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Mr. Birkholz,

The informational meeting that the Minnesota Department of Commerce set up on December 13, 2007 in Winona on CapX2020 had a Q&A period where questions from the public were answered by both Commerce personnel and Utility representatives. At least four of the answers given to two themes of questions were either misleading or, based on published research, simply incorrect. The errors were so blatant and intentional that I wonder whether industry-centric personnel should even be allowed to represent their case.

The first category of questions dealt with possible health effects to both humans and livestock. The Arcadia farmer who spoke about negative health effects in his dairy herd from living near a utility substation had comments that were not perfectly pertinent since they dealt with "returning neutral ground currents" ("stray voltage") on distribution lines, not transmission lines. But it was particularly surprising to hear from all of the Commerce and Utility personnel that there are no health effects on humans from transmission lines. While it may certainly be in the best interest of both the Utilities and the Department of Commerce to believe in this fallacy, a number of scientific studies and industry publications disagree.

The Institute of Electrical and Electronics Engineers (IEEE) periodically issues a document called "IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz," last published as "IEEE Std. C95.6-2002." On page 14 is "Table 4 – Environmental Electric Field MPEs (maximum permissible exposure), whole body exposure." The highest MPE for the general public is supposed to be less than 5000 volts per meter (5 kV/m). The footnotes to this standard indicate that "at 5 kV/m induced spark discharges will be painful to approximately 7% of adults." The proposed 345 kV transmission lines should have a level of between 3 kV/m and 4.8 kV/m directly under the lines, based on figures from the CapX2020 brochure entitled "Electric and Magnetic Fields (EMF): The Basics." Allowing for variable tower and conductor heights to follow local topography, the actual levels could easily exceed 5 kV/m. The Cap X2020 publication also states that the safe exposure for those with implanted pacemakers or defibrillators is only 1 kV/m.

The failure of a life-sustaining medical device or painful shocks to a minority of the public seem to lead to the conclusion, in the Minnesota Department of Health's "White Paper on Electric and Magnetic Field Policy and Mitigation Options," that "the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health affects." This self-serving conclusion, besides being contradictory to leading Industry publication, also neglects all

but the most obvious human health affects. The informational blinders placed on the general public by this effect-minimizing form of so-called "make-to-the door-toxicology" become more obvious when some of the replicated studies financed by electrical Utilities as far back as 1979 are considered. For instance:

1. Battelle Pacific Northwest Laboratories got funding for a study funded by EPRI, the Electric Power Research Institute, exposing multiple generations of rats to levels of AC power typically found under transmission lines. Among their findings were:
A. A "marked reduction" in the level of nighttime pineal gland melatonin after 3 weeks of exposure.
B. Significant changes in the neuromuscular system within 30 days of exposure.
C. Significantly increased incidence of fetal malformations.

2. The Polytechnic University of Brooklyn got funding for another rat study financed by the New York State Power Lines Project. Fetal and newly-born rats were exposed to low-power 60 Hz AC (powerline) fields for a brief period, then shielded from fields for 90 days. Testing of short-exposure rats versus controls showed that exposed rats learned more slowly and made significantly more mistakes in cognitive tests.

3. The New York State Department of Health funded a study showing that monkeys exposed to low-frequency, low-strength electromagnetic fields for 3 weeks had significantly decreased serotonin and dopamine. Dopamine recovered quickly with no exposure, but serotonin stayed abnormally low for several months.

4. The U.S. Navy's "Project Henhouse," funding 6 different laboratories in powerline-frequency chicken studies, reported (from 5 out of 6 labs) that "apparently very low-level, very low-frequency, pulsed magnetic fields contribute to increased abnormality incidences in early embryonic chicks."

5. A non-governmental, non-industry study by Winters and Phillips at the Cancer Research and Treatment Center in San Antonio, Texas, reported that human cancer cells exposed for just 24 hours to low-level, 60 Hz fields had a permanent growth rate increase as high as 1600%, making powerline fields a potent cancer promoter, but not a direct cause.

Apparently, the WHO (World Health Organization), cited by the presenters at the public meeting, along with the Minn. Dept. of Health, do not consider hormone alterations, increased birth and learning defects, and accelerated cancer growth "adverse health affects". And a few studies, even when they come from Industry funding, don't constitute a "body of evidence".

Most of the conclusions on EMF that are spoon-fed to the public are based not on science but on the far cheaper methods of statistical meta-analysis. Many government and industry sponsored meta-analyses of electromagnetic field related studies have relied on previous summaries and meta-analysis performed by industry-sponsored analysts. One well known example is Dr. John E. Moulder, PhD, Professor of Radiation Oncology at the Medical College of Wisconsin. His work with cancer skews all of his considerations toward ionizing radiation and the breaking of chemical bonds. So besides not even considering the most damning studies in his reviews (from an industry perspective), he ignores electromagnetic effects below those directly causing immediate cellular damage, and refuses to consider relevant epidemiological evidence to the contrary if there is presently no known theoretical model to account for it. This leads to

conclusions that usually begin with "the body of evidence suggests," or "there is very little evidence to suggest," as if the Truth was somehow just a majority opinion. Paraphrasing that position, opposing evidence can't be seen, because "I have to believe it's possible in order to see it, i.e. Believing is Seeing." But as physicist Martin Rees famously said, "absence of evidence is not evidence of absence." This sort of "reasoning" is just a deductive process warped to fit a convenient outcome: A) Develop a theory, B) Test the theory through observation, C) Ignore data that doesn't fit the theory of the funding sponsors. But incomplete models of reality shouldn't be confused for Reality itself. Or as physicist Richard Feynman said, "Nature cannot be fooled." Granted, epidemiological studies are very expensive, controversial and lengthy. Why not simply look at all the evidence, including all of the anecdotal reports from the "canaries in the coal mine" who are EMF hypersensitized, and may be showing us what's in store for an increasingly EMF exposed population at large?

Meta-analysis of Industry-sponsored analyses versus non-Industry shows a vast discrepancy in the conclusions about health-related EMF effects, depending strongly on who pays for the study. As with the FCC's CRADA (cooperative research and development agreement) with the telecommunications industry, it's clear that the "fox is in the henhouse" and that low-taxing governments can no longer possibly obtain funding for truly conclusive and unbiased studies that would adequately safeguard the public.

Increasingly, local governing bodies, more progressive state governments, and many governmental bodies overseas are adopting the "Precautionary Principle." This puts the weight of evidence gathering on well-funded industries to prove safety, not on poorly- funded private or governmental commissions to prove danger. But as long as 1) the money comes from industry profits, 2) there's a revolving door between industry and government, 3) the Utilities don't even follow industry-published guildelines, 4) the public places convenience over safety, and 5) only the grossest effects are considered relevant, putting the terms "health" and "powerline EMF" in the same sentence is oxymoronic.

Regarding the second broad category of questions at the public hearing, the REAL reason for the expansion of transmission capacity, again, both Department of Commerce personnel and Utility representatives took great umbrage with any suggestion that the expansion was unnecessary, for whatever reason. Yet it was quite clear from their maps of existing and proposed productions areas, transmission routes, and highest load zones that the biggest user is the Twin Cities Metro, and the power will be pumped through the "backyards" of those who use the least (or, in my case, not at all, since I've been "Off-grid" since 1980). There is plenty of blame to spread around. Consider the consumer advocates, Chambers of Commerce and energy-gobbling industries who lobby incessantly for cheap electricity. Or the Not-In-My-Backyard, relatively wealthy, Metro homeowners who think of conservation as a dirty word unless it's socio-political. Or the coal, nuclear and wind industries who all want the most profitable locations for production (while demanding public subsidies). And of course the Utilities that collectively throw up their hands and proclaim there's no other reasonable (read cheapest, politically painless, technologically unimaginative) means to obtain the ends.

As long as "cheap" and "NIMBY" prevail over "needs" and long-term "safety", I'm certain the Utilities will successfully lobby for what they propose. But I still hold them primarily at fault for an obviously disingenuous PR push to portray Metro-centralized energy over-consumption of cheap, South Dakota, coal-generated and low-rent, SW Minnesota wind-generated electricity as a safe, time-tested means to a greener future grid. The grid will never be safe, efficient, or truly

reliable as long as it's ugly tendrils wave overhead, exposed to the vagaries of increasingly harsh weather, while increasingly loosing power through the resistance caused by bigger loads, despite raising voltages to further endanger humans and wildlife. Living in a rural area, I have a keen sensitivity for "BS" and that's what I heard behind the self-serving "answers" at the public hearing.

Based on over 25 years of work installing solar PV and small wind turbines, utilizing PV and wind myself, troubleshooting electrical malfunctions, and helping other homeowners reduce both their consumption and their EMF exposure, I've concluded that the only REAL alternative to this puzzle that the Utilities claim they're caught in is to **Put the Production Where the Loads Are!** We don't need big transmission lines if the source is near the load. Isolating sources, consumers, and end-results is never a good idea. It makes people dumber, isolating them from their own analysis of causes and effects, and an uninformed populace leads to poor decision making. You want the Power? You get to look at it! Otherwise, the high-voltage EMF crossing through the countryside that feeds the Twin Cities is just the electronic version of "second-hand smoke". And we all know where the litigation on <u>that</u> went.

While taking personal responsibility for household electrical production and consumption is <u>our</u> choice, and while it's becoming exponentially popular worldwide, I realize it's not mainstream thinking - yet. Putting a positive spin on conservation is certainly politically easier than talking influential metropolitans into wind farms in the high-priced land of the suburbs. But let's not kid ourselves. It all has to happen if you take the "Seven Generations" viewpoint. A purely economic perspective is fine if you include all of the "externalized costs". The Greek roots of the word "economy" mean "management of a house." That house is now global. Nothing is external to it. If we're on this planet as stewards, not thieves and plunderers, to encourage less than our best, for our economy <u>and</u> our progeny, is irresponsible at the least, and criminal from an environmental, moral, scientific and hopefully one day, judicial viewpoint.

Sincerely,

Robert Dahse