

Building Automation and Generator Controls Strategies that Produce Revenues and Reduce GHG



CONFIDENTIAL

Presentation Objectives

- **Introduction to North America Power Partners (NAPP)**
- **The New Age of Demand Management**
 - Expanding from facility based model to wholesale markets resource model
 - Typical Programs and Wholesale Markets Overview
 - Environmental Benefits of Demand Response
 - The critical role of technology

Introducing North America Power Partners

- **Sole focus is providing premier Demand Response services**
- **Certified Curtailment Service Provider (CSP) in these ISO regions – from Maine to Virginia and west to PA, WV, and parts of OH, IL, KY TN - and California**
- **Energy Star Certified**
- **Woman Owned Business (WBE)**
- **Net zero carbon emissions commitment**



The New Demand Response: How does it work? Why Is it Important?

Demand Management Traditional Model:

- **Utility based programs**
 - Air conditioner cycling
 - Interruptible rates
 - TOU pricing
- **Value Proposition to utility:**
 - Forego or delay capital improvements
 - Optimize value of current distribution assets
 - Improve system load factor
 - Pass market price risk to customers (TOU)
- **Value Proposition to customer:**
 - Reduced peak demand charges
 - Discounted rates

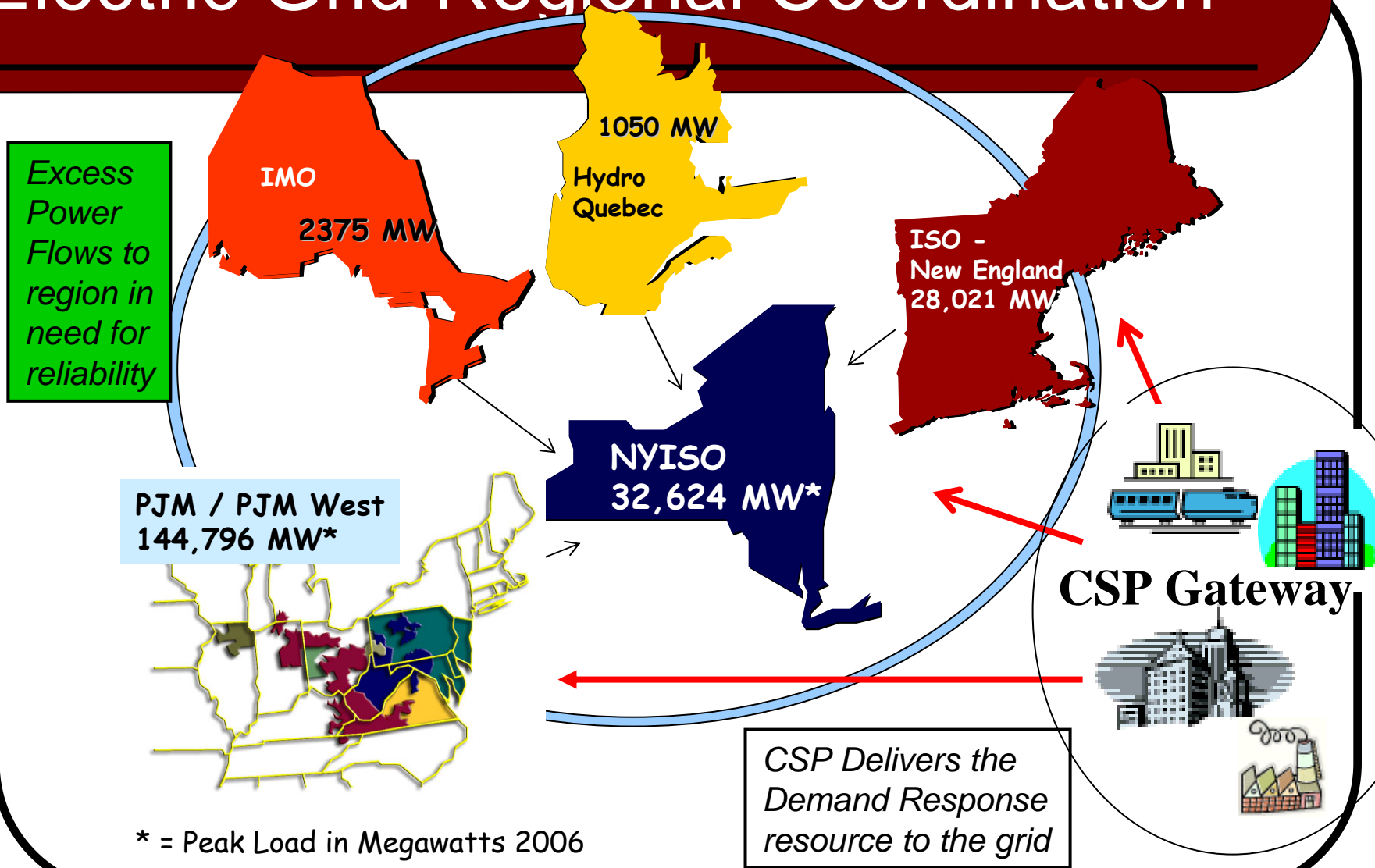
Demand Response Wholesale Resource Model:

- **Regional electric grid operators (ISO's) based programs:**
 - Pilot Programs for peak load reduction
 - Permanent tariff based resource model allows full participation in ALL wholesale markets
- **Value Proposition to grid operator:**
 - alleviates peak transmission congestion
 - Reduces peak demand
 - offsets the loss of a major generating unit – both planned and real time “reserves” resources –
- **Value Proposition to customer:**
 - A path for end users to earn a new revenue stream as a wholesale market resource
 - Ensuring the reliability of the grid
 - Greenhouse Gas Emission Reductions compared to traditional wholesale resources

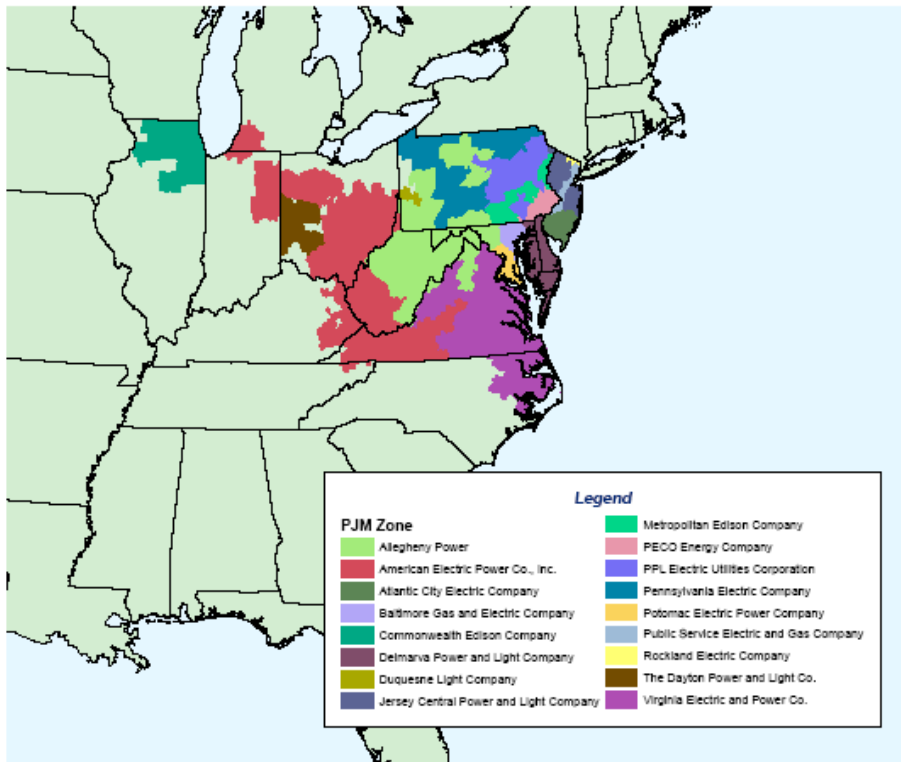
Definition of Demand Response

- **Demand Response is:**
- **The reduction of electricity usage by the end user in response to:**
 - a high price signal (economic) or
 - an emergency event called to maintain grid reliability
- **A path for end users to earn a new revenue stream for ensuring the reliability of the grid**

Electric Grid Regional Coordination



Your facilities as wholesale market resources



Eligible Wholesale Markets:

Capacity: Peak Days
(Demand based Resources)

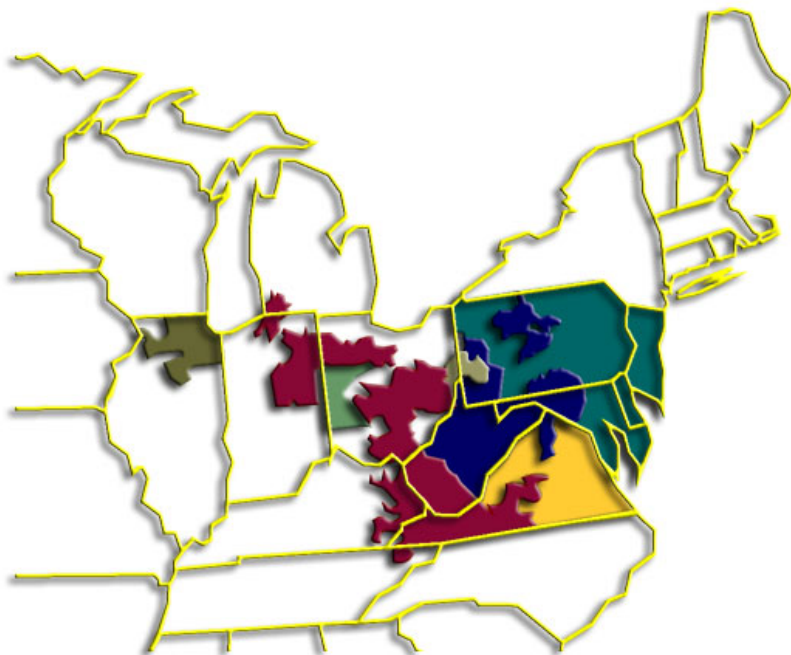
Energy: Any Day
Generation based Resources

Reserves: Any Day
Generation based Resources

Demand Response can replace all of these types of wholesale resources



Peak Day “On Call” Program: PJM Capacity Market



Key Rules:

Interruptible for up to 10 times during planning period (mandatory performance from June 1 through September 30)

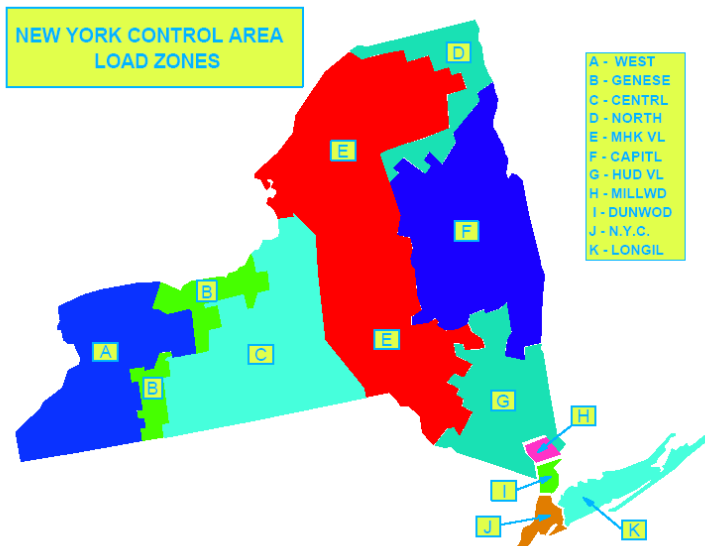
Interruptible for up to 6 consecutive hours from 12:00 to 20:00 on non-holiday weekdays

Able to be implemented within 2 hours

PECO & NJ	\$/MW/Day	\$/MW/Year
2007	\$ 177.51	\$64,791.15
2008	\$ 143.51	\$52,381.15
BGE, PEPCO	\$/MW/Day	\$/MW/Year
2007	\$ 140.16	\$51,158.40
2008	\$ 180.58	\$65,911.70
Rest of PJM except AEP utilities*	\$/MW/Day	\$/MW/Year
2007	\$ 40.80	\$14,892.00
2008	\$ 111.92	\$40,850.80

TOTAL REVENUES FROM THE ISO

Peak Day “On Call” Program: NYISO ICAP SCR Capacity Market



Key Rules:

- Interruptible for up to 8 consecutive hours
- You receive a **day-ahead advisory** (21 hours) and 2 hour prior notification
- Monthly Commitment/Enrollment Period
- Seasonal Commitments – Winter and Summer
- Standby Generators eligible

NON NYC or LI ZONES	\$/MW/Day	\$/MW/Year
Low	\$ 197	\$72,000
High	\$ 362	\$132,000
NYC ZONE	\$/MW/Day	\$/MW/Year
Low	\$ 493	\$180,000
High	\$ 690	\$252,000
LI ZONE	\$/MW/Day	\$/MW/Year
Low	\$ 362	\$132,000
High	\$ 592	\$216,000

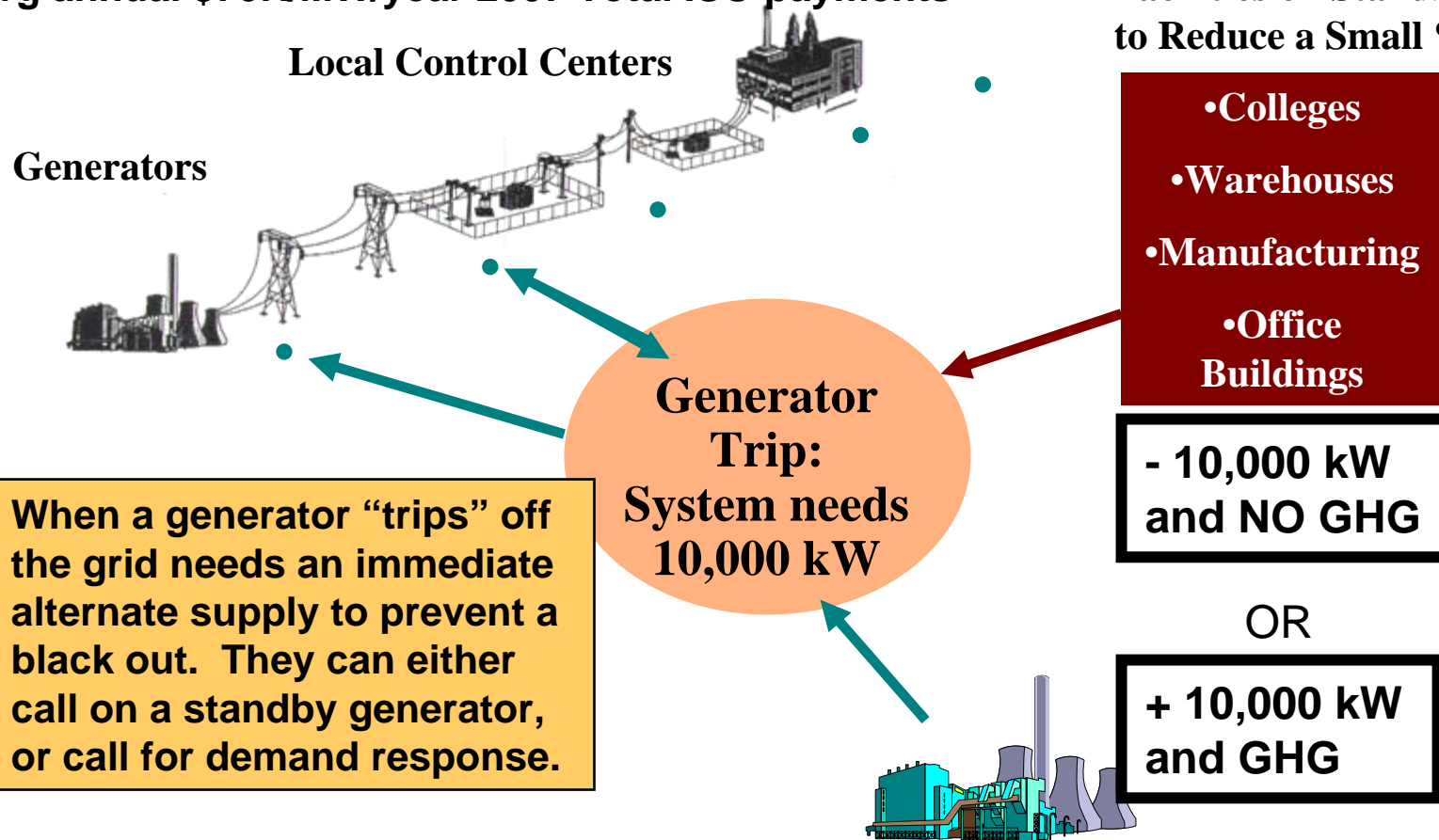
TOTAL REVENUES FROM THE ISO

Reserves Market resources

DR replaces Standby Generators

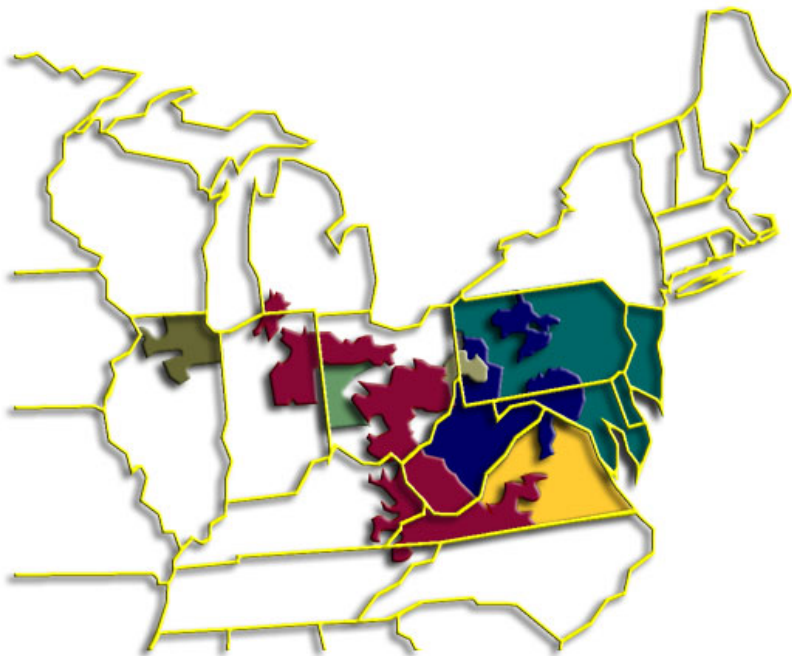
Avg annual \$70K/MW/year 2007 Total ISO payments

Facilities on Standby to Reduce a Small %



Standby Generators running 24/7 since 1967

Self Schedule Program PJM Energy Market



Key Rules:

Self scheduled by customer
Minimum 3 hour notice to schedule bid into PJM
Use NAPP online bid form or call control room
Baseline calculations – 10 day period – 5 day average

- Hourly Wholesale Price for Electricity
- Prices vary hourly by utility zone
- Sell Back your “unused” electrons
- Greater benefit during high price periods – ISO pays same \$/kwh to generator as to DR resource

CONFIDENTIAL NOTICE TO CUSTOMERS

From: North America Power Partners

Date: July 10, 2007

Re: High Prices on PJM Energy Markets – Self Schedule your Load Reduction today!

Electric prices on the day-ahead market for July 9, 2007 settled between \$0.10 and \$0.265 per KWH for most zones for hours between 11AM and 10PM. The day ahead energy market provides an indicator of the level of real time prices that will be experienced. With the weather forecast for a heat alert day in much of the MidAtlantic and New York coastal regions, tomorrow should be a good day to achieve similar high price levels.

Why is “Carbon” important?

- Carbon has been linked to global warming: CO₂ is a greenhouse gas (GHG)
- Federal and State mandates to reduce GHG are driving focus on carbon footprint
- Cap and Trade System on Horizon
- Demand Response can produce significant GHG emissions reductions

Carbon reduction values for PJM from EPA eGRID2006 data

DEMAND RESPONSE REDUCES YOUR “CARBON FOOTPRINT”

eGRID subregion annual NOx output emission rate (lb/MWh)	eGRID subregion annual SO2 output emission rate (lb/MWh)	eGRID subregion annual CO2 output emission rate (lb/MWh)
RFC East	1.707	8.035
RFC Michigan	2.452	6.824
RFC West	2.841	10.199

Source: EPA eGRID2006 Version 2.1 Subregion Location(Operator)-based File (Year 2004 Data)

Carbon reduction values for facility self scheduled activity and reserves

DEMAND RESPONSE REDUCES YOUR “CARBON FOOTPRINT”

Transaction ID	Billing Quarter	Activity Month	Revenues Received Month	Program	DR Start Period	DR End Period	Self Schedule kWhrs	Reserves kWhrs	Total Self Schedule and Reserves kWhrs	NOX emission reduction (lb)	SO2 emission reduction (lb)	CO2 emission reduction (lb)
20074327	Q4	Oct-07	Nov-07	E	8/19/2007	9/5/2007	3,563	-	3,563	6	29	3,904
20074332	Q4	Oct-07	Nov-07	E	8/19/2007	9/5/2007	2,923	-	2,923	5	23	3,202
20072221	Q2	May-07	Jun-07	S	5/1/2007	5/31/2007	-	1,294,800	1,294,800	2,210	10,404	1,418,496
20072309	Q2	Jun-07	Jul-07	S	6/1/2007	6/30/2007	-	531,800	531,800	908	4,273	582,604
20072584	Q3	Jul-07	Aug-07	S	7/1/2007	7/30/2007	-	572,900	572,900	978	4,603	627,631
20073068	Q3	Aug-07	Sep-07	S	8/1/2007	8/31/2007	-	379,200	379,200	647	3,047	415,426
20073090	Q3	Aug-07	Sep-07	E	6/20/2007	7/10/2007	65,912	-	65,912	113	530	72,209
20073952	Q3	Sep-07	Oct-07	S	9/1/2007	9/30/2007	-	1,020,400	1,020,400	1,742	8,199	1,117,882
20073957	Q3	Sep-07	Oct-07	E	8/3/2007	8/19/2007	74,935	-	74,935	128	602	82,094
20074317	Q4	Oct-07	Nov-07	S	10/1/2007	10/31/2007	-	1,510,200	1,510,200	2,578	12,134	1,654,474
20074322	Q4	Oct-07	Nov-07	E	8/19/2007	9/5/2007	24,150	-	24,150	41	194	26,457
20073962	Q3	Aug 8th	Oct-07	Aug 8th	8/8/2007	8/8/2007	16,488	-	16,488	28	132	18,063

187,971 5,309,300 5,497,271 9,384 44,171 6,022,442

2,737.47 metric tons CO2
465.56 cars per year

1 car = 5.88 metric tons of CO2 equivalent per year

1 metric ton = 2200 lbs of CO2

The Critical Role of Technology

- Requires Advanced Metering (equal payments requires equal treatment to other wholesale resources)
 - 1 minute interval data
 - Near real time
 - Web based solutions
- Requires Automation and Controls
 - Response Times (1 day/2hour/10 minutes)
 - Maintaining comfort, production while participating (no negative impacts)
 - Eliminates reliance on human communications and manual intervention to create a more reliable resource
 - Customer control or CSP remote control of multiple pieces of equipment with short notice

Automation and Controls – Facility Equipment

- **Continuous monitoring, analysis and feedback**
- **BAS/EMS systems (new or existing) programmed with DR “protocols”**
 - Reduce/cycle HVAC, chillers, elevators, refrigeration, VSD motors, lighting (dimnable ballasts or circuit based), etc.
 - Ramp back up after call event ends
- **Wireless controls combined with temp/humidity/CO2 monitors allow alternate cost effective solution and allows CSP remote control with assurance of no negative impact on comfort**
- **Internet based communications provides visibility to asset performance for CSP and customer**
- **GOAL – develop dependable resources with little to no impact on customer operations**

Wireless Controls



Automation and Controls – Generator Equipment

- **Switch gear and phasing equipment required to allow turn on while utility power is ON**
- **Wireless controls with safety overrides allow customer or CSP remote control of generator (many are located in remote locations)**
- **GHG Emissions: permit issues offset by GHG benefits**
- **GOAL – develop dependable resources with little to no impact on customer operations**



A 200KW generator in DR can achieve \$5,000 to \$10,000 per year in DR payments and reduce 35,000 lb CO2 per month for operation in reserves market (called no more than 1X per month for max 30 minutes)

Issues to address & next steps

- **How to maintain revenues in your own account (to fund EE projects)**
- **Creative CSP offers that include metering and technology to be paid from DR revenue streams**
- **Assessment of existing facilities capabilities (EMS/BAS, generators) for day ahead and short notice DR**

Thank you for your attention

North America Power Partners

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1-888-ISOPROGRAM