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Unlocking America's Energy Resources: Next Generation

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Mr. Chairman and Members of the Committee, thank you for inviting me to testify. Today's topic is an important one and I am glad to represent the distributed energy point of view. Today's high fuel prices and energy security concerns highlight the importance of looking beyond centrally-fired power plants for solutions to meet our future electricity needs.

I am appearing here today in my capacity as President of Cummins Power Generation. Cummins Power Generation, a subsidiary of Cummins Inc. (NYSE: CMI), is a global leader in the production and supply of power generation equipment, with specific focus on increasing the availability and reliability of environmentally responsible electric power around the world. With over 80 years' experience, we deliver cost-effective power solutions for a wide variety of customers – commercial and industrial businesses, recreational users, emergency responders, government agencies, utilities, and homeowners -- through our global distribution network. Our products include engines, alternators, generator sets, and systems including power control and power transfer technologies. Our services range from system design, project engineering and management, large scale temporary power projects, and operation and maintenance

contracts. We also operate several small scale power plants providing electrical power as well as hot or chilled water derived from waste heat.

Distributed energy (DE) is electrical energy that is produced at or near the site where the energy is consumed. DE is not one technology – it can be produced by generator sets using diesel or natural gas and increasingly other fuels like biomass, biodiesel, ethanol, or hydrogen. DE can also include emergent technologies such as fuel cells, wind turbines or solar. DE performs a number of important roles for power consumers and utilities including: emergency standby power to increase reliability, prime power where power is unavailable, peaking power to reduce the load on the grid at times of peak usage, the opportunity to utilize combined heat and power to reduce their total energy costs, and as protection against line or substation failure in a distribution grid.

It is estimated that there are approximately 160 gigawatts of emergency standby power installed in the US. There are also approximately 11 gigawatts of baseload distributed energy and another 6.5 gigawatts of distributed energy being used to meet utility peaking needs. It is also worth noting that in the US there are approximately 30 gigawatts of combined heat and power plants of less than 100 megawatts.

While these numbers are impressive, they are far short of the potential opportunities for DE. In one market study at Cummins, we estimated an additional market potential of 150 gigawatts for combined heat and power (CHP) installations below 100 megawatts in the commercial and industrial sectors. We believe the market opportunity is larger when you

consider opportunities to expand the use of other types of DE. It is worth noting that favorable government policies in Europe have allowed DE technologies to enjoy far greater success in the marketplace. DE technologies account for approximately 13% of the electricity generated in Europe, more than double their penetration in U.S. markets.

The benefits of DE are numerous. It is energy efficient, it bolsters grid reliability, and provides backup power at the point of use when the grid fails. DE is also environmentally sound. In some situations it can also be a source of lower cost power. DE protects some of our nation's critical infrastructure including water and sewage treatment, emergency communications equipment, oil refineries, nuclear power plants, financial data centers and much more.

During emergencies like last year's hurricanes or the Northeast blackout of 2003, DE played a critical role in assuring first responders could do their jobs and critical facilities like hospitals continued to function. DE assured that communication systems continued to operate and that critical information, such as the financial data that underpins the banking system, was secure. It kept businesses running and mitigated the economic impact of these disasters. As a result of their investment in DE, many oil refineries were also able to continue to operate, gasoline distribution centers were able to load fuel into trucks, and gasoline was made available to consumers. Unfortunately, not everyone made such investments and there were interruptions in the fuel delivery system.

I would like to highlight a few specific cases of how distributed power provided critical support to Cummins customers during Hurricane Katrina and the Northeast blackout.

When any major weather event is predicted for the US, Cummins Power Generation and its distributors begin to prepare a storm response. In the case of Hurricane Katrina our response involved twice daily conference calls (every day for 9 weeks), to organize the marshalling not only of generating assets, but technicians, distribution equipment and fuel. To respond to the national emergency, generating equipment was relocated from around the country, and from Canada and Mexico. We estimate we deployed in excess of 160MW to the region. Some of that equipment remains in place today. We are proud of our ability to mobilize generating equipment in this manner; however, permanent DE installations would have provided better protection for the region.

A hospital that did have emergency DE in place, is Turro Infirmary in Kenner, LA. Turro Infirmary is one of the hospitals in the New Orleans area that managed to keep operating during Katrina on backup power. After the storm, the hospital recognized the value of having sufficient and reliable emergency power and has decided to upgrade its system by replacing generators that were over 50 years old with new Cummins Power Generation units so that it will continue to be well-prepared for the next emergency.

The communications industry has also realized the benefits of reliable backup power. Verizon Wireless installed Cummins generators at its cell towers and major switching stations in upstate New York. During the blackout of 2003, while some people stood in

long lines at pay phones, these generators meant that Verizon wireless customers continued to have uninterrupted wireless access throughout the emergency.

Also during the blackout, Cummins generators enabled New York Mayor Michael Bloomberg to respond to the blackout because New York City Hall was supported by a Cummins emergency standby system keeping the lights on, the computers running and building systems operating. All airports have standby generation to power air traffic control systems and runway lighting, but at Newark Liberty Airport, a Cummins standby power system provided uninterrupted power to the entire airport terminal throughout the outage making travelers much more comfortable with air conditioning and lighted bathrooms. Water systems and sewage treatment facilities stopped working in Detroit, Cleveland and several other cities in the affected area, but in Mississauga, Ontario, outside of Toronto, a Cummins Power Generation prime power system kept the sewage and water system operating for the city's 800,000 residents.

Beyond emergencies, DE makes important contributions to grid reliability. For example, each summer Cummins places 168 megawatts of power in the Northeast to help utilities meet their seasonal peak. This is made up of two large projects, 72 megawatts at FirstEnergy in New Jersey and 96 MW at Long Island Power Authority.

At FirstEnergy our portable diesel generators are used to provide reliability support to the grid. During peak periods the generators are started, relieving constraints and lowering the chance of a system failure. This past fall 40 of those units were unhooked from the

grid and moved to areas affected by the hurricanes. These generators provided emergency power to hospitals, like Forest General Hospital in Hattiesburg, MS; water systems, like Veolia Water Works in Kenner, LA; and to support FEMA operations. They were recently moved back to First Energy to be in place to meet this summer's peaking requirements.

The 96 MW's of Cummins generating capacity on Long Island provide reliability support to the local power grid to fill a gap between electricity supply and demand until new transmission capacity can be built to meet the needs of Long Island. Without this support from DE, on peak days, Long Island would have a serious electricity shortfall. Importantly, stringent emission control standards were applied to this project. Each 2 MW containerized generator is equipped with state-of-the-art emissions control technology designed to meet New York Department of Environmental Conservation's stringent air quality standards. The emissions control technologies applied to this site, along with the use of ultra-low sulfur fuel, resulted in more than 90% reduction in nitrogen oxide, carbon monoxide and particulate matter. The control package utilized on the generators reduces emission output to levels that are better than EPA Tier III standards.

Additionally, DE makes important contributions in the area of efficiency. Using DE in combined heat and power configurations (CHP) leads to very high efficiencies by using heat normally wasted in the electric generation process to do useful work, such as heating, air conditioning or serving industrial processes. An example of this benefit is a

CHP system installed by Cummins at American Honda's corporate headquarters in Torrance, California. That project is saving the company 30% annually on its total campus energy expenditures. In addition to the energy savings, the CHP system allows American Honda to demonstrate corporate leadership and environmental responsibility. As the ethanol industry in the US continues to develop, it is looking increasingly to install CHP plants to support its production facilities.

One of the areas that could most benefit from distributed power technologies is utilizing landfill gas to generate electricity. Cummins has installed a landfill gas to energy plant at the Viridor Waste Management landfill in Dunbar, Scotland allowing a nearby cement plant to obtain a significant portion of its power demand at lower costs than can be supplied by the local utility. The Viridor plant not only allows the cement plant to save on its energy costs, but harnesses the methane gas produced by the landfill which when flared into the atmosphere has about twenty times the greenhouse effect of carbon dioxide. This project is also an example of how favorable government policies can encourage deployment of these highly efficient technologies. The project was eligible for increased revenue in the form of Renewable Obligation Certificates, a UK government trading program to encourage development of renewable energy projects making the cost of power from such sources more competitive. The Certificates allow Viridor Waste Management to invest in the environmentally friendly waste-to-energy project and supply cheaper electricity to the cement plant and still make money on the project.

The benefits DE provides to our nation's energy infrastructure are undeniable. Those benefits go beyond the individual benefits received by the owners or users of the DE asset – but benefit all Americans through enhanced reliability, efficiency, and critical infrastructure protection. However, more often than not, Federal and state policies treat DE as a burden to the electrical system rather than a benefit. DE technology advancements are also limited because of a lack of Federal research and development funding. Further, connecting DE technology to the grid is difficult because interconnection requirements are often inconsistent and expensive to implement. In addition, tax policy does not favor CHP as it does other clean efficient sources of electricity by giving production tax credits for the benefits it provides.

The traditional drivers for DE are being magnified by current global trends. Higher fuel costs, climate change initiatives and a push for environmental stewardship, and homeland security concerns all point to the use of increased use of DE to secure and ensure the viability of continued energy supply into the future. However, unless the US adopts policies that create a favorable marketplace for DE, the technologies will continue to struggle and much of the electricity generating capacity available in the US will not be allowed to feed back on to the grid. I am concerned that, as a result of less favorable policies toward DE, its adoption rate has been slowed and this has been to the detriment of our power sector and the security of our critical infrastructure.

What does DE need to reach its full potential? We believe there are four policy areas that the government could adopt to allow the country to reap the full benefits of DE

technologies: increased Federal R&D funding for DE technologies, a review of backup power requirements for critical infrastructure, tax policies that favor CHP, and national uniform interconnection standards.

Federal Funding for DE R&D

There are potential technological breakthroughs that could have a significant effect on the efficiency, reliability and emissions from generators that run on natural gas, biomass and similar fuels. Federal funding to ensure that these technologies are developed rapidly could have a major positive impact on fuel consumption and emissions in the near or medium term. Federal funding, particularly through the Department of Energy, also ensures that the best research by all competitors in the field is brought together to get results more quickly and to define how DE can contribute most effectively to the grid.

Similarly, federally funded research on fuel cells for power generation applications has already resulted in significant breakthroughs on this important technology. However, significant work remains to be done before this technology will be able to meet the performance and cost targets required for it to have an impact in our country.

With the progress that has been made to date, it is critical that funding not be stopped mid-stream or we will lose the benefits we have gained. These are technologies that can help us fulfill a number of our critical priorities: low cost and reliable energy infrastructure: diversifying our fuels to reduce dependence on any single fuel; improving the security of our critical infrastructure; using more renewable fuels; and improving the

efficiency and reducing the emissions of our power sources. Moreover, these technologies can contribute to these goals in the near or medium term rather than the distant future. We must continue our research focus on DE.

Last year, this Committee worked to develop the Energy Policy Act of 2005 (EPAct). That legislation authorized $730 million to be spent on DE technology and policy development over the next three years. Unfortunately, the Administration has not requested funding at any where near that level for FY07. In FY 2006, DOE allocated approximately $60 million for DE work. For FY 2007, it requested only $30 million. As Congress finishes the FY07 Appropriations process it should provide additional funding for DE research and development. Without full funding, progress on DE will remain limited. Key programs may be ended short of their goals and other programs will not begin at all.

One example of the type of work DOE is doing with respect to DE is the Advanced Reciprocating Engine Systems (ARES) program. Three engine manufacturers, including Cummins, participate in this cost-shared program. The goal of the program is to develop a cleaner, more efficient natural gas reciprocating engine. These engines are workhorses of the industry, used in nearly every DE application. While making these engines more efficient doesn't sound as glamorous as technologies using unconventional energy sources, if the goals of the ARES program are achieved and our estimates of market demand are correct, there will be a fuel saving of 491 trillion Btu's of natural gas, NOx emissions will be reduced by 170,000 tons, and 26 million tons of CO2 will not be

emitted into the atmosphere over a ten year period. To make this point another way, for every 10GW of ARES products deployed, over 100 trillion Btu's of energy will be saved, reducing oil consumption by 17.2 million barrels annually. We think this is an important program and appreciate DOE's continued support.

ARES is just one of the many programs industry and DOE are working on to encourage advancement of DE technologies and market penetration of those technologies. Other important DE programs include the Gridwise Architecture Board, DOE Regional Application Centers that promote CHP implementation, and DOE's Landfill Methane Outreach and Coal Bed Methane Outreach Programs that promote the useful and environmentally friendly utilization of these waste energy sources nationwide.

Another area where there is work to be done to advance DE technology is on microgrids. Microgrids are defined as single or multiple clean distributed power resources serving multiple customer loads (e.g., residential subdivision, mixed-use residential and commercial centers, business and industrial parks). Microgrids can provide cost savings and enhanced reliability to consumers while simultaneously making the grid more robust to outages caused by nature and security breaches. In the event of such disasters, microgrids because of their capability to operate in an "island mode" can help restore the power grid more rapidly.

Microgrid research and development has positioned the concept for real world application. R&D is currently funded by DOE and the California Energy Commission

and is aimed at studying the interaction of distributed resources with the grid, performance of power electronics, and the seamless transitioning of the microgrid when necessary between "island" and "normal" or "parallel" operations with the utility grid. It is imperative that funding for such programs be continued and expanded.

Internationally, Cummins Power Generation is working to develop DE technology that uses a variety of readily-available biofuels. In India, Cummins is working with the Indian Institute of Science on technologies that use wood chips, rice husks and coconut shells, among others things, to generate electricity in a distributed form. We are using this technology to support rural electrification in India. These small scale systems (20-40KW) power entire villages providing new economic opportunities to areas that would otherwise be unserved by the grid. Globally, biofuels are becoming an increasingly important source of feedstock for power generation. Increased use of these fuels will help dampen growing worldwide demand for petroleum. These international programs highlight the additional research that is necessary to enable DE power generation to fully realize the benefits of biofuels.

Critical Infrastructure Backup Power Requirements

Congress should consider expanding the role that DE technologies play in assuring our homeland security and in disaster relief and recovery. Last year's hurricanes highlighted the fragility of our fuel delivery system. With much of our oil production and refining in the Gulf Coast, the impact of a power outage to these key facilities can have ramifications well beyond the region; causing fuel supply disruptions in other parts of the country. In

recognition of this vulnerability, Homeland Security Secretary Chertoff and Energy Secretary Bodman recently sent a letter to the oil refining and distribution industry asking them to review their current backup generation capabilities and needs and to enhance them if necessary. Other industries are equally vulnerable to power supply interruptions. In an example close to home, lack of backup power meant Fairfax County residents had to boil water after power was knocked out to the local water system after Hurricane Isabel hit the east coast -- even well after power restored. Cleveland residents faced a similar problem after the Northeast blackout of 2003.

Congress, the Administration and the States should review existing backup power requirements in light of today's changing requirements and then implement new requirements where there are gaps. We believe Congress should begin to develop a power security policy. Such a policy should include a review of current backup power capabilities for critical facilities, and authorization for DHS and/or DOE to require key industry sectors to have sufficient backup power available.

Tax Incentives

We believe tax policies should be adopted to encourage DE, and CHP in particular. Specifically, because distributed energy, when used in a CHP application, has significant environmental and efficiency benefits, its deployment should be encouraged. CHP systems have an overall energy efficiency level of 85%. Compare this with an average of 34% for central power stations. One way to encourage CHP is through a tax credit and faster depreciation. Market penetration of combined heat and power systems would

increase dramatically with such a credit. This type of tax credit was critical to the development of the wind industry in the US. We believe a similar credit would have a beneficial impact on the development of new CHP projects. During consideration of EPAct, production tax credits for CHP were considered but ultimately removed during conference. We believe Congress should reconsider adoption of CHP tax credits.

Uniform Interconnection Standards

In EPAct, Congress passed legislation to require States to develop their own interconnection rules. This was a major step. Prior to the legislation many states had no interconnection requirements at all. As a result of the legislation, states are beginning to develop interconnection processes, but there is still a great deal of variation from state to state and utility to utility. Importantly, many of the safety and technical questions about interconnection have already been resolved through an industry driven process conducted by the Institute of Electrical and Electronics Engineers (IEEE). IEEE 1547 is a technical standard for interconnection developed through a consensus process that included utilities, DE equipment manufacturers, end-users, and state and regional regulators.

We believe Congress needs to take another step on the development of uniform interconnection standards. Because each state has not adopted IEEE 1547 as written, there remains inconsistency in the interconnection process with which those seeking to install DE projects must comply. DE project developers are often met with requests for unnecessary protective equipment or unreasonable commercial terms that can make an otherwise good project uneconomic. Further, a consistent standard would speed the

interconnection process and lower the costs of DE equipment by allowing manufacturers to develop pre-certified interconnection equipment. We believe Congress should require the development of a national uniform interconnection standard for small generators, which would include the adoption the IEEE standard.

Mr. Chairman, I thank you for holding this hearing. I think it is important for the nation that you fully consider the benefits of DE and adopt policies to encourage its continued development and deployment. Again, I thank you for this opportunity to testify.