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The Conference on Corporate Interference with Science and Health: Fracking, Food and Wireless: genesis, rationale, and results[1)]

Abstract: A number of serious environmental health hazards created by under-regulated/unregulated industries have morphed into public health crises around the world. *The Conference on Corporate Interference with Science and Health* (the Conference) was held to examine this trend in three economically significant industries: fracking, food, and wireless. The Conference provided an overview of the structures of these three industries and the history of standard-setting therein, identified the sources of environmental exposures created by these industries, and surveyed the health consequences of these exposures and the policies that have resulted in them. It then examined corporate influence on the setting of these policies and the production of scientific studies and interpretation of their results. The Conference also analyzed the general influence of corporations on the political system and the relationship of this conflict of interest to the aforementioned topics. The concluding discussion focused on what solutions could be implemented to improve public health, including what institutional changes are necessary to promote public awareness and change policy.

Keywords: corporate lobbying; electrohypersensitivity (EHS); electromagnetic intolerance syndrome (EIS); public health hazards; regulatory policy; scientific controversy.

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Introduction

Modern industry, often operated by large multinational corporations, is seen as contributing significantly to our quality of life. However, it also exerts significant influence on governments to take actions that, while benefitting the corporate bottom line, create negative public health externalities. This is particularly true in the United States, where elected officials are dependent on donations in order to be elected (and re-elected) and industries have monetary resources that buy influence.

Corporate interference can occur at many levels. Most commonly, it can influence safety regulations and, in some cases, even prevent safety regulations from being established. Through political campaign contributions, corporate interference can dramatically influence who is elected to public office, which has major influence on which or even whether regulations are enacted at all. The influence of industry on occupational and environmental health policies in the United States has been reviewed by Huff (1), who documented how corporations influence national and international public health organizations. Corporations, through their political influences, can alter what kinds of research are done. Huss et al. (2), for example, reported that studies on the dangers of cell phones, which were funded by the telecommunications industry, were much less likely to report a statistically significant result as compared with studies funded by public agencies. Often, corporations contract with academic scientists in ways that compromise the latter's objectivity and constitute a clear conflict of interest. Perhaps the most distinguished scientist who was later discovered to have these conflicts of interest was Sir Richard Doll, a respected epidemiologist who dismissed concerns about dioxin and vinyl chloride, never disclosing the funding that he had received from Dow and Monsanto (3). Corporations also influence public opinion through advertisements that are often inaccurate.

The goal of the Conference was to address the effects of corporate influence on three topics of current interest and importance – namely, fracking, food, and wireless. In each of these topics, there is a strong economic incentive for industries to expand and generate financial returns. At the same time, however, there are also major concerns regarding safety and the potential for increasing the risk of disease development. Because many environmental advocates tend to be focused on a single issue, one goal

was to highlight the commonalities across the topics and to examine the scope of the other problems.

The Conference on Corporate Interference with Science and Health: Fracking, Food and Wireless was held on March 13th and 14th, 2013 in the Victor Borge Auditorium at Scandinavia House in New York City. It was attended by approximately 150 participants including lawyers, doctors, environmental advocates and members of the arts and letters and sports and entertainment communities. A reporter from the CNN Medical Unit was in attendance; the head of the medical unit had expressed an interest in the food issue in particular and was willing to take a look at wireless health hazards beyond the cell phone health risks previously covered on air by Dr. Sanjay Gupta. Since the Conference, the CNN Medical Senior Managing Editor followed up regarding reporting stories about fracking pollutants, health effects of glyphosate in the food supply and wireless devices on public transport. However, six months later no reports have been televised or reported online.

The Conference comprised six panels and one video presentation. The Conference started with the Overview of Fracking, Food and Wireless panel, followed by History of Standard Setting, which also surveyed sources of exposure from the industries in question. The next panels were Health Consequences of Current Policies, Corporate Influence on Science and Policy, and Other Unconsidered Externalities of Current Industry Practices. Addressing the Source of Common Problems of Corporate Interference, which comprised a video of an interview with former U.S. Attorney Whitney North Seymour Jr. Esq., "How Campaign Contributions and Lobbying Affect Public Policy", surveyed current practices in United States governance leading to the unprecedented corporate influence discussed throughout the Conference. The final panel, "Discussion of Solutions to Improve Human Health", which involved extensive audience Q+A, considered policies and practices that could curb the aforementioned trends. In practice, themes overlapped among the panels, resulting in frequent references to issues brought up in previous discussions. This review is largely structured by industry area, and issues brought up in the various panels and Q+A sessions are addressed within these sections.

The following organizations co-sponsored the Conference: The American Academy of Environmental Medicine, The EMRadiation Policy Institute, Grassroots Environmental Education, Environment and Human Health, Inc., The Institute for Health and the Environment, Catskill Mountainkeeper, Vermonters for a Clean Environment, and WEACT for Environmental Justice. Catskill Mountainkeeper's Regional Director for the High Peaks, Dr. Kathleen Nolan, was a fracking panelist at the Conference; and the Director of the Institute for Health and the Environment, Dr. David O. Carpenter, served as a wireless panelist and co-moderator of the Conference. The other speakers included Dr. Lennart Hardell, Dr. Magda Havas, State Representative Andrea Boland (ME) and Whitney North Seymour, Jr., Esq. on the wireless issue; Dr. Ronald Bishop, Dr. David Brown and Hydrogeologist Paul Rubin on fracking; as well as Dr. Will Allen, Dr. Michael Hansen, Dr. David Mortensen, Dr. Sheldon Krimsky and 2004 MacArthur Fellow Cheryl Rogowski on food. In addition, Dr. Arline Bronzaft addressed the issue of noise and Whitney North Seymour, Jr., Esq. covered the issue of the effects of campaign contributions and lobbying on public policy. This author moderated the Conference and was joined by Dr. Carpenter and Dr. Hansen as co-moderators for specific panels (4).

Fracking

The fracking panelists discussed the lack of standard setting and oversight of this industry, including gross exemptions from federal laws that other industries emitting the same substances are subject to as well as the resulting exposure pathways created, including waste from produced water, drill cuttings contaminated with both chemicals and radioactivity with no protocol for disposal, migration of contaminants to the air and water, pollution created from so-called evaporation pits, air pollution created at compressor stations, and neurotoxic contaminants that find their way far from original frack sites because they have been repurposed into road spreading (de-icing and dust control). The panelists also discussed various state policies, such as non-disclosure agreements on contaminated water replacement and medical gag-orders being foisted on doctors in hospitals around the country (doctors have to sign confidentiality agreements with energy companies to get a list of the chemicals sick patients may have been exposed to and, in most cases, will not be able to tell their patients or the public health community what the chemicals in question were in order to protect industry trade secrets).

Specific cases of contamination in Pennsylvania were discussed along with the difficulties faced by medical staff, funded by non-profits, to identify exact causes of symptoms (including but not limited to skin rash and lesions, nausea and vomiting, nosebleeds, eye irritation, cardiac problems, headaches, dizziness, low birth weight, elevated blood pressure, throat irritation, and breathing

problems) from uncertain mixtures of chemicals and how to treat patients (other than warning them not to shower, drink tap water or go outside on days of high contamination). Detailed analyses featuring diagrams of exposure pathways through water channels, air, soil, food, and farm animals were provided. Other sources of problems, such as noise and light pollution from gas flares, road accidents from trucking, subcontractors with little to no training increasing the risk of chemical leakage, and social upheaval from transient workers living in temporary accommodations, were highlighted as other byproducts of the fracking industry.

The existence of vertical gas drilling and contamination in New York State was revealed (two-thirds of 64,000 wells remain unplugged and 11,000 active wells exist with minimal oversight due to shortage of manpower at the New York State Department of Environmental Conservation-NYSDEC). The waste from vertical drilling has been used for road spreading in New York raising questions about how much extra waste from future horizontal drilling could be repurposed in this way or deposited in another way (in landfills, underequipped water treatment facilities, in bodies of water in the state or mixed into concrete construction blocks). An analysis of regulatory policy failures ensued, including the use of average emissions over time (with mere daily, weekly or yearly reporting requirements instead of regular peak measurements of pollutants), which can obscure data on emissions high enough to cause health problems because exposure to a chemical in or on the body for a few minutes or hours is sufficient to initiate toxicity.

A discussion of certain policies proposed for New York State, such as setbacks from water bodies in the context of hydrogeology and integrity of the infrastructure, ensued. One NYSDEC proposal for setbacks was mere tens of feet, even though tracer tests have shown that contaminants have traveled at least 1 mile through existing water channels. The processes of drilling wells and exploding charges to create horizontal fractures in rock create more pathways for water and contaminants to travel than those that existed prior to the onset of industrial activity. Unfortunately, the cement casings used in the wells can fail within 5 years due to saline water and corrosive acid gasses; steel casing failure is directly proportionate to cement casing failure; and finally, a fissure of only 0.001 inches is enough to create direct contamination of surrounding water bodies. Notwithstanding the high risk of immediate to near-term contamination from fracking processes or well casing failures, natural hydrogeological processes ensure that chemicals will migrate into the water supply in the long term due to future well failings after sealing as well as the industry practice of injecting produced water into the depths of the water table, which could result in eventual permanent aquifer-wide contamination if fracking becomes sufficiently widespread.

The Discussion of Solutions to Improve Public Health (the final panel), which took place at the end of the Conference, did not resolve the issue of how to quantify the externalities New Yorkers would be willing to "live with", only pointing out that the externalities were objectively extreme and had been obfuscated by existing policies in other states such as confidentiality agreements on water contamination, medical gag orders, lack of waste tracking, and aforementioned air averaging measurements. There were no solutions offered to make the process safer, but a suggestion to implement better monitoring of people living near sites was offered. There was also a general acknowledgment that the public believed that natural gas was "cleaner" because it "burns cleanly" when consumed (while, in fact, the cost of contamination from its extraction was greater than that created by most other fuel sources). It also was acknowledged that given the existing glut of natural gas in the United States, some of the natural gas produced in New York would be exported to other countries, where prices are higher, and that natural gas was a "bridge fuel" with limited supply that would ultimately have to be supplanted with more permanent sources of energy later on.

Food

The food panelists surveyed practices related to farming and food production, including food additives [direct or indirect (from liners and containers and packaging)], nano and processing additives, GMOs, pesticides, rBGH and antibiotic use, organic labeling, and transgenic animals/synthetic biology (effectively a type of "additive"). The panelists also addressed the issue of pollution created from current farming processes – pollution bio-accumulating in waterways, the creation of more volatile organic compound emissions than any other industry, and high levels (35%–51%) of greenhouse gas (GHG) emissions. The economic externalities of pollution, manure disposal, subsidies, public health costs from antibiotic overuse, food-borne illness, and reduction in property values from consolidated animal feedlot operations (CAFOs) were quantified at over US $37 billion per annum, a figure that did not include long-term health consequences from

pesticides, genetic modifications, nanotechnology, and other additives.

The history of the agricultural system in the United States from the Civil War, when pesticides such as arsenic and sodium bisulfide were first introduced, to the present, including the Food Policy Protection Act, was examined in the context of the relationship between the government and private corporations. Included in this discussion was the fact that six companies which genetically modify foods (and account for 66% of the market for seed sales) also sell the herbicides which these foods were modified specifically to accommodate.

Several historical themes that echoed present-day problems in other industries were emphasized: namely, the United States government's refusal to adhere to any international regulations on food safety for the first half of the 20th century and the abandonment of regulatory design during the war in the name of national security. The ubiquity of contamination, namely, high levels of arsenic and lead from the food supply in Americans' bloodstreams, represented a kind of equal-opportunity poisoning where one might see increases in disease population-wide. However, with few unexposed populations to distinguish, it was initially difficult to link the source of problems directly to the contaminant. (These themes are echoed with fracking; other nations ban the practice while the United States allows it with little regulation in the name of putative energy security; and with wireless, standards were set high enough to allow the industry and the military to achieve their technical objectives while health consequences were effectively ignored, resulting in the acceptance of the idea that if the whole public is exposed, the cause of the difference in health outcomes will not be noticed.)

Alternatives to pesticides in agriculture via beneficial insects were discussed in conjunction with other health and environmental effects of current farming practices. These include runoff of waste (nitrates, phosphorous, etc.) into streams, which leads to contaminated drinking water and increased global warming gasses, and inadequate crop rotation, which leads to unsustainable food production. The issue of economic subsidies for additives and certain food products such as corn, soy, canola, wheat and sugar, which have had the net effect of increasing the supply of genetically modified food, was discussed. The cumulative health effects of low-dose exposure to pesticides was identified as a problem as well as the possibility that the genetic modifications in the food themselves may present future health problems. The fact that companies originally thought that genetic modifications would be rejected by the public (in response to the development of the process to transform plants to make them resistant to the herbicide atrazine, one executive from Ciba-Geigy had stated, "that's an ethical problem, we'll never be able to sell that") was examined in the context of current corporate efforts to prevent labeling that would distinguish among genetically modified, non-modified foods, and organic foods. The development of weed resistance to GMOs (a turn of events that had been deemed impossible by the industry in 1997) that created the necessity for new modifications and exponential increases in the use of pesticides in the last 5 years, which led to the destruction of field edge plants and, in turn, bees and other beneficial insects, was highlighted as a policy externality.

The discussion of the optimal farm size to promote sustainability – potentially 80 acres – was contrasted with policies forcing even organic farms to be larger than that in order to qualify for organic labeling certification. Other labeling trends were discussed as well, including nutrition labeling, country of origin labeling (fought by the United States, which wanted to retain the ability to label meat as American regardless of whether it was possibly born, raised or slaughtered elsewhere); labeling for irradiated, cloned or otherwise modified food, including but not limited to those that were nanotechnology-enhanced; wild caught versus farmed fish labeling; allergen labeling; calorie labeling being expanded nationally (via the Patient Protection and Affordable Care Act) for restaurant chains (with exceptions made for movie theaters – a consequence of asymmetrical lobbying power); and variability among eco-labels, including the word "natural", which does not necessarily guarantee that the food is unmodified.

The issue of food additives was addressed in two ways. First was the paint-by-numbers advice on how to avoid them (assuming a desire to avoid exposure to unknown quantities of unstudied or inadequately studied chemicals), which was to "stay on the edges of the supermarket", where presumably produce and less adulterated foods reside on the shelves. Next, the evolution of how corporations were left to self-police the safety of new chemicals added to food was tracked up to the current policy of manufacturers submitting voluntary notification to the Food and Drug Administration (FDA), announcing and justifying why they deemed a new additive to be safe. (FDA does not actually review the data in the scientific studies provided with the corporations' notifications, but instead issues a non-binding judgment as to whether it agrees or disagrees with a manufacturer's safety assessment.) In stating that it did not have the manpower to conduct scientific assessments of over 10,000 additives on the market and expressing the rationale that manufacturers

were selling the products anyway, with or without FDA approval, FDA acknowledged that its purview effectively had been captured by industry.

Wireless

The discussion of wireless started with a review of scientific knowledge about extra-low frequency (ELF) radiation from the 60 Hz grid, including but not limited to neurodegenerative disease, cancer, electrohypersensitivity (EHS), and reduced male fertility before turning to modern wireless devices and infrastructure that have become prevalent in the last 15 years. Since the 2001 2b carcinogenicity classification of ELF by the WHO and the subsequent 2011 determination of the same for radiofrequency radiation, there has been minimal action by governments to enact policies to reduce or mitigate exposure. In the case of the United States, there has been a refusal to acknowledge the health effects at the Federal Communications Commission (FCC) and in most other corners of government. There are, however, several exceptions. First is the 2002 announcement in the Federal Register, "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities" by the Architectural and Transportation Barriers Compliance Board (United States Access Board), that electromagnetic sensitivities may be considered disabilities under the ADA (5). Second is the 2005 report by the Congressionally-authorized National Institute of Building Sciences (NIBS) written in conjunction with the United States Access Board, which acknowledged the existence of EHS (6). Third is the statement made by the Interagency Working Group on Radiofrequency Radiation that standards are not protective of human health. The fourth exception consists of letters written by an EPA official, Dr. Norbert Hankin, acknowledging that standards for continual exposure do not exist and that the short-term standards do not protect against athermal effects. Finally, a National Academy of Sciences 2008 report acknowledged new current exposure conditions that need to be studied.

In 1999, a year before Europe issued the REFLEX studies, which linked radiofrequency radiation to serious biological effects, the United States National Institute of Environmental Health Sciences (NIEHS) authorized studies in 1999 that did not get started until 2011. These studies focus on animals, who react to electromagnetic fields in a completely different fashion than humans (fewer induced currents), thereby posing the question of what relevance the studies are likely to have, even if they are finished by the projected due date of 2014 (15 years after being commissioned).

The concept that transmitters, including Wi-Fi, cell towers and smart meters, are emitting continual, virtually 24/7 exposures that cumulatively expose people to more radiation than most get from use of their cell phones (already linked to head cancers at levels of use that resulted in much lower levels of exposure than people get from their cell phones today) was introduced. Data linking exposure from cell towers to cancer and EHS were presented, and the fact that ubiquitously Wi-Fi'ed environments in institutions, including schools, offices, hospitals, cafés and trains generally expose people to more radiation than when they are in close proximity to a cell tower was explained. New and future sources of higher exposures were identified, such as chipped appliances "talking" to smart meters within the home, higher powered smart phones, and iPads that can emit up to 100,000 times more radiation than deemed safe enough to prevent toxic exposure conditions (per the levels identified in the 2012 Bioinitiative Report corresponding to lowest observed effects). Industry-issued scientifically faulty explanations for why the technology must be safe were described: lack of knowledge for a specific disease mechanism (something true for 60% of known cancer-causing substances, including asbestos and dioxin), "inconsistent evidence" and the shibboleth that non-ionizing radiation does not have sufficient energy to cause mutations. (There is evidence for mechanisms that can lead to cancer, such as generation of oxygen species, gene induction, alterations in calcium function and release and altered metabolism, as well as the indirect manner by which toxins can reach the brain through breach of the blood brain barrier by the pulsed, modulated microwave radiation emitted by wireless devices.)

Discussion of how the federal government failed to develop its own standards, but relied instead upon guidelines issued by industry organizations, which have clear conflicts of interest, ensued. The process of trying to get simple warning labels that would have educated people about how to reduce radiation exposure to their bodies at state and other levels of government (Maine and San Francisco) and how these efforts have been thwarted by aggressive industry campaigning was discussed. On the international level, the process of underreporting of risks by INTERPHONE (which did at least acknowledge a doubling of gliomas from cell phone use of approximately a half-hour a day for 10 years) by omitting data from cordless phones, not considering occupational exposures, and not reporting salivary gland tumors, was highlighted along with design flaws in other major studies that resulted in

underreporting of risk by having inappropriately short latency periods, failing to distinguish laterality (use of device on same side of the body), and so on. Conflicts of interest in international studies were further analyzed. For example, the head of the International Agency for Research on Cancer (IARC), Anders Albohm, was forced to resign after it was revealed that his brother was a wireless industry lobbyist. (The post Albohm-IARC ultimately categorized radiofrequency radiation as a Class 2b carcinogen.)

The public confusion over how to quantify relative radiation amounts was elucidated with discussion of the issue of schools opposing cell towers on or near their premises [as per an early recommendation by the California Public Utilities Commission (CPUC) in 1993], but installing Wi-Fi systems with radiation well in excess of levels that would have been emitted by towers that would have been impermissible or disfavored by local zoning codes or school policy. The issue of risk from new public exposures that have only been ubiquitous for a number of years was addressed by both the panelists and audience in several Q+A sessions throughout the Conference. One Conference attendee, in making the point that if the entire population was exposed to high enough levels of a toxic agent, some will manifest sickness, asked why coalminers who developed black lung disease were not termed "hypersensitive" to coal dust, while people who cannot tolerate publicly allowable levels of radiation from Wi-Fi and cell phones on public transport, and so on, were called "hypersensitive" to electromagnetic fields.

Another Conference participant asked how best was she to protect her family in light of these exposures, while another asked if society gets some benefits from technical progress, might that outweigh the costs of some people becoming ill. There was general consensus that devices needed to be used more safely and that wired connections should be favored over wireless ones. There was discussion during one Q+A session about how some universities had a jack at every desk in some classrooms to provide internet access a decade ago, and that that policy had largely been supplanted by Wi-Fi'ed classrooms, because purveyors of the technology advertised it as the cheapest way to provide internet access in classrooms. One panelist indicated that it was unfair if 3% or up to 10% of the population was effectively banned from participating in society because of severe intolerance to exposure from Wi-Fi and other similar exposures, while the moderator suggested that if one had a 3% risk (more conservative estimate) of becoming permanently sensitized to something, one might reasonably conclude that continual exposure to that substance in excess of levels already found to make people ill was a risk not worth taking. Moreover, one would assert that Wi-Fi must not be placed in a child's school or in the workplace and that this tradeoff was economically undesirable for society. One panelist responded to a question about what to do about a utility that threatened to cut off water service if a homeowner refused a wireless meter by saying that the homeowner should allow the service to be disconnected and call in the press to bring attention to the issue. Another participant enquired about ultrasonic pest control devices like Riddex. The panelists thought that they emitted sound waves as opposed to electromagnetic radiation. In any event, it was suggested that most rodents and pests did not react to the sound waves while some did. This suggests that there are similarities between Wi-Fi and Riddex, such that the majority do not "feel" the reaction to the presence of the pulsed, modulated microwaves emitted by Wi-Fi, while some do and are forced to flee the premises because of it.

Other unconsidered externalities of industry practices

The issue of GHG creation from farming was expounded upon as an unconsidered externality of current food production methods. The differences between organic and chemical farming were discussed. Organic farming was found to conserve more water in the soil, induce less erosion, maintain higher quality soil, and use fewer fossil fuels than equivalent chemically farmed crops (30% less in the case of maize and beans). Carbon dioxide (CO_2) emissions from conventional farming practices are increased by associated processes, such as the use of chemical fertilizers, use of fossil-fueled vehicles on site and for shipping (trucks, tractors, combines), as well as the practice of freezing and cooling food. CO_2, together with methane (CH_4) and nitrous oxide (N_2O) account for 90% of all GHG emissions of the United States farming sector. N_2O was also identified as being a major contributor to ocean "dead zones" and a cause of destruction of soil life, including earthworms and microorganisms that enrich the quality of the soil. Animal confinement practices were found to have greatly increased methane emissions since 1995.

Another consequence of the depletion of organic matter from the soil is that the soil can no longer act as a carbon sink to absorb carbon from the atmosphere; whereas organically farmed soil can function as an absorber of atmospheric carbon dioxide, conventional farming processes result in soil absorbing less than half of its potential capacity. Some of this sink capacity could be restored if soil were replenished with organic matter such as mycorrhizal fungi that is destroyed by chemical farming

(nitrogen fertilizers stimulate bacterial overgrowth that consumes organic matter). However, it was acknowledged that some of the destroyed sink capacity was due to over-irrigation (which also can occur with organic farming) as well as from the direct destruction of organic matter by other industrial processes that result in deforestation and clear-cutting.

After the implications of clirnate change from GHG (heating, glacier melting, flooding of low-lying areas, ocean acidification, and extreme weather) were highlighted, a prescription was offered: the phasing out of synthetic nitrogen in favor of composting (which would also reduce nitrate poisoning in two-thirds of the drinking water supply in the United States), along with use of cover crops and crop residues to bolster the organic matter in the soil. Other suggestions included the following: use of beneficial insects instead of pesticides to reduce emissions from chemical production (which would also have the benefits of removing chemical exposure both to workers and to the consumers of food and reducing reliance on GMO's), the immediate reduction of animal confinement operations (the acceleration of this practice since 1995 made it a major contributor to CH_4) and a refocusing on local distribution. A slide show at the end of the Conference documenting farming in Cuba (currently 80% organic) demonstrated the results of the aforementioned suggested changes, which were hailed as relatively easy and faster to implement than retrofitting energy plants to achieve immediate GHG reduction.

Other issues discussed at the Conference included the impacts of noise and delay tactics by the transportation (aviation and trucking) and racing (motocross and auto) industries, which began with denial of the health effects. The point that there was a tendency in the United States to permit new sources of industrial activity and think about the environmental health consequences after the fact was underscored. Further, it was suggested that studies should be vetted prior to rollout or approval of new substances, technologies, practices, and industries. It was added that the federal government's modus operandi was to support industry and ignore science that was inconvenient to certain economic activity and to not enforce existing rules, thereby leaving corporations to enact voluntary compliance. (This phenomenon is in evidence with the federal agencies that simultaneously promote industrial activity while also being responsible for health oversight, such as the FCC with wireless – although the FCC admits it doesn't check device safety per se – and the Mineral Management Service, which is simultaneously responsible for oil rig safety in the Gulf and promoting oil drilling leases.)

Noise studies that showed clear impacts on children's learning ultimately resulted in remediation: the New York Transit Authority agreed to overhaul the adjacent subway infrastructure by putting rubber pads on the tracks and paid for the placement of acoustical ceiling tiles on affected classrooms. It was emphasized that when advocating remediation, cost/benefit analysis should be convincing to policymakers; in this instance, children at a school near elevated train tracks were a year behind in reading scores, and the technological adjustment was within budget and did not interrupt the economic activity at issue.

Wi-Fi, as a contrast to noise, is the subject of studies that suggest it is impacting children's learning (as well as causing and aggravating the symptoms of EHS, sperm degradation and increasing risk for cancer) and is used to facilitate an economic activity (transfer of data in a cheap fashion); it is not in and of itself an externality or a byproduct of another industry, but a product and an industry in and of itself. Though cost-benefit has not been properly accounted for in any public forum, there is a de facto assumption that because it is perceived as convenient (notwithstanding the fact that hard-wiring is more secure for data transfer), the benefit automatically outweighs the cost. An example of this type of conclusory thinking can be seen in a 2012 letter from the Director of the New York State Education Department's (NYSED) Office of Facilities Planning stating

> *"... at this time, there are no recommendations or guidance that would prevent local school districts from installing and using wireless systems in schools. While fiber optic systems may present less of a hazard in this regard, districts also struggle with providing state of the art and relevant educational programs for students, and wireless technology is a primary component of available technology"* (7).

In referring to the 1994 Report by the Board of Regents on the Environmental Quality of Schools and recommendation #7 (prudent avoidance of electromagnetic fields) (8), the NYSED letter acknowledged

> *"Over the years since the report was issued, the Department has implemented numerous recommendations in the report including some requirements related to this item. For example the Department did not allow overhead transmission lines to be installed on school property subsequent to the report. It is true, however, that new sources of electromagnetic fields have been developed or gained wider use since the report was issued that have not been addressed".*

Recommendations #9 and #10 of the Board of Regents report also recommended providing

> *"students, parents, school personnel and the community access to information, in a timely manner, about known and potential exposures to environmental health hazards in their school environment. In addition all test reports will be made available upon request".*

The Report also recommended "an expedited process for resolving environmental health concerns", requiring schools "to use less toxic and less hazardous products for instruction, building operations and maintenance…", evaluating "curricular mandates for hazardous materials uses and processes", identification and abatement of "sources of air contamination or hazardous conditions that originate in school buildings", and "the reasonable accommodation of students and school personnel with environmental sensitivities, as diagnosed by a licensed physician".

The NYSED letter failed to address that the 1994 Board of Regents' recommendations applied to Wi-Fi, since it represents a major escalation of electromagnetic fields in the school environment, and since the radiation emitted by Wi-Fi enabled devices and transmitters was designated a Class 2b carcinogen in 2011 – the same category as the 60 Hz fields that the 1994 report originally contemplated. To date, no evaluation of the curricular mandate for use of a Class 2b-designated agent has occurred, and there have been no publicly acknowledged accommodations made in the State of New York for students or teachers with EHS.

Another provision in recommendation #10 stipulated the elimination of conflicts of interest with contractors for testing and laboratory analysis (where the contractor would benefit from *removal*) but did not mention eliminating such conflicts of interest where the contractor would benefit from *non-removal*, i.e., keeping Wi-Fi installed. At least one school district in Fullerton, CA, which sought to defend their use of Wi-Fi over environmental health concerns raised by parents, hired a contractor who was believed to have grossly under-reported radiation levels (9) based upon reported analysis of measurements of comparable systems elsewhere and empirical analysis in a published dosimetry study (10).

Noise, like Wi-Fi, was also cited as being responsible for negative cardiovascular outcomes and diminished quality of life. Reference was made to the WHO's assertion that quality of life is not determined by mere absence of disease symptoms (suggesting that people are entitled to be free of exposures that contribute to risk of disease or create and aggravate neurological syndromes). The noise problem was contextualized by one of the moderators as it related to fracking (noise from heavy industrial activity in residential zones, ongoing 24/7) and putative clean alternative energy, such as wind turbines, which can create symptoms similar to EHS if their power output is high enough and they are sited too close to areas where people dwell. Noise, as a biological effect, as opposed to an industry creating a variety of exposure conditions, differed from the three major topics discussed at the Conference in that there were specific ways to make it largely remediable.

Other health consequences related to a specific form of electromagnetic pollution, dirty electricity (largely a byproduct of poor wiring, poor filtering on outdoor distribution lines and increased use of electrical devices), were examined. One such increasingly ubiquitous set of devices, compact fluorescent lights (CFLs), were identified as a large source of dirty electricity. A question about CFLs posed by a Conference attendee applied to many of the issues under discussion. He asked why they were of concern when they did not affect him personally. The response was that whether or not he was personally affected was not germane; this answer elucidated a truth about public health issues in general and related to the aforementioned comment about black lung disease not being termed "hypersensitivity to coal dust". Toxins affect different people differently – some are only completely disabling to a minority, but they do affect a statistically significant number of people, and in such instances, regulation is appropriate. CFLs, like smart meters, are electromagnetic pollutants that are subsidized by the government (the former, along with LED's and other so-called energy-efficient alternatives, will be mandated over incandescent lighting by the federal government in 2014 in the name of supposed GHG reduction that is overstated when one considers the energy costs of producing CFLs, which also potentially create groundwater contamination from mercury leaching from disposed bulbs). The lack of official acknowledgment of health consequences by major agencies of the United States government, a problem in and of itself, enables escalation of the exposure problem by giving the government cover to subsidize and/or mandate use of these technologies and promote their ubiquity. A comment by a Conference attendee during the Q+A session for the History of Standard Setting and Sources of Exposure panel referred to the rollout in her community of Distributed Antenna Systems (DAS), a technology promoted by the FCC, which exposes more people to greater amounts of radiation than they would have been exposed to by most cell towers. During the final Q+A session, the plan submitted to the FCC to do away with wired infrastructure was cited in response to a Conference attendee who wondered what would happen if certain wired technologies were no longer supported. Since the Conference, the press has reported that this could come to fruition in Sullivan County and Fire Island, NY, where landline service and wired Internet are proposed to be permanently abandoned and replaced with wireless after wired infrastructure was destroyed by hurricanes.

The issue of how clean alternative energy sources (often cited as viable alternatives to fracking) actually are was brought up through the discussion of solar power and wind energy, which more often than not use improperly

filtered inverters that contribute to the production of dirty electricity in human environments. The tendency to market technologies that do not create GHG emissions as "green" and "clean" occurs without consideration for other problems created, such as electromagnetic pollution. In the case of both CFLs and smart meters, apart from creating problematic exposures to radiofrequency radiation, the pollutants the technology is intended to prevent, namely, GHG emissions from energy-producing plants, have not been shown to be decreased by these technologies.

Instances of people who were able to improve their blood sugar levels and symptoms related to multiple sclerosis, asthma, dermatitis, and EHS by limiting exposure to dirty power and magnetic fields were presented. While the issue of dirty electricity as a component of "sick building syndrome" and how many people are affected by it requires more quantification and study, it is a pollutant that predates the recent escalation of exposures to radiofrequency radiation from wireless devices. Its existence suggests that society has taken certain infrastructure decisions for granted (e.g., the way buildings are wired) and that it can take time to accept that some common practices might trigger negative health outcomes. Today, even with evidence that Wi-Fi and smart meters create health problems for people, the practice of installing them in and on buildings is becoming ubiquitous; thus, the question is raised whether the practice will continue to be accepted for long periods of time. The other major difference between the two electromagnetic pollutants (dirty electricity and radiofrequency exposures from wireless devices) is that the latter are more widespread and orders of magnitude higher than the former. Moreover, the scientific literature on dirty electricity comprises a small fraction of the total literature on electromagnetic fields. The question of how information about the health hazards of wireless technology can get from the voluminous literature to the general public in the face of the industry's denials of the seriousness of the problem, a virtual media blackout, finger pointing among federal agencies (FCC said they relied on FDA to certify safety of radiological devices, but FDA said they did not do this), standard setting by industry organizations, failure to conduct new research or make policies based on existing studies, was posed.

Addressing the source of common problems of corporate interference

The question of why the public is uninformed about the health hazards posed by wireless devices was answered from another vantage point. A video entitled, "How Campaign Contributions and Lobbying Affect Public Policy: A Conversation with Whitney North Seymour, Jr. Esq." (shot before the Conference) aired on Day 2. The enormous, uncurbed effects of years of corporate funding of campaigns and lobbying at federal agencies, The White House and Congressional offices, coupled with a revolving door between people who worked for the government and then moved directly into lucrative lobbying work to promote interests of corporations they had previously regulated, were detailed. Furthermore, the relationship of this problem to wireless health hazards was elucidated. The issue of elected representatives refusing to question the FCC's failure to address athermal health effects with the rationale that they feared antagonizing constituents who used cell phones was discussed. The concern was tantamount to worrying whether enquiring about the health consequences of cigarettes in the 1950s would offend constituents who smoked. This point underscored the issue, which was repeatedly brought up during the Conference, that people were generally so under-informed about the health effects of wireless and other topics due to aforementioned corporate influence on federal regulatory and legal processes that they lacked enough information to be able to advocate on behalf of their own interests while they were actively consuming the products in question. In this way, the analogy to tobacco circa 1950 was apt.

Discussion

The prognosis for fixing problems is a function of the level of proliferation of the technology in question and the ease and willingness to reverse policy course. Regions can be protected from fracking before a large infrastructure investment is made, but all municipalities should pass laws and step up enforcement if they want to protect people from exposure via waste dumping and road spreading with fracking fluid materials.

Wireless is a much more ubiquitous industry that is a large part of the modern economy. Presenting institutions with information about health effects does not have much effect after even merely moderate infrastructure investments have been made, but individuals can more easily make changes in their home environment (e.g., by swapping their wireless router for a wired one or turning the wireless router off when not in use) and often do so when presented with detailed information about wireless versus wired technologies. There have been a few forums around the United States, but there is no major source of information in the media, so the number of people who have received this information remains very small.

Another large stumbling block for change is habituation and addiction to the technologies in question (fueled by advertising), the belief that "everyone is doing it, so it must be ok", and the perception of the need to cater to the desires of the consumers of the institutions. Because micro-environments vary greatly, the difference between having Wi-Fi and not having it at home or at work means exposures that vary in orders of magnitude. These exposures can vary from building to building or even from room to room, so a change in job, a new office within a building or a change of behavior at home can lead to profound differences in health outcomes.

The local food movement and consumer awareness are driving changes in purchasing decisions that will force the conversion of some GMO fields to organic or at least something more natural. Public awareness in the United States is on the upswing such that even failed labeling initiatives have strengthened organic consumer movements. However, the industry still has command of Congress, and an appropriations bill with a section known as the "Monsanto Rider" was passed even with 80,000 phone calls from citizens who were concerned about GMOs. (The rider undermines federal judicial review of agency actions and would allow new genetic modifications to be implemented unchallenged.)

Wireless is unlike the two other topics in that there is minimal awareness of the hazards. Consumers (especially institutional ones) have integrated the products into their lives and thus are not likely to lobby for precautionary policy or drive policy with alternate purchases, absent a major public relations campaign. Three policy options were presented at the Conference as possible responses to the severe health threats posed by this industry: passive denial, precautionary avoidance, and the imposition of major limitations on radiofrequency transmission. While passive denial with some precautionary advice offered in some agency documents may be the default positions of the United States government, the Fourth Estate promotes *active* denial in society with underreporting, promotion of industry naysayers, and reliance on industry advertising dollars.

The issue brought up in the discussion of noise about the federal government facilitating the rollout of technologies with corporations before studying them, or notwithstanding the existence of science already suggesting serious health effects, brings up the question of how long regulations on wireless will persist without any major acknowledgment of the health problems or change in regulations. When a private concern has developed a process for a new economic activity, there should be an assessment of alternatives. Regarding fracking, the process to retrieve natural gas from deep shale had been under development for years, and companies had private meetings with officials in the Bush administration during the last decade to secure gross exemptions from federal law. An EPA report insisting that fracking was not a hazard to the drinking water supply was followed up with the release of documents showing this claim to be untrue. A larger public inquiry into energy security to determine whether the government should be putting resources into other energy sources instead of sanctioning a process with considerable environmental consequences was eschewed. Likewise, while plans for fiber-optics were supplanted by those from electrical engineers to beam data across indoor environments via pulsed, modulated microwaves, there was no public discussion about standards and safety.

ln 2013, the FCC put out a Request for Comment on updating wireless standards; it is effectively focused on cell phones and not on the transmitter infrastructure. (This review of standards should have taken place in the late 1990s prior to the explosion onto the market of new devices that create exponentially higher public exposures to radiofrequency radiation than previous technologies.) Taxes from cell phone minutes and other telecommunications sales are the second largest source of revenue to the United States Treasury (behind oil revenues), and the technologies, pushed by aggressive advertising (with no curbs on spots showing children and even babies using wireless devices against their bodies or in their cribs, contrary to the advice of the manuals), have been integrated into daily life. A little over a decade ago, investment brokerage reports heralded the arrival of devices that would move computing "real estate" off desks and "unchain" people from their offices, notwithstanding insurance company reports that questioned the ultimate costs of electromagnetic fields and the prior case of a high-tech product line emitting electromagnetic fields, video display terminals (VDTs), being yanked off the market and redesigned after the radiation exposures they created were linked to birth defects, stillbirths and eye strain by an HMO and after 15 years of industry denials of reports of these health problems.

One piece of advice from an Ericsson cell phone engineer, who developed a severe form of EHS from exposure to electromagnetic radiation, was that wireless signals should only be strong enough to receive a signal outdoors and that people should use wired connections indoors; this is contrasted with the American inventor of the cell phone, who advocates having cell tower boosters in buildings. While it might not be reasonable to expect people not to use cell phones at all indoors, public buildings and

airports could have designated areas for cell phone use just as buildings used to have restricted smoking areas. If the precautions recommended by the 1993 CPUC ruling to keep cell towers "away" from schools and hospitals were well known and adhered to, escalation of public exposures from Wi-Fi in schools, offices and hospitals and devices on public transport creating radiation exposures in excess of cell towers hypothetically sited too close to these institutions (not precautionarily sited) would have been the subject of intense public debate.

A recent moratorium by the Israeli government on 4G technologies and wireless Internet delivery into homes and a plea by that country's Deputy Health Minister not to deploy Wi-Fi in schools stands in contrast to the United States government's silence, which prevents full public disclosure about the known and potential hazards of wireless technologies. Given pre-existing concerns about levels of radiation from cell towers, society could have opted to stop wireless delivery at phone and text service to stop antenna proliferation and exposures above levels already linked with statistically significant levels of disease. Smartphones and tablets (and thus users of data) require more transmitters, increase the demand for Wi-Fi access, and emit orders of magnitude more radiation than older model cell phones. The concept of using cell phones for calls outdoors and only in designated areas indoors and using hard-wired Internet connections indoors would have prevented the public health problem that now exists (EHS, sperm degradation, and cognitive processing impairments) as well as the increased risk for cancer and other diseases and conditions. On average, the continual exposure from Wi-Fi that people get is in excess of daily use of a cell phone (11), as well as in excess of what people get even from most cell towers sited closer than precautionary policies recommend.

Although 4G systems were eventually permitted in Israel, the German Government's Federal Office of Radiation Protection advised all of its citizens not to install Wi-Fi and other wireless technologies like cordless phones and Bluetooth because these add to cumulative lifetime exposure. Switzerland gave a document to all its citizens acknowledging that certain biological effects occur well below internationally accepted standards. In 2009, the European Parliament (EU) suggested keeping transmitters away from schools and by 2011, the Council of Europe (CoE) recommended immediate action to protect children by removing wireless technologies and replacing them with wired connections in schools. In 2013, the Israeli Supreme Court ordered the country's government to assess how many children have EHS in consideration of a lawsuit to remove Wi-Fi from schools there.

Meanwhile in the United States, the FCC, via its spun-off Schools and Libraries Division, subsidizes the poorest school districts 90 cents on the dollar to put in Wi-Fi while other countries suggest using hard-wired connections. With DAS systems and the funneling of $9 billion from the upkeep of telephone service in rural areas to the promotion of wireless broadband and with a proposed Congressional bill to mandate a smart grid throughout the nation, the United States government actively promotes these technologies and increased public exposures to radiation. Worse, the FCC has actively partnered with GE Healthcare to promote wireless in hospitals at levels orders of magnitude higher than exposures from cell towers that were recommended by the CPUC in 1993 not to go near hospitals. The majority of the American medical community are not only not advocating for safe public exposure levels as some of their peer groups in Europe and Russia have done but are in fact promoting these wireless hospital technologies (i.e., Mobile Body Area Networks or MBANs), that have already resulted in negative health outcomes in healthcare settings and could result in major lawsuits.

People with severe forms of EHS cannot access hospitals with wireless in them at all; others who react to Wi-Fi with heart rate changes will have their medical outcomes in emergency situations affected by hospital staff's responses to "mystery" symptoms that are incorrectly linked to idiopathic or other causes and are really only treatable by removing the source of provocation. It is unknown how many people have been mistakenly put on long-term heart medication, as well as sleeping pills and pain medication that only lessen the severity of some symptoms, when they could become asymptomatic by avoiding the source of provocation – excess levels of microwave radiation from wireless technologies. There is no "pause" button in sight. While Winston Churchill stated that "Americans can always be counted on to do the right thing after they have exhausted all the other possibilities" (a point I brought up with Mr. Seymour during our interview), after money is spent on replacing safe infrastructure with more expensive wireless facilities, the public cost/benefit analysis tends to cut against a re-do/"putting the genie back in the bottle".

Returning again to the point about coal exposures that cause people to develop a disease (black lung disease) as opposed to being termed "hypersensitive to coal dust", inasmuch as the term "electrohypersensitivity" emphasizes the neurology/immunology of the affected person instead of the fact that the person has been poisoned by a fairly recently allowed environmental exposure in public,

the French term for EHS, electromagnetic intolerance Syndrome (EIS), which evokes the concept that the person's body has developed a kind of allergy, may be a better term to describe the syndrome and should be considered for use in the United States and in subsequent published literature. The previous term, microwave sickness, was used during the Cold War and referred to the same illness, which was then manifesting as a result of occupational exposures from certain industrial and military activities.

Society needs to have a public discussion about whether having electromagnetically intolerant people who cannot access critical institutions, including but not limited to most schools, courts, hospitals, public buildings, and many outdoor public spaces in cities (estimated to be around 3%, but likely a higher percentage with a sliding scale of symptoms of unwellness, and the possibility of more becoming critically unwell due to cumulative exposures from increasingly intense exposures from a plethora of devices and transmitters over time) is tolerable to a civilized society. It is a question of whether having a relative minority (though a statistically significant number of people) made severely ill by a 2b carcinogen that is increasingly impossible to avoid and that is not yet the subject of much litigation forcing access to public buildings and institutions should be considered merely "unfortunate" or should be viewed as a severe public health problem deserving of immediate attention.

Given that the Conference wireless panelists emphasized the fact that current public exposures from new technologies that had only been ubiquitous for a few years were both causing people to be tipped over into EHS/EIS and creating an access barrier to any institution with continual sources of pulsed, modulated microwave exposures on the premises, this author decided that providing a venue with access to this statistically-significant portion of the population was a priority; in fact, the Conference venue accommodated people with EHS/EIS by shutting off the three Wi-Fi systems under control of the building management for the duration of the event.

The estimates for the population with this condition in Sweden are between 2.6% and 3.2% as of a 2006 study (12) (although to date, 5.3% of that entire country's population has registered with the Swedish Association for the ElectroHyperSensitive) and the Government makes accommodations for them with transportation, housing and schooling. An Austrian study estimates the population at 3.5% as of 2001 (13) and an estimate as of 2006 puts the number in Switzerland at 5% (14). While there is little public awareness of this problem in the United States, a New York Court determined that microwave sickness (the Cold War name for EHS) was a compensable disability as an "occupational radiation disease" in a 1982 court case (15). Moreover, an American literature review from 1998 provided 10 citations of United States occupational and clinical cases dating back to 1953 (16). More recently, there are acknowledgements of the existence of EHS/EIS and the concomitant issue of access in the aforementioned United States Access Board announcement in the 2002 Federal Register (5) and the aforementioned 2005 United States Access Board Report written in conjunction with NIBS (6). The NIBS report refers to a study done in the United States by Levallois and Neutra for the California EMF Program, which indicates that at least 3% of people are sensitive to electromagnetic fields. This study, which was quoted in the Program's report, "An Evaluation of the Possible Risks from Electric and Magnetic Fields (EMFs from Power Lines, Internal Wiring, Electrical Occupations and Appliances)" was ultimately published in *Environmental Health Perspectives* in 2002 (17). Moreover, there was a double-blind study published in 2011 by American scientists confirming the existence of the phenomenon of EHS/EIS (18). In 2010, an American literature review (19) cited a German study, which found that >10% of the population there reported symptoms of EHS/EIS (20).

Another issue related to the problem of getting information about potential and existing health hazards (often disputed by industry) has to do with compelling corporations to label their products. In November 2012, Proposition 37, which would have required labeling of GMO foods in California, was narrowly defeated after Monsanto and Dupont (citing increased costs, "shakedown lawsuits" that would cost grocers and farmers who could not prove whether food had GMOs or not, and a few doctors who spuriously claim that GMO foods cause fewer pesticides to be used) outspent labeling advocates 5 to 1. Two months after the Conference, the city of San Francisco approved a settlement with the Cellular Telecommunications and Internet Association (CTIA) to refrain from further litigation that would prevent the injunction of its Wireless Right-to-Know law in return for the wireless industry's agreement to waive attorneys' fees. With the agreement not to pursue litigation further, the industry succeeded in maintaining the legal holding that the government should not compel them to produce speech that was controversial.

Two dozen countries provide their citizens information about wireless health hazards and how to reduce radiation, begging the question of how and when science can ever be "uncontroversial" enough in the United States to provide people information about existing data so they can make up their own minds about how much exposure they would like to have. Previous examples from asbestos, tobacco, chlorofluorocarbons, and lead suggest that

industries insist that a controversy exists long past the point where evidence suggests otherwise.

Similarly, after a federal district court ruled that graphic warning labels on cigarette packs, that FDA had been instructed to produce as part of the Family Smoking Prevention and Tobacco Control Act of 2009, violated the tobacco industry's right against compelled speech (the graphic images were deemed not to increase consumer awareness about smoking risks, not to protect the consumer from confusion or deception, but to create controversy by evoking an overly strong emotional response calculated to provoke the viewer into quitting or never starting smoking), the Justice Department and FDA decided to stop litigation.

More recently, landowners whose water and land were contaminated with fracking waste leaks and whose children became sick were offered remuneration by three companies in return for signing a gag order that would have bound their two minor children for life from speaking publicly about the health effects of fracking. It is unclear at this juncture whether this industry maneuver is legal, and it remains to be seen if any government agencies will weigh in with the court system to challenge the Constitutionality of these contractual provisions. Recently, a contract was offered to a mother of a child with EHS/EIS to get money from the school district for a homebound-schooling plan accompanied with a gag order, which would prevent her and her children from discussing Wi-Fi health hazards with school staff members (presumably this would include PTAs and school board members).

The trend of having regulatory and legislative bodies capitulate before the conclusion of litigation on issues of public concern is a more recent development in the evolution of government deferring to industry by allowing self-regulation, self-standard setting, release of products and processes onto the market (without studying them and without adequate contemplation or provision for the development of alternatives), restrictive confidentiality agreements, and production of industry-sponsored studies that deny harm found in independent studies.

Given the cozy relationship between industry and government (and industry and the press due to advertising revenues), a new paradigm is needed to inform the public about emerging and emerged health considerations of new products and technologies and where the Precautionary Principle should apply even during a "controversy". While there is greater public awareness about food issues than wireless, it does not appear to be great enough to leverage legislative action at the state or federal level yet.

As an industry that has more localized contamination, fracking seems to have attracted a broad range of opposition, and has been staved off in New York State to date. The local food movement and demand for organic food are creating economic incentives to have more sustainable farming practices; this is an example of where a marketplace versus a legislative solution may change policies. For now, the general consensus regarding wireless is that it will take more "bodies in the streets" and, therefore, the passage of time for certain disease latency periods before people are likely to put pressure on policymakers for action, although the prospect of lawsuits for public access from people with EHS/EIS may force awareness of the current toll exacted by industry practices.

A review of some historical examples of products and processes including dioxins, Agent Orange and tobacco, suggests that bans and major policy changes have occurred eventually from irrefutable proof of very acute health outcomes in statistically significant numbers. However, there are no new social mechanisms in place to address the manufacturing of scientific misinterpretation and doubt, which will likely continue to taint court proceedings on mass torts that involve issues of causation on the topics of current concern. However, hypersensitivity, as opposed to cancer, creates major access barriers that involve Constitutional issues that could force remediation without having to produce evidence of the cause and effect between exposure to *specific* products and illness. Instead, evidence that EHS/EIS exists, that the symptoms are brought on by Wi-Fi types of exposures and that people with EHS/EIS can be reasonably accommodated by shutting off transmitters in buildings is theoretically sufficient to force behavior changes by institutions.

Meaningful public accommodation for the most acutely affected would have the secondary effect of remediating risks for the public at large, thus improving public health without actually forcing products off the market and triggering a more aggressive industry response. As people with EHS/EIS start to go on long-term disability, the ranks of those receiving government benefits could swell 50%. In this way, the costs of creating a disenfranchised class of people would be passed down to the taxpayers, who may find it preferable to have a policy change (accommodation upon request or even a permanent switch to wired technologies indoors) that would double as public health protection.

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