The Alliance for Industrial Efficiency

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Hearing on "Energy Tax Prevention Act of 2011"
House Committee on Energy and Commerce
Subcommittee on Energy and Power

February 9, 2011

Chairman Upton, Subcommittee Chairman Whitfield, Ranking Member Waxman, and other members of the Committee, thank you for the opportunity to testify on this important topic. The focus of my testimony will be on the prominent role energy efficiency plays in the Environmental Protection Agency's (EPA) approach to regulating greenhouse gas emissions and the advantages of this approach for US manufacturers.

I am the Executive Director of the Alliance for Industrial Efficiency, a diverse coalition that includes representatives from the business, environmental, labor and contractor communities. The Alliance is committed to enhancing manufacturing competitiveness, reducing emissions, and creating jobs through industrial energy efficiency, especially through the use of Waste Heat Recovery (WHR) and Combined Heat and Power (CHP).

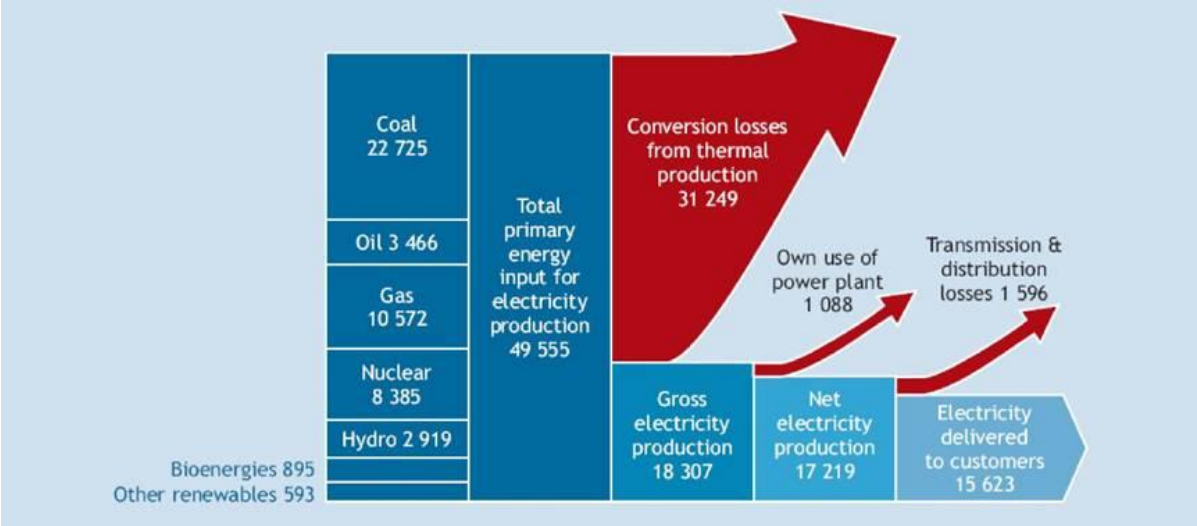
As McKinsey and Company has recognized: "Energy efficiency offers a vast, low-cost energy resource for the U.S. economy – but only if the nation can craft a comprehensive and innovative approach to unlock it."[1] EPA's GHG Guidance provides this innovative approach. The EPA rules will create opportunities for the largest factories and power plants to identify ways to become more efficient – and save money over their operating lifetimes. The rules will drive installation of proven technology that will enhance America's manufacturing competitiveness.

Waste Heat Recovery and Combined Heat and Power will Make American Manufacturing More Competitive

Conventional power generation is incredibly inefficient and has changed little since the days of Thomas Edison. As the following graphic illustrates, roughly two-thirds of energy inputs (68 percent) are simply emitted into the air under conventional approaches, with a mere 32 percent actually delivered to customers:

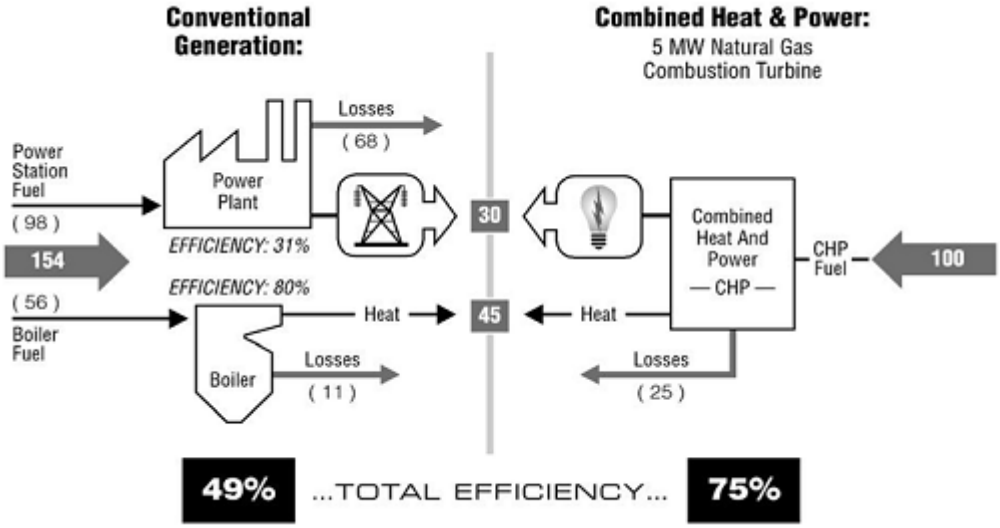
[1] McKinsey & Company, July 2009, "Unlocking Energy Efficiency in the U.S. Economy," at 1 (http://www.mckinsey.com/clientservice/electricpowernaturalgas/downloads/us_energy_efficiency_full_report.pdf).

FIGURE 1: Losses from Conventional Power Generation[2] (TWh)



Perpetuating energy waste is a mistake. By capturing and reusing this waste heat, Waste Heat Recovery (WHR) and Combined Heat and Power (CHP) convert what would otherwise be wasted energy into additional electricity and thermal energy (heat). This dramatically increases fuel efficiency – allowing utilities and companies to effectively "get more with less." As Figure 2 illustrates, total fuel use is significantly greater with conventional separate heat and power generation (here 154 units) than it is under Combined Heat and Power (here 100 units).

FIGURE 2: CHP System Efficiency[3]



[2] International Energy Agency, 2008, "*Combined Heat and Power: Evaluating the benefits of greater global investment,*" at 6 (Figure 3) (http://www.iea.org/papers/2008/chp_report.pdf).

[3] US EPA, "Output-Based Environmental Regulations Fact Sheet" (http://www.epa.gov/chp/state-policy/obr_factsheet.html) (Note that this figure is for illustration only. CHP performance relative to separate heat and power depends on numerous site- and project-specific factors).

WHR and CHP offer a scalable, off-the-shelf technology that can provide enormous amounts of clean, low cost power. According to the U.S. Department of Energy's Oak Ridge National Laboratory, CHP could supply 20 percent of U.S. electric capacity by 2030, thereby helping to create jobs and save industry money. Under this scenario, WHR and CHP can produce 156 gigawatts (GW) of new, clean power by 2030 – equal to the capacity of more than 300 conventional power plants.[4] Moreover, full deployment of these technologies could reduce CO_2 emissions by more than 800 million metric tons per year – the equivalent of removing more than half of the current passenger vehicles from the road.[5] These reductions not only have obvious environmental benefits, but also enhance manufacturing competitiveness by reducing costs.

The economic savings of energy efficiency are evident at ArcelorMittal's Northern Indiana steel plant where Waste Heat Recovery projects capture and harness the manufacturer's waste heat to generate 220 megawatts of power[6] – more clean electricity than all the solar panels connected to the U.S. electric grid. Recycling energy saves the plant $100 million annually,[7] while reducing carbon emissions by the equivalent of removing 166,000 cars from the road.[8] In part because of these savings, this was the only ArcelorMittal facility to remain in full operation throughout the recession.

WHR and CHP facilities can use the money they save on energy to expand labor and production. Take, for example, West Virginia Alloy, the country's largest silicon producer. For more than 75 years, West Virginia Alloys has melted quartz rock, converting it into silicon metal while venting its 1,400° F waste heat into the atmosphere. Their new project will recycle this heat to create 65 megawatts of pollution-free power, saving the company millions each year. West Virginia Alloys plans to use the savings to build a new (sixth) furnace, increasing both production and employment by 20 percent – and taking a key step to help bring silicon manufacturing back from overseas.[9]

Indeed, WHR and CHP can fuel job creation nationwide. The Oak Ridge National Laboratory finds that a robust investment in CHP could create nearly 1 million new, highly-skilled technical jobs across the country.[10] These workers would be responsible for the construction, installation and maintenance of CHP equipment – as energy recycling equipment is manufactured right here in the United States. By identifying WHR and CHP as available control options, EPA's GHG

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[4] Estimate assumes typical power generation of 500 MW from a traditional coal-fired power plant.
[5] Oak Ridge National Laboratory (ORNL), Dec. 1, 2008, *Combined Heat and Power: Effective Energy Solutions for a Sustainable Future*, at 4 (http://www1.eere.energy.gov/industry/distributedenergy/pdfs/chp_report_12-08.pdf).
[6] Primary Energy Recycling Corp (PERC) website (reporting a combined 220 megawatts of installed capacity; calculation of thermal energy based on energy content of reported steam capacity) (http://www.primaryenergyrecycling.com/projects.htm).
[7] Chris Steiner, "Gray is the New Green," *Forbes*, Sept. 15, 2008 (http://www.forbes.com/forbes/2008/0915/054_2.html).
[8] Thomas R. Casten, Aug. 2008, "Profitably Reducing Greenhouse Gas Emissions," at 3 (http://www.recycled-energy.com/_documents/media-kit/RED-ReducingBroch.pdf).

Guidance helps jumpstart this investment, reducing energy costs and creating employment opportunities for America's manufacturing sector.

EPA's Greenhouse Gas Rules

The Alliance for Industrial Efficiency has applauded EPA's PSD and Title V Permitting Guidance for Greenhouse Gases (hereinafter "BACT Guidance"). The Guidance would provide a significant boost to energy efficiency and productivity at US manufacturing facilities. The BACT Guidance reflects EPA's pragmatic, common-sense approach to regulating GHG emissions. It requires facilities to adopt Best Available Control Technology (BACT), taking economic, energy, environmental and other costs into consideration. Because regulators are explicitly told to look closely at the cost effectiveness of control technologies, burdensome requirements will not be imposed on regulated entities. To the contrary, EPA has made clear that energy efficiency is the centerpiece of its compliance strategy.

EPA has adopted reasonable standards for emitting sources. The Guidance simply requires facilities to adopt "technically feasible" and proven control options. Of note, EPA's Guidance explicitly recognizes the benefits of WHR and CHP. It mentions WHR and CHP in the Guidance itself;[11] the example in Appendix H (where waste heat recovery is identified as BACT); and in each of the accompanying white papers, which explicitly mention CHP/ waste heat recovery as available technologies for each of the covered sectors.[12] Indeed, as elaborated above, WHR and CHP have a significant role to play in reducing greenhouse gas emissions.

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[11] *See, e.g.,* US EPA, Office of Air and Radiation, EPA–HQ–OAR–2010–0841; FRL–9228–2, Nov. 2010, "PSD and Title V Permitting Guidance for Greenhouse Gases," at 31 (hereinafter "BACT Guidance") ("Furthermore, combined cycle combustion turbines, which have higher efficiencies than simple cycle turbines, should be listed as options when an applicant proposes to construct a natural gas-fired facility").

[12] *See, e.g.,* US EPA, Office of Air and Radiation, Oct. 2010, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Industrial Commercial, and Institutional Boilers," at 10 (Table 1) (identifying Combined heat and power as an "applicable" technology for all boilers) (http://www.epa.gov/nsr/ghgdocs/iciboilers.pdf); US EPA, Office of Air and Radiation, Oct 2010, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Pulp and Paper Manufacturing Industry," at 11 (Table 3) ("List of Control Measures and Energy Efficiency Options" identifies various heat recovery technologies) (http://www.epa.gov/nsr/ghgdocs/pulpandpaper.pdf); US EPA, Office of Air and Radiation, Oct. 2010, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Iron and Steel Industry," at 9-10 (Table 1) (identifies heat recovery as a technology used in steel production) & 31 ("All steel plants require both electricity and steam to operate, which make them good candidates for combined heat and power (CHP), also known as cogeneration.") (http://www.epa.gov/nsr/ghgdocs/ironsteel.pdf); US EPA, Office of Air and Radiation, Oct. 2010, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Coal-Fired Electric Generating Units," at 28 (Exhibit 3-1) (identifying several heat-recovery technologies as a technology being used at existing utilities) (http://www.epa.gov/nsr/ghgdocs/electricgeneration.pdf); US EPA, Office of Air and Radiation, Oct. 2010, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Portland Cement Industry," at 10 (Table 3) (listing "Heat recovery for power – cogeneration" as an available control measure) (http://www.epa.gov/nsr/ghgdocs/cement.pdf); US EPA, Office of Air and Radiation, Oct. 2010, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Petroleum Refining Industry," 14-19 (Table 1) & 27 ("The large steam requirements for refining operations and the continuous operations make refineries excellent candidates for combined heat and power (CHP) generation.") (http://www.epa.gov/nsr/ghgdocs/refineries.pdf); US EPA, Office of Air and Radiation, Oct. 2010, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Nitric Acid Production Industry," at 13 &

New construction of manufacturing facilities and energy efficiency modifications to existing facilities will continue under EPA's GHG rules. States and the companies they regulate are ready to begin this process. As the National Association of Clean Air Agencies (NACAA) reports, every state but one is poised to issue BACT permits.[13] Moreover, EPA is ready to serve as a partner in implementation. The Guidance and accompanying White Papers provide examples of available control technologies. EPA has already created a database of permitted technologies for electric utilities and cement production,[14] which should be expanded over time to reflect Best Available Control Technologies across different sectors. To the extent regulated entities need assistance identifying appropriate technologies, the network of DOE's Clean Energy Application Centers are well positioned to provide this guidance.[15] Each of these tools reduces the purported "uncertainty" surrounding the permitting process.

While EPA's GHG regulation is in its early stages, the reasonableness of the process is evident in the recent experience of Calpine Corporation's Russell City Energy City in San Francisco, California, the first major power plant subject to federally enforceable greenhouse gas limits. Anticipating new EPA GHG regulations under the Clean Air Act, Calpine Corporation asked regulators to included GHG limits in its Prevention of Significant Deterioration (PSD) permit. During the permitting process, the local regulatory agency (Bay Area Air Quality Management District – BAAQMD) concluded that energy efficiency, particularly high-efficiency generating equipment was the only suitable set of technologies for the facility.[16] BAAQMD dismissed infeasible proposed emissions controls, such as carbon capture and bio-sequestration. Nor did BAAQMD require Calpine to consider redesigning the facility to run on wind or solar power (despite requests by area environmental organizations). Rather, the regulators worked to develop fair, effective, and economical standards in granting permits. Calpine opted to install a combined cycle natural gas turbine, a type of waste heat recovery system, which reuses exhaust heat to generate additional electricity. Significantly, this approach will create 650 construction jobs and

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14 ("energy recovery is a valuable resource for these facilities"; "bottoming cycle combined heat and power (CHP) could also be used for energy recovery at nitric acid plants.") (http://www.epa.gov/nsr/ghgdocs/nitricacid.pdf).

13 *See* National Association of Clean Air Agencies, October 28, 2010, "GHG Permitting Programs Ready to Go by January 2nd" ("[E]very state but one is poised to ensure that sources can obtain preconstruction permits under the Clean Air Act come January 2, 2011") (http://www.4cleanair.org/Documents/NACAAGHGSIPCallletterssummaryfinal.pdf).

14 US EPA, Greenhouse Gas Mitigation Strategies Database, Version 1.0 (visited Dec. 1, 2010) (http://ghg.ie.unc.edu:8080/GHGMDB/).

15 *See* DOE, Industrial Distributed Energy website for more information on Clean Energy Application Center locations and contacts (http://www1.eere.energy.gov/industry/distributedenergy/racs.html). *See* also US EPA, Office of Air and Radiation, Oct 2010, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Pulp and Paper Manufacturing Industry," at 19 (highlighting available government resources: "For example, the U.S. EPA's Combined Heat and Power Partnership provides information on CHP technology basics, guidance for streamlining CHP projects, information on federal and state policies and incentives, CHP feasibility assessment tools, and a database of funding resources. The U.S. DOE's CHP Regional Application Centers provides educational assistance and project-specific support in eight different U.S. regions, including project development and screening tools; technical assistance and training; information regarding issues related to permitting, utilities, and siting; and case studies.") (http://www.epa.gov/nsr/ghgdocs/pulpandpaper.pdf).

16 EPA, Office of Air and Radiation, "GHG BACT Analysis Russell City Energy Center Case Study, 2010. (http://www.epa.gov/oar/caaac/pdfs/RCEC_GHG_BACT_Analysis_Case_Study.pdf).

add millions in taxable revenue for the City of Hayward.[17] These job-creation benefits did not go unnoticed. In fact, Kim Huggett, president and CEO of the Hayward Chamber of Commerce, declared, "The Russell City Energy Center will be a magnet for bringing new business to Hayward."[18] Jack Fusco, president and CEO of Calpine, joined leaders from other utilities, reaffirming the economic benefits of the GHG permitting process, in a letter to the Wall Street Journal stating: "Contrary to the claims that the EPA's agenda will have negative economic consequences, our companies' experience complying with air quality regulations demonstrates that regulations can yield important economic benefits, including job creation, while maintaining reliability."[19]

Through the tailoring rule, EPA has directed its regulation of GHGs toward the largest emitters. By focusing on these sources, EPA has limited regulation to facilities that already have experience complying with Clean Air Act rules. The Alliance for Industrial Efficiency supports this approach.

BACT compliance will create opportunities for factories and power plants to identify ways to become more efficient and save money over their operating lifetime. Indeed, potential savings in industrial energy use (and associated greenhouse gas emissions) are vast as the industrial sector is responsible for about one-third of total US energy demand.[20] BACT creates an opportunity for facilities to assess their processes and identify more efficient technologies to reduce emissions and save energy. This "introspection" will ultimately make regulated companies more competitive.

EPA is further advancing energy efficiency in its regulation of GHGs by "encourage[ing] permitting authorities to consider establishing an output-based BACT emissions limit, or a combination of output- and input-based limits, wherever feasible and appropriate."[21] Traditional "input-based" regulations set emission limits based on the amount of fuel used (e.g., pounds of pollutant per million BTUs). Output-based limits, however, are expressed as emissions per unit of useful energy output (e.g., pounds per megawatt hour). This rewards generators that have the highest "output" of megawatt hours and the lowest "output" of pollutants. EPA has adopted several output-based

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[17]Calpine, Russell City Energy Center Fact Sheet (http://www.russellcityenergycenter.com/wp-content/uploads/2009/09/fact-sheet-909.pdf).

[18] Calpine Corporation, Nov. 18, 2010, Press Release: Russell City Energy Center on Track for Construction Following Decision by Federal Environmental Appeals Board (http://phx.corporate-ir.net/phoenix.zhtml?c=103361&p=RssLanding&cat=news&id=1498689).

[19] Dec. 18, 2010, The Wall Street Journal, "We're OK With the EPA's New Air-Quality Regulations" (http://online.wsj.com/article/SB10001424052748703989004575653040755204932.html?mod=WSJ_Opinion_MIDDLEThirdBucket#articleTabs%3Darticle),

[20] *See* US Energy Information Administration, Aug. 19, 2010, Rep. No. DOE/EIA-0384(2009), "Annual Energy Review 2009," (Table 2.1a Energy Consumption by Sector, Selected Years, 1949-2009); *see also* US Energy Information Administration, May 25, 2010, Report #: DOE/EIA-0484(2010), "International Energy Outlook 2010 – Highlights" ("The industrial sector uses more energy globally than any other end-use sector, currently consuming about 50 percent of the world's total delivered energy.") (http://www.eia.doe.gov/oiaf/ieo/highlights.html).

[21] BACT Guidance. at 46. See also *id.* at 38 (noting that for "combustion sources, it may be more appropriate to rank control options based on output-based metrics that would fully consider the thermal efficiency of the options when determining control effectiveness").

emissions standards,[22] and has issued guidance encouraging states to adopt the same.[23] We appreciate that EPA has reaffirmed its interest in output-based standards in the Guidance,[24] and believe that this will further elevate energy efficiency as a compliance option.

Looking Forward

The Alliance for Industrial Efficiency is committed to making US manufacturers more competitive through industrial efficiency. We are pleased to see that EPA's GHG Guidance acknowledges the critical role that efficiency can play in reducing emissions and we believe EPA's regulation of GHG emissions can provide a valuable tool to help spur investments in industrial energy efficiency that will in turn expand American manufacturing and jobs.

Representative Upton's "Energy Tax Prevention Act of 2011" will hinder important investments in energy efficiency such as WHR and CHP. EPA's focus on energy efficiency as the primary method of reducing greenhouse gases will create new investments in manufacturing that will make America more competitive. We urge the Committee not to move forward with efforts to block these rules, but instead to focus on legislation to help manufacturers capture the tremendous opportunity from industrial energy efficiency. We urge the Committee to develop a Clean Energy Standard that includes industrial WHR and CHP. In addition, the Congress should expand existing tax incentives for these investments similar to that proposed in the last Congress by Representatives Heller, Paul, Inslee, and Tonko. In this way, Congress will complement EPA's efforts, driving new investment and job creation in America's manufacturing sector.

Thank you for the opportunity to testify.

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[22] EPA has used an output-based approach for the new source performance standards (NSPS) for NOx from utility boilers, NSPS for mercury from coal-fired utility boilers, and cement kilns. For instance, the most recent *New Source Performance Standards for Stationary Gas Turbines* ([EPA–HQ–OAR–2004–0490, FRL–8033–4], RIN 2060–AM79, p. 38483) provides turbine owners with the option of using an output-based standard for calculating NOx emitted per unit of useful recovered energy. In its final NESHAP rule for the Portland Cement Manufacturing Industry ([EPA-HQ-OAR-2007-0877]; RIN 2060-AO42), EPA proposed an output-based methodology for PM, NOx and SO_2.

[23] *See* US EPA, Aug. 2004, "Output-Based Regulations: A Handbook for Air Regulators" (http://www.epa.gov/chp/documents/obr_final_9105.pdf).

[24] *See, e.g.* BACT Guidance at 38 ("In particular, where the output of the facility or the affected source is relatively homogeneous, an output-based standard (*e.g.*, pounds per megawatt hour of electricity, pounds per ton of cement, etc.) may best present the overall emissions control of an array of control options.").