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2014 Draft New York State Energy Plan Comments
NYSERDA
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These comments on NYSERDA's 2014 Draft New York State Energy Plan ("Plan") are being submitted on behalf of the Community Watersheds Clean Water Coalition, Inc., a not-for-profit coalition representing over 50 organizations – community, housing, environmental, and religious throughout New York City, Westchester and Putnam Counties. Our original purpose – to protect the water resources throughout NYC's Croton Watershed – has been extended to all watersheds throughout New York State.

The Plan extols the need for NYS to use "clean" energy sources to reduce air pollution and global warming. However, by being deliberately confusing on what it means by clean energy, the Plan is able to promote natural gas as a clean-burning fuel, and as the upcoming fuel of choice for all of New York State. CWCWC vehemently rejects this dangerous premise and unacceptable direction.

CWCWC is particularly concerned because natural gas extraction, largely from the Marcellus shale, will require high-volume horizontal hydraulic fracturing (HVHHF or "fracking"). This entails, for each well, the consumptive use of tens of millions of gallons of water laced with undisclosed chemicals. Additionally, much of the natural gas used in NYS is extracted from the Pennsylvania Marcellus shale, known for its high levels of radioactive materials such as radium-226 and radon. How to dispose safely of such materials is a continuing problem that still has to find a safe, long-term solution. In particular, radium-226, an alpha particle emitter with a 1,600-year half-life, could present a disposal problem for generations to come. All fracking should be discontinued until safe disposal can be developed.

The Plan does devote a section to "renewable" energies in the form of wind, solar, and hydro generation, but it does not provide a specific, well-defined road map with specific benchmarks describing how they will achieve their projected growth. There is no analysis of the multiple new, promising research results that could hasten the integration of these renewables into a more flexible grid, or develop much improved electricity storage facilities, or promote their use for electric vehicles and fuel cells.

This deliberate confusion helps the Plan's real purpose: to promote natural gas as the premier fuel for the production of power in New York State. CWCWC adamantly rejects this purpose.

Volume I

From the very beginning, the Plan equates renewable power sources – hydro, solar, wind – with "carbon-free solutions" (page 6). Presumably, these technologies are also "clean". The meaning of "clean" is nowhere defined.

From the start, however, the Plan emphasizes the critical role of natural gas.

" Electric and natural gas delivery infrastructure is the secure backbone of the energy system, allowing consumers to easily connect to efficient, affordable, reliable, and increasingly clean energy sources." (page 22)

The implication is that into the foreseeable future, the utilities will have the determining authority over how the electricity and natural gas get delivered. It implies an electrical grid with centralized power generation, and with large reserves of power amounting to much more than needed to meet the occasional peak demand.

The Plan is circumspect in advocating outright for the production of natural gas in NYS. Rather, it refers mostly to "natural gas infrastructure" meaning pipelines, compressor stations, metering stations, etc. However, "expanding access to natural gas" implies that at the appropriate time, NYS will not only continue to import natural gas from Pennsylvania and the Gulf Coast, but would also lift its present drilling moratorium.

The Plan carefully omits the downside of fracked natural gas such as the dangerously high levels of radioactive materials, such as Radium-226 and Radium-228 in both NYS and PA Marcellus shale[i], and the problems of the safe storage of Radium-226 over, at least, 50 generations; and the high probability of radon, transported with natural gas, entering enclosed areas such as kitchens. Another serious omission is the failure to reference the many pollutants that are found in a well's "produced" water; only methane is mentioned.

However, if the Plan were as committed to "clean" energy as it would have us believe, we should expect to see specific plans for gradually decentralizing the grid and creating a "smart grid" with the flexibility to meet distributed demands. We should also expect to see considerably more emphasis on using demand-side management (DSM) to lower the costs and encourage local use of renewables. A recent study published in the Yale Environmental Review shows that DSM does lead to savings both short-term and as lagged effects.[ii]

Concurrently with promoting distributed renewable energy sources, such as wind and solar, the Plan should also strongly encourage research in the development of batteries capable of storing and delivering excess energy when needed.[iii]

The Plan promotes, with great fanfare, the establishment of a $1 billion New York Green Bank "to unlock and mobilize private sector capital for greater investment in New York's clean energy economy." (page 36) But where is "clean energy" clearly defined? Does it include energy

sources, such as natural gas, that is being promoted as cleaner than oil? It does not appear to apply specifically to "renewables" that are considered separately on the next page (page 37) with a list of general incentives and resources.

For example, Table 8D, page 24 compares average annual growth rates between 2012 and 2030. For natural gas, it shows 1.1%,; for renewables it is only 0.3%. Such growth rates will negate the possibility of diminishing pollution.

"Update and modernize electricity and gas delivery systems to replace aging infrastructure and ensure service quality and reliability with a more integrated and distributed energy network." (page 40)

Here, the gas delivery system is once again emphasized. Aging infrastructure will be replaced and modernized – an obvious and inescapable necessity. Approximately how much of this rehabilitation work will include a "more integrated and distributed network" is an open question.

"Accelerate securing of critical infrastructure to ensure the safety, security, and reliability of an increasingly complex and interconnected energy system, including transportation, liquid fuels, electricity, and natural gas infrastructure." (page 42)

"Reduce reliance on petroleum products for heating buildings by supporting the use of clean alternatives to heating oil and expanding access to natural gas in the near term while pursuing strategies to reduce natural gas leakage." (page 43)

Expanding access to natural gas and its delivery infrastructure would preclude any rapid conversion to renewables. All indications point to the use of natural gas as far exceeding the use of renewables.

The plan for "DEC to evaluate regulations to limit methane emissions from natural gas compressor stations on intrastate pipelines" is lamentably insufficient. In addition to methane, it has been abundantly confirmed that compressor stations emit a variety of toxic air pollutants among which are formaldehyde, hydrogen disulfide, carbon dioxide, and the volatile organic compounds (VOCs) benzene, toluene, ethylbenzene, xylene, which, during temperature inversions, can form ground-level ozone that is harmful to human health. Such ill effects are even increased during compressor "blowdowns".

Increase transportation alternatives and vehicle diversity to harness the benefits of decreased dependence on oil and a cleaner, more connected, and more flexible transportation sector. (page 46)

The Plan calls for NYSERDA and NYPA to "stimulate market demand for electric vehicles." The electric vehicles will need recharging by plugging into the grid. If the grid depends on the consumption of oil, coal or natural gas, the benefits of electric vehicles in creating a cleaner environment could be negated by pollution at the generating source. Only if the grid is supplied by renewable energy sources will electric vehicles be truly clean.

"NYSERDA to assess and develop potential deployment strategies and infrastructure requirements for the commercialization of hydrogen fuel cell vehicles."

The Plan does not specify how the hydrogen is to be produced. The most common method in the U.S is by steam reforming of natural gas, a high temperature reaction of methane (the main component of natural gas) with water vapor that produces carbon monoxide and hydrogen. We strongly recommend that NYSERDA investigate and develop other, cleaner methods of producing hydrogen, that look promising but are still at the developmental stage.

Encourage clean technology innovation and commercialization to maximize the economic impacts of a vibrant private sector in New York. (page 48)

The Plan should define precisely what is meant by "clean technology" and "clean energy". Does the Plan include natural gas as a source of clean energy?

Reducing Environmental Impacts Associated with Our Energy System (page 57)

Decrease greenhouse gas emissions in New York
Reduce the carbon intensity of our energy system (MWh/CO2)
Reduce reliance on petroleum in all sectors (Btu consumed)
Reduce health and economic impacts associated with air pollution from fossil fuel use in the energy sector
Increase number of alternative fueled vehicles registered in New York to 1million vehicles by 2025
Increase number of alternative fueling and charging stations
Increase fuel diversity of electricity and transportation systems
Increase the average fuel economy of passenger motor vehicles registered in New York

In regard to the first two items in this list, promoting natural gas as a clean energy source will only serve to increase greenhouse gas emissions together with the carbon intensity of the NYS "energy system". A preponderance of reliable studies has shown that methane is one of the most potent causes of global warming. Natural gas is overwhelmingly composed of methane. According to the International Panel on Climate Change (IPCC) Fifth Amendment Report, Table8.7, Chapter 8, pp. 8-58, methane is one of the most potent greenhouse gases on earth. Over a 100-year period it traps 34 times more heat per mass than carbon dioxide; over a 20-year period, it traps 86% times more.

Volume II – Technical Appendix

End-Use Energy

Chapter 1- Energy Use and Cost

General Comment: The front page shows a picture of a gleaming, clean saucepan whose contents are being warmed by a pure, blue flame. The viewer makes the connection that this clean way of cooking depends on clean natural gas.

Energy use at both primary and net levels, i.e. end-use sectors, is estimated in British Thermal Units (Btu) to provide equivalent comparisons across different fuel and energy types. In 2011, New York's total or primary use of energy totaled 3,695 trillion Btu (TBtu), while net use of energy at the end-use level was 2,640 TBtu, or 71 percent of total primary energy. The difference between total primary energy (for all fuels and all sectors) and net energy is the amount of energy that is "lost"(in various forms of heat) in the process of generating and delivering electricity to the end-use customers (1,055 TBtu, or 29 percent of NewYork's total primary energy). (page 19}

Natural gas represents 1,247 TBtu, or about 34 percent of New York's total primary energy use. About 36 percent of the natural gas used in New York is used to generate electricity, which is distributed across all the customer sectors. About 32 percent of the natural gas used in New York is used on-site by residential customers (primarily for space heat), while about 24 percent is used on-site by commercial customers. About six percent is used by industrial customers.

Since roughly one third of energy is lost, this means that about one third of the 1,247 TBtu provided by natural gas (mostly methane) is lost – or 400 TBtu of methane is pumped into the atmosphere on an annual basis. Given the global warming capacity of methane, this is a serious problem that emphasizes the need for NYS to switch to renewable sources of energy as soon as possible. By the year 2030, the Plan estimates an increase in natural gas use to 1,481 TBtu and, therefore, an increase in atmospheric methane contamination. As we pointed out in the preceding volume, according to the International Panel on Climate Change (IPCC) Fifth Amendment Report, Table8.7, Chapter 8, pp. 8-58, methane is one of the most potent greenhouse gases on earth. Over a 100-year period it traps 34 times more heat per mass than carbon dioxide, 86 times more over a 20-year period.

Chapter 2- Efficiency for Buildings and Industry

Energy efficiency resources help the State to cost-effectively meet its energy needs, while increasing economic activity and reducing emissions of greenhouse gases and other pollutants. Using energy more efficiently in buildings and industry reduces energy bills, makes businesses and industry more competitive, helps New Yorkers save money, and enhances quality of life by

increasing comfort, safety, and productivity. (page 44)

NYSERDA is to be commended for its promotion of energy efficiency in all facets of NYS endeavors. It is to be expected that such a program will cut down on energy use, although the cost of manufacturing energy efficient devices should be factored in, together with the pollution engendered by their manufacture. Not wasting energy in the first place is arguably the most effective and efficient way of conserving energy and cutting down on pollution. There are many ways of accomplishing this goal, such as simply switching off appliances when not in use. Since this is rarely done, a device that automatically switches off an appliance (a TV set, for example) when not in use should be mandatory on appropriate appliances.

…promotion of a clean energy economy through business and market development (p.46)

The Plan should define exactly what is meant by a "clean energy economy".

The Draft Energy Efficiency and Renewable Resource Potential in New York (Potential Study) quantitatively estimates the magnitude of cost-effective energy efficiency opportunities for electricity, natural gas and petroleum products, including distillate and residual fuel oil, propane, and kerosene, for New York's residential, commercial and industrial customers. (page 56)

We note that nowhere in the following five pages where this issue is discussed is there any mention of renewables.

As a part of the Governor Cuomo's effort to improve energy efficiency in the State, the $1 billion New York Green Bank was introduced as the financial engine that will mobilize private investment to build a more cost-effective, resilient and clean energy system in New York. The Green Bank will partner with private sector lenders to accelerate the deployment of clean energy by providing financial products, such as credit enhancement, loan loss reserves and loan bundling, to support securitization and build secondary markets. (page 63)

Will renewables be included under a "clean energy system" Since the two concepts have been referred to separately, a clarification is needed as to whether or not the Green Bank will also subsidize renewables.

By contrast, ***Energize NY Financing is a program of the Energy Improvement Corporation (EIC), a New York not-for-profit local development corporation (LDC) formed to scale the demand for energy efficiency and renewable energy upgrades in residential and commercial properties on behalf of member municipalities. (page 64)***

Orange County and several municipalities in Westchester County are currently eligible. We question why so few are eligible.

Chapter 3-Transportation

New York's transportation system, based on motor fuel consumed per capita is more energy efficient than that of any other state in the nation. This can be attributed in large part to the extensive availability and usage of public transportation in New York, particularly in the downstate area. (page 71)

NYS should develop and expand its highly successful public transportation system, and better link "upstate" municipalities (e.g. Rochester), with downstate centers. The present rail system is inadequate to service both freight and passenger trains between western NYS and downstate communities. New rail lines are needed that would allow fast passenger service between western and downstate municipalities. Such connections could help stimulate the lagging economy in the western part of the state.

Research on cars and buses that are powered by hydrogen fuel cells should be encouraged. Their only emission is water vapor. However, the hydrogen should be produced via renewable energy, not by steam reforming.

Chapter 4-Growing the Clean Energy Economy

A footnote on page 107 finally defines what is meant by "clean energy", namely, "In the context of this report, the clean energy economy is defined as 'economic activity that produces goods or delivers services designed to increase energy efficiency or generate renewable energy'."

Fortunately, the report views clean energy as a source for economic growth. ***"The Clean Energy Economy is a significant emerging sector in NewYork's economy with three primary characteristics: high job growth, high wages, and significant export potential."(page 107).*** Otherwise, it might not even have been considered since no mention is made that a clean economy will also help reduce atmospheric pollution and hence, global warming.

The Plan is optimistic that NYS has all the right resources in terms of its workforce, the high quality of its universities and other centers of learning, the integration of industry's needs with the research conducted at these centers, the capacity to convert research discoveries into commercially viable products, public-private partnerships, its ability to help start-up companies to become viable – to become a national and world-wide center for new, clean technologies. The Plan is optimistic that NYS will reap large, economic benefits.

Although this is a convincing picture of NYS's possible clean energy future, there are no detail regarding how it is to be achieved. To quote General Omar Bradley: "Amateurs talk strategy, professionals talk logistics."

Sources

Chapter 1 – Electricity Report

Another promising strategy is the development of utility-scale energy storage facilities, which could help full advantage of generation from large wind projects, can increase system flexibility by storing energy during periods when energy is "bottled" and demand is low, for use during periods when energy demand is high. (page 10)

We question why the Plan refers only to "large wind projects" and omits solar power generation which is growing at a fast pace, and which faces similar intermittency problems. In both cases, energy needs to be stored for use when needed. Research is progressing at a fast pace, and NYS, with its preeminent number and diversity of scientific research centers, is poised to be a leader in this field. Announcements of new potential breakthroughs in battery storage technology are increasingly frequent. We cannot possibly cite all of them, but a very recent announcement is of particular interest because if successful, it could revolutionize the way energy is stored and delivered and undercut the role of utilities.[iv]Another interesting possibility is to use organic molecules as battery material. (see **Organic mega flow battery promises breakthrough for renewable energy:** HARVARD TECHNOLOGY COULD ECONOMICALLY STORE ENERGY FOR USE WHEN THE WIND DOESN'T BLOW AND THE SUN DOESN'T SHINE. *January 8, 2014)*

Chapter 2 – Natural Gas Report

Most of the growth in natural gas production is a result of the application of recent technological advances and continued drilling in shale formations with high concentrations of natural gas liquids and crude oil, which have a higher value in energy equivalent terms than dry natural gas. (page 68)

Shale gas refers to natural gas that is trapped within shale formations. Shale reserves are fine-grained sedimentary rocks that can be rich sources of petroleum and natural gas. Over the past decade, the combination of horizontal drilling and hydraulic fracturing has allowed access to large volumes of shale gas that were previously uneconomical to produce. The production of natural gas from shale formations has rejuvenated the natural gas industry in the U.S. (page 78)

The Plan brings forcefully to the reader's attention that NYS increase in natural gas production was primarily due to extensive drilling in the Trenton-Black River formation in the Finger Lakes region, where unconventional (i.e. horizontal drilling with fracturing) was used. The Plan says that "horizontal well completions combined with hydraulic fracturing can provide the best means for producing economic volumes of natural gas from the Marcellus shale." The Plan apparently regrets that this method of extraction is on hold in NYS, particularly since "horizontal drilling and hydraulic fracturing are not new to natural gas development in New York." Nowhere are the downsides of hydraulic fracturing with a horizontal component ever mentioned. It is clear that the Plan would gladly comply the minute the Governor gives the go-ahead.

From 2011 to 2035, State annual gas demand is expected to grow by about 185 Bcf (21 percent) to about 1.48 Tcf.(page 97)

The Plan does not offer any way to reverse this trend by introducing renewable energy sources. On the contrary, the Plan discusses the numerous pipeline projects that will be needed to supply NYS with its future natural gas needs. (Table 5B) (page 106)
The message from this chapter is that not only will the need for natural gas increase, but that the use of natural gas as a fuel is a good path to take. Nowhere are the deleterious effects of natural gas use on global warming even mentioned. Nor are the harmful consequences to the surrounding environment of High Volume Horizontal Hydraulic Fracturing (HVHHF or "fracking" ever mentioned. Although it is clear that the Plan is looking forward to the day when the ban on fracking will be lifted, there is never a word of caution that the fracking wastes from the Marcellus shale are likely to be highly radioactive and that storage could be a problem.

Chapter 4 – Renewable Energy Resources

If fully developed, the preliminary estimates of renewable resource Bounded Technical Potential shown in Table 3 could meet nearly 18 percent of New York's projected primary energy needs in 2020, and 38 percent in 2030. (page 179)

The Plan does not provide even the bare outlines of a road map that would justify these predictions. It does not even refer to promising new technologies that would justify such a prediction, or even go beyond it. Yet, many such technologies already exist (see a few hereby listed) and are waiting to be developed to the commercial stage. [v]

It is extremely disappointing, and even troubling, that this very smooth study, paid for by us taxpayers, should go to such lengths to confuse the issue of what constitutes "clean energy" in order to promote its real purpose: the extraction and increased use of natural gas in New York State.

Impacts & Considerations

We note that the cover picture shows well-kept farm buildings, dark, minimally-plowed soil in the foreground, and wind-turbines in the background. Is the purpose to imply that New York will remain pristine, and import its carbon-based fuels from other states such as Pennsylvania, Oklahoma, and Texas?

Chapter 1 – Impacts of the Energy System

"Climate scientists have concluded that limiting the increase in global average temperatures to 2 degrees Celsius above pre-industrial levels is necessary to minimize the likelihood of severe, disruptive climate impacts. In response, New York has adopted a goal of reducing its emissions of heat-trapping greenhouse gases (GHGs) 80 percent by 2050 . Achieving this goal will require sustained support for energy conservation and efficiency programs that support a comprehensive, synergistic reduction in energy demand, and for new local sources of clean energy, targeted modernization of supply-side infrastructure and adoption of renewable energy." (page 10)

Again, the Plan side-steps a clear definition of "clean energy". Further, it does not face the hard facts regarding how much CO2 emissions will have to be cut back in order to avoid a catastrophic increase in global warming.[vi] In particular, what will be the NYS contribution? Specific data that could serve as a basis for NYS's contribution to global warming reduction may be found in a December 2013 article by James Hansen et al.[vii]To quote: "…A 2 degree centigrade global warming limit implies a cumulative carbon emissions limit of the order of 1000 GtC."[viii] It has been generally accepted that 2 degrees centigrade above pre-industrial era levels is the limit beyond which disastrous global warming can no longer be contained. Earth has already warmed by about 0.8 degrees centigrade in the past century! Rather than make general statements about the need to reduce its dependence on "dirty" fossil fuel (coal, etc.) and to switch to clean energy (presumably renewables), NYS should mobilize its highly-trained and talented citizenry, and fashion a precise Manhattan Project style effort to bring about, by 1950, an energy supply system that no longer depends on fossil fuels. Although the Energy Plan makes statements to that effect, it does not include even a hint of a specific plan that would make such an outcome possible, or even plausible.

"New York's largest GHG sink resulted from the net CO2 flux from forested lands in NY, including urban forests. In addition to the forestry sector, cultivation practices in the agriculture sector were also found to be net sinks of CO2e emissions in New York. In 2000, the combined carbon sink from the forestry and agriculture sectors accounted for a total sequestration of 22 MMTCO2e." (page 13)

It is well known that NYS's dairy farms are large producers of methane. Even NY State Forests are threatened by High Volume Horizontal Fracturing (HVHF or fracking"). The Plan should explain in more detail how these two resources, in the future, will continue to be effective carbon sinks.

"Without adaptation measures, annual costs in New York State for climate change in the eight sectors analyzed in the ClimAID report are projected at around $10 billion by mid-century… New York's investments in energy efficiency and renewable energy are proving to be a significant creator of jobs and economic benefits." (pp 25-26)

There should be an analysis explaining by how much these investments have reduced GHGs.

The RGGI (Regional Greenhouse Gas Initiative) "is a nine-state cooperative effort to reduce GHG emissions from electric power plants by means of a cap-and-trade system."(page 28)

Among the five sub-programs that are discussed, only one - NY Adoption of California GHG Vehicle Standards – provided any figures pertaining to the reduction of GHG emissions. It is disturbing, to say the least, that such potentially critical impacts are treated so perfunctorily. Surely, we are entitled to know whether or not the expenditure of our tax dollars will contribute to a healthier environment for all NYS residents, as proven by health impact studies, or will this expenditure only provide some extra jobs and income, for a few? A detailed study of the health impacts of the projected Plan at various timelines as compared to a plan where renewables would be the overwhelming energy sources should be an essential component of this Plan. Although the Plan presents, in considerable detail, the overall health effects of carbon-based fuels, particularly as it affects minority groups, there is lacking a detailed, step-by-step plan for the study of these effects.

"Natural gas-fired facilities are the cleanest fuel electric generating facilities, releasing primarily GHG pollutants and NOxs…Economic, operational, and environmental advantages make natural gas the current fuel of choice for new and replacement generation in New York." (page 32)

According to the USEPA's Overview of Greenhouse Gases, "Pound for pound, the comparative impact of CH4 on climate change is over 20 times greater than CO2 over a 100-year period."

Since methane (CH4) leaks can be considerable, larger than had been previously realized, contributions of such leaks to global warming is far larger than previously estimated. The situation is well summarized in a February 13, 2014 New York Times article: …"**a surprising new report, to be published Friday in the journal Science, concludes that switching buses and trucks from traditional diesel fuel to natural gas could actually harm the planet's climate.**

Although burning natural gas as a transportation fuel produces 30 percent less planet-warming carbon dioxide emissions than burning diesel, the drilling and production of natural gas can lead to leaks of methane, a greenhouse gas far more potent than carbon dioxide.

Those methane leaks negate the climate change benefits of using natural gas as a transportation fuel, according to the study, which was conducted by scientists at Stanford University, the Massachusetts Institute of Technology and the Department of Energy's National Renewable Energy Laboratory.

The study concludes that there is already about 50 percent more methane in the atmosphere than previously estimated by the Environmental Protection Agency, a signal that more methane is leaking from the natural gas production chain than previously thought."

Therefore, natural gas, which is mostly methane, has a doubly negative global warming effect. When it is burned, it emits carbon dioxide, the premier atmospheric global warming constituent – particularly harmful because of its thousands of years atmospheric longevity, unlike methane whose atmospheric longevity is only about 100 years. In addition, as already mentioned, CH4is 20 times more potent than CO2 over a 100-year period. In spite of this evidence of its

harmful effects, the Plan continues to promote natural gas as a clean-burning fuel, with no mention of its contribution to global warming. This will encourage even more importation of natural gas from outside NYS, and could eventually sell to the public the "advantages" of NYS extracting natural gas from its own Marcellus and Utica shales.

Rather than continuing its misguided efforts to promote natural gas as a "clean" fuel, the Plan should be promoting renewables.

Under ***Impact of Wind Energy*** ***(page 58),*** the Plan includes the following: ***"The development of energy projects, particularly wind projects, can impact wildlife during both construction and operation of the facility. Environmental impacts from new wind energy development include habitat disturbance or destruction during construction of turbines and transmission lines; and potential mortality of birds and bats from collisions with the tower and turbine blades."*** And on page 61: ***"The development of miles of access roads and utility ROWS at a wind project can split valuable habitat that have a significant impact on the species dependent on that habitat."*** And, again: ***"The permanent loss of agricultural land can result from construction of access roads, wind turbines, and other greenfields generation facilities."***

Significantly, there is no mention of far worse environmental impacts due to the development of natural gas pipelines that will, of necessity, cross streams and wetlands en route to their destinations in NYS and elsewhere. For example, the Spectra AIM project will impact over 2 miles of wetlands, among other impacts to water-bodies, as it traverses NYS en route to New England. And the report is careful not to mention that the natural gas, mostly methane, that NYS imports from Pennsylvania's Marcellus Shale is laden with radon. Radon's physical properties are similar to those of natural gas, so the two are mixed as they travel together in pipelines. However, they differ in their chemical properties. Methane burns with the clear blue flame shown on the cover of this section. Its combustion product is CO2, the leader among global-warming gases. However, radon does not burn. It simply escapes into its surroundings. In NYC, these are often small, poorly-ventilated kitchens. The United Nation's World Health Organization (WHO) (September 2009)says that radon is a worldwide health risk in homes. To quote Dr. Maria Neira of WHO: "Most radon-induced lung cancers occur from low and medium dose exposures in people's homes. Radon is the second most important cause of lung cancer after smoking in many countries." The U.S. is among those countries.

To give the reader a balanced presentation of the pros & cons of the various possible energy supplies, the Plan should include the drawbacks of natural gas, and not only extol its virtues. It should be forthcoming in regard to the real dangers of bringing radon into homes. It should also describe the fragmentation of forests and fields due to access roads, gathering lines, and pipes that are the inevitable consequences of HVHHF or fracking. Although the latter has not yet occurred in NYS, the Plan does not exclude it. And the Energy Plan certainly counts on making natural gas a mainstay for the present, with only vague commitments to seriously transitioning to renewables by 2050. The irony of the Plan's criticism of wind energy in contrast with the picture on the first page of this section that shows a pristine farm with wind turbines in the background, is too blatant to ignore.

CWCWC Conclusions

The NYS Energy Plan is a disappointing document. It does not present a well-documented, specifically-timed plan for reducing NYS's energy dependence on fossil fuels, and replacing them with clean energy renewables. Nowhere in the document will the reader find a clear-cut definition of "clean" energy. Renewables admittedly are "clean", but natural gas is also referred to as being clean. What is clear is that natural gas is being promoted as the energy source of choice.

It is extremely disturbing that our NYS leaders are unwilling to confront the existential issue of our time – global warming – despite the incontrovertible evidence of global climate disruptions, and despite the scholarly research presented by international forums and individual experts.

For the past several years, there has been an accumulation of warnings of the dire threats presented by global climate change. Recent major conclusions by a U.N. Panel (see The NY Times, April 13, 2014) state: "In a report unveiled here, the Intergovernmental Panel on Climate Change found that decades of foot-dragging by political leaders had propelled humanity into a critical situation, with greenhouse emissions rising faster than ever. While it remains technically possible to keep planetary warming to a tolerable level, only an intensive push over the next 15 years to bring those emissions under control can achieve the goal, the committee found."[ix]

"The report from the Intergovernmental Panel on Climate Change (IPCC) found greenhouse gas emissions steadily on the rise, growing more quickly between 2000 and 2010 than in any of the three previous decades. That's despite the global economic crisis, the creation of carbon markets and reams of city- and state-level policies worldwide aimed at curbing carbon. "If the world hopes to avert the worst impacts of warming and cut emissions 40 to 70 percent by midcentury, *the next 15 years will be critical (emphasis added)*. After that, the report warns, options become more limited and the costs rise dramatically. But the good news, the panel found, is that the price of current solutions is "relatively modest" and governments are increasingly preparing to tackle the challenge."[x]

A lengthy report published by James Hansen et al concludes that "Cumulative emissions of about 1000 GtC (gigatons of carbon), sometimes associated with 2 degrees centigrade warming, would spur "slow" feedbacks and eventual warming of 3-4 degrees centigrade with disastrous consequences."[xi]

There is no doubt that a substantial majority of climate experts consider global warming to be highly probable. They also tell us that the next 15 years will allow us to deal with the problem effectively. The longer we wait the more difficult and costly it will be to contain global warming.

Switching to natural gas will not help solve the problem.

Leakage of natural gas during extraction by hydraulic fracturing and from other sources negates, to a large extent, its purported advantages as a clean-burning fuel. It has been well established that natural gas, largely methane, has over 100 times the global warming potential of CO2 over a 20-year period, and 20 times that of CO2 over a 100-year period. The remaining gas is eventually burnt, and emits CO2, the ultimate global warming gas that remains in the atmosphere for millennia.

Fortunately, there are alternate, truly clean sources of energy that already exist at various stages of development.[xii] A recent research analysis by Mark Jacobson et al outlines a plan for converting NYS's power providers to solely "wind, water, and sunlight" by 2030, admittedly an ambitious plan, but imperative to get started. Specific prognostics for all 50 states are also presented.[xiii]

It would be tempting to elaborate on the tremendous recent strides that are moving wind and solar power generation to competitive levels with traditional generation sources, such as fossil fuels. The need to design electrical grid systems that can respond to intermittent, distributed sources is causing some revolutionary upheavals in the way electricity is delivered and stored. Research on batteries that can store significantly larger quantities of electricity is producing significant results. A group of researchers at MIT "say that liquid metals could provide the solution to a solar energy challenge – ensuring that power is available at all times.[xiv]

Already, many of the proposed technologies are well developed. And New York has the research institutes, the human resources and the business acumen to bring them through the transitions from the laboratory stage to the market. NYS should be rapidly developing these new technologies, and transforming its hundred-year old grid to accommodate them, rather than relying on natural gas, one of the prime movers of global warming.

Thank you for this opportunity to comment.

Respectfully submitted,

Marian H. Rose, PhD President emeritus, CWCWC

[i] See the rdSGEIS Appendix13

[ii] YALE SCHOOL OF FORESTRY & ENVIRONMENTAL STUDIES

Utility demand-side management programs show lasting and lagged effects
By HOWE 'ZHUOHAO' WANG - MAY 15, 2013

Demand-side management (DSM) programs encourage energy users to incorporate energy efficient design and reduce energy consumption and demand. Such programs have been in existence since the late 1970s. After a brief period of disappearance during the market restructuring of the electricity market, they are now experiencing a renewed interest during this period of increasing electricity prices, volatile electricity supply, and growing debate over climate change. Yet there is no authoritative judgment over the cost-effectiveness of DSM, which is evaluated by how much it costs to reduce 1 kilowatt-hour (kWh) of electricity compared to previous demand-side management programs. Opinion varies when it comes to the electricity and cost saving impacts. To move forward and advance to next stage of energy efficiency development and policy-making, a comprehensive and controlled evaluation of previous policies becomes particularly important.

In a recent paper from *The Energy Journal*, a group of researchers from Sophia University-Tokyo, Cornell, Duke and Resources for the Future analyze the effects of utility and third-party demand-side management program expenditures on electricity demand. Controlling for various consumption drivers, the authors use utility-level data from the U.S. Energy Information Administration (EIA) and other sources over 1992 to 2006 to identify the elasticity between electricity demand and demand-side management spending. The result demonstrates that DSM expenditures between 1992 and 2006 produced a 0.9 percent savings in electricity consumption over that time period and a 1.8 percent savings over all years. Such

savings translate to a cost saving of roughly 5 cents per kWh saved with a 5 percent discount rate. More interestingly, the research also suggests that the impact of such programs is still effective even 15 years later—indicating a lasting effect on consumers' energy consumption behavior. Also, the data generated also show that the effects of program spending could be initially small, yet continuously increase and achieve its maximum only a few years later. This a sensible conclusion considering the information coordination, training, demonstration and financing activities required for such programs.

The effectiveness of utility energy efficiency and demand-side management programs is at center of increasing interest and research. This paper's finding highlights the importance of sustainable support of energy efficiency programs. Policy-makers should incorporate consideration of lasting and lagged effects of DSM programs into consideration and demonstrate policy and market commitment to DSM program development.

[iii] **Battery Energy Storage for Enabling Integration of Distributed Solar Power Generation**

Hill, C.A. ;Such, M.C. ; Dongmei Chen ; Gonzalez, J. ; Grady, W.M.
Smart Grid, IEEE Transactions on
Volume: 3, Issue: 2

As solar photovoltaic power generation becomes more commonplace, the inherent intermittency of the solar resource poses one of the great challenges to those who would design and implement the next generation smart grid. Specifically, grid-tied solar power generation is a distributed resource whose output can change extremely rapidly, resulting in many issues for the distribution system operator with a large quantity of installed photovoltaic devices. Battery energy storage systems are increasingly being used to help integrate solar power into the grid. These systems are capable of absorbing and delivering both real and reactive power with sub-second response times. With these capabilities, battery energy storage systems can mitigate such issues with solar power generation as ramp rate, frequency, and voltage issues. Beyond these applications focusing on system stability, energy storage control systems can also be integrated with energy markets to make the solar resource more economical. Providing a high-level introduction to this application area, this paper presents an overview of the challenges of integrating solar power to the electricity distribution system, a technical overview of battery energy storage systems, and illustrates a variety of modes of operation for battery energy storage systems in grid-tied solar applications. The real-time control modes discussed include ramp rate control, frequency droop response, power factor correction, solar time-shifting, and output leveling.

[iv] **Utility in a box?** Why solar plus batteries equals trouble for utiliries, by Claudia Assis, February 26, 2014

[v] Bill Gates-Backed MIT Researchers Ready to 'Change The World' With Renewable Energy **Storage Technology** – Brandon Baker, March 10, 2014.

"With cheaper materials, scientists can use solar to extract more hydrogen from water"
UmairIrfan, E&E reporter, *Published: Monday, January 27, 2014*

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Breakthrough in hydrogen fuel production could revolutionize alternative energy market –
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[vi] IPPC – Climate Change 2013, The Physical Science Basis

[vii] PLOS one – Assessing "Dangerous Climate Change". Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature. James Hansen et al, December 2013

[viii]GtC is Gigatonnes of Carbon

[ix]***U.N. Climate Panel Warns Speedier Action Is Needed – The NY Times*** **-JUSTIN GILLIS**APRIL 13, 2014

[x]**ClimateWire – Mon., April 14, 2014 – U.N. panel says next 15 years will be critical for affordable climate change actions**

[xi] PLOS I ONE "Assessing 'Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generation and Nature" *James Hansen et al. December 3, 2013*

[xii] Mark Z. Jacobson et al – "Examining the Feasibility of converting New York State's all-purpose energy infrastructure to one using wind, water, and sunlight." Elsevier, Energy Policy, March 13, 2013

[xiii] See http://thesolutionsproject.org/infographic/.

[xiv]**EcoBusiness**- Bill Gates-Backed MIT Researchers Ready to 'Change The World' With Renewable Energy Storage Technology, Brandon Baker, March 10, 2014