



Improving Grid Reliability in the US

The Use of Emergency Generators in Emergency DR

June 13, 2012

Introduction to EnerNOC

Market Leader in C&I Demand Response and Energy Efficiency

- More than **8,000 MW of Demand Response** under management across **12,500** customer sites
- Over **500,000 MWh of Energy Efficiency** achieved to date
- 100+ utility and grid operator partners

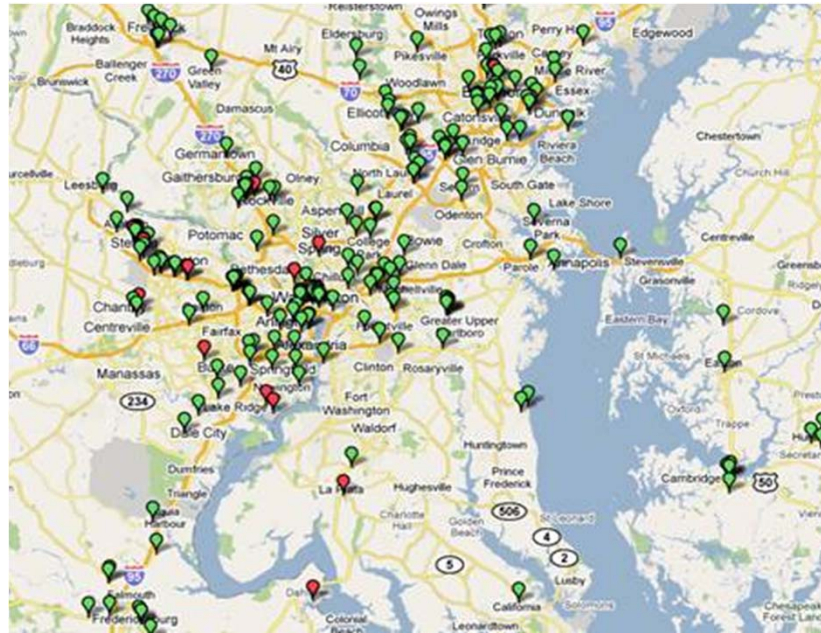
Strong Track Record

- Publicly traded on NASDAQ (ticker: ENOC)
- 2011 revenues of ~\$280 million
- 600+ full-time employees
- Headquarters in Boston

What is *Emergency DR*?

End users become part of the grid reliability solution

- **Customers reduce their demand** for electricity from the grid in response to ISO declared ***Emergency DR*** dispatch signal
- **Customers receive payments** for participation and **risk reduction** due to the reduced likelihood of outages
- ***Emergency DR*** is **NOT** economic DR or peak shaving



How does Emergency DR work?

Grid load is reduced through reduced consumption and/or on-site generation



Curtailment – Turning off lights, turning up cooling set-points, turning off air handlers, shifting production schedules, escalators, elevators, water features, parking lights, signage, heating elements, etc.



Self Generation – facilities use properly permitted emergency back up generation to serve part or all of their facility load

ISOs only dispatch Emergency DR for imminent emergencies

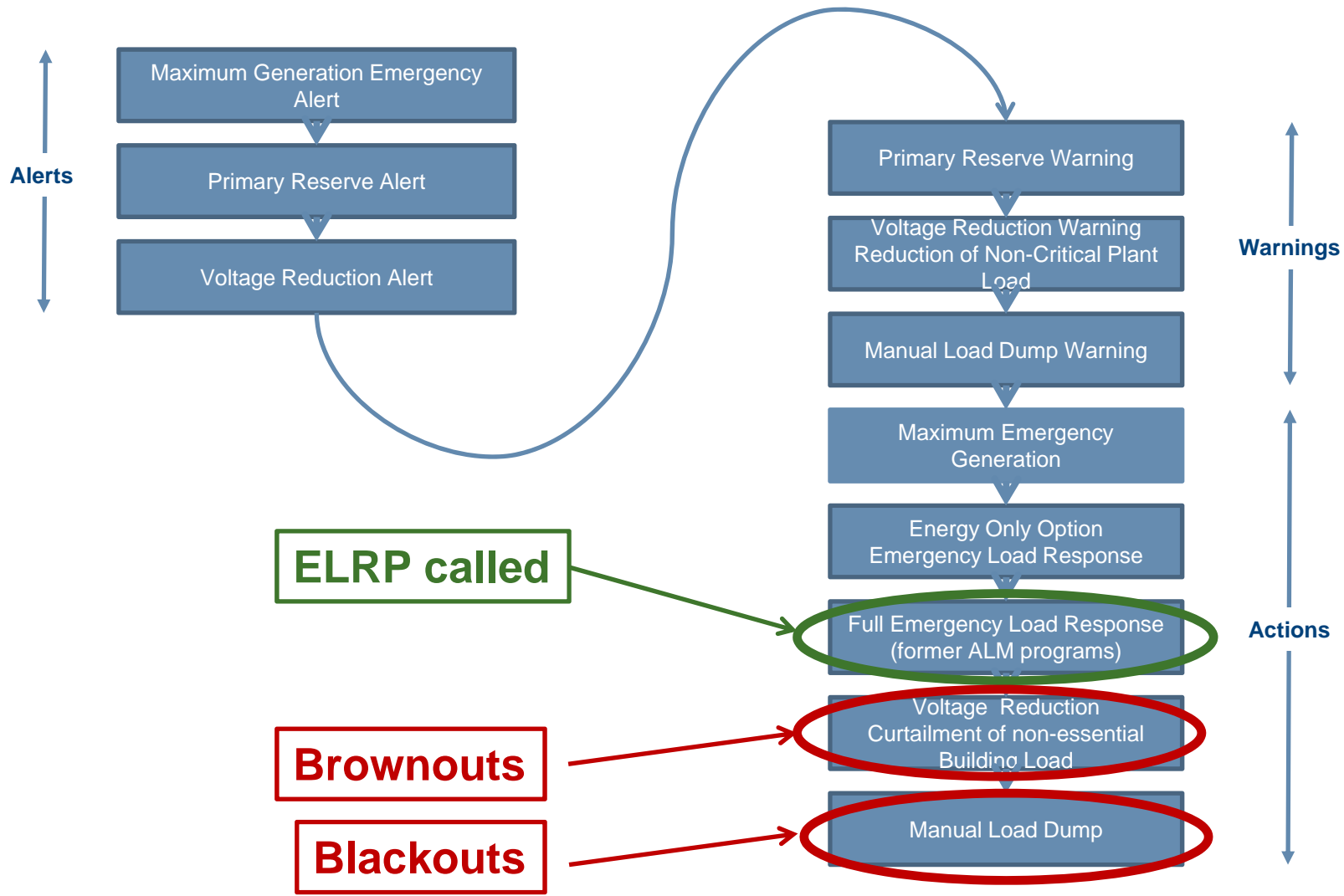
Emergency DR dispatches follow rigorous procedures and reporting

- **North American Electric Reliability Council (NERC) requires formal plans for Capacity and Energy Emergencies** to be executed when dispatching Emergency DR
- When facing an energy shortfall a **grid operator must declare an Energy Emergency Alert Level 2 (EEA Alert 2)**; measures at this step can include:
 - Public appeals
 - Voltage reduction
 - Interruption of non-firm load
 - **Emergency DR**
 - Utility-side load conservation
- Following an EEA Alert 2 declaration, the **grid operator must report back to the NERC** on causes, measures taken to address the shortfall, and post-event mitigation

Emergency DR is only dispatched for emergencies – not high load or prices

PJM's procedures during a grid emergency

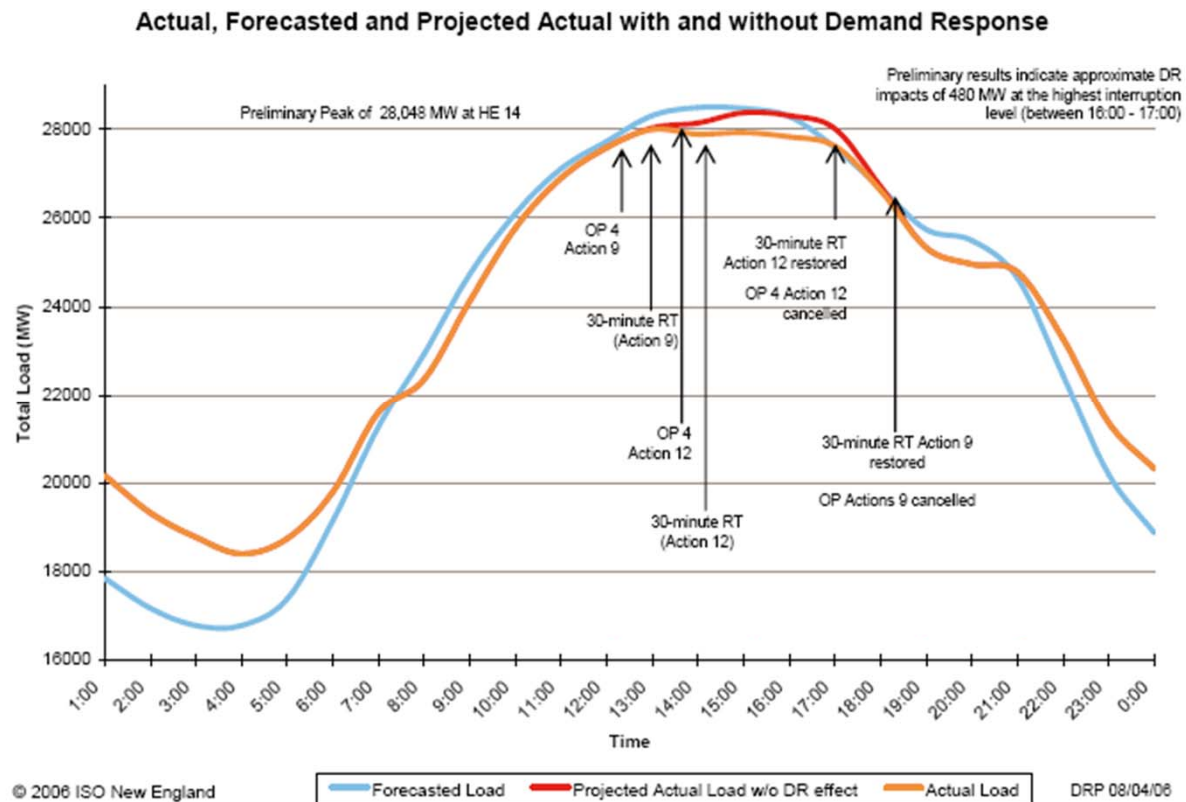
Their process during an emergency is very specific and regimented



From PJM's Manual 13 (Emergency Operations), Section 2 (Capacity Emergencies)

Demand Response is a tangible resource

Emergency Demand Response is reliable and verifiable, as demonstrated in New England on August 2nd, 2006



Emergency DR Program Tariffs - Overview

- **PJM Emergency Load Response Program (ELRP)**
 - Program timeframe: **June 1 – September 30, non-holiday weekdays**
 - Program duration: Up to 6 hours per event, required to perform in first 10 events called by PJM (**60 hours per year**)
 - Called just prior to brownout
- **Texas Emergency Interruptible Load Service (EILS)**
 - Program timeframe: **January 1 – December 31, 24/7**
 - Program duration: Maximum 6 dispatches and **24 hours per year**
 - Called just prior to brownout, next action is forced load shedding
- **ISO New England Operating Procedure (OP) 4, Action 12**
 - Program timeframe: **January 1 – December 31, business days (excluding national holidays) between 7 am and 7 pm**
 - Program duration: No hourly limits, no maximum hours per year
 - Called coincident with initial brownout

Emergency DR Programs are Rarely dispatched

The risk of dispatch to maximum hours is low

Location	Total events called, 2003-2011	Cumulative event duration (hours)	Notes
ERCOT	2	30.5	<ul style="list-style-type: none">• Extreme Weather Feb 2-3, 2011 for 28 hours, 15 min
ISO-NE	3	26	<ul style="list-style-type: none">• Southwest Connecticut only dispatched in 2003 (16 hours) following 2003 blackout• Connecticut only dispatched in 2005 (6 hours)• All of New England dispatched in 2006 (4 hours)
NYISO	16	113	<ul style="list-style-type: none">• No events called in 2004, 2008, or 2009• 2 events (total 22 hours) of events dispatched immediately following 2003 blackout• 5 events (total 35 hours) in 2006; majority of events responded to distribution system failure in NYC
PJM	14	61	<ul style="list-style-type: none">• All events called in eastern PJM zones only; western zone have not been called• No events called in 2003, 2004, 2008, and 2009

Emergency DR keeps the lights on

The ELRP improves grid reliability



June 30, 2010

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Dear Members:

PJM has already initiated 2 Emergency Load Management events this year in the District of Columbia portion of the PEPCO zone. The Demand Resource actions to reduce load in response to the PJM emergency request helped PJM maintain the reliability of the grid under these dynamic and critical conditions caused by transmission equipment outage conditions coupled with unseasonably hot weather. The ability to utilize Demand Resources as a capacity resource to assist operators in maintaining reliability is an important tool in PJM market.

I understand the May 26 event was especially complicated given it occurred during a PJM emergency drill and outside the official load management compliance period that occurs from June through September. My staff has informed me that PJM members operating as Curtailment Service Providers, including your company, with demand resources in this area were very responsive to the system needs during this event **and I would like to thank you for your commitment to the reliability of the grid.**

The ability to target demand resources and their load reductions where needed based on system conditions highlights the value these resources bring to the PJM market. I appreciate your company's contribution to help manage through this situation.

Sincerely,

Andrew L. Ott

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Cc: Commissioner Lori Murphy Lee
Chairman Betty Ann Kane
Commissioner Richard Morgan
Chairman Jon Wellinghoff
Commissioner Philip Moeller
Commissioner Marc Spitzer
Commissioner John Norris

Emergency DR benefits the environment

Infrequent emergency DR dispatches prevent larger environmental issues

- **If the grid fails, every emergency generator in the area will operate** for an extended period of time
 - The existing emergency generator fleet includes many poorly maintained, non-permitted generators
 - DR programs only utilize curtailment or properly permitted generation
- **After a grid failure it can take days to restore conditions to normal operating levels**, affecting public health and safety
 - During the August 2003 eastern blackout many millions of gallons of untreated sewage from NYC was dumped into rivers due to power failure
- **Study prepared for EPA¹ shows that DR programs benefit air quality**
- **Emergency engines already exist; therefore, no pollution from construction, no land use issues, no water use issues, no transmission needed**

¹ Study by Synapse Energy Economics , 2003

Emergency DR events do not correlate with high Ozone days

See Analysis of Emergency DR and Ozone Concentrations; February, 2012

Date	Geographic Extent	Duration (Hours)	High O ₃ Day?	Notes
September 24, 2010	Mid Atlantic (subset)	6	Yes	
September 23, 2010	Mid Atlantic (subset)	5.5-6 depending on zone	Yes in MD; No in DE	
August 11, 2010	Pepco Only (DC Only)	6	Yes	August 9-11 were exceedance days; August 10 higher than 11
July 7, 2010	Mid Atlantic (subset)	4-5.5 depending on zone	Yes	July 5-6 recorded higher concentrations
June 11, 2010	Pepco Only	4.2	No	
May 26, 2010	Pepco Only (DC Only)	2.7	No	
August 8, 2007	Mid Atlantic	4-5 depending on zone	No	August 6 and 7 had exceedances
August 2, 2006	Mid Atlantic	4	No in MD, Yes in DE	
August 3, 2006	Mid Atlantic	5	No in MD, Yes in DE	
July 27, 2005	Mid Atlantic and Dominion	4	Yes	July 25-26 recorded higher concentrations
August 4, 2005	Mid Atlantic	3	Yes	

EPA set a precedent in GHG reporting regulation

The EPA included emergency DR in the emergency generator definition in the Greenhouse Gas reporting standards

The EPA carved out emergency DR, **without an hours limitation**, in the emergency generator definition in Final Rule of the GHG reporting regulation:

*An emergency generator operates only during emergency situations, for training of personnel under simulated emergency conditions, **as part of emergency demand response procedures**, or for standard performance testing procedures as required by law or by the generator manufacturer. A generator that serves as a back-up power source under conditions of load shedding, peak shaving, power interruptions pursuant to an interruptible power service agreement, or scheduled facility maintenance shall not be considered an emergency generator.*

Source: 40 CFR 98.6

- Emergency engines participating in emergency DR **are emergency generators and thus exempt** from the GHG reporting regulation
- Engines participating in non-emergency DR **are not considered emergency generators and are not exempt** from the GHG reporting regulation

State Air Regulators recognize the value of DR

Most permitting agencies allow the operation of emergency engines for emergency DR

States/Counties that allow use of emergency DR in air regulations

- Connecticut*
- Massachusetts*
- Vermont*
- Rhode Island*
- New Hampshire*
- Maine
- New York
- Ohio*
- Pennsylvania
- Maryland*
- Virginia*
- West Virginia
- Illinois
- Indiana
- Michigan
- Texas

States/Counties that do not currently support emergency DR in air regulations

- Delaware
- New Jersey
- Washington, DC

States noted with * required regulatory change to facilitate emergency DR participation by emergency engines

Arguments for increasing the 15 hour limitation

- **ISOs must follow NERC Standards** when dispatching DR for emergencies; owners, CSPs, cannot dispatch them.
- **Emergency DR Programs are rarely dispatched** but provide low cost insurance against emergencies, **but they must meet tariff requirements** that specify minimum hours of availability for participation
- **There is NO increase in total hours the engines can be run;** must fit within the existing 100 hour limit.
- **Emergency DR events can substitute for testing hours**
- **Numerous states allow emergency engines to participate** in emergency DR; no state limits participation to 15 hours
- **Cost per ton of saved emissions in the hundreds of thousands of dollars**

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