RESILIENT POWER CASE STUDY

Connecticut Department of Energy and Environment Microgrids Program

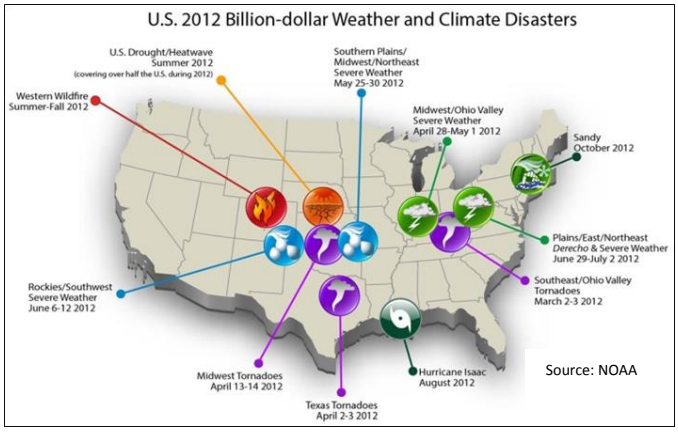
November 2014

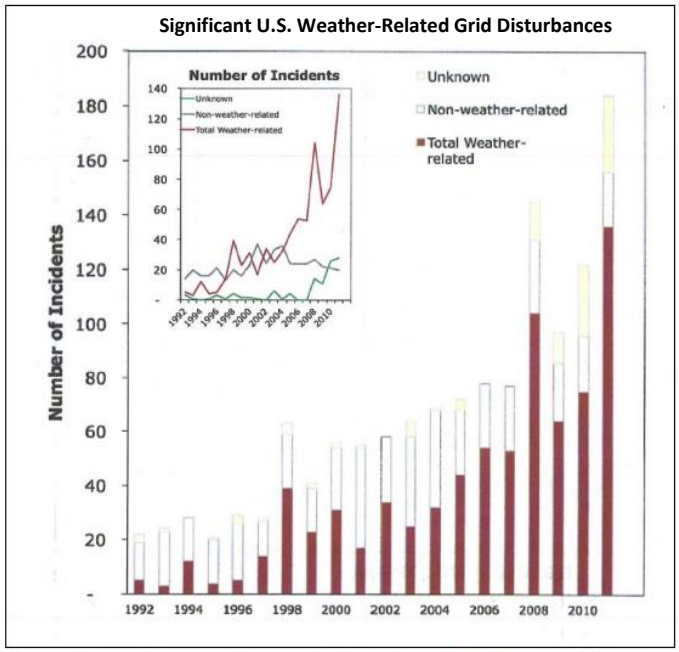
RESILIENT POWER
A Project of Clean Energy Group
www.resilient-power.org

On October 29, 2012, Hurricane Sandy knocked out electricity to some 8.5 million customers in the North-eastern United States, 1.3 million of whom were still in the dark a week later. The storm served as a wake-up call to the fragility of our nation's aging electrical grids. However, Sandy was not unique; the frequency and cost of natural disasters continues to increase, and is a nationwide problem.

As one of the states most affected by Sandy, Connecticut was the first out of the gate with a major program supporting the deployment of resilient power technologies. In 2012, the Connecticut Department of Energy and Environmental Protection (CTDEEP) initiated a three-year, $48 million pilot program, targeting municipal microgrids to support critical infrastructure. Projects may receive up to $3 million, however, the grants may only be applied toward design, engineering and interconnection costs; applicants are expected to self-finance generation, energy storage, and other capital costs.

In its first two rounds of funding, the Connecticut Microgrid Grant and Loan Pilot Program (http://www.ct.gov/deep/cwp/view.asp?a=4120&Q=508780) awarded 11 project grants, for a total of $23 million. Projects were judged on the basis of thoroughness, costs/benefits, financial underpinnings, cost effectiveness on a $/kW basis, contribution to public need, inclusion of public and private commercial facilities if possible, technical feasibility, reliability, operation in parallel mode 24/7, and other criteria including diversity of geographic location.





Source: *Electric Grid Disruptions and Extreme Weather.* See http://evanmills.lbl.gov/presentations/Mills-Grid-Disruptions-NCDC-3May2012.pdf.

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CT DEEP AWARD WINNERS			
ROUND 1			
Project	**Facilities**	**Generation**	**Grant Amount**
UConn Depot Campus/Storrs	Campus buildings	400 kW fuel cell, 6.6 kW PV	$2,144,234
City of Bridgeport-City Hall/Bridgeport	City hall, police station, senior center	(3) 600 kW natural gas microtrubines	$2,975,000
Wesleyan/Middletown	Campus, athletic center (public shelter)	(1) 2.4 MW and (1) 676 kW natural gas CHP reciprocating engine	$693,819
University of Hartford-St. Francis/Hartford	Dorms, campus center, operation building	1.9 MW diesel (existing), 250 kW diesel, 150 kW diesel	$2,270,333
SUBASE/Groton	Various buildings and piers	5 MW cogen turbine, 1.5 MW diesel	$3,000,000
Town of Windham/Windham	2 schools (various public purposes)	130 kW natural gas, 250 kW solar, 200 kWh battery; (2) kW diesel	$639,950
Town of Woodbridge/Woodbridge	Police stations, fire station, Dept. of Public Works, Town Hall, high school, library	1.6 MW natural gas, 400 kW fuel cell	$3,000,000
City of Hartford-Parkville Cluster/Hartford	School, senior center, library, supermarket, gas station	600 kW natural gas	$2,063,000
Town of Fairfield-Public Safety/Fairfield	Police station, emergency operations center, cell tower, fire HQ, shelter	50 kW natural gas recip. engine, 250 kW natural gas recip. engine, 47 kW PV	$1,167,659
ROUND 2			
City of Milford	Parsons complex, middle school, senior center, senior apartments, city hall	(2) 148kW natural gas CHP units, 120KW PV, 100kW battery storage	$2,909,341
University of Bridgeport	Dining hall, rec center, student center, 2 res buildings as shelters, police station	1.4 MW fuel cell	$2,180,898

As shown in the table above, the winning proposals employ a variety of generation types including fuel cells, solar PV, natural gas microturbines, combined heat and power units, and diesel generators, along with other elements such as batteries for energy storage. The funded microgrids will support diverse critical facilities and services, including police stations, senior centers, municipal buildings, schools, fire stations, supermarkets, gas stations, cell towers and shelters.

Following its Round 1 solicitation, CT DEEP incorporated lessons learned to create an improved Round 2 solicitation. CT DEEP personnel identified several critical areas to be addressed:

- Municipalities need support, including information and financing assistance
- Strong incentives are needed to limit the use of diesel generators and encourage renewables and storage
- Utility buy-in is important
- Careful review is needed to ensure that proposed projects are financially sound and financeable
- 100% reliability is necessary for many critical services

CTDEEP took a number of steps to address these needs in the second round of the program, including enlisting the Connecticut Green Bank for financing assistance, limiting diesel generation to no more than 25% of total system generation capacity, offering additional points in the judging process to proposals that included renewables and storage, and engaging municipalities through additional outreach. CT DEEP anticipates administering a third round of microgrids solicitations in 2015. More information about this program can be found on the CTDEEP website at: http://www.ct.gov/deep/cwp/view.asp?a=4120&Q=508780.

This paper is a product of Clean Energy Group and part of a series of reports and case studies issued through the Resilient Power Project, a joint project of Clean Energy Group and Meridian Institute. This project works to expand the use of clean, distributed generation for critical facilities to avoid power outages; to build more community-based clean power systems; and to reduce the adverse energy-related impacts on poor and other vulnerable populations from severe weather events. This project has been generously funded by The JPB Foundation, The Kresge Foundation, and The Surdna Foundation. The views and opinions expressed in this report are solely those of the authors. For more information about this project, download its reports, and links to sign up for its webinars and e-distribution list, please visit the Resilient Power Project's website at www.resilient-power.org.