Prepared Testimony

Of

Jim Crouse, Executive Vice President, Sales and Marketing
Capstone Turbine Corporation

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"American Energy Security and Innovation: An Assessment of Private-Sector Successes and Opportunities in Energy Efficient Technologies"

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Chairman Whitfield, Ranking Member Rush and distinguished members of the subcommittee, my name is Jim Crouse and I am the Executive Vice President for Sales and Marketing for Capstone Turbine Corporation. I am delighted to be here today to testify on behalf of the US Combined Heat and Power Association ("USCHPA") as a member of the trade association's Board of Directors. USCHPA is a nonprofit trade association, originally formed in 1999 to promote deployment of Combined Heat and Power ("CHP") systems, Waste Heat to Power ("WHP"), district energy and other distributed generation sources in the United States through education and advocacy. USCHPA's membership includes over 60 organizations and their affiliates (including several Fortune 500 companies), and more than 300 individual members, including installers, engineers and consultants.

CHP technologies produce both electricity and useful thermal energy from a single fuel at a facility located near the consumer. These efficient systems use heat energy that normally would be wasted in an electricity generator, and save the fuel that would be used to produce heat or steam in a separate unit. CHP units can generate equivalent amounts of thermal and electric energy with far less fuel input than conventional systems—resulting in lower air pollution, reduced costs, and better conservation of natural resources.

Waste heat to power (WHP) technologies capture energy that would have otherwise been vented or lost, thereby producing clean power without burning any additional fuel or emitting any additional emissions. Capturing this waste heat in the industrial sector increases manufacturing productivity and competitiveness. These technologies capture vented heat from industrial furnaces and stacks as well as from the waste energy available in pressure drops within pipelines.

The installed capacity of CHP in United States today totals 82 GW. According to the EIA, that represents about 7 percent of current U.S. nameplate electric generating capacity.[1] Industry estimates indicate the technical potential for additional CHP at existing sites in the U.S. is

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[1] http://www.eia.gov/electricity/capacity/

approximately 130 GW – or 12 percent of current U.S. electric capacity.[2] This is why USCHPA applauded the recent Executive Order by the President to accelerate the investment in industrial efficiency and to encourage the deployment of 40 additional gigawatts of new cost effective CHP.[3]

As the Alliance to Save Energy's Commission on National Energy Efficiency Policy's 2030 report noted, this investment can be made cost neutral.[4] As the report noted, the United States could double its energy production by 2030 by using CHP at a cost of around $166 billion in annual investment. However, because of the efficiencies found in CHP, this investment would return $169 billion in annual savings. In fact, the report points out that every $87 dollars made in energy efficiency investments in commercial buildings and the industrial sector would result in a net energy savings of $189 dollars.

The abundance of natural gas in United States today provides a singular opportunity for CHP deployment. The switch from coal to natural gas in power generation is the primary driver of lower CO2 emissions in the United States. The IEA noted that the United States has experienced the greatest emissions reductions of all countries or regions since 2006.

Capstone Turbine Corporation is the world's leading producer of low-emission microturbine systems, and was first to market with commercially viable air bearing turbine technology. We are a publicly traded company with our headquarters and manufacturing facilities in Chatsworth and Van Nuys, CA, near Los Angeles. We employ approximately 215 people and have annual revenues of over $100 million per year. During the past five years our revenues have grown about 35% year on year as sales of our 200 to 1000 kW products have taken off – especially in oil and gas applications where microturbines are able to run on waste gas that would otherwise be vented or flared to produce highly reliable onsite power and thermal energy.

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[2] http://www.uschpa.org/i4a/pages/index.cfm?pageid=1

[3] http://www.whitehouse.gov/the-press-office/2012/08/30/executive-order-accelerating-investment-industrial-energy-efficiency

[4] http://ase.org/resources/ee-commission-report-summaries

A microturbine is a small, fuel flexible turbine, typically sized one megawatt and below, and can be best described as a jet engine in a filing cabinet sized box. Capstone offers our customers a variety of options, with the scalability of our systems, ranging from 30 kW to 10 MW and with our largest individual microturbine consisting of a 200 kW system. Since combustion is continuous, the microturbine has extremely low emissions. A recuperated cycle allows for highly efficient electricity production. Because they are fuel-flexible, microturbines can operate using liquid or gaseous fuels, including natural gas, biogas, diesel, biodiesel, kerosene, propane and wellhead or flare gas. We have over 120 U.S. patents and continuously innovate our products.

When combined with a heat recovery unit, our systems can provide CHP and can also be configured to provide combined cooling heat and power (CCHP), with efficiencies up to 90%. Microturbines are used by customers throughout the world in commercial, institutional and industrial applications such as offices, multi-unit residential buildings, hospitals, schools and universities, factories, hotels, data centers, landfills, wastewater treatment plants, farms and in hybrid electric vehicles. We have shipped over 6,500 Capstone microturbines to customers worldwide and currently export about half of our production.

One of the benefits of CHP, and particularly Capstone's technology is its resiliency, which was recently demonstrated during the intense powers of Superstorm Sandy. While the destruction was widespread and tragic, with more than 8 million utility customers losing power, there were some instances of buildings and facilities using Capstone and other CHP technologies to "keep the lights on" during those dark days. For example:

- First, for critical services like hospitals, and senior living facilities the need for 24/7 reliable power, either from a base load or backup source is essential. Hospitals are a perfect application for combined heat and power due to consistent thermal and electric loads. Capstone is pleased to report that our installation at Christian Health

Care Center, in Wyckoff, New Jersey, only momentarily lost power allowing the nearly 300-bed facility to continue to operate on its own power system without disruption.

- Second, after a storm like Sandy there are bound to be displaced residents. Unfortunately, as we found out, in many instances the force of the storm was so great, and the path of destruction so wide, that it was difficult to find shelter with heat and power. One location that had the foresight to plan for these issues is Salem Community College in Carneys Point, New Jersey. After seeing the devastation caused by Hurricane Katrina, the Salem County Red Cross updated its disaster relief shelter agreement with Salem Community College to require the college to have a back-up power system capable of providing electricity, cooling and heating to the shelter facility in the aftermath of a massive storm. The community college installed Capstone microturbines, and due to the ability of our system to function without grid power, Capstone's microturbines were able to provide power, heating and cooling for the school and the shelter through the entire duration of the grid power outage.

- Finally, as our nation continues to increase its reliance on the cloud for its banking, commerce and other needs, there is attendant growth in the need for reliable and energy efficient data centers and server rooms. Again, this is where CHP generally, and Capstone's microturbines specifically come into play as the Public Interest Data Center in New York also maintained secure power during Sandy. Again, the data center's dual mode microturbine seamlessly picked up the data center load when the utility suddenly blacked out. Consequently, the servers never went down.

Microturbines, like many other CHP technologies, provide value to the user not only through reliability, but also through reduced utility costs, low emissions, and low maintenance, while also reducing pressure on the utility grid. We are certified by the California Air Resources Board to meet its strict emissions requirement, which we are able to achieve with no active after treatment of the exhaust, meaning that no chemicals are added to the exhaust to clean it. Our microturbine is able to eliminate nearly all SOx and NOx particulate matter emissions as well as reduce greenhouse gas emissions by nearly 40% when compared to baseline utility power for electricity and a standard natural gas boiler for heat.

The benefit from lower maintenance requirements is due to the microturbine having only one moving part, no lubricants, no cooling water and no exhaust after-treatment. A microturbine has only 6 hours of planned maintenance per year resulting in uptime of 99%. The microturbine's engine typically does not need an overhaul until 40,000 hours. In addition, we offer a Factory Protection Program covering all planned and unplanned maintenance for a fixed cost, allowing for predictable maintenance costs over the 5- or 9-year term. We have more than 95 distribution partners globally providing access to after sale support need to achieve these high levels of operational availability. Our projects support local jobs for engineers and tradesmen as distributors work directly with customers to design, install and support projects.

I want to note that we have projects all across the United States, including several projects in this subcommittee's members' districts.

- Lois Capps (D-California) – We have an installation at Carpenteria Valley Farms and with Southern California Gas Company.
- Kathy Castor (D-Florida) – We have an installation at MacDill Air Force Base, which uses 2 C30s as back up power.
- John Dingell (D-Michigan) – We have a 1 MW installation under construction at Ann Arbor VA Hospital.
- Michael Doyle (D-Pennsylvania) – In 2011, a developer transformed Old South Hills High School into a 106-unit LEED-Gold senior living facility. Capstone microturbines were combined with a solar PV array to produce power and hot water for the facility.
- Morgan Griffith (R-Virginia) – We have 65 kW microturbine installation at the town of Christianburg's wastewater treatment plant.
- Ed Markey (D-Massachusetts) – We have a 30 kW installation with

Cambridge Housing Authority, a national leader in subsidized affordable housing for low-income households.

- Doris Matsui (D-California) – We have 2 C65 microturbines recently installed at American River Packaging in Sacramento.
- David McKinley (R-West Virginia) – Dominion Transmission has 53 microturbines installed at 11 sites to provide low emission, highly reliable electricity at its remote sites. They also use CHP units for fuel gas heating.
- Cathy McMorris Rodgers (R-Washington) – We have 4 C65 microturbines at the Spokane wastewater treatment plant.
- Pete Olson (R-Texas) – We have an Uninterruptible Power Source installation at a U.S. government site. This site was commissioned in 2009 after Hurricane Katrina and Hurricane Ike each took the facility offline. The facility installed UPSource models featuring 6 C65 microturbines that generate up to 390 kW of continuous power. Heat recovery modules on each microturbine ensure production of 251,000 BTU/hr (74 kW) per microturbine of clean waste heat used to heat water for lab use. The microturbines eliminated the need for a secondary boiler system. The microturbines are not reliant on the electric utility and provide a 100% up-time solution. On average, the site demonstrates 20% savings over cost of ownership of traditional UPS in n+1 configurations due to higher efficiencies. We also have over 20 MW of microturbines installed in the Eagle Ford shale formation that reduce flaring and provide onsite power for oil and gas.
- Joseph Pitts (R-Pennsylvania) – Masonic Village is a continuing care retirement community with more than 1,700 residents. For decades, the complex's old coal plant burned in excess of 5,000 tons of coal each year to produce heat for laundry and space heating. In 2002, 5 C60 low-emission Capstone microturbines in a CHP application were installed to produce a combined 300 kW of electricity. They were upgraded to C65 CHP units in 2007 and a sixth C65 microturbine was added in 2011. Each C65 produces 408,000 BTUs an hour for a 47% increase in net heat recovered and an overall system efficiency of approximately 83%.
- Steve Scalise (R-Louisiana) – BP installed a C60 Capstone microturbine

at its Grand Isle Offshore Platform in Louisiana in 2002 to provide reliable onsite power to the platform. BP chose a microturbine for its high reliability, small footprint, low maintenance, high efficiency and low emissions.

- Paul Tonko (D-New York) – Proctors renovated the 2,700 seat theater in downtown Schenectady in 2007. Proctor's Theater had been heated with a boiler plant and cooled with various distributed cooling systems. A new central boiler and chiller plant was designed for the renovated facility. The electric capacity of the CHP plant is 240 kW (Four 60 kW Capstone microturbines) and supplies the base electric, heating and cooling load all year around, minimizing the standby charges (the CHP plant capacity represents 13.8% of the peak electric demand). The CHP facility is integrated with a new central boiler and chiller plant. The project provides a peak reduction of 240 kW, and resulted in more than $500,000 in annual net energy savings for the host site facility.

Capstone has benefitted from ongoing DOE R&D funding. From winning an initial competition to develop high efficiency CHP in the early 2000s, we have continued to value our joint partnership with DOE and are currently working with them on the development of a 370 kW product that aims to achieve 42% electrical efficiency. Currently, our microturbines provide the most energy efficient gas turbines under 4.5 MW. We are also undertaking R&D to develop systems that can run on opportunity fuels such as syngas, solar power and hydrogen.

Despite all of these positive developments, our company and the CHP industry continue to encounter numerous barriers towards greater deployment. The barriers we face in deploying greater amounts of CHP are legal, regulatory and economic. We would like to see greater top-level government leadership on specific CHP issues in the context of energy policy. For example, while the Executive Order to increase CHP is helpful in highlighting the value of the technology, active leadership in the form of federal procurement of CHP to meet federal energy efficiency goals would more clearly demonstrate support for achieving such targets. According to the Alliance to Save Energy, these types of efficiency improvements in federal facilities would save taxpayers $13 billion annually.

Beyond simply encouraging or even requiring federal facilities to take advantage of the efficiencies of CHP for the long-term savings for the taxpayer, there are other concrete steps that the Federal government can engage in to encourage the deployment of CHP technologies. For example, as the EPA implements its Boiler MACT emissions standards, CHP should be strongly encouraged as a compliance strategy for those currently burning coal or oil. DOE's Clean Energy Assistance Centers can provide site-specific technical and cost information to facility managers.

Similarly, we hope states will look to EPA's guidance on output-based emissions regulations, which recognize both the efficiency and pollution prevention benefits of CHP, unlike input-based standards. Output based standards encourage cost-effective, long-term pollution prevention through process efficiency. We also want to work with utilities to demonstrate the benefits that CHP can bring to the grid as a clean, distributed resource. Both states and utilities should include CHP in energy strategy and resource planning efforts.

Likewise, we were glad to hear FERC propose reforms for small generator (<20MW) interconnections to reduce the time and cost to process requests and allow for more efficient interconnection of distributed resources. The CHP industry is eager to be an active participant in these discussions. We hope guidance to state regulators on common and fair interconnection standards and rates for CHP will be heeded.

Finally, as Congress considers how to address the need for comprehensive tax reform, we note that there are several technologies that currently benefit from government support though various levels of an Investment Tax Credit. We believe the lack of parity in support levels for decentralized and renewable energy technologies blur the market place and does not properly encourage the deployment of the best technologies or the technologies that provide the most benefit to the system. We support parity in the treatment of the various types of clean energy sources and would encourage a focus on performance-based measures to best spur market competition.

In conclusion, Capstone and the USCHPA believe that a variety of factors, including technological advances and the abundance of cheap, domestically sourced power have combined to allow the United States to take advantage of the efficiencies of CHP.  While barriers exist, we remain confident that the policy makers will eventually get it right to help facilitate further deployment of CHP in the United States and allow businesses to capture the cost savings of this transformative technology.

Thank you for the opportunity to testify at today's hearing and I look forward to answering any questions you may have.