American Gas Cooling Center
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Mark E. Krebs, AGCC Education Committee Chairman, Laclede Gas Company

Friday, December 14, 2001

Rick Weston
The Regulatory Assistance Project
50 State Street, Suite 3
Montpelier, Vermont, 05602

Subject: Comments regarding the draft "*Model Regulations for the Output of Specified Air Emissions from Smaller-Scale Electric Generation Resources*"[1]

Dear Mr. Weston:

The American Gas Cooling Center (AGCC) is the national trade association for utilities and manufacturers whose common goal is to develop viable markets for highly energy efficient space conditioning alternatives that are not powered by electricity. Technologies we represent include recovering heat from distributed generation (DG) and utilizing it directly for space heating, domestic and process water heating and to power absorption refrigeration and desiccant dehumidification systems.

The objectives of this correspondence are to address the specific questions raised in the subject draft. We also hope to educate the "working group" about fuel-cycle analysis methodologies, so that the "working group" can best achieve its stated purpose "*to develop a set of model rules that states can adopt in whole or adapt, that will foster the deployment of environmentally sustainable and economically efficient distributed generation.*" We will begin by addressing your specific questions:

Questions:
"Should the deployment of DG result in better (or at least not worse) environmental outcomes than what would have occurred in the absence of the DG? If so, then the question of what generation resources will be displaced (and their emissions, if any) by the use of both existing and new DG becomes relevant to the design of proposed DG emissions standards. Most currently available distributed generation technologies produce air pollutants at a greater rate (on an output basis) than a state-of-the-art natural gas-fired, combined-cycle central generating station (GCC) with best available control technologies (BACT) installed."

Reply:
New DG installations should not be permitted to operate at lower efficiency or with higher emissions than the least efficient and/or least environmentally benign alternative presently acceptable by regulation. The issues of what DG displaces and the emissions trade-offs thereof are more than merely relevant. Addressing these issues should be the fundamental purpose of this project. Unfortunately, the "working group" has thus far chosen to ignore the most basic and fundamental of these issues to defend its position that DG threatens the deployment of cleaner, centrally generated electricity from combined-cycle turbines (CCTs), even though CCTs are currently not the only acceptable alternative to DG. By doing so, the "working group" may seriously jeopardize the stated purpose of this project as well as the "working group's" own credibility. These issues include:

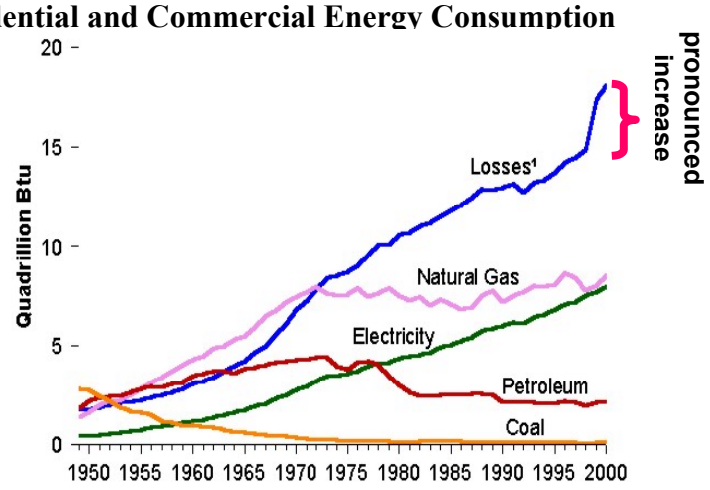
[1] http://www.rapmaine.org/DREmissionsRuleNovDraft.PDF

- Neglecting to consider heat recovery capabilities of certain DG systems is effectively promoting global warming and squandering of finite energy resources through centralized generation of electricity.
- Neglecting to consider transmission and distribution (T&D) losses is again effectively promoting global warming and squandering of finite energy resources through centralized generation of electricity as well as asking the public to believe that energy is somehow created by utility meters.
- Placing an emphasis upon one-size-fits-all NO_x reduction on an "output" basis, and requiring catalytic converters, is again effectively promoting global warming through centralized generation of electricity, as well as greater DG fuel consumption (hence CO_2), deeming the entire nation as "extreme non-attainment" and disregarding relationships between NO_x and VOC's as ozone precursors.

The Commission for Environmental Cooperation (CEC) has recently published some definitive studies through their electricity and the environment program[2] that are inconsistent with the "working group's" positions. These contradictions include:

- Major increases of criteria pollutants, toxic releases, global warming gases, etc., due to central power plant building of all types.
- The likelihood that new power plants will be built just outside of American borders to escape American emissions regulations.

In addition, according to the Energy Information Administration (EIA), "*Natural gas became an important resource, growing strongly until 1972, when its growth essentially stalled. Electricity, only an incidental source in 1949, expanded in almost every year since then, **as did the energy losses associated with producing and distributing the electricity***." [emphasis added][3] Moreover, there has been a major increase in the rate of T&D losses in recent years. Such losses cause more energy consumption, pollution and global warming. Overlooking these effects would fundamentally undermine the accuracy, thus the credibility, of any final product published by the "working group." Of more concern, to affirmatively decide to overlook such elementary issues places the credibility of the "working group" itself at issue. It is also important to recognize that electric T&D losses will increase as trading of electricity increases. The following EIA graph illustrates these losses:[4]



[1]Energy lost during generation, transmission, and distribution of electricity

[2] http://www.cec.org/programs_projects/other_initiatives/electricity/index.cfm?varlan=english
[3] http://www.eia.doe.gov/emeu/aer/eh/frame.html
[4] Figure 7. Residential and Commercial Energy Consumption http://www.eia.doe.gov/emeu/aer/eh/total.html

Some additional concerns regarding the working group's apparent bias towards CCTs include:

Limiting comparisons to "output basis" of unspecified emissions
Concepts regarding the environmental superiority of CCTs are predicated upon an improper technical understanding of real-world conditions. Disregard for such real-world variables fundamentally skews comparisons to unfairly favor CCTs. For example, the term "output basis" appears to be synonymous with a generating unit's "ISO" rating. "ISO" ratings are based upon bus-bar electrical output of brand-new equipment operating at optimal conditions of 59 deg. F and sea level. This basis of comparison ignores highly significant (T&D) losses and other factors such as those listed below whose cumulative effect is significant.

- Efficiency and emissions (other than SCR controlled NO_x) from CCTs vary significantly as a function of inlet air temperature.
- When temperatures are highest, turbine capacity and efficiency are lowest.
- When temperatures are highest, electric demand, hence T&D loss is highest.
- Turbine vanes (and thus turbine efficiency) can deteriorate significantly over time.

Deeming combined-cycle turbines (CCTs) equipped with selective catalytic reduction (SCR) as best available control technology (BACT) BACT for DG
The fact that it is possible to economically apply SCR to a 250 MW generator project does not also make it economically possible for a 250 kW project. SCR emissions control systems in small applications typically cost twice as much as the equipment being controlled, thereby deftly eliminating economic feasibility. Paradoxically, if CCTs are so great, why are there no similar requirements being proposed for all central power plants to be SCR equipped CCTs? And, if SCR is economically attractive for CCTs as small as 80mW, why is it not being advocated for substantially larger coal-fired plants, where it would be even more cost effective? Even if SCR technologies were affordable in small DG sizes, the potential attraction to illegal drug manufacturing and public safety liabilities of ammonia stockpiles could easily out weigh any potential net emissions benefits.

Questions:
"The role of a technology-neutral and fuel-neutral standard is being considered. Such a standard could, depending on how it is set, preclude the deployment of certain technologies. Also, should the standards differ depending on whether the DG will be deployed in attainment or non- attainment areas? Lastly, the question arose whether other potential environmental harms (e.g., land use and water pollution) should be addressed in addition to air emissions."

Reply:
For the reasons just provided, standards should differ based upon local attainment or nonattainment status while also considering what grid averaged emissions offsets there may be as well as emissions offsets related to a diverse set of heat recovery opportunities. Standards should also consider whether NO_x or VOC reduction is the most effective means of attaining a given area's desired ozone level (if necessary at all). The full spectrum of potential "environmental harms" should be considered as well. These should include all "criteria" air emissions as well as heavy metals, air toxics, thermal pollution and CO_2. Likewise, the consumption of water resources should also weigh in. One of the aforementioned CEC report's stated the following regarding water conservation:

> *The generation of thermoelectric power relies heavily on water inputs: the average amount of water used to produce thermoelectric power in the US has declined in the last fifty years, with gains in technological efficiency: the gallons per kilowatt hour requirements have dropped from approximately 62 gallons per kWh in 1950, to roughly 20-25 gallons in the 1990s. Estimates by the US Geological Survey suggest*

that over 194 billion gallons of groundwater and surface water (fresh and saline) are withdrawn daily to produce electricity.

Combined-cycle power plants are expected by many to dominate future generation capacity additions. To the extent that these plants use cooling towers for cooling, which they normally do if at all possible, their water consumption is still extremely wasteful relative to DG.

Concerns about central plant water consumption are already developing into conflicts in several areas of our country. These conflicts will intensify significantly if the projections contained in the National Energy Policy Development (NEPD) Group's report come true. The NEPD Group's report states: "*America **must have** in place between 1,300 and 1,900 new electric plants. Much of this new generation will be fueled by natural gas*." [emphasis added] [5] The same NEPD Group report estimated the total capacity of these plants at 393,000 MW.[6] Assuming the CEC's average of 22.5 gallons per kW at a 75% load factor, this forecasted 393,000 MW could consume over 58 trillion gallons per year of water. This is in addition to the present usage of 70 trillion gallons per year estimated by the USGS. Using any reasonable variable for these calculations, water consumption for centralized power consumption is staggering whereas with DG, virtually no water is consumed and some forms of DG, namely fuel cells, actually produce water.

Regarding the "working group's consideration of technology or fuel neutrality, there is no evidence of this within the draft. Conversely, there is little doubt that this draft, if implemented, would "*preclude the deployment of certain* [DG] *technologies*" according to what the "working group" myopically decrees to be beneficial forms of DG (which are effectively limited to a couple of fuel cell technologies and renewables). While we agree that base loading of uncontrolled emergency diesel gensets could be environmentally undesirable if such practices were widespread, there are better ways of accomplishing the more difficult but socially appropriate balancing of environmental sustainability and economic efficiency as opposed to eliminating reciprocating engines and turbines.

Despite the laudable efforts made my Joel Bluestein in his analysis entitled *Environmental Benefits of Distributed Generation*, [7] the "working group" is apparently unwilling to alter its thinking that internal combustion engine-based DG technologies are environmentally undesirable. This concerns us a great deal but comes as no surprise given that the National Renewable Energy Laboratory (NREL) is funding the Regulatory Assistance Project (RAP) for the following reasons:

- NREL, by virtue of its DOE appointed mission, is slanted towards renewable forms of DG.
- RAP "packed the bleachers" of this "working group" with regulators, who have a vested interest in regulation and, while usually well intentioned, rarely possess a thorough technical understanding of what they regulate.
- There are also a disproportionate number of self-proclaimed "environmental advocates" within the "working group" who rely, to a large extent, on regulatory funding for their existence.
- While RAP has made this draft available on its web site, this is not a regulatory proceeding. Hence there has not been a significant effort to seek public comment; and, there is nothing to indicate that the working group will implement public comments it does not agree with.

In fact, it is easy to speculate that the strategy behind this is something like the following:

1. Renewables and fuel cells have a hard time competing against more affordable forms of DG, such as those which use turbines or reciprocating engines; at least at the present time.
2. CCT manufacturers and developers also view DG as competition.

[5] Chapter 1, Page XI
[6] Chapter 1, Page 4
[7] http://www.rapmaine.org/DGEmissions-Bluestein.doc

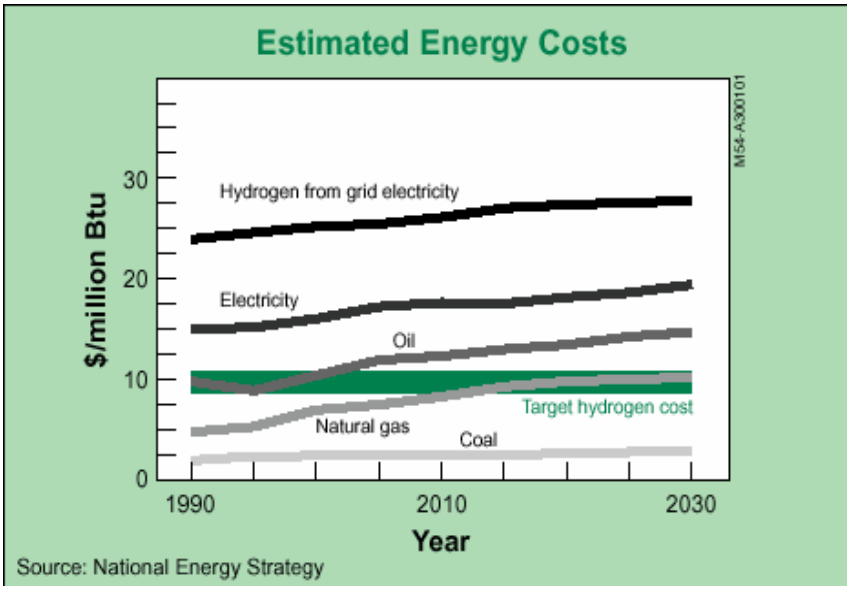
3. More expensive forms of DG, such as renewables and fuel cells, could become "the only game in town" other than CCT-derived electricity providers (which have also agreed to token renewable "portfolio's"), simply by eliminating less expensive DG alternatives through "air quality" regulations unfairly biased in favor of CCT's

The success of a market economy is based upon educated consumers with viable choices. Unfortunately, most consumers (as well as most regulators and legislators) are either kept ignorant of or are purposefully ignoring important physical differences between total resource efficiency and efficiency at the point of end-use, as well as the resulting overall emissions differences. We also contend that the ongoing "rush to gas" for fueling CCT's adversely impacts consumer choice, needlessly wastes finite energy resources of natural gas and, in the processes, unnecessarily generates massive amounts global warming gases. As of September 11th, the national security implications of this rapidly emerging energy monoculture should also be thoroughly reevaluated.

Questions:
"The working group is considering whether carbon dioxide should be included among the emissions to be regulated."

Reply:
As addressed in the previous question, yes. However, the "working group" needs to expand its abilities to comprehensively and transparently consider the tradeoffs between "criteria" emissions reductions and CO_2 reductions. The emphasis is on the word tradeoff. Typically, efficiency suffers; hence CO_2 emissions increase as specific "criteria" emissions are reduced (such as NO_x).

The issue-at-hand is how often myopic approaches to solving problems usually create different (and often far worse) problems. Classical cases-in-point of unintended consequences include the catalytic converter[8] and MTBE. Likewise, the ostensible environmental superiority of fuel cells may not work out as planned, given that the cheapest source of hydrogen may be coal gasification. The graph shown below illustrates this forecast:



In short, fuel cells could end up predominately coal-fueled; and, while emissions at the point-of-use might be minimal, total fuel-cycle emissions might be immense.

[8] Catalytic Converter Is Growing Cause of Global Warming (http://www.junkscience.com/news2/catalyt.htm)

Further discussion of fuel-cycle analyses

We hope to shed further light upon fuel-cycle analysis issues to improve the "working group's" knowledge of them and assist the "working group" to best achieve its stated purpose. To begin, the following tables show that, for each Btu extracted from the ground, converted to electricity in a combined-cycle power plant and delivered to an electric water heater, only 0.36 Btu ends up as usable hot water. Conversely, for a gas water heater, 0.54 Btu is delivered as hot water because the direct use of natural gas avoids the losses of indirect use as a fuel to make centrally generated electricity, even at "state of the art" efficiency.

Electric hot water overall efficiency (energy derived from combined-cycle turbine)

gas wellhead to power plant	90%
power plant thermal efficiency	50%
power plant to end-use meter	90%
electric resistance water heater efficiency	90%
cumulative efficiency	36%

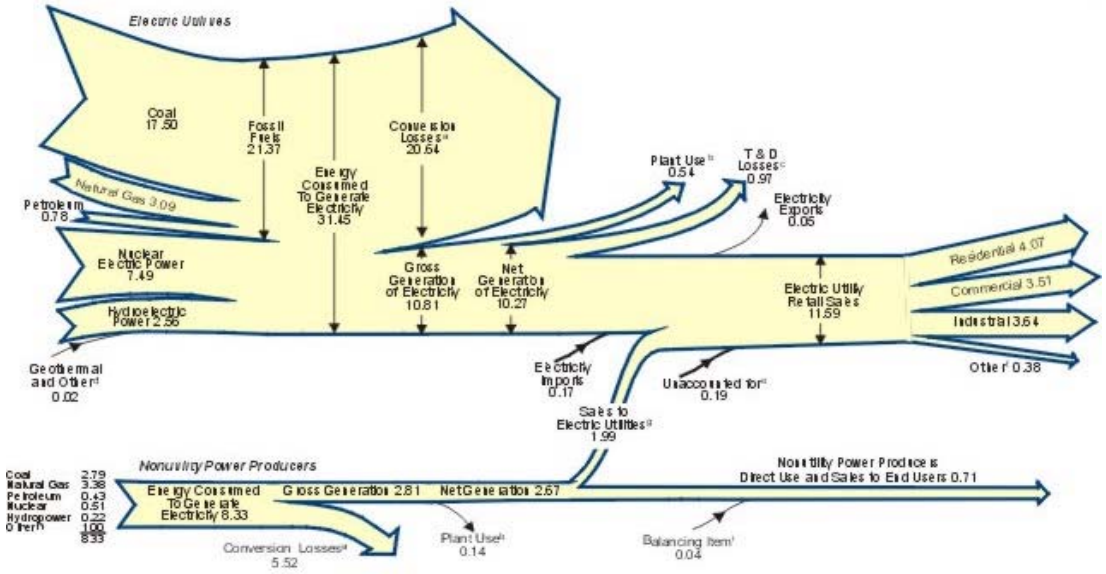
Gas water heater overall efficiency

gas wellhead to end-use meter	90%
gas water heater efficiency	60%
cumulative efficiency	54%

These calculations indicate that the direct use of natural gas for water heating is already far superior to CCT-provided electricity for water heating. Distributed generation with heat recovery (a.k.a., CHP or BCHP) only improves such inherent advantages. Moreover, these calculations are lenient towards CCTs, given the numerous real-world variables previously discussed, which are being omitted in this example for simplicity.

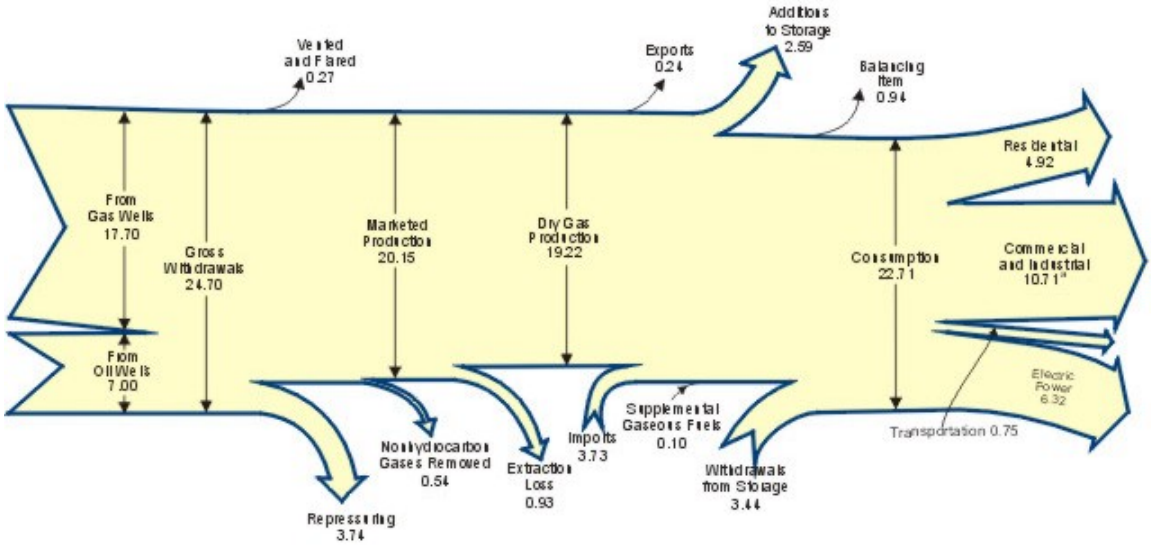
The "working group's" fuel-cycle education will continue by contemplating the next two graphics:

Source to Site Electricity Flow 2000 (Quadrillion Btu)[9]



[9] http://www.eia.doe.gov/emeu/aer/diagrams/diagram5.html

Source to Site Natural Gas Flow 2000 (Trillion Cubic Feet) [10]



One Quadrillion Btu (1 Quad) and a trillion cubic feet (TCF) of natural gas contain essentially equivalent amounts of energy. Therefore, comparing the previous Energy Information Administration (EIA) graphs the following relationships can be determined:

1. Natural gas delivers nearly twice the amount of energy to consumers relative to electricity
2. Natural gas delivery is accomplished at least 2 ½ times the efficiency of electricity production and delivery (37% overall electricity efficiency versus 91% natural gas efficiency).[11]

Further comparing the natural gas and electric statistics contained within the EIA's Annual Energy Review[12], it is evident that natural gas performs these services with far less environmental degradation and at less than ¼ of consumer cost relative to electricity ($47 billion yearly revenue for the natural gas industry versus $218 billion for the electric industry). Despite these features, contemporary American energy policies over the past two Administrations have focused primarily upon the increased importance of natural gas as a fuel for producing electricity. This focus has sprung from politically powerful associations under the guise of utility restructuring and their profit motive, which recognizes the multi-billions of consumer dollars[13] to be gained. The following quotations, from the Edison Electric Institute's (EEI) President,[14] aptly evidences this intent:

- "These companies, with EEI's help, are shaping public policies and the market, and they are going to be among the winners."
- "This adds up to more value for electric stocks.... It is a tremendous competitive edge."
- "The future will be even brighter if we continue to get the public policies right, and we at EEI are working hard to make that happen."

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[10] http://www.eia.doe.gov/emeu/aer/diagrams/diagram3.html

[11] EIA's electricity flow graph does not include production and delivery losses for the primary fuels, so it is not truly "source to site". For example, the losses associated with natural gas transmission or coal transportation to the power plant are not included. Also, note that the nuclear input is not uranium, or even enriched uranium, but nuclear electric power (which has a resource efficiency of approximately 16% when enrichment and power plant losses are taken into account. Conversely, EIA's natural gas flow graph does start from the wellhead. Also note that Hydro and Nuclear enter the electricity graph at 100% efficiency. Nuclear is only ~20% efficient, as is hydro (delivered electricity/potential hydraulic energy. That makes the 37% closer to 27% and the ratio closer to 3.5:1. CCTs are only ~40% (0.9*0.5*0.9).

[12] http://www.eia.doe.gov/emeu/aer/contents.html

[13] "A source-based standard [ASHRAE 90.1-1999] could have cost the electric power industry billions of dollars" Mike McGrath, EEI Washington Letter, October 23, 1998

[14] http://www.eei.org/issues/news/releases/000209.htm

To ensure the "working group's" stated purpose is achieved, we recommend that the group proceed as follows.

1. Define and develop analytical procedures that impartially, comprehensively and transparently evaluate and balance the pros and cons of both supply-side and demand-side energy alternatives, to identify least-cost & least disruptive strategies.
2. Encourage independent analysts to help perform sensitivity & scenario analyses.

Several tools can help the "working group" get started with the development of "*best available scientific information*" for formulating DG emissions policies. These include the EPA's own E-GRID2000 electric utility emissions database.[15] Lawrence Berkeley National Lab's (LBNL) Home Energy Saver web site[16] is another tool that begins to demonstrate the usefulness of fuel-cycle analysis. However, the problem with both the EPA's EGRID and LBNL's Home Energy Saver approach is that they are based on yearly averages over relatively broad regions. In reality, avoided line losses for a typical CHP application are often much more than 7%. In fact, they could be twice that depending upon the answers to the following questions.

- What are the conventional processes that are to be displaced through CHP?
- Where is the facility located?
- When are the processes operational?
- What are the weather conditions on an hourly basis of the unit's operation?

Summary & Conclusions

While environmental issues such as these may not have been what Alfred Einstein was most concerned with at the time, he nevertheless elegantly stated the rationale behind fuel-cycle analysis in the following quotes:

- "Problems can never be solved by thinking on the same level that created them."
- "Solutions to problems should be as simple as possible – **but no simpler**.

With Einstein's sage advice as inspiration, I offer the following as an appropriate corollary:

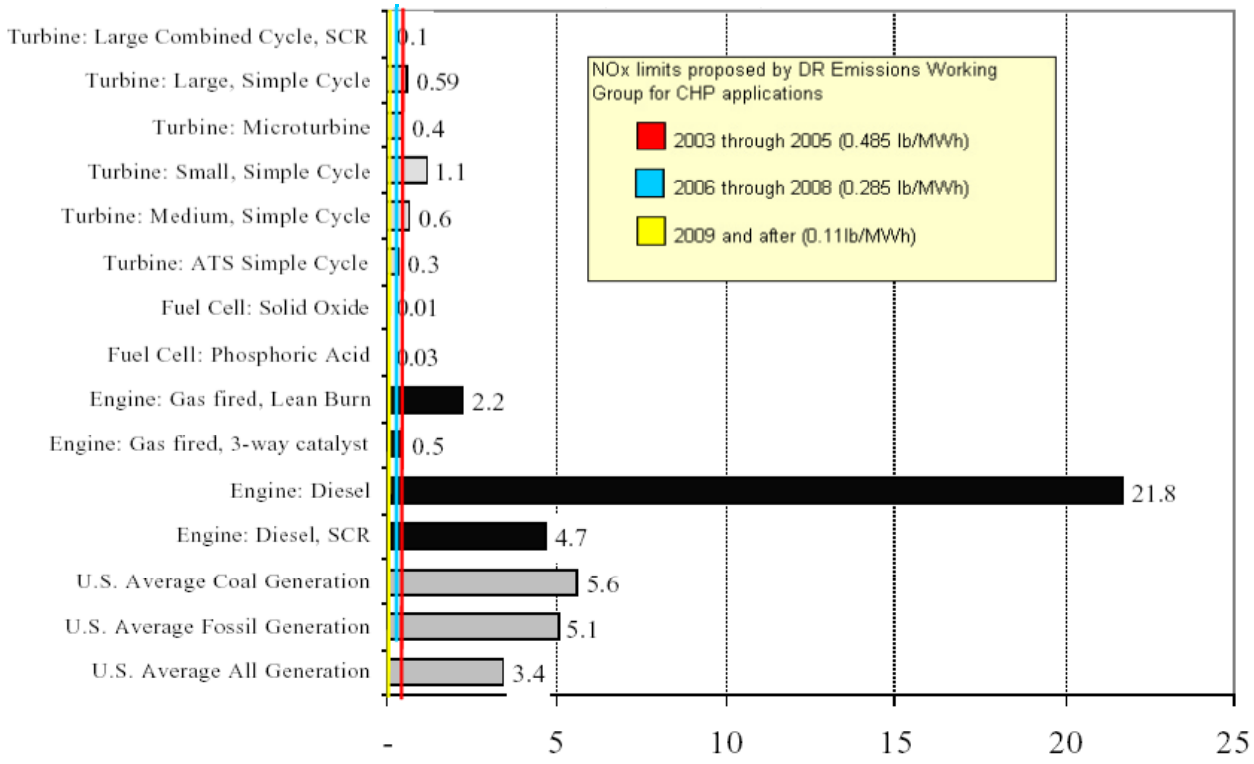
- "Human traits like greed and ignorance can not be regulated out of existence but can easily be regulated into existence."

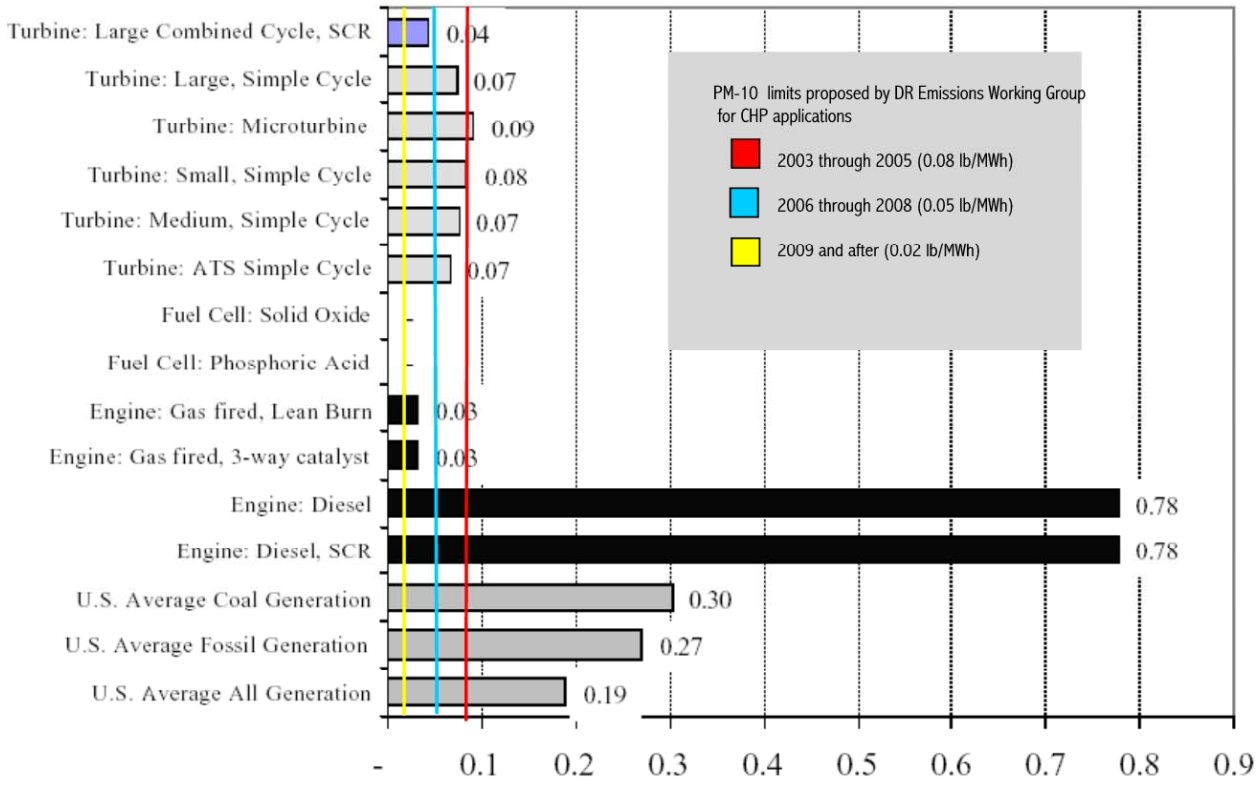
For the "working group" to fully achieve its stated objective, it should give full credit where credit is due. Otherwise, shorting a little credit here and a little credit there quickly adds up to a cumulative effect that makes DG and CHP look environmentally inferior to CCTs, regardless of the facts. The "working group" must also give full consideration to the fact that DG with heat recovery is much more diverse than just large industrial on-site generation of electricity and steam from one energy source. Many of the most promising forms of CHP on the market are used for commercial applications that do not include heat recovery for the generation of steam. These include using recovered heat to power absorption chillers and/or desiccant dehumidification systems that further displace electricity consumption.

The table to the right and the following graphs summarize how the "working group" would eliminate base-loaded generators that would typify CHP applications despite the fact that these technologies would help rather than harm air quality.

	Phase One: January 1, 2003, Through December 31, 2005	Phase Two: January 1, 2006, through December 31, 2008	Phase Three: January 1, 2009, And thereafter
NO_X	[0.5 – 0.47] lb/MWh	[0.3 - 0.27] lb/MWh	[0.15 - 0.07] lb/MWh
PM-10	0.08 lb/MWh	0.05 lb/MWh	0.02 lb/MWh
CO	0.60 lb/MWh	0.30 lb/MWh	0.10 lb/MWh
CO_2	1400.00 lb/MWh	1400.00 lb/MWh	1400.00 lb/MWh

[15] http://www.epa.gov/airmarkets/egrid/index.html
[16] http://homeenergysaver.lbl.gov/


Turbine: Large Combined Cycle, SCR
Turbine: Large, Simple Cycle
Turbine: Microturbine
Turbine: Small, Simple Cycle
Turbine: Medium, Simple Cycle
Turbine: ATS Simple Cycle
Fuel Cell: Solid Oxide
Fuel Cell: Phosphoric Acid
Engine: Gas fired, Lean Burn
Engine: Gas fired, 3-way catalyst
Engine: Diesel
Engine: Diesel, SCR
U.S. Average Coal Generation
U.S. Average Fossil Generation
U.S. Average All Generation
0.1
0.59
0.4
1.1
0.6
0.3
0.01
0.03
2.2
0.5
21.8
4.7
5.6
5.1
3.4
NOx limits proposed by DR Emissions Working Group for CHP applications
2003 through 2005 (0.485 lb/MWh)
2006 through 2008 (0.285 lb/MWh)
2009 and after (0.11lb/MWh)
-
5
10
15
20
25


Turbine: Large Combined Cycle, SCR
Turbine: Large, Simple Cycle
Turbine: Microturbine
Turbine: Small, Simple Cycle
Turbine: Medium, Simple Cycle
Turbine: ATS Simple Cycle
Fuel Cell: Solid Oxide
Fuel Cell: Phosphoric Acid
Engine: Gas fired, Lean Burn
Engine: Gas fired, 3-way catalyst
Engine: Diesel
Engine: Diesel, SCR
U.S. Average Coal Generation
U.S. Average Fossil Generation
U.S. Average All Generation
0.04
0.07
0.09
0.08
0.07
0.07
-
-
0.03
0.03
0.78
0.78
0.30
0.27
0.19
PM-10 limits proposed by DR Emissions Working Group for CHP applications
2003 through 2005 (0.08 lb/MWh)
2006 through 2008 (0.05 lb/MWh)
2009 and after (0.02 lb/MWh)
-
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

We appreciate the difficulty of balancing environmental sustainability and economic efficiency; and, we share the "working group's" concerns with regard to the unregulated use of uncontrolled diesel gensets. Technologies to convert these gensets to dual-fuel operation are presently under development[17] and should be available to significantly and cost-effectively reduce diesel emissions. Yet these technologies do not appear to be on your "radar screen" for some reason. Regardless, the emissions levels being proposed would disallow these state-of-the-art technologies. This is not balance. This is counterproductive.

Given the numerous attributes of DG, emissions limits should arguably be no stricter than those required of conventional power plants and/or set in a manner that lowers grid-average emissions over time as significantly cleaner DG (versus only the cleanest DG) is deployed. Otherwise, overly strict DG permits will only serve to perpetuate conventional power plants with higher environmental degradation while squandering finite energy resources.

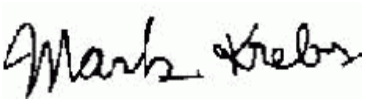
Given the numerous attributes of DG, emissions limits should arguably be no stricter than those required of conventional power plants or at least established in a manner that lowers grid-average emissions over time as significantly cleaner DG (versus only the cleanest DG) is deployed. Otherwise, overly strict DG permits such as these will only serve to perpetuate conventional power plants and the increased pollution thereof.

H.R.1335, entitled the "Clean Power Plant Act of 2001," introduced in the House by Maine Congressman Tom Allen, provides what appear to be reasonable emissions limits for power plants over 15 MW. These limits are specified in Sec. 4, which is attached for your reference on the last page.

Based upon these proposals, in conjunction with an ongoing 1) disregard of Joel Bluestein's analyses, 2) disregard of heat recovery opportunities and 3) disregard of a myriad of real-world fuel-cycle issues, it is easy to conclude that the "working group" has an "electro-centric" agenda that is extremely prejudiced against the direct use of natural gas and stands as yet another a prime example of the downside of bureaucratic largesse.

In the unlikely event that the "working group" wants to change its thinking on these matters, AGCC offers its support. I can be contacted at (314) 342-0714 or via the following e-mail address: mekrebs@i1.net

Sincerely,



CC (DOE):

David Garman	Gary Burch	Monica Lamont	Robert Dixon	Bill Parks	Ron Fiskum
Eric Lightner	Pat Hoffman	Joe Galdo	Phil Overholt	Dave Bassett	Imre Gyuk
Gerri Paige	Gil Bindewald	Debbie Haught	Merrill Smith		

CC ("working group")

Rick Weston	Ed Garvey	Brock Nicholson	William Taylor	Nathanael Greene	Roger Hamilton
Nancy Seidman	Alison Silverstein	Janet McCabe	William Keese	Jim Lents	Frederick F. Butler
Chris James	Jim Burg	Ron Methier	Wm. Steinhurst	Eric Heitz	Linda Taylor
Tom Basso	John Farrow	Paul Burks	Fred Hoover	Eric Wong	Michael Glenn
Carl Weinberg	Terry Harvill	Nancy Sutley	Ethan Rogers	Joe Bryson	Joel Bluestein

CC (EPA)

John Seitz	Bob Rose	Skip Latiner

[17] http://www.cat-dual-fuel.com/resources.htm

H.R.1335
Clean Power Plant Act of 2001

SEC. 4. AIR EMISSION STANDARDS FOR FOSSIL FUEL-FIRED GENERATING UNITS.

Section 111 of the Clean Air Act is amended by adding the following new subsection at the end thereof:

(k) EMISSION RATES FOR CERTAIN FOSSIL FUEL-FIRED ELECTRIC GENERATING UNITS-

(1) IN GENERAL- In addition to other requirements applicable under this section to such units, emissions of air pollutants from each fossil fuel-fired electric generating unit that is a new source or an existing source for purposes of this section shall not exceed the following:

(2)

(A) MERCURY- Mercury emissions shall not exceed 10 percent of the mercury otherwise present in the flue gas. Not later than 2 years after the date of enactment of this subsection, the Administrator, in consultation with the Secretary of Energy, shall promulgate methods for determining initial and continuing compliance with this subparagraph and fuel sampling techniques and emission monitoring techniques for use by generating units in calculating mercury emission reductions for the purposes of this subparagraph.

(B) SULFUR DIOXIDE- Sulfur dioxide emissions shall not exceed 3.0 pounds per megawatt hour and total annual sulfur dioxide emissions shall not exceed 3.0 pounds multiplied by the average megawatt hours generated by the unit in the calendar years 1998 through 2000.

(C) NITROGEN OXIDES- Nitrogen oxide emissions shall not exceed 1.5 pounds per megawatt hour and total annual emissions of nitrogen oxides shall not exceed 1.5 pounds multiplied by the average annual megawatt-hours generated by the unit in the calendar years 1998 through 2000.