

RESILIENT



POWER

A Project of **Clean Energy Group**

Building Resilient Energy Systems

Hosted by The U.S. Department of Housing and
Urban Development

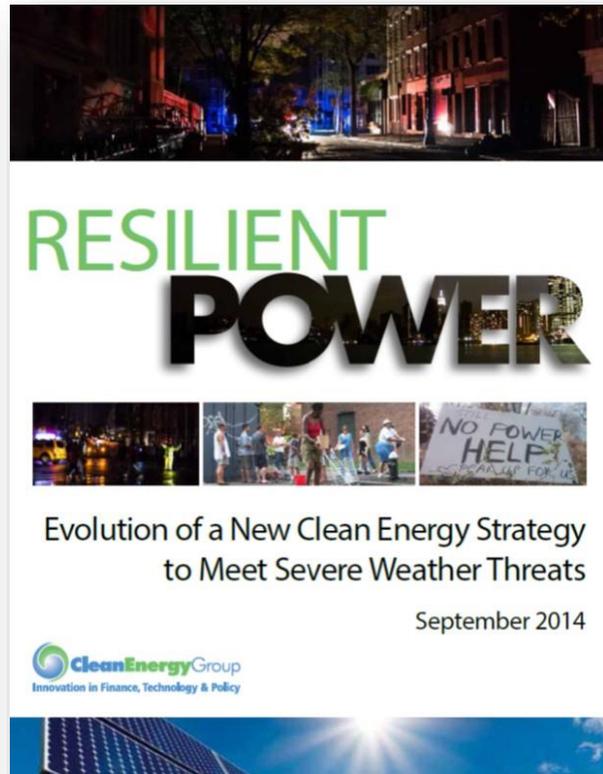
July 30, 2015

Lewis Milford
President
Clean Energy Group

Seth Mullendore
Project Director
Clean Energy Group

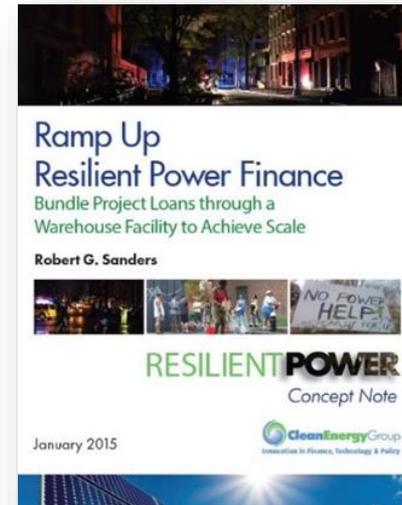
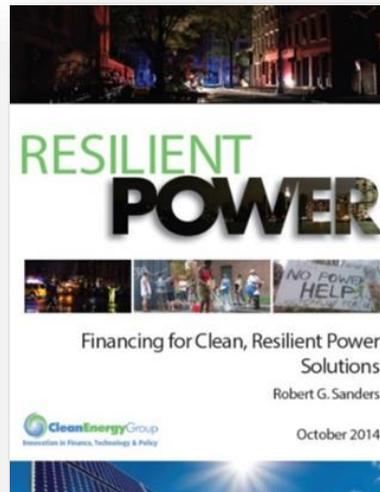
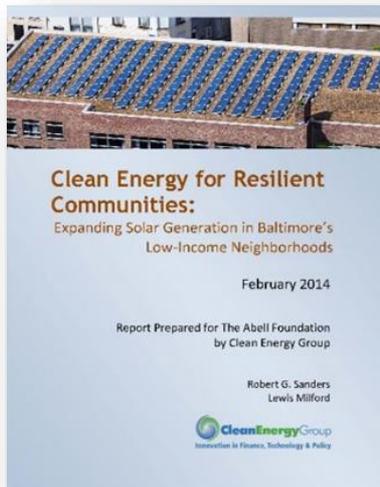


Who We Are



Resilient Power Project

- Increase public/private investment in clean, resilient power systems
- Engage city officials to develop resilient power policies/programs
- Protect low-income and vulnerable communities
- Focus on affordable housing and critical public facilities
- Advocate for state and federal supportive policies and programs
- Technical assistance for pre-development costs to help agencies/project developers get deals done
- See www.resilient-power.org for reports, newsletters, webinar recordings



Sandy and Power

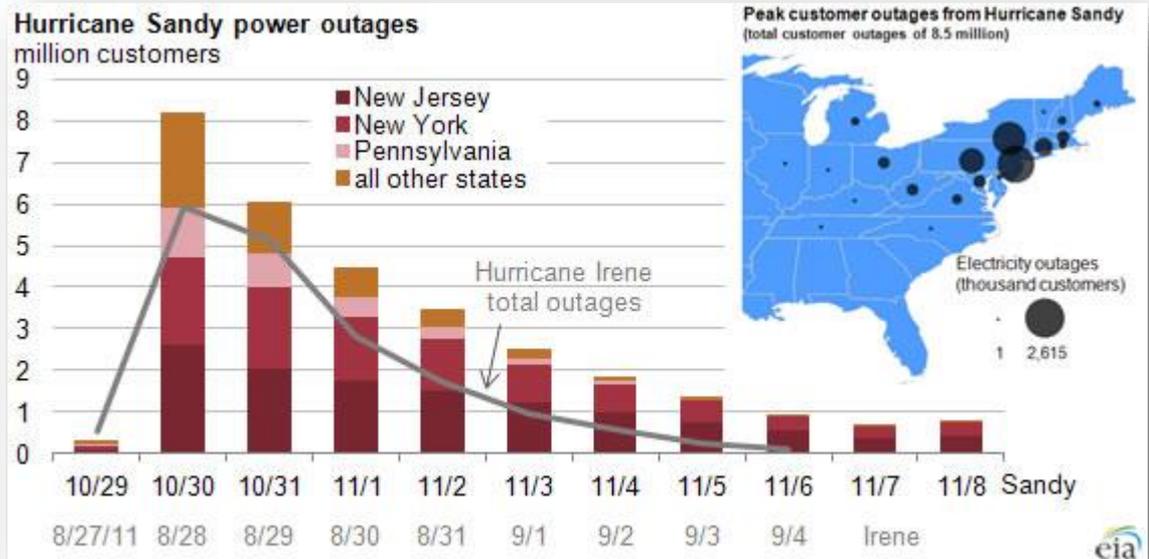


“The fact that the NYU hospital is dark but Goldman Sachs is well-lit is everything that’s wrong with this country.”



“Extensive power outages during Sandy affected millions of residents and resulted in substantial economic loss to communities. Despite the size and power of Hurricane Sandy, this was not inevitable: resilient energy solutions could have helped limit power outages.”

Hurricane Sandy Rebuilding Strategy: Stronger Communities, A Resilient Region (Aug. 2013)

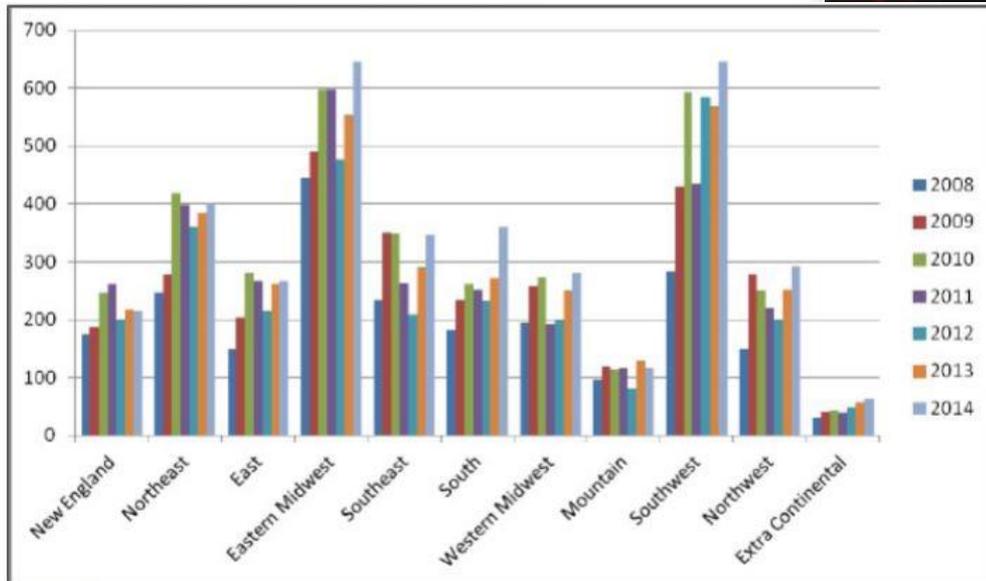


Power Outages & Severe Weather



Top 10 Cities Likely to See Big Increases in Power Outage Risks

Reported Power Outages by Region (2008-2014)



1. New York City
2. Philadelphia, PA
3. Jacksonville, FL
4. Virginia Beach, VA
5. Hartford, CT
6. Orlando, FL
7. Tampa, FL
8. Providence, RI
9. Miami, FL
10. New Orleans, LA

Extreme Weather Disproportionately Hurts Vulnerable & Low-Income Communities

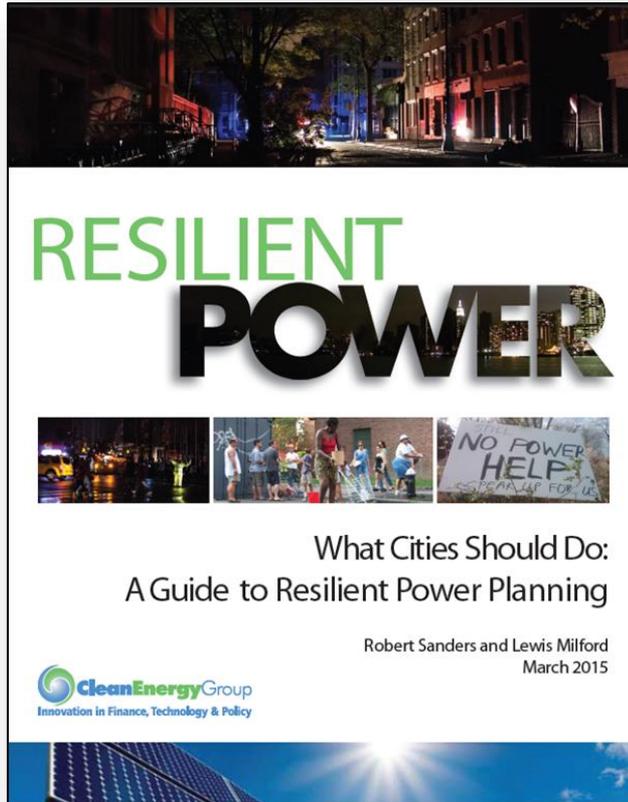


- Extreme weather events harms low-income, elderly and disabled populations disproportionately
- Flooded counties had households at 14% below US median income.
- Drought & heat waves affected counties with households at 5% below US median income.



- **Hurricane Sandy:** 110 US fatalities and \$42+ billion in property damage - costliest U.S. hurricane.
- 600,000 people live in 6 low-lying, mostly NY minority communities of South Bronx, Newtown Creek, Brooklyn Navy Yard, Red Hook, Sunset Park & Staten Island.
- In Red Hook (Brooklyn), the borough's largest housing project, 4,000 of the 6,000 residents had no heat or water for over a week after the storm.
- No backup generators at senior centers.

Resilient Power Inequality



When it comes to reliable energy technologies to protect against power outages, there is a disparity between the haves and the have-nots.

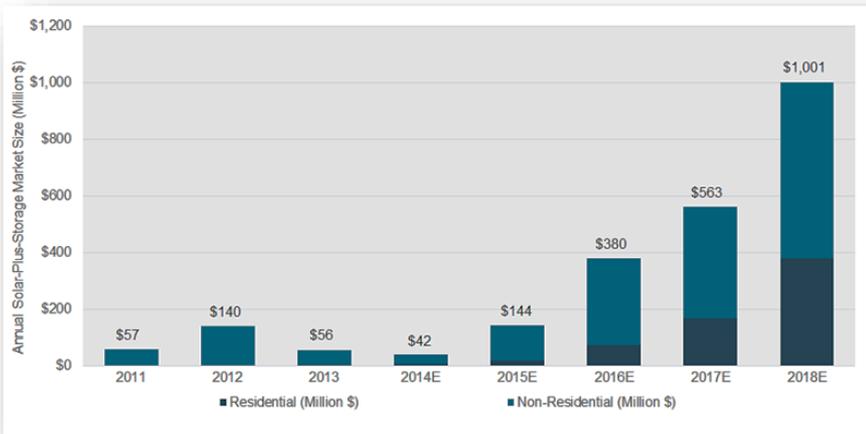
Call it “resilient power inequality.”

<http://www.cleangroup.org/assets/2015/Resilient-Cities.pdf>

Solar+ Storage New Major Market Trend—Finance Industry

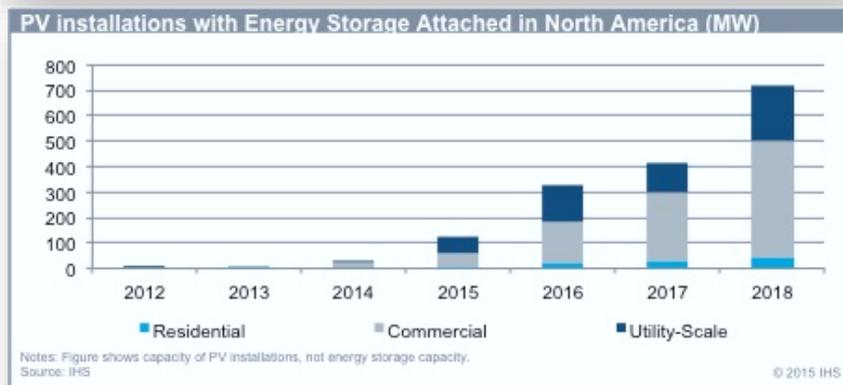
“In 2014, a chorus of analyses from major financial institutions—including Bank of America, Barclays, Citigroup, Fitch Ratings, Goldman Sachs, Morgan Stanley, and UBS—found that solar-plus-battery systems pose a real and present threat to traditional utility business models.”

<https://cleantechnica.com/2015/04/16/solar-plus-storage-is-coming-to-ders-says-finance-industry/>



US Solar-Plus-Storage Market to Surpass \$1 Billion by 2018

<http://www.greentechmedia.com/articles/read/US-Solar-Plus-Storage-Market-to-Surpass-1-Billion-by-2018>



IHS: 9% of solar PV systems will have attached storage in 2018

<http://www.utilitydive.com/news/ihs-9-of-solar-pv-systems-will-have-attached-storage-in-2018/375636/>

Solar and Storage: The Energy Transition

ENERGY

Clean Energy Revolution Is Ahead of Schedule

106 APR 8, 2015 8:00 AM EDT

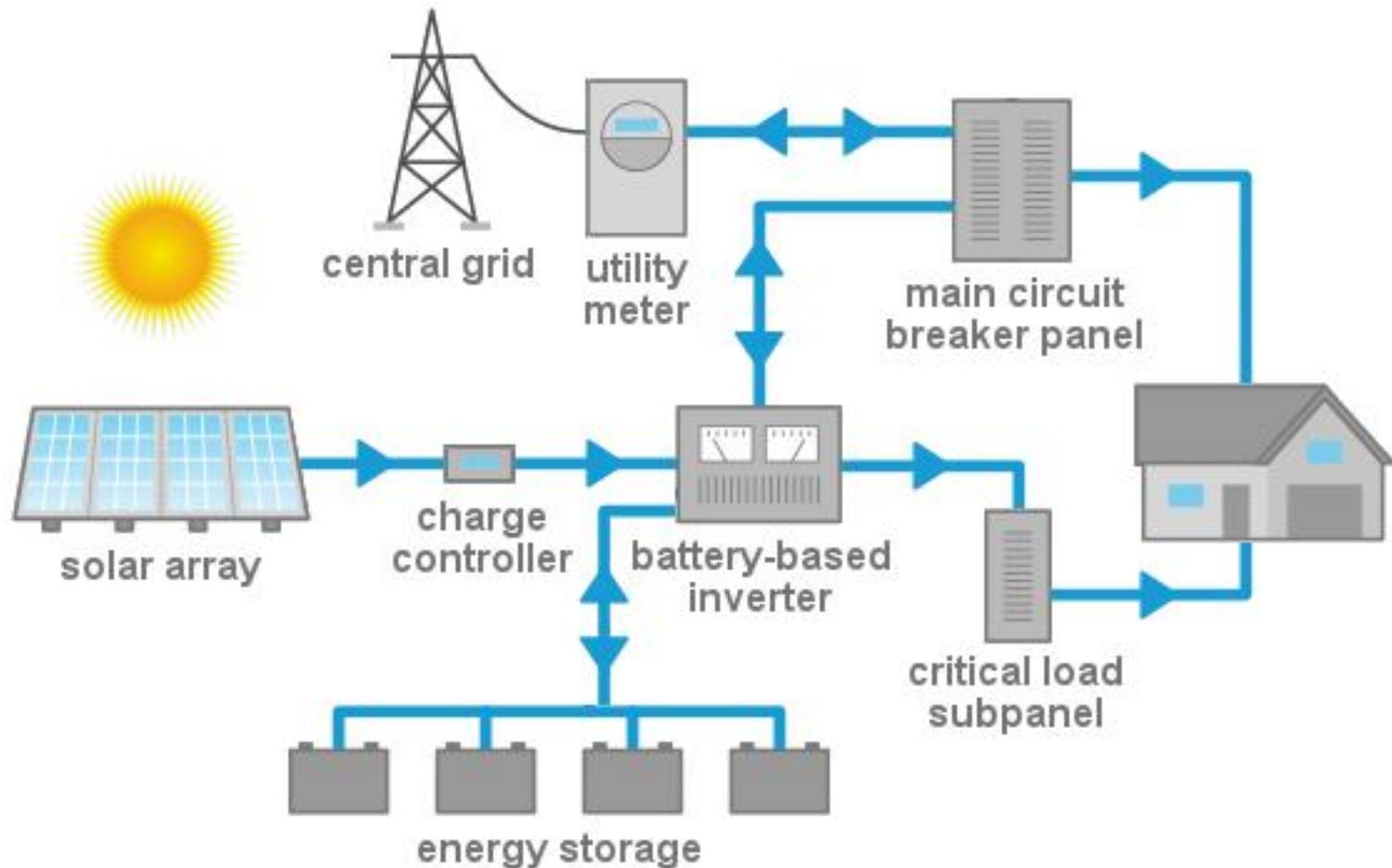
By Noah Smith

BloombergView

Solar-plus-batteries are set to begin a dramatic transformation of human civilization. The transformation has already begun, but will really pick up steam during the next decade. That is great news, because cheap energy powers our economy, and because clean energy will help stop climate change.

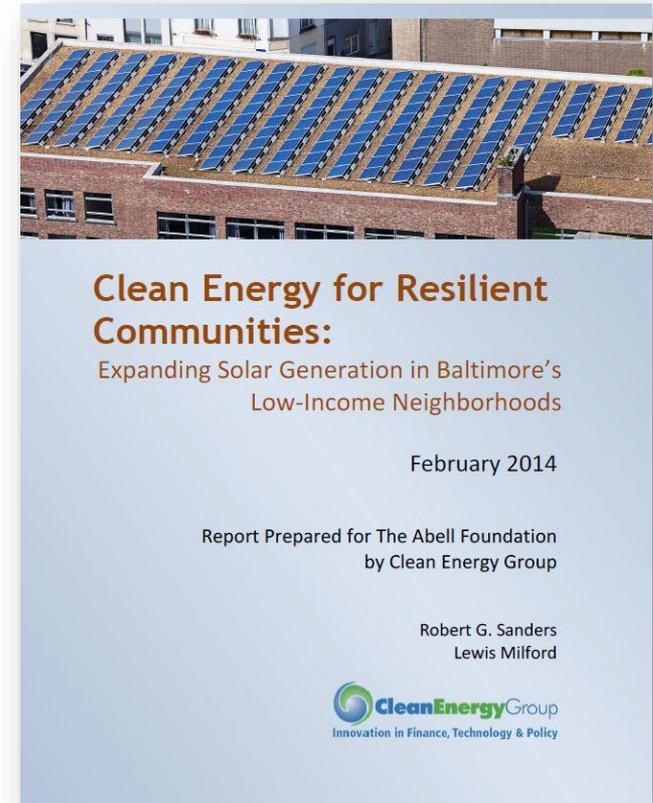
<http://www.bloomberqview.com/articles/2015-04-08/clean-energy-revolution-is-way-ahead-of-schedule>

How Resilient Solar + Storage Works



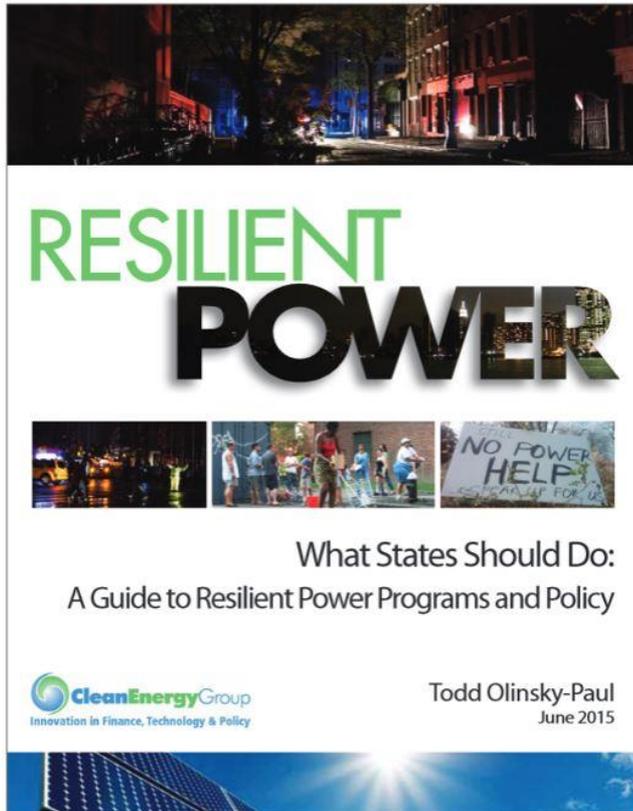
Resilient Cities – What Should Cities Do?

- Disaster preparedness planning: evaluates vulnerabilities
- Few cities assess risks & mitigation strategies re: grid outages for critical public & community facilities
- None has developed citywide resilient power strategy
- Finance solar+storage systems with little or no upfront costs
- Cities must invest in resilient power



<http://www.cleangroup.org/assets/Uploads/2014-Files/Clean-Energy-for-Resilient-Communities-Report-Feb2014.pdf>

What States Should Do: A Guide to Resilient Power Programs and Policy

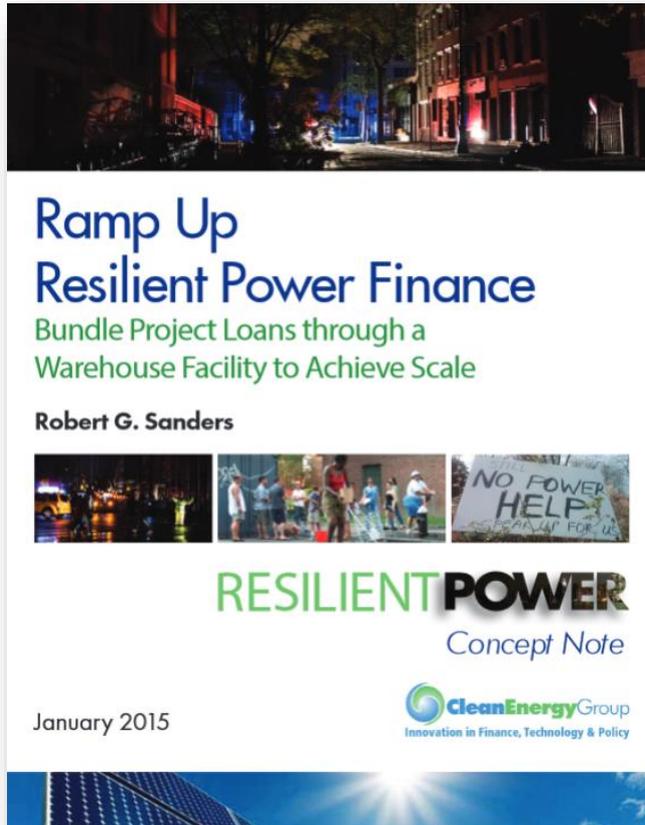


Read the report at
<http://bit.ly/ResilientStates>

First comprehensive look at the emerging resilient power movement in the Northeast:

- \$400 million in new state-managed funds
- 90+ critical facilities – including emergency shelters, wastewater treatment plants, firehouses and other first responder facilities
- Moving from demonstration projects to market-based solutions
- Best practices and policy recommendations

Financing Resilient Power



- **Project & Company Financing:** How are projects financed now, where are sources of expansion capital?
- **Commercial & Green Banks:** How to provide debt in emerging tech markets?
- **Foundation Roles:** Program support, PRIs & endowment asset allocation
- **State and Local Support:** Incentives & credit enhancement reduce project risk
- **Warehouse Credit Facility:** Rolling up transactions to get to scale
- **Goal:** To calibrate a development finance strategy to the reality of early stage market – without leaving low-income & vulnerable populations behind

Public Support for Solar+Storage

Public Investments:

- **Connecticut DEEP: \$48 Million**
- **New Jersey BPU: \$200 Million** Energy Resilience Bank and **\$10 Million** Energy Storage Program
- **Massachusetts DOER: \$40 Million** Community Clean Energy Resiliency
New York NYSEDA: \$40 Million NY Prize microgrids, **\$66 Million** CHP

TOTAL: >\$400 million in new NE state funds alone in last 18 months



Resilient Solar+Storage Projects to Date:

- **New Jersey BPU: \$3 million** for 13 solar+storage projects at schools, wastewater treatment plants. **Total : \$12 million**; State investment for round two: **\$6 million**
- **Massachusetts DOER: \$26 million** for 21 municipal projects, including 31 solar+storage projects at schools, wastewater plants, first responders. **Total project investment: ~\$52 million**
- **Vermont** Solar+storage microgrid. **Total project investment: \$12.5 million**

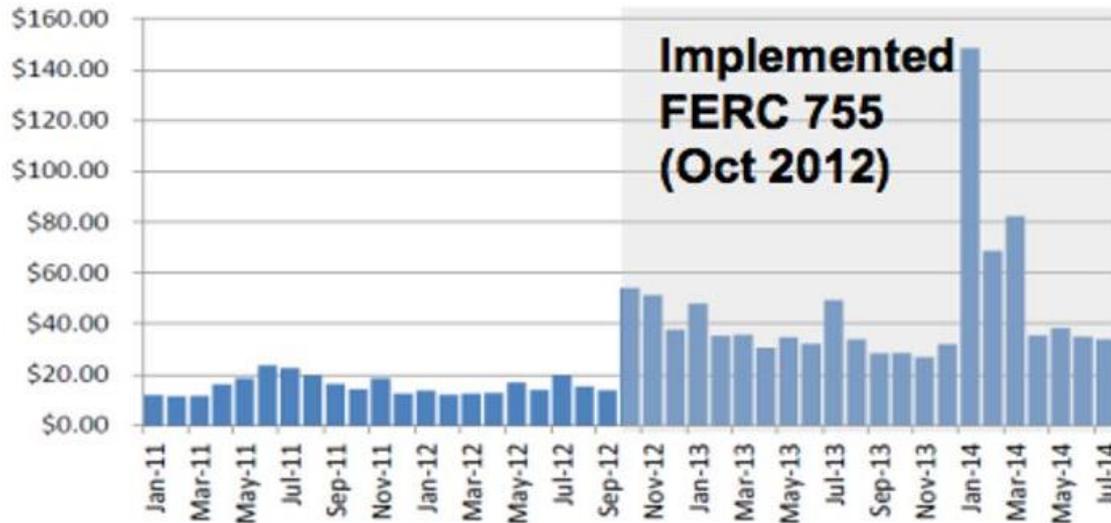
TOTAL: ~\$76.5 million in solar+storage projects over the past 6 months*

**Results do not include California*

Solar+Storage: The Economic Case

PJM

Fast Storage Revenue \$/MW/hour



- Frequency regulation market participation can reduce payback period for solar+storage projects in PJM territory to 4 years
- Resilient energy storage being provided by third party storage companies at little to no cost to developer

Other Half of the Bill – Demand Charges

Your electricity charges

These charges are for the electricity you used (supply) and getting that electricity to you (delivery). Rates are based on a 30 day period. When your billing period is more or less than 30 days, we prorate your bill accordingly.

Electricity you used during this 32 day billing period from Aug 16, 2013 to Sep 17, 2013

Rate: EL9 General Large

We measure your electricity by how many kilowatt hours (KWh) you use. One KWh will light a 100 watt bulb for 10 hours. The meter multiplier is the factor by which the meter difference is multiplied to determine your usage. Demand or kW is the highest amount of electric usage in any half hour during the bill period. Your total electricity use is the sum of the usage from your various meters as shown in the meter detail section of your bill starting on page 3.

Total electricity use	716,800 kWh	1778.88 kW
On peak energy (Mon-Fri 7am - 10pm)	315,457 kWh	
Off peak energy (Mon-Fri 10pm - 6am)	401,343 kWh	
G & T demand (Mon-Fri 8am - 10pm)	1636.80 kW	
Secondary demand (all hours, all days)		1851.36 kW

► Your supply charges

These charges are for the delivery portion of your electricity bill. You will receive a separate bill for your electricity supply. If you have a question about your supply bill, please call SUEZ ENERGY RESOURCES NA, INC. at (888) 232-6206.

► Your delivery charges

On peak 315,457 kWh	\$4,531.98
Charge for maintaining the system through which Con Edison delivers electricity to you during on peak hours.	
Off peak 401,343 kWh	\$5,765.86
Charge for maintaining the system through which Con Edison delivers electricity to you during off peak hours.	
G & T demand 1636.8 kW	\$14,456.21
Charge for the electricity delivered to you by Con Edison during the hours of 8am to 6pm Monday through Friday.	

Primary demand 1778.8 kW	\$29,390.57
Charge for the electricity delivered to you by Con Edison during the hours of 8am to 10pm, Monday through Friday.	
Secondary demand 1851.3 kW	\$32,819.84
Charge for the electricity delivered to you by Con Edison all hours all days during the billing period.	
SBC/RPS charges	\$4,085.75
The System Benefits Charge/Renewable Portfolio Standard charges fund New York State renewable energy, environmental and other related public policy programs.	
Meter charges	\$80.70
Charge includes \$47.43 for the meter(s), \$12.50 for meter reading, and \$20.77 for meter maintenance. <i>Some or all the charges may be avoided if you switch to an alternate provider.</i>	
Billing and payment processing charge	\$1.04
<i>This charge may be avoided by switching to an energy services company (ESCO).</i>	
Temporary NY State Surcharge	\$1,483.02
GRT & other tax surcharges	\$2,429.47
Taxes on Con Edison gross receipts from sale of utility services	
Sales tax @ 4.5000%	\$4,263.68
Tax collected on behalf of New York City.	

Total delivery charges \$99,012.12

►► Total electricity charges \$99,012.12

\$30's - \$40's/kW peak demand charges; in CA & NY, 400,000+ C&I accounts monthly bills consist >40% demand

Source: Green Charge Networks

Resilient Power Projects – Housing



- Technical assistance fund: project grants to design and deploy resilient power systems
- Demonstrate viability of clean energy + storage in affordable housing and assisted living
- Working with housing and solar+storage developers in NYC, Chicago, DC, Newark, Boulder
- Via Verde (Bronx) – 1st solar+storage project for resilient power applied to affordable housing

Resilient Power Projects – Critical Facilities



- Demonstrate viability of clean energy + storage in critical community facilities
 - Community shelters, police and fire stations, hospitals, wastewater treatment
- Working with municipalities to develop resilient power plan for critical facilities
- Municipal solar+storage project planning underway in Baltimore, Salt Lake City, Los Angeles, Duluth, DC

RESILIENT POWER

A Project of Clean Energy Group

Sign up for the RPP e-Distribution List to get notices of future webinars and the monthly *Resilient Power Project Newsletter*: <http://bit.ly/RPPNews-Sign-UP>

More information about the Resilient Power Project, its reports, webinar recordings, and other resources can be found at www.resilient-power.org.

Contact Info

Lewis Milford
President
Clean Energy Group
Email: Lmilford@cleanegroup.org
Phone: (802) 223-2554

Seth Mullendore
Project Director
Clean Energy Group
Email: Seth@cleanegroup.org
Phone: (802) 223-2554



www.cleanegroup.org

www.cesa.org

www.resilient-power.org