2000s, to distract the general public from the larger issues of energy policy and BP’s behavior<sup>30</sup>. This ethic was then duly adopted by many well-meaning people, with both good and bad effects. Sad but apparently true! One must therefore peel off that onion layer and look at the bigger picture.

Clean energy work is also not just about pushing for governmental action by actions such as writing your representatives, or attending a climate protest, although I certainly recommend those too. Getting involved in some way with advancing the installation of photovoltaics or heat pumps or EVs in your home or community, and actively getting involved with advocating for specific policies such as renewable energy standards or incentives or interconnection policies, will contribute directly to getting the job done, and will teach you loads. And best of all, such direct involvement will get you involved with the *other people* who are involved with those things as well, who will provide comradery and support, teach you things, and ultimately achieve things you’d never dreamed were possible.

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<sup>29</sup> See the work of Amory Lovins, who famously predicted this decades before it became apparent.

<sup>30</sup> <https://interestingengineering.com/culture/carbon-footprint-coined-by-big-oil-to-blame-you-for-climate-change>

Finally, remember too that you can't do everything. Do what you can, and remember that it's not your fault that we are so far behind. What matters most is a persistent focus on *something*, or a few things. Let others take the rest.

And finally, remember the spiritual side of this. Connect deeply with your being as part of much larger whole, and with the idea of bringing human civilization more in harmony with nature. That deeper sense often tends to get lost today in our hectic world, obsessed as it is with political and social strife, economic and environmental woes, wars and catastrophes, and shallow social media distractions. It is possible to tune much of that out, and focus instead on creating a truly sustainable, healthy, and peaceful society, with renewable energy as the foundation.

In summary then, I invite you to join the Renewable Energy Revolution today and:

**Optimize!**

**Energize!**

**Organize!**

**Harmonize!**

**Synthesize!**

**Catalyze!**

**Actualize!**

**Realize!**

## Ten Impactful Things You Can Do to Promote the Transition to Renewable Energy

- 1) *Learn* about clean energy technologies, and development possibilities, and spread your knowledge. Energy is a fairly technical and complex topic, and there is a lot to know. Everyone has an opinion, but those opinions mean little unless they're well informed. Worse, there is a lot of anti-renewable energy propaganda floating around, repeated even by well-meaning people, much of it intentionally promulgated by well-organized and thought-out PR campaigns designed to stop renewable energy development. So study up, and update your knowledge regularly to build real and accurate understanding. Read articles in the news and on websites. Learn to separate the hype from fact. Attend clean energy fairs. Engage with your local clean energy providers and advocates and ask questions. Allow your opinions to evolve continuously as you learn. Mine still do. Evolution in thought is a clear sign that you're actually learning.
- 2) *Bring attention*—diplomatically—to clean energy possibilities, ideas, initiatives, etc., in your everyday life. Human beings are highly social beings that tend to follow the herd, and often won't act until they feel that a consensus has been reached. Simply bringing attention can promote the development of that consensus in your community of people. And countering the propaganda will also help, if you know your stuff well. Take a little risk and be outspoken, and learn how to be positively persuasive, even if you fail at time. You also may be able to contribute to organized education efforts and such in your area, for example by making presentations at schools, churches, libraries, etc.
- 3) *Advocate* for renewable energy in your state. Educate yourself first and often about what your state's renewable energy policies are, find a way to get involved, even if it means just contacting your representatives and utilities and such. Don't leave it all up to the "professional" advocates at the statehouse, or the activists on the street. Join in and help them out, or provide your input independently. You can find your state policies at [www.dsireusa.org](http://www.dsireusa.org). It takes time to get up to speed, so take that time. Be nosy and ask questions. You can generally find out what's being proposed in your state with a few quick searches on your legislature's website, and by asking around.
- 4) *Become aware* of the overall politics in your area around energy policy. What positions is your electric utility actually taking? Your town? Your representatives? What is happening at the federal level? Question authority, and speak your truth to the powers that be.
- 5) *Do* what you can to lower your carbon footprint without taking your eye off the powers that be. You may not have the money to do everything you'd like, but don't worry about that. You might find out that you can do more than you thought. It will take time: For example, you might have to insulate the house better or reroof before getting that heat pump or solar system, respectively. Patience and persistence win the day. Consider these facts:
  - a. Improving the thermal efficiency of your home can be cost effective. You can put a little or a lot into that.

- b. Heat pumps can be cost effective, especially now that oil prices have become very uncertain going forward and have spiked a few times.
- c. Solar systems can often be had today for no money down.
- d. Electric vehicles are now readily available, and charging stations are rapidly appearing. And there are tax breaks for electric vehicles as well as solar systems and batteries.

As you go about these things, please don't obsess about "saving a lot of money" if you get a solar system or similar. Just try to break even, if you must, keeping in mind that the goal is save the environment, not obtain a windfall. If you're wealthy, consider paying extra! Remember that you're shifting the money you spend from something bad to something good, and you're also paying for the young people entering the renewable energy world and helping renewable energy companies in general to survive and hopefully grow. Remember also that early adopters help the most to advance things, per dollar invested. And so don't worry if solar is going to get cheaper next year, or if everything's not perfect—for example whether snow will hamper some of your solar collection, etc. Nothing is ever perfect. Do what you can now.

- 6) *Promote* the renewable energy transformation of the infrastructure surrounding you, in schools, churches, town buildings, commercial districts, etc. Such institutions can often achieve a lot, and their projects can provide beacons of change for the local community, but they may need your voice to get over the hump. Get directly involved with these too to learn your stuff. Then take that knowledge and apply it elsewhere.
- 7) *Get involved* with local groups that work on clean energy, and form a new group if you can't find one. Comradery is very helpful, and the power of bringing together the differing skills of different people cannot be underestimated. Virtually all great human achievements are collective efforts in one way or another.
- 8) *Think* about the larger issues that impact all this too: Clean energy development doesn't exist in a vacuum. Voting rights, election integrity, economic justice, etc. all bear on clean energy development in the end. If you can help with these issues, do so with the knowledge that this will help clean energy too.
- 9) *Consider* that there is a great deal more to renewable energy than just PV panels, batteries, heat pumps, and EVs. There is also passive solar design of buildings, sustainable building, sustainable water practices, etc. Homeowners, architects, and planners can seek and design new buildings from the ground up that incorporate and integrate sustainable building and renewable energy. There is also a growing synergy between agriculture and photovoltaic installations—Agrivoltaics!\_that farmers can pursue. Cooks can experiment with solar cooking—the old adage that solar cooked food tastes better is actually often true!
- 10) *Shift* your career into clean energy work if that works for you. There are many sorts of positions now in the industry, and there is plenty to do for decades to come. It's a rapidly evolving industry—so be prepared for a wild ride! Spend frugally and save to prepare yourself for that ride.