

This file records my correspondence in late 2004 with Berkshire County resident Eleanor Tillinghast, which led to my composing the op-ed essay, "Wind Power Works," which ran in the Berkshire Eagle on Jan. 8, 2005. I've **boldfaced** the most salient portions of the emails, which appear in chronological order.

-- CK

Komanoff #1 to Tillinghast, 10-19-2004

Date: Tue, 19 Oct 2004 12:38:22 -0400
To: info@GreenBerkshires.org
From: Charles Komanoff <kea@igc.org>
Subject: a question about E. Tillinghast's 14-May-04 report

Dear Eleanor Tillinghast --

I've just skimmed your report, "Wind turbines don't make good neighbors -- Some Problems of Wind Power in the Berkshires," which is on-line at http://www.greenberkshires.org/wind_power_plants_postings/wind_turbines.html

I'm puzzled by your assertion that "... larger goals like reducing global warming, pollution, dependence on fossil fuels ... will not be ameliorated one whit by the construction of these turbines on our mountains." (emphasis added)

I've spent the better part of my professional career, dating from the early 1970s, analyzing (and critiquing) electric utility planning and operation. (My 1981 book, "Power Plant Cost Escalation," is considered the definitive work on the financial meltdown of the U.S. nuclear power sector.) I know how utility grids work. And I can attest that each additional or "incremental" kilowatt-hour generated by low- or zero-running-cost units such as wind turbines, hydro dams and solar photovoltaic arrays translates one-for one into reduced output by power plants running on fossil fuels.

My understanding is in direct contradiction of your statement. Could you please explain or elaborate? (I'll be happy to do the same, if you'd like.)

Thanks and best wishes,

Charles Komanoff / 212 260 5237 or return e-mail

PS -- I live in NYC but occasionally visit the Berkshires and, more often, the Adirondacks. I "joined" the environmental movement in 1969-1970, inspired by wilderness and wild nature.

Tillinghast #1 to Komanoff, 10-20-2004

Date: Wed, 20 Oct 2004 08:33:53 -0400
From: "Green Berkshires, Inc." <info@greenberkshires.org>
To: Charles Komanoff <kea@igc.org>
Subject: Re: a question about E. Tillinghast's 14-May-04 report

Good morning, Charles. I'm headed out to a meeting, but want to respond briefly to your email. At some point this week, I would really like the chance to speak with you. I'm always looking for energy experts because that's how I learn.

Although I have studied the energy industry for the past year, I am still very much a novice, and welcome the opportunity to learn from experts. **I don't agree that each additional kWh generated by wind turbines translates one-for one into reduced output from fossil-fueled power plants.** Yes, of course, one kWh from wind means one less kWh from a gas-fired plant. However, **a grid that supports wind turbines must have spinning reserves so that another plant can be switched on at the instant the wind stops.** Reports from Germany and England (the former from a major energy producer, the latter from the Royal Society of Engineers) state that -- and I'm paraphrasing here -- for every 100 MW of installed capacity of wind power, 85 MW of traditional capacity must be available. I can't remember the amount that must always be in spinning reserve, but I seem

to remember the figure 40%. To your larger point about my use of the phrase "one whit", I could write reams on this, but only have time at this moment to make a few comments. Our national energy consumption has been climbing, international energy consumption, particularly by China, has been skyrocketing. Both far outpace the potential offsets of covering our Berkshire mountains with wind power plants. The wind power companies wave all sorts of numbers about the pollution offsets from wind turbines. I looked at a 525 MW combined-cycle gas-fired power plant proposed by the family of our state's environmental affairs secretary. The pollution caps set by the state were low. If 30 MW of Hoosac wind power (assuming the impossible notion that the plant will produce 30 MW of power annually) meant that 30 MW of power were not produced by that Roy family plant, what would be the results in terms of pollution? I don't remember the exact calculations as I type this (although I can get them for you) but I do remember that the amount of pollution could be retired annually by buying less than \$60,000 of pollution credits. Compare that with the approximately \$3 million American taxpayers and ratepayers will spend annually subsidizing the Hoosac wind power plant. For that amount of money, we could support demand response and energy conservation programs that reduced usage by real numbers, and, over time, made a real difference in global warming, pollution, and use of fossil fuels. Anyway, I could type all morning about this, but I've got to head out to meetings. I look forward to your response, and the opportunity to speak with you later. Thanks for emailing me.

Komanoff #2 to Tillinghast, 10-20-2004

Date: Wed, 20 Oct 2004 09:59:55 -0400
To: "Green Berkshires, Inc." <info@greenberkshires.org>
From: Charles Komanoff <kea@igc.org>
Subject: Re: a question about E. Tillinghast's 14-May-04 report

Hi Eleanor --

I appreciate your prompt, thoughtful and collegial response. Thank you!

Let me first address spinning reserve; then your "macro" points.

Every grid requires reserve capacity and spinning reserve to deal with fluctuations in demand as well as interruptions in supply. The question is: how much additional reserve capacity and spinning reserve are required as wind turbines join the grid.

I've looked at the literature on this; here's what it says:

*re reserve capacity: the amount of additional reserve capacity required begins to be noticeable only as intermittent capacity (such as wind) reaches about 10% of the grid total; and it starts to be significant only at 20%. I haven't done the calculations (you know the numbers better than I do) but I believe that even 10% is well beyond the highest projections for New England for some time.

*re spinning reserve: Fluctuations in wind output are managed the same way as fluctuations in demand, with the use of spinning reserve. **At low levels of wind capacity, the levels of spinning reserve are the same as that with no wind generation. Even at high levels of wind capacity, the additional spinning reserve will never be more than a few percent of the wind output.**

Thus, my "one-for-one" statement to you should properly be: one-for-one at the wind-power levels forecast for the next 5-10 years, and "97-98 for 100" at higher levels. Note also that ongoing improvements in real-time forecasting of wind velocity should make wind output more predictable and thus keep a lid on the incremental need for spinning reserve.

As for the bigger energy picture: our energy situation is so dire (w/r/t climate havoc, oil wars, etc.) that we need energy efficiency and conservation and renewables combined. If you, like me, "came of age" environmentally in the 1970s, you (like me) may have become accustomed to the idea of finding or proving enough conservation etc. to "top off the grid" and defray the "need"

for a nuke or coal-fired plant. But the game, if you will, has changed. We need every possible unit of efficiency + conservation + renewables to achieve maximum reduction in the use of fossil fuels. Each wind turbine not built is a missed opportunity to slow climate havoc.

So I return to my main point: each Hoosac turbine means less mining, shipping and combustion of fossil fuels. (And, by the way but importantly, the wind turbines will displace not the new modern gas plants, which are so efficient that they're relatively cheap to run, but rather output of older, dirtier and less efficient oil and/or coal plants.) True, Hoosac can't do anything about the forced replacement of bicycles by cars in China, or continued motorization in the U.S. for that matter. (Though I will argue at some other time that the mass advent of renewable energy in the U.S. might change the "dynamic" of energy use and policy here, with big ripple effects ...)

I have fought those developments with my heart and soul for over three decades and continue to do so. But please let's not let "the perfect be the enemy of the good." The wind turbines will do some good. I hope you will reflect on that good and incorporate it into your balancing of the pluses and minuses of wind power in the Berkshires.

Let me hear back from you again. No rush, but I think this dialogue is good for us both.

Thanks and best wishes,

Charles

Tillinghast #2 to Komanoff, 10-26-2004

Date: Tues, 26 Oct 2004 22:58 -0400
From: "Green Berkshires, Inc." <info@greenberkshires.org>
To: Charles Komanoff <kea@igc.org>
Subject: Re: a question about E. Tillinghast's 14-May-04 report

Charles, I wanted you to know that I've been under a huge deadline during these past two weeks, ending on Friday, and have been unable to think coherently about anything else. On the few moments when my mind has strayed to other things, I've been thinking about your email, and look forward to responding to it. Thanks for giving me so much thought-inviting information.

Komanoff #3 to Tillinghast, 11-18-2004

Hi Eleanor --

I hope it won't be much longer before you're able to attend to my email of Oct 20, in which I tried to support my core assertion, in my first (Oct 19) email, that essentially each kWh produced by wind power results in one fewer kWh produced from fossil fuels.

Please let me know if you need fresh copies of those emails.

Thanks and best wishes.

-- Charles

Tillinghast #3 to Komanoff, 11-18-2004

Charles, your emails have been sitting in my inbox, generating guilt at my tardiness, but they have to be lower in my priority list than some other projects on which I'm working. I'm sorry about that. I will get to them as soon as I can. Please bear with me. Thanks so much.

Komanoff #4 to Tillinghast, 11-22-2004

Eleanor --

It's been over a month since my two original emails, in which I questioned the validity of the statement in your May report that "... larger goals like reducing global warming, pollution, dependence on fossil fuels ... will not be ameliorated one whit by the construction of these turbines on our mountains."

I understand that you're busy. Me too. I'm concerned, though, that our dialogue is dragging on. I don't want it to peter out without your addressing my challenge to this very important -- and damning -- statement you have made against the wind turbines.

Please don't feel that I'm asking you to undertake a big research project. It's a fairly straightforward issue, I think. To my knowledge, no opponents of wind power projects (e.g., Cape Wind, the U.K.) are making the claim I'm asking you to defend, or renounce.

Could you please give me a substantive reply by the end of next week -- Dec. 3? I would appreciate that.

Thanks and best wishes -- and happy Thanksgiving.

-- Charles

Tillinghast #4 to Komanoff, 11-22-2004

Date: Mon, 22 Nov 2004 22:00:46 -0500
From: Eleanor Tillinghast <eleantillinghast@att.net>
To: Charles Komanoff <kea@igc.org>
Subject: Re: our wind power dialogue

Charles, maybe it's because I've had a long day. But I just got in, read your email, and had to laugh. Excuse me? Yes, reviewing my earlier research and assembling an answer to your "challenge" is a research project. You've already selected an audience for what I thought was a private exchange of emails: Tom Stokes is a friend; I don't know the other person. Who knows who you have blind-copied. So, the short answer is: I don't know who you are, or which audiences you are playing to, or what you intend to do with my answer, so, yes, of course, I take this kind of "challenge" seriously, and if, and when I decide to answer it, I will do so in my own time and way.

Komanoff #5 to Tillinghast, 11-23-2004

Eleanor --

Yes, I bcc'd Tom, my closest friend and colleague (my first enviro work was w/ him, here in NYC, in 1970), on all my emails to you; and I bcc'd another close friend, one Anne Hansen from Toronto, on my second email, from Oct 20. That's the extent of it. I don't view that as a breach of faith, but will refrain from bcc'ing on this and any further notes. I apologize for the offense.

The fact is that I feel entitled to a substantive reply from you -- just as I feel obligated to reply similarly to anyone who writes me (even, or perhaps especially, from out of the blue) and collegially takes issue with me on a factual point I have presented on a public matter.

Your May 14 position paper is an important document, Eleanor. You made a large, public statement (of some 17,000 words!) on an issue of great importance. Your words carry weight. You have an obligation, I believe, to respond to factual criticisms. And to do so, I would say, in a fairly timely manner.

I'm reminded of old discussions with other anti-nuclear power activists back in the 1970s, when a lot of U.S. electricity was made from oil. I was adamant in asking my colleagues to concede that in some cases, reactors (loathsome though they were otherwise) did actually reduce the use of oil.

Here the debate is not over nuclear power plants but about windmills; and the issue I'm raising (since you did, in your May 14 paper) is dependence on fossil fuels generally. Whether windmills do or don't displace fossil fuels isn't determinative by itself, there's obviously a host of other vital concerns to raise and weigh (as you did in your paper). But we have an obligation to get as many of the facts right as we can.

My concern over your statement stands, and I remain hopeful of getting a substantive reply from you in the relatively near future.

Thanks and best wishes,

Charles

Komanoff #6 to Tillinghast, 12-07-2004

Dear Eleanor

Before writing this, I took a tour of your Web site, www.greenberkshires.org. I found it quite stirring. The photographs are beautiful, and the text and the design are equally evocative. The total effect is gentle yet strong, understated but determined. Whoever composed it (you, I imagine, or a team led by you) clearly has a passion for our natural heritage, along with a sense of clarity and a zest for communicating.

I was particularly struck by the mention of a tulip tree, on the Heritage Trees page. Before me, on my desk, is a framed photograph of a tulip tree at the base of the Palisades cliffs in New Jersey, in parkland not far from the George Washington Bridge. I snapped the photo in the fall of 2001 as part of my healing process from the 9/11 attacks, which took place barely six blocks from my home in lower Manhattan. As I wrote in an essay that was syndicated nationally, my tulip tree came to personify life, struggle, strength; I would be happy to send you a copy.

I infer from your recent silence that you have washed your hands of our correspondence. That disturbs me. I wrote you in good faith, asking you to defend a key claim you advance to support your vocal opposition to the Hoosac wind farm. (I'm referring of course to your assertion in your May 14, 2004 essay, "Wind turbines don't make good neighbors," that "... global warming, pollution, dependence on fossil fuels, and energy consumption ... will not be ameliorated one whit by the construction of these turbines on our mountains.")

That was seven weeks ago. Despite several requests from me, all of them courteous (I would say), you haven't substantively defended your position that wind turbines have zero ameliorative effect on global warming and other harms from fossil fuels. Indeed, since your initial reply, you haven't spoken to the issue at all.

That's not right. All of us in public life have a duty to support the positions we advocate. If we can't do so, don't we owe it to "the opinions of mankind" to

amend our positions accordingly? I've built a 34-year career in the environmental movement on this principle, and I expect others wearing the mantle of environmentalism to do the same.

I want to close on a note of sympathy. It's clear from your Web site that the prospect of wind turbines marring the untrammelled landscape of the Berkshires is a painful one for you. It is for me as well. As I mentioned in my initial e-mail, wilderness was my "portal" into the environmental movement, and it is still my personal North Star. There is so little wild nature left, the diminution of any is heartrending. Once I would have fought the Hoosac windmills with all my heart. But today I believe that Earth's need to replace fossil fuels with renewable energy must override even that consideration.

That's my trade-off. You're entitled to yours. But we have to be true to the underlying facts. In that spirit, I ask you, if you can't support your statement, to withdraw it.

Best wishes,

Charles Komanoff

Tillinghast #5 to Komanoff, 12-07-2004

Charles, no I haven't washed my hands of our correspondence. It has helped me refine my thinking, and I refer to it in my mind with some regularity. Periodically, when I come upon a document that I think might interest you (such as the study by the Royal Society of Engineers in London or the E.ON Netz report from Germany), I consider sending it but realize that doing so without writing something in a larger context could seem confrontational, and I have enough fights underway without creating or exacerbating one with you. **I simply haven't had time to do the research and writing that your concerns demand. I'm in the midst of writing three op-ed pieces (and will be sure to forward them to you) with footnotes, that will be posted on the GreenBerkshires.org website.** I wish I had 100 hours in the day. I work more than full time on this and am scrambling as best as I can to work through the regulatory processes (which demand huge amounts of time and money, thus fundraising) and to get information out to people. I was frosty in my last email to you, but much of that was because I was truly exhausted, and didn't need another challenge at that moment. That's not my nature, and I do hope to respond to you at some point, either by elaborating on my position in an op-ed, or through an email to you.

Komanoff #7 to Tillinghast, 12-07-2004

Date: Tue, 07 Dec 2004 22:56:22 -0500
To: Eleanor Tillinghast <eleanortillinghast@att.net>
From: Charles Komanoff <kea@igc.org>
Subject: Wind power and "the grid"

Hi Eleanor --

I was glad to get your e-mail replying to mine from this morning.

You mentioned a study by the Royal Society of Engineers in London and an E.ON Netz report from Germany. I found nothing of substance from the RSE -- just a series of disjointed posts. But I did track down a German report, at <http://www.eon-netz.com/>, a 16-p. pdf doc, "Wind Year 2003, An Overview," which is probably the one you had in mind. (By the way, the oddly named E.ON Netz appears to be an electric utility operating in Germany's Schleswig-

Holstein and Lower Saxony, where an unusually high amount of wind turbines have been installed.)

The gist of the report, from my reading, is that the variability of wind power output (i) requires the maintenance of a considerable amount of back-up or reserve generating capacity, but (ii) does not impede or compromise the 1-for-1 displacement of electric generation and fuel use by existing generating stations.

More simply, wind power is presently of only limited value in displacing power stations themselves -- the things still have to be kept functional. But it has full (100%) value in displacing fuel use by those power stations, i.e., fossil fuels -- which is precisely the claim I made in opposition to yours in your May 14th statement.

To quote from the E. ON Netz report itself, at p. 7, bottom:

This means that due to their limited availability, wind power plants cannot replace the usual power station capacities to a significant degree, but can basically only save on fuel.

Indeed, no wind developer I know of seeks to take credit for displacing more than a modest amount of existing capacity. But taking credit for allowing existing stations to be run at lower levels, burning less fuel, is entirely appropriate.

(I recognize that the distinction between capacity and operation isn't necessarily clear to people without experience in power systems. I'll be happy to elaborate or try a better explanation, if you'd like.)

Eleanor, there's just no getting around the fact that each kWh of output from a Hoosac wind turbine, or any other wind turbine, will displace a kWh of output from an existing fossil fuel power station somewhere on the grid.

I don't mean to be harsh, but to deny the above is to skate perilously close to flat-earth territory. As I have said previously, you can fight the Hoosac turbines all you want on esthetic or other grounds, but you have to concede that stopping them means that, in their absence, a not inconsiderable quantity of fossil fuels will, somewhere, be taken from the Earth, transported to power stations, and burned, releasing toxins and climate-altering carbon dioxide into the atmosphere.

I don't anticipate your giving up opposition to the wind turbines. But I do look forward to your acknowledging the consequences I have just described.

Best,

Charles