A satellite image of Hurricane Sandy, showing a well-defined eye and a dense, swirling cloud structure over the Atlantic Ocean. The text is overlaid on the image.

# Hurricane Sandy: Energy Impacts and Response Actions

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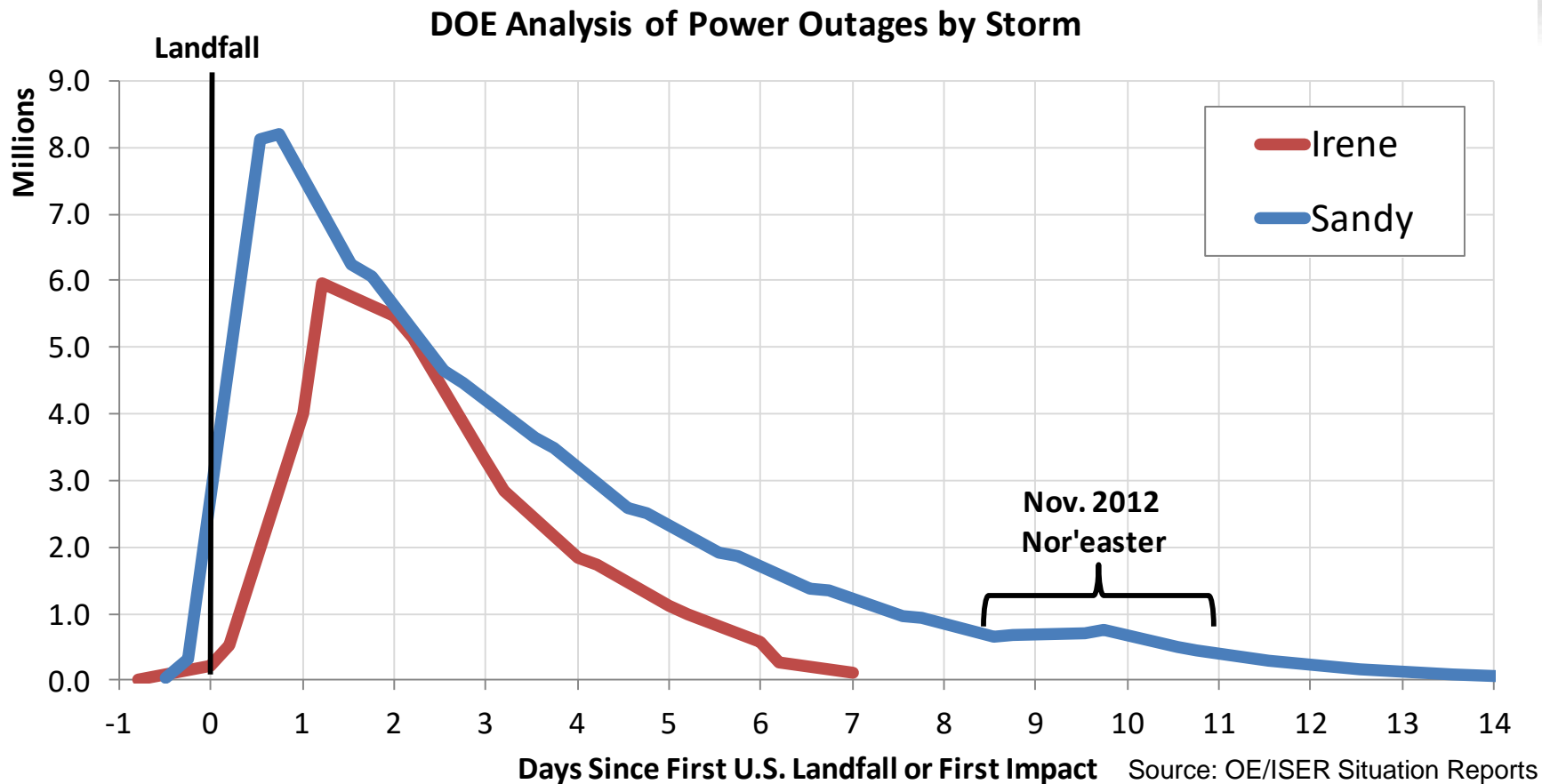
# Storm Comparisons

Information	Hurricane Sandy	Hurricane Irene	Hurricane Katrina
First U.S. Landfall Date	October 29, 2012	August 27, 2011	August 29, 2005
Strength at First U.S. Landfall	Post-Tropical Cyclone	Category 1 Hurricane	Category 3 Hurricane
U.S. Landfall Location and Sustained Wind Speeds	Atlantic City, NJ – 80 mph	Cape Lookout, NC - 90 mph Little Egg Inlet, NJ - 80 mph Coney Island, NY - 75 mph	Plaquemines Parish, LA – 127 mph
Extent of Tropical Storm Force Winds (from Center)	500 miles	300 miles	230 miles
Affected States	NC to ME	SC to ME	Gulf Coast to Midwest
Peak Flooding <sup>1</sup>	New York City <sup>2</sup> - 14.1 ft Philadelphia - 10.6 ft	New York City <sup>2</sup> – 9.5 ft Philadelphia - 9.9 ft	New Orleans – up to 20 ft Pascagoula – 12.2 ft
Property Damages	\$65 billion	\$14 billion	\$125 billion
Deaths	159	45	1,833

1) Above Mean Lower Low Water    2) Battery Park

Sources: NOAA , EQUecat, Property Claim Services, press

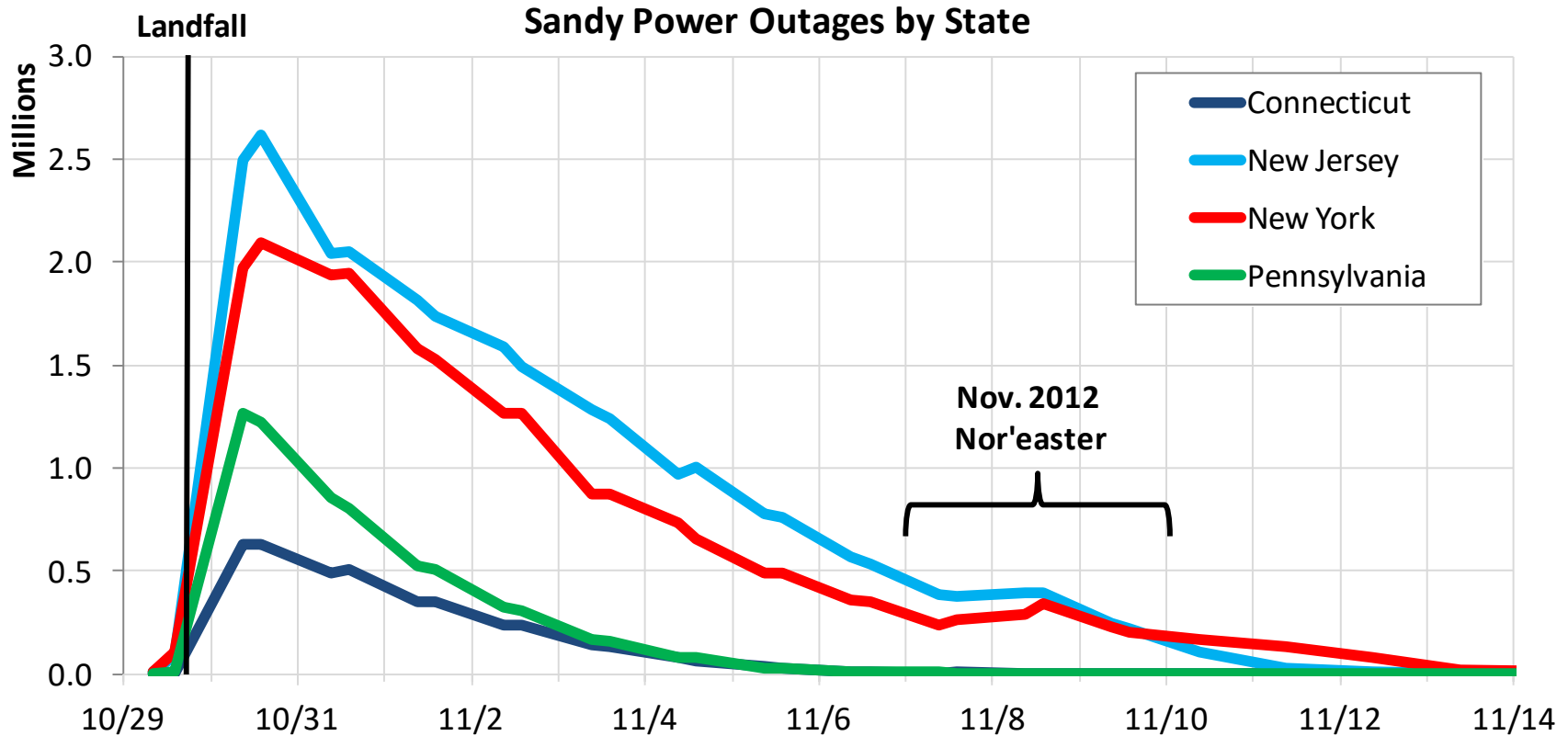
# Electricity Outages



Storm	Peak Outages (Millions)	Total Outages* (Millions)
Irene	5.95	6.69
Sandy	8.20	8.66

\*Total outages reported at one point or another over the course of storm and resulting from other storms affecting the region during the restoration period.

# Electricity Outages



State	Peak Outages (Millions)
Connecticut	0.63
New Jersey	2.62
New York	2.10
Pennsylvania	1.27

Source: OE/ISER Situation Reports

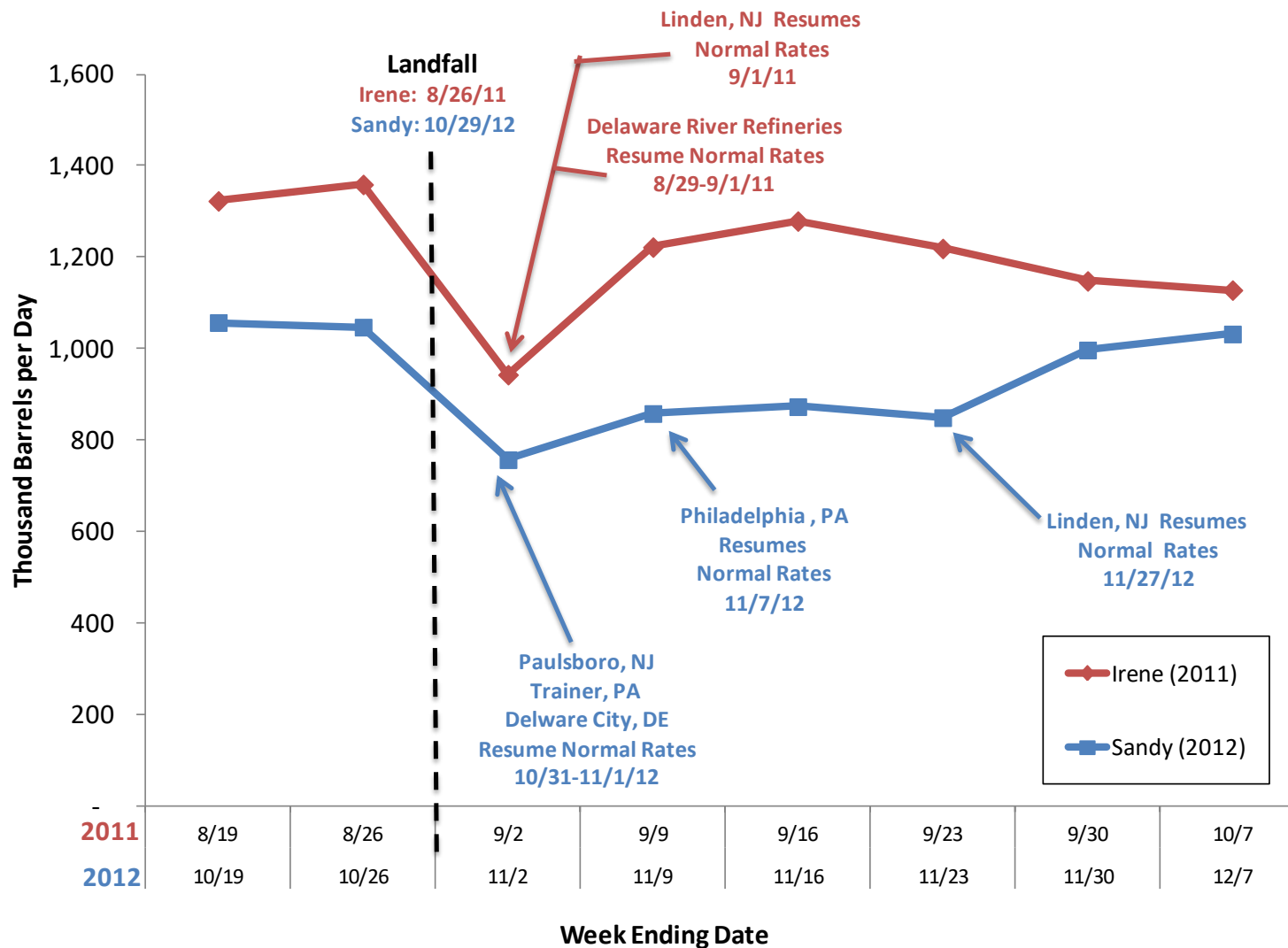
# Oil, Gas, and Nuclear Outages

Infrastructure	Hurricane Sandy	Hurricane Irene
<b>Refineries</b>		
Number	2 shut, 4 reduced	1 shut, 5 reduced
Capacity Shut	308,000 barrels per day	238,000 barrels per day
<b>Pipelines</b>		
Products	Buckeye, Colonial, Plantation	Buckeye, Plantation, TEPPCO (LPG)
Crude	None	Portland Pipe Line
Natural Gas	New Jersey Natural Gas	None
<b>Ports</b>	Hampton Roads, Baltimore, Delaware Bay, New York, Long Island Sound, Southeastern New England, Boston	North Carolina, Hampton Roads, Baltimore, Delaware Bay, New York, Long Island Sound, Southeastern New England, Boston
<b>Petroleum Terminals</b>	57	25
<b>Nuclear Power Reactors</b>	3 shut, 5 reduced	2 shut, 6 reduced

Source: OE/ISER Situation Reports, NRC

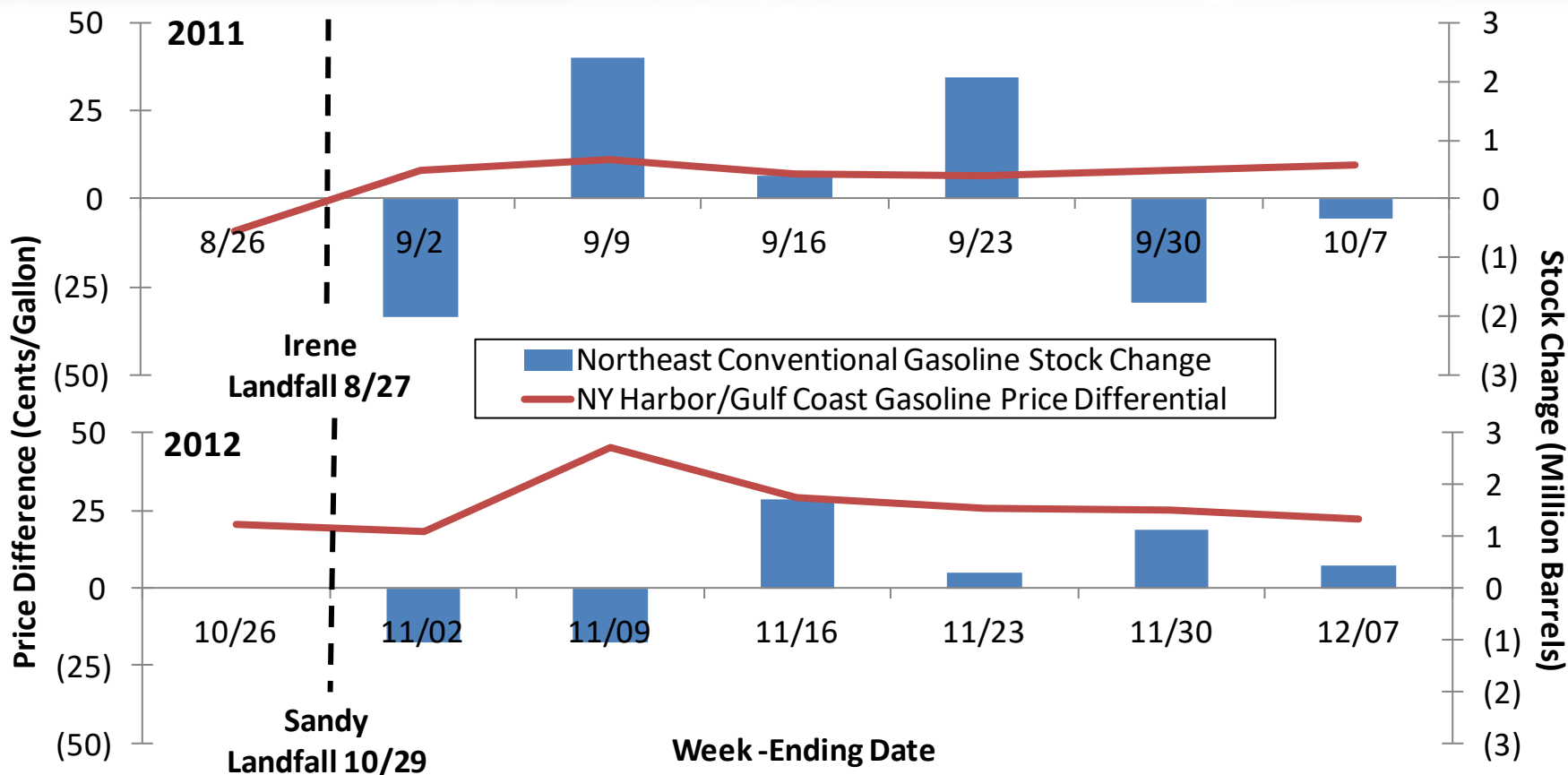
# Refining Activity

## Weekly Gross Inputs into East Coast (PADD 1) Refineries



# Gasoline Stocks

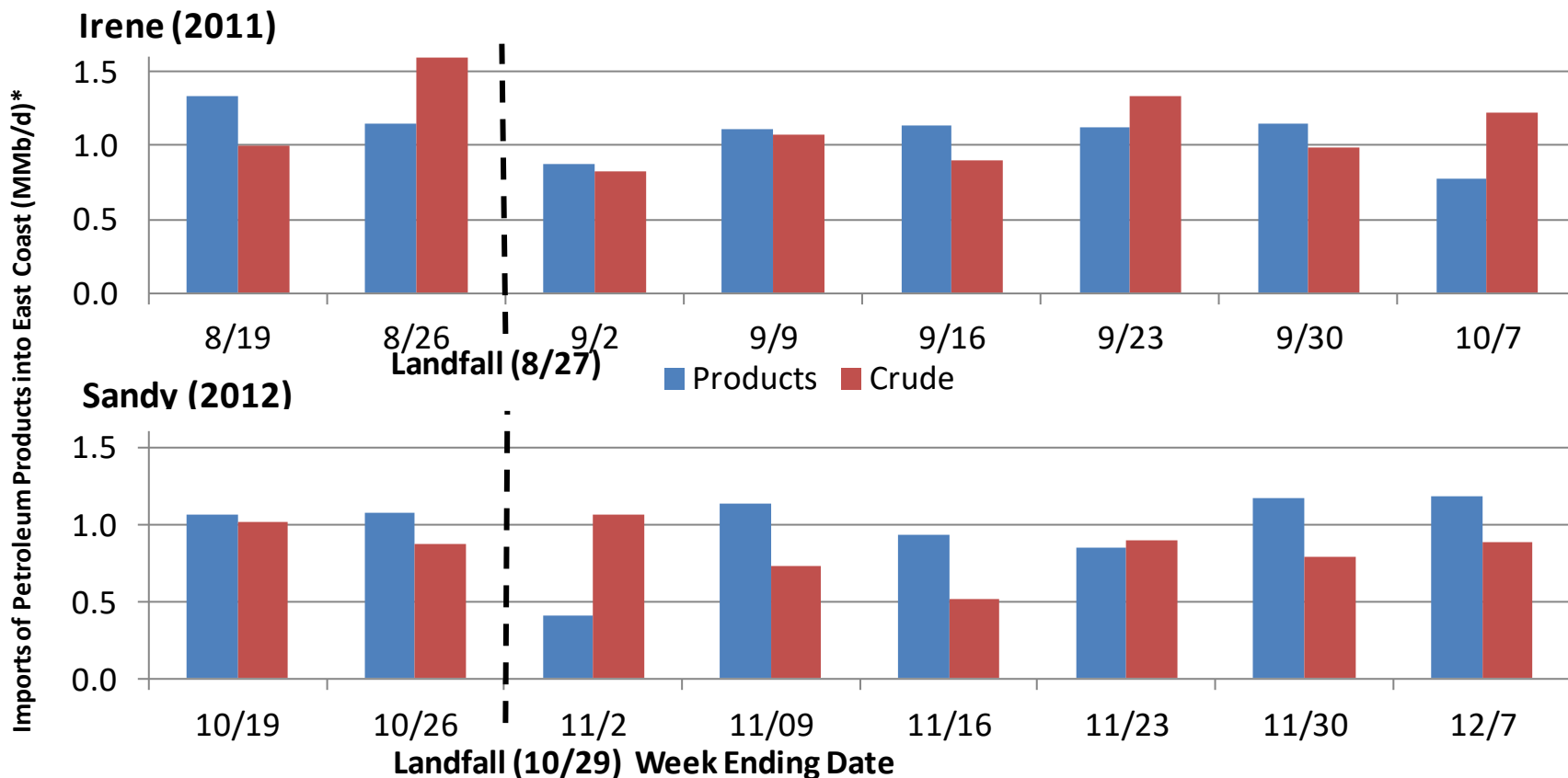
## NYH Gasoline Changes and Spot Price Differentials



- **Irene:** gasoline stocks fell by 2 million barrels (7%) and the premium over the Gulf Coast price rose 17 cents per gallon
- **Sandy:** gasoline stocks fell 2.2 million barrels (10%) and the premium over the Gulf Coast price rose 28 cents per gallon

# Petroleum Imports

## Weekly Petroleum Imports to the East Coast (PADD 1)



- Product imports fell by 264,000 b/d (23%) the week after Irene and 668,000 b/d (62%) in the week after Sandy.
- Product imports recovered in the second week after landfall for both storms.



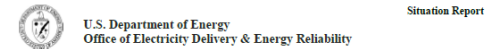
# Situational Awareness

DOE provided situational awareness of energy infrastructure outages and restoration activities for federal, State, and local stakeholders.

- Emergency Situation Reports:
  - Power outages and status of restoration activities.
  - Status of petroleum refineries, pipelines, and storage terminals.
  - Status of natural gas pipelines
  - Status of nuclear power plants.

[http://www.oe.netl.doe.gov/emergency\\_sit\\_rpt.aspx](http://www.oe.netl.doe.gov/emergency_sit_rpt.aspx)

- Visualization and Mapping:
  - Regional maps with county-level power outage data



## Hurricane Sandy Situation Report # 10 November 2, 2012 (10:00 AM EDT) [http://www.oe.netl.doe.gov/emergency\\_sit\\_rpt.aspx](http://www.oe.netl.doe.gov/emergency_sit_rpt.aspx)

### Highlights:

- At 8:00 pm EDT October 29, the National Hurricane Center reported Sandy made landfall near Atlantic City, NJ as a post tropical cyclone.
- As of 9:00 am EDT November 2 there are 3,628,739 customers without power in the affected States. This is a decrease from the 4,434,650 customers without power reported in Situation Report #9. Restoration estimates and efforts by electric utilities are reported below.

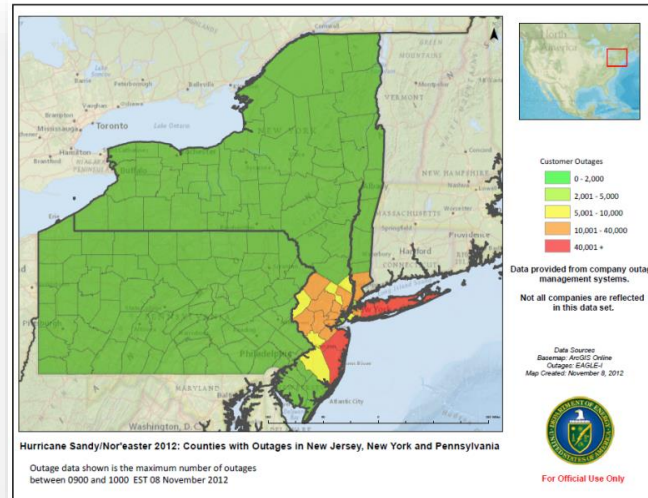
### Summary

Electric Outages by State				
Impacted State	Current Customer Outages	Percentage of Customers Without Power	Peak Outages Reported in DOE SitReps	Customers Restored Since Peak
Connecticut	238,871	12%	636,539	387,688
Maryland	18,608	< 1%	311,020	292,412
Massachusetts	1,650	< 1%	298,072	296,412
Michigan	10,003	< 1%	120,637	110,634
New Jersey	1,587,584	39%	2,615,291	1,027,707
New York	1,268,803	14%	2,097,933	829,130
Ohio	68,710	1%	267,323	198,613
Pennsylvania	324,747	5%	1,267,512	942,765
Rhode Island	7,339	2%	116,592	109,053
Virginia	1,910	< 1%	182,811	180,901
West Virginia	100,304	10%	271,265	171,461
<b>TOTAL:</b>	<b>3,628,739</b>		<b>6,175,615</b>	<b>4,546,776</b>

Note: States with fewer than 1,000 outages are not included in the table. Due to a large number of service providers, including investor owned utilities and cooperatives, the number of customer outages reported may not be comprehensive.

Sources: Outages obtained from company web sites and DOE communications. Total State customers are based on 2010 EIA Customer Data.

- On November 1, the US Environmental Protection Agency (EPA), in consultation with the US Department of Energy, expanded the emergency waiver of the Ultra Low Sulfur Diesel (ULSD) fuel specifications to allow the use of high-sulfur heating oil in diesel-powered highway and nonroad equipment in addition to nonroad vehicles in New Jersey. The waiver will be in effect through November 20.
- On October 31, the US Environmental Protection Agency (EPA), in consultation with the US Department of Energy, issued an emergency waiver of the reformulated gasoline (RFG) requirements for the States of Connecticut, Delaware, Maryland, Massachusetts, New Hampshire,



### Situation Report

(C) in Washington, DC; (M) in Boston, MA; the FEMA Emergency Operations Center Region III RRCC in

### Situation Report

of the Northeast that this line, the company said that the Station is portable and, all pipelines to the 3 airports

completed the Jersey's barrier

to 95% of its mining good. The company CL&P personnel have needed to

will be restored by, which

if the vast restoration may has been out-of-state sides more than ma, Florida, so, North

customers who were affected by Hurricane Sandy (less than one percent) will receive service

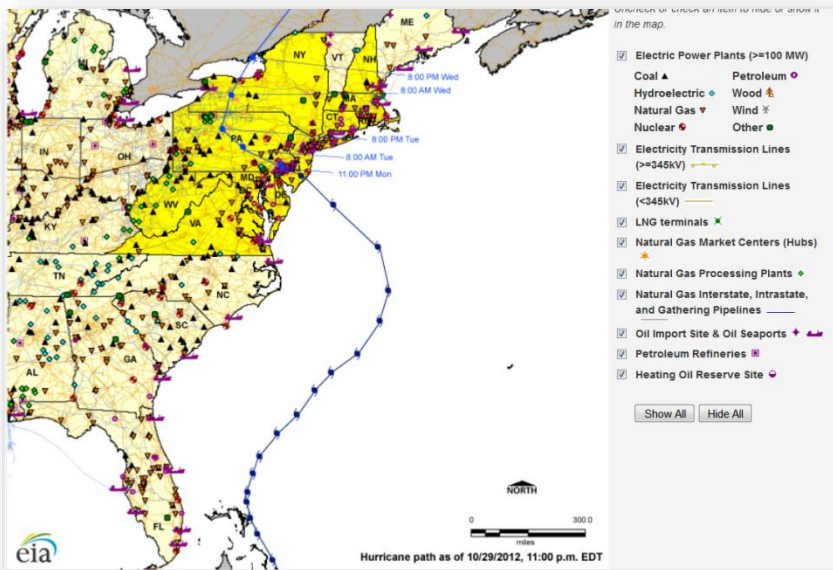
Department of Energy | 2012-09-07/07/12

Energy Reliability

# Informational Resources

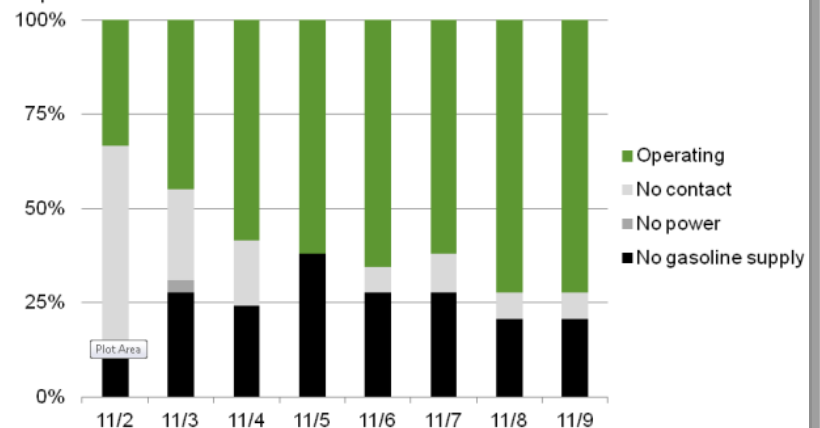
The EIA provided informational resources on energy infrastructure in the path of Hurricane Sandy.

- Interactive Infrastructure Map
  - The interactive map displayed the track of Hurricane Sandy over energy infrastructure
- New York City Metropolitan Area Retail Motor Gasoline Supply Report
  - Emergency survey summarized status of area fueling stations.



## Availability of gasoline in the New York City metropolitan area

Percentage of Sampled Stations



Source: EIA emergency survey

# Assisting Power Restoration

DOE, in partnership with FEMA and other federal agencies, worked around the clock to support the impacted States and utilities.

- **Utility Calls:** Daily conference calls between utility executives and Secretary of Energy.
- **Interagency Taskforce:** DOE participated in an interagency taskforce on power restoration and fuel availability at the FEMA National Response Coordination Center.
  - Focused on eliminating any bureaucratic roadblocks - help to get power back up as quickly as possible.
  - Facilitated the movement of utility workers by working with U.S. DOT to issue the appropriate permits for utility trucks crossing state lines.
- **Power Marketing Administrations and Other Assistance**
  - Personnel and equipment from the Energy Department's Power Marketing Administration (PMA) offices in Western States were involved in the restoration efforts.
- **“Boots on the Ground” support:** 35 DOE Personnel Deployed.



# Addressing Fuel Shortages



- **Jones Act Waiver:** DHS issued, in coordination with DOE, the Maritime Administration and the DOD, a waiver of the Jones Act allowing foreign vessels to ship petroleum products from the Gulf of Mexico to Northeastern ports.
- **Fuel Flexibility Waivers:** The EPA in coordination with DOE issued a number of waivers that allow for fuel flexibility in the use of a variety of fuel products.
  - Reformulated Gasoline (RFG) waiver.
  - Ultra Low Sulfur Diesel (ULSD) waiver for emergency response vehicles and equipment in NY, NJ, and PA.
  - Non Action Assurance allowing fuel loading and unloading without the use of vapor recovery systems
- **Accessing Reserves:** For the first time, diesel fuel from the Northeast Home Heating Oil Reserve was released for use by emergency responders, generators and emergency equipment and buildings, as well as to alleviate fuel shortages in Connecticut.
- **Hours of Service (HOS) Waivers:** DOT FMCSA issued a regional emergency declaration and waived Federal regulations applying to driver hours of service.
- **Additional Efforts included :** Opening Ports, Generators to Gas Stations and Fuel to First Responders.

# State & Local Actions

- **Rationing Fuel:** The State of New Jersey, New York City, and two New York counties established fuel rationing programs in order to alleviate long lines at fueling stations.
- **Easing Regulations:** The State of New Jersey and New York State, along with the New York City government, issued temporary waivers on certain State and local fuel regulations in order to alleviate fuel shortages
- **Monitoring Price Gouging:** New Jersey, New York, and Connecticut monitored sellers of fuel and emergency generators, among other goods, for price gouging.
- **Facilitating Restoration:** New York deployed National Guard troops who helped identify and properly mark downed power lines so that utility crews could be freed up to focus on the technical work of repairing lines.
  - The New York City government, in partnership with FEMA, launched the “NYC Rapid Repairs” program to send teams of contractors and City inspectors into neighborhoods impacted by Hurricane Sandy to make emergency repairs, including permanent or temporary restoration of heat, power, and hot water, and other limited repairs to protect a home from further significant damage.

# Recognized Practices

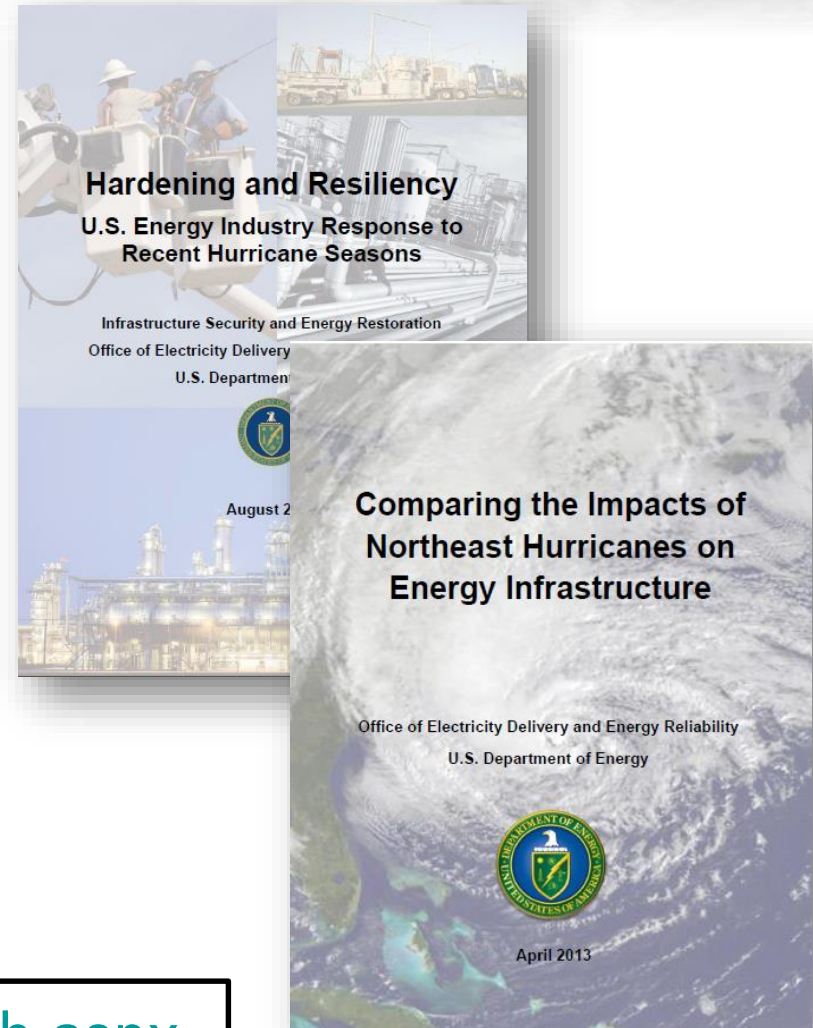
- Dedicated senior leadership involvement
  - Secretary of Energy held daily conference calls with utility CEOs
- Expanded mutual aid assistance
  - Peak deployment of ~70,000 workers (including DOE PMA crews)
  - DOD movement of personnel and resources
  - State and Federal waivers to facilitate movement of resources across State lines
- Expedited waivers
  - President: “zero tolerance for red tape”
  - Facilitated movement of personnel and resources
  - Provided flexibility in fuel systems

# DOE Reports

DOE -OE published analytical reports related to major energy disasters and public and private sector response actions.

- **Comparing the Impacts of Northeast Hurricanes on Energy Infrastructure:** compares the impacts of Hurricanes Irene and Sandy
- **Hardening and Resiliency: U.S. Energy Industry Response to Recent Hurricane Seasons:** focuses on the energy industries efforts to harden infrastructure against future storms.
- **Comparing the Impacts of the 2005 and 2008 Hurricanes on U.S. Energy Infrastructure:** compares the impacts of Hurricanes Katrina, Rita, Wilma, Ike, and Gustav.

<http://www.oe.netl.doe.gov/outreach.aspx>



# THANK YOU

**For public information visit:**

<http://energy.gov/oe/services/energy-assurance/incident-preparedness/state-and-local-energy-assurance-planning>

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