STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Case 02-E-0781 - Consolidated Edison Company of New York, Inc. – Proceeding on Motion of the Commission as to an Electric Tariff Filing to Establish a New Standby Service in Accordance With Commission Order.

Case 02-E-0780 - Orange & Rockland Utilities, Inc. – Proceeding on Motion of the Commission as to an Electric Tariff Filing to Establish Standby Service in Accordance With Commission Order.

PREFILED DIRECT TESTIMONY OF

WILLIAM CRISTOFARO, P.E..

MARCH 20, 2003

I. INTRODUCTION AND WITNESS QUALIFICATION

Q. PLEASE STATE YOUR NAME, OCCUPATION AND BUSINESS ADDRESS.

A. My name is William Cristofaro, PE. I am president of Energy Concepts Engineering PC in Rochester, NY. Energy Concepts performs mechanical and electrical engineering across all New York State and the North East, specializing in on-site power and Combined Heat and Power plants. Our address is Energy Concepts Engineering PC, 3445 Winton Place, Suite 102, Rochester, NY 14623.

Q. WOULD YOU PLEASE DESCRIBE YOUR QUALIFICATIONS?

A. Yes. I received my Bachelor's in Science degree in mechanical and environmental engineering from the University of Miami in Coral Gables Florida.

I am a licensed professional engineer in New York State and Connecticut and have been a practicing engineer in NYS since 1976. I have been actively involved in all forms of mechanical and electrical engineering for buildings and facilities. In particular my major focus has been on energy engineering of both new and retrofit systems for building heating, cooling, industrial process and electrical systems.

My experience with on-site power and CHP plants began in 1991 with one of the first fully successful design and implementations of a natural gas fired CHP plant in upstate New York. Since 1991 and to the present the Energy Concepts staff and myself have been involved with the successful implementation of over 30 CHP plants in the Northeast. I presently serve on the NYS Combined heat and Power task force facilitated by NYSERDA. I have been actively involved with on-site power and alternative energy organizations and in testimony before the NYS assembly energy committee, and with CLEAN a non-profit organization representing on-site power. I am a member of ASHRAE, AFE and ASEE.

Q. ARE YOU EMPLOYED BY A PRIVATE GROUP IN NEW YORK TO PRESENT THIS TESTIMONY?

A. No.

Q. WHAT IS THE PRIMARY PURPOSE OF YOUR TESTIMONY IN THIS CASE?

A. I will present testimony related to the engineering design and actual operation of CHP plants and how such operation relates to fundamental assumptions underlying utility standby tariffs.

Q. WOULD YOU PLEASE DESCRIBE HOW YOUR DIRECT TESTIMONY IS ORGANIZED IN THIS CASE?

A. My testimony is organized into the following sections:

(1) Relevancy to this proceeding.

(2) CHP in a design and operations context.

(3) Fundamental assumptions of standby tariffs that conflict with actual CHP and on-site plant operation.

(4) Disadvantageous effects of standby tariffs on the operation and benefit of CHP.

(5) Specific recommendations for standby tariffs structured to better reflect the technical operations of CHP plants.

Q. WAS THIS TESTIMONY PREPARED BY YOU OR PREPARED UNDER YOUR DIRECTION?

A. Yes. I prepared it.

I. RELEVANCY TO THIS PROCEEDING

Q. WHY IS THE QUESTION OF CHP DESIGN AND OPERATIONS RELEVANT TO THIS PROCEEDING?

A. Under the terms of the Joint Proposal and standby tariff the cost recovery rates for both contract demand and daily as used demand my be incorrectly reflect actual cost impact to the utility for maintaining true standby for the large majority of typical on-site CHP plants. It can be demonstrated that according to the design and operations of most CHP plants actual standby cost will likely be considerably lower than the proposed rates.

II. CHP IN AN DESIGN AND OPERATIONS CONTEXT

Q. HOW ARE THE MAJORITY OF CHP SYSTEMS DESIGNED AND OPERATED?

A. Most CHP plants are designed to operate very efficiently both from an electrical, thermal and utility-parallel operations perspective. A major design goal with a CHP plant is to design a modular and reliable plant. That is, a plant consisting of several units operating in tandem with electrical and thermal loads. Example, a 500-kilowatt (kw) plant will typically consist of either 7 by 75 kw units or 4 by 120 kw units. The typical units and plant is computer controlled for parallel operation with the utility. Typically the plant will operate at full power until when and if at such a time the remaining parallel power provided to the facility by the utility drops below a desired set point level. At that time the computer controlled CHP plant will ramp back so as to avoid feeding power back to the utility. (Unless there is either a utility power sell back agreement or an NYISO market sell back contract and participation.) Since it is important for cost savings for a CHP plant to run consistently, particularly during peak utility periods, tremendous care is taken to assure cogeneration unit robustness and survivability from either short duration alarm shutdowns or extended down periods. The engine or turbine water-cooling (heat recovery) hydronic systems are designed to operate continuously and in a manor to maximize cogen engine protection. With most designs, there is double redundancy of major components such as pumps, heat exchangers and control devices to maximize engine system protection. An array of computer alarm and data trending points are used to pre-empt the potential malfunction or failure of critical components. In addition, computer control systems are programmed with "fuzzy logic" type routines to try to automatically work around certain problems or automatically ramp to the next cogen unit based on certain system or unit failures. CHP plant maintenance-warranty contracts are usually established as a virtual warranty and maintenance. With such contracts a monthly fee is paid by the owner or developer of the plant that serves as a continuous extended full engine and generation protection plan. The purpose and result of such combined maintenance and warranty contracts are immediate, unquestioned 8-hour response time by cogen service personnel to repair cogen units. Often, microprocessor controllers and automatic phone dialers will contact service personnel for immediate service even before the owner is aware a problem has developed. Most often such response is to serve only one in a multiple unit line-up a typical CHP plant. Full CHP plant failures are quite rare due to the modular design, computer controls, remote access ability and service/warranty contract methods.

Q WHAT IS THE EFFECT OF SEVERAL SUCH PLANTS IN A SINGLE UTILITY TERRITORY?

A With several plants in operation the statistical probability of the plants totally failing at the same time is extremely low. While the probability of one of several modules in a plant is greater, each module often represents just 15 to 25 percent of total plant load. *With several plants in the same system the total percentage effect on* ***true utility demand decreases as the number of CHP plants and number of multiple units increases.*** Normally accepted statistical models can demonstrate this with actual operations experience from existing CHP plants.

III. FUNDAMENTAL ASSUMPTIONS OF STANDBY TARIFF THAT IS IN CONFLICT WITH ACTUAL CHP OPERATION

Q. HOW IS THE PROPOSED TARIFF NOT RELECTIVE OF CHP OPERATION?

A. As previously indicated in part II, coincidence of CHP failure and consequently CHP site demand on utility resources is infrequent and in smaller proportions than the proposed standby tariff contract demand and daily as used demand rates attempt to recover. Generally, the combined cost effect of the contract demand rate and daily as used demand rates proposed approach as much as 30 to 40 percent of the normal full parent demand rate cost per kw of metered demand. While certain CHP plant reliability rates may differ, the averages of actual operating plants point to a lower percentage of cost recovery allocation for respective CHP plant demands on the utility system. Moreover, when several CHP plants are taken in the aggregate, such effects are made greater in the direction of the consideration of lower contract demand and daily as used rates.

IV. DISADVANTAGEOUS EFFECTS OF STANDBY TARIFFS ON THE OPERATION AND BENEFIT OF CHP PLANTS

Q. WHAT EFFECTS WILL POORLY DESIGNED STANDBY TARIFFS HAVE ON THE DESIGN AND OPERATION OF CHP PLANTS?

A. Poorly designed standby tariffs lead to contorted CHP plant designs and decisions by owners, which ultimately are not in concert with either the utility goals or that of government energy policy.

To work around higher standby demand rates, CHP plant designs may incorporate diesel-fired units to be used only when specific primary cogen units fail in an effort to avoid high demand charges. This results in higher capital cost for equipment that may very infrequently be used. It may also have the unintentional effect of more reliance on diesel unit as an easy alternative to consistent proper cogen unit maintenance.

Standby rates and the confusion and anxiety created by then have prompted some owners and developers to choose to implement “off the grid” CHP plants. This is done to completely avoid all utility tariffs and cost. In fact in the last 3 years of designs and installations performed with Energy Concepts Engineering the quantity of “off grid” plants has increased each year. While effective in avoiding standby tariffs the “off grid plant” actually reduces the potential benefits on-site power CHP plants can offer to the electric grid. With proper controls, a CHP plant and it’s associated computer controls can be readily incorporated into a statewide system to participate in several markets to assist in NYISO goals. CHP plants could provide certain portions of demand shedding capability; load reduction and power sell back to the NYISO and/or local utilities.

V. SPECIFIC RECOMMENDATIONS FOR STANDBY TARIFFS STRUCTURED TO BETTER REFLECT THE TECHNICAL OPERATIONS OF CHP.

Q. HOW SHOULD THE STANDBY TARIFFS BE MODIFIED?

A. From a design and operations standpoint the overall structure of the proposed standby tariffs seems consistent with actual realities of plant operation. That is the four point overall structure of: 1.) A base connection charge, 2.) A Contract Demand, 3.) Daily as used and 4.) KWH purchase rates from third parties or optionally from the Utility based on average NYISO market conditions. However, owners of CHP plants should be given choices that reflect the actual operating reality of their CHP plant and the effects on utility true local and system standby cost. In general we recommend a scaling back of contract demand and daily as used demand rates to more properly reflect these conditions.

Alternately, and possibly of equal recovery value to the utilities, provide choice of an option(s) in the choice of rates for Contract Demand and Daily As Used Demand such that a decrease in one would be linked to an increase in the other. Practically, this would better result in a choice of two (or more) ratios of Contract Demand and As Used in a defined standby tariff.

Another and simpler method would be to maintain the existing owner choice of taking service under the otherwise applicable parent tariff or the applicable standby tariff.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes