

**New Jersey Board of Public Utilities  
Energy Master Plan  
First Public Stakeholder Session  
Newark, NJ  
October 23, 2006**

**Stakeholder Comments On Indigenous Resource Mobilization  
by Ruben S. Brown,  
The E Cubed Company, LLC,  
For Climate Energy, LLC,  
and the Joint Supporters**

Thank you Commissioners and distinguished officials. I am Ruben S. Brown, President, The E Cubed Company, LLC speaking on behalf of Climate Energy, LLC, and the Joint Supporters, an ad hoc voluntary association active across the Northeast and at FERC. I speak today particularly on behalf of Climate Energy, LLC which is deploying its "Freewatt<sup>TM</sup>" system in New England and New York residences and would like to do so in New Jersey.

**Mobilizing NJ's Indigenous Resources**

I am honored to be here to promote the mobilization of New Jersey's indigenous energy resources once again.

This is the fourth time over thirty years that I have had this opportunity. I have tackled New Jersey's indigenous energy resources at existing dams in NJ's rivers, at existing factories, commercial and institutional facilities (cogeneration), at existing facilities (demand resources/energy efficiency), and now at existing residences which need to replace their furnace.

Approximately 30 years ago I inventoried the existing low head dams in the State on behalf of Allied Chalmers Hydro Turbine Corporation, to determine where standardized tube turbines could be deployed. Turbines had never standardized before. It was done first here and in Massachusetts. As one result, the hydroelectric plant at Great Falls, Patterson, was redeveloped. Plants were also installed further down the Passaic and elsewhere.

Approximately 20 years ago I inventoried opportunities for cogeneration across the State on behalf of the Ratepayer Advocate/Consumer Counsel, the BPU, and JPC&L to determine that enough opportunities then existed to allow JPC&L to close down efforts to rehabilitate the destroyed Three Mile Island and to shift to the procurement of Distributed Resources from alternative power producers.

Over the past 10 years I have participated in various efforts at PJM and the FERC to promote the eligibility of demand resources across the state to participate in the wholesale market institutions set up by the PJM Interconnect Association.

Now I am actively seeking to improve the efficiency of indigenous energy consumption by upgrading residential heating systems in New Jersey into electricity producers involving micro-cogeneration.

The data offered with the request to comment today indicates that two-thirds of the residential heating in New Jersey is by natural gas and that about 1.3 million single family residences utilize natural gas furnaces. Natural gas furnaces are replaced about every 15 to 25 years. Assuming an average of 20 years, then about 5% are replaced each year, i.e. about 66,000 per year.

Improving the efficiency of this natural gas usage and reducing electricity requirements from outside the household is a powerful strategic goal that your plan should incorporate.

We propose that 20% or 13,000-15,000 of the annual replacements should be systems that produce some electricity along with the heat produced and seize the fundamental fuel efficiency, energy conservation, and environmental benefit of combined heat and power production that has long been practiced at the commercial and industrial level. Micro-CHP systems are defined and discussed below.

Our firm has worked on similar initiatives in other States, including New York, Pennsylvania, Delaware, Connecticut, Massachusetts, and Rhode Island, and in the RTO/ISOs of NYISO and ISO-New England.

Most recently our firm has negotiated the expansion of energy efficiency, distributed generation, load management, and demand response as “Other Demand Resources” into the emerging Forward Capacity Market (FCM) at ISO-New England.

A corresponding procurement by the State of Connecticut wrapping Connecticut 2006 RFP around the FCM market design was also negotiated by our firm and sets a model how NJ could take fresh leadership in PJM to advance opportunities for NJ’s Demand Resources, including energy efficiency, DG/CHP (PV, Micro-CHP, CHP), load management and demand response and NOT JUST DEMAND RESPONSE ALONE.

Beginning December 1, 2006, household micro-CHP systems, PV, energy efficiency, load management and other measurable and verifiable resources, if aggregated in groups larger than 100 kW within a load zone (eight zones in New England) will now be able to participate in the wholesale electric market and obtain a capacity payment benefit for the kW it can offer as a Demand Reduction resource. The initial transition period payment will be \$3.05 kW/Month. When the Forward Capacity Auction takes effect in June 2010, it expected to be worth the same thing a wholesale generating facility will be worth.

### **EPACT OF 2005 ADVANCES MICRO-COGENERATION (MICRO-CHP)<sup>1</sup>**

Section 923 of the Energy Policy Act of 2005 (“EPAct”) advances micro-cogeneration development and deployment at the residential level (Micro-CHP) and defines some issues that need to be advanced including:

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<sup>1</sup> CHP = Combined Heat and Power. Micro-CHP systems are CHP systems that are small.

- (1) The use of small-scale combined heat and power in residential heating appliances;
- (2) The use of excess power to operate other appliances within the residence; and
- (3) The supply of excess generated power to the power grid.

We particularly encourage the State of New Jersey to consider how to promote implementation of Section 923 by advancing Micro-cogeneration deployment at the residential level as part of the consideration of the measures identified in these Cases, especially net metering and time-based metering. Section 921 also authorizes \$40 million to advance this activity in 2007 and 2008. Strong leadership by the State of New Jersey could be instrumental in moving this component of an advanced energy portfolio into place, especially with respect to provision (3) “the supply of excess generated power to the power grid.”

Technologies available for under 10 kW electric micro-CHP could include:

Commercial or commercial Launch Phase

Internal Combustion Engines

Stirling Engines

Developmental Phase

Rankine Cycle Engine – Water

Rankine Cycle Engine – Organic

Further Out

Thermoelectrics

Thermophotovoltaics

Fuel Cells

## **CLIMATE ENERGY™, LLC**

ECR International, Inc., New York’s largest manufacturer of home heating equipment, founded Climate Energy, LLC to provide homeowners with the benefits of break-through combined heat and power technology. Climate Energy utilizes ECR furnaces and 1.2 kWe Honda™ generators in micro-CHP systems (“micro-Combined Heat & Power” or “micro-cogeneration”) which are designed to be installed at the residential level when a furnace needs replacing or is needed in a new home. The units are ultra quiet and output specific emissions are the lowest for any type of fossil-fueled power generation.

In early 2006 20 beta North American units were deployed in Massachusetts which allows net metering for CHP. These appliances are designed to “follow” the thermal load of the customer rather than the home’s electric load. If /when there is an imbalance of these two demands, net metering allows the excess electric power to flow to

the grid. More than 30,000 units adapted to local conditions are already in use world-wide.

Results are highly positive. The units are 85-93% efficient (See Exhibit A) at converting to useable heat and electricity the fuel inputs than would have fed a conventional heating furnace alone. Carbon Dioxide emissions for the substantial amount of electric power thus produced are reduced 70-75% over central plant levels for the same amount of electrical generation. Combined electric and gas savings range from 25-35%. The units produce an estimated annual average of 4,500 kWh of electricity (about half the load of an ordinary household) and consume less electricity for motors and other uses than the furnace they replace.

To clarify the importance of net metering, the Climate Energy micro-CHP system follows heating load and not the electricity load in the residence. It produces 1.2 kWe of electricity employing a new type of high-endurance ultra-quiet Honda™ generator interfaced by proprietary Climate Energy, LLC technology.

On occasion the electrical output obtained while following heating loads is greater than the residential electrical consumption, hence net metering provides a place for the excess electricity to go. While it is optimized during the residential heating season, the system can also be operated as a Demand Resource (when aggregated) in other periods to provide reliability benefits as warranted, such as during periods when air conditioning loads raise peak electrical demands on the grid.

The opportunity for micro-CHP has generally been underappreciated compared to other alternatives for distributed generation, such as solar and wind, and we strongly encourage the State of New Jersey to recognize and facilitate this opportunity to enhance the efficiency of home heating systems. Furthermore, a great advantage of Micro-CHP is that it can be implemented rapidly through the existing large infrastructure of the home heating manufacturing and service industries that are well established in New Jersey.

Micro-CHP systems fueled by natural gas, which can be used in nearly all homes, have now been shown to provide about 80% of the net environmental and energy conservation benefit of converting homes to solar PV technology for supplemental power generation, all at a remarkable 20% of the initial cost of the widely promoted, but application limited, solar alternative.

### **Summary of Initial Recommendations**

In sum, ECR International, Climate Energy, The E Cubed Company, LLC and other providers of micro-CHP technology, such as residential fuel cells, have a direct interest in the revision of New Jersey's Energy Master Plan. Exhibits A and B are attached to illustrate graphically the fundamental concepts.

Climate Energy urges the State of New Jersey's Energy Master Plan officials to actively promote the development and utilization of residential micro-combined heat and power systems by:

1. Evaluating and recognizing the potential of residential Micro-CHP systems and testing that potential in various scenarios under varying assumptions.
2. Facilitating net metering of electric power produced by micro-CHP systems that follow building heating loads.
3. Establishing alternative energy/renewable Class II or III credits for systems that combine the production of thermal and electric benefits. For example, this has been established by Legislation and administrative implementation in Connecticut for CHP systems with greater than 50 percent efficiency.
4. Allow residential micro-CHP, at a minimum to 10 kW to net meter. There are already twelve States that allow CHP to net meter, some with higher levels for residential projects, a number allow 50 or 60 kW at residential sites.
5. Encourage the development of recognition by PJM that New Jersey's Demand Resources, including Energy Efficiency, DG/CHP, and Load Management represent value adjuncts to the RTO's wholesale market structure so that indigenous resources in NJ, such as residential micro-CHP systems can be recognized as capacity resources for PJM, i.e. the new ISO-NE Forward Capacity Market which will begin capacity payments on December 1, 2006 to DG, EE, LM, in addition to Demand Response.