U.S. DEPARTMENT OF
ENERGY

Rising Seas Summit

Adaptive Instructure Panel

November 5, 2015

Energy Sector Adaptation to Climate Change

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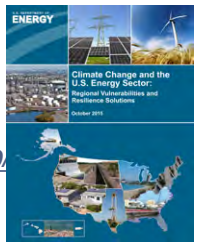
U.S. Department of Energy

Provide technical assistance, information, and innovative resilient technologies

- **Issued DOE Reports:**
  - ✓ *Climate Change and the U.S. Energy Sector: Regional Vulnerabilities and Resilience Solutions –October 2015*
    http://www.energy.gov/sites/prod/files/2015 /10/ Regional_Climate_Vulnerabilities_and _Resilience_Solutions_0.pdf



- **Developed information and tools: 'energy theme' of the U.S. Climate Resilience Toolkit** http://www.data.gov/climate/energy-infrastructure

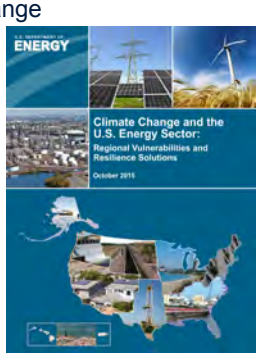
- **Developing methodologies for conducting cost-benefit analysis-studies on sea-level rise/storm surge effects on energy assets**

- **Demonstrating and Deploying Adaptive Energy Technologies (e.g., microgrids, smartgrids)**

Climate Change and the U.S. Energy Sector: Regional Vulnerabilities and Resilience Solutions

Purpose of Report

- Enhance energy sector resilience to regional climate change
- Objectively assess energy sector vulnerabilities by region
- Characterize resilience solutions and challenges to address regional vulnerabilities



Audience

- Private-sector decision makers
- Local, state, and regional stakeholders (e.g., Climate Action Champions, State Energy Assurance Planning; Place-based initiatives)

Value Added

- Provides regional/local technical information to:
  - Further characterize potential climate change impacts on specific energy assets
  - Develop strategies to cost-effectively increase local, regional, and national energy system resilience

Image sources: NIH, BPA, USGCRP, DOE

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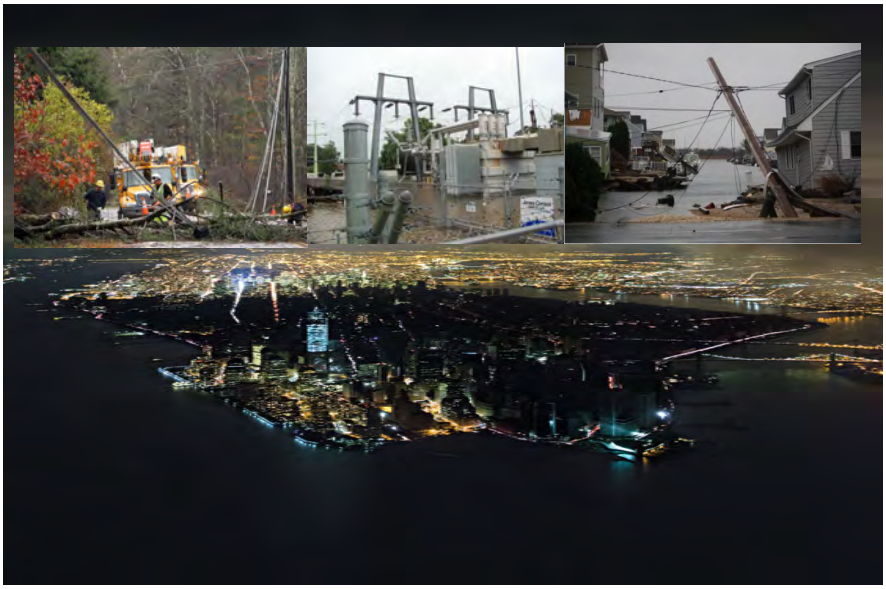
Climate Change Impacts on the Energy Sector



Climate Change-Energy Impacts: Interdependencies Across Sectors

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Illustrative Examples of "Adaptive" Energy Infrastructure

- **Infrastructure Hardening:** Elevate or relocate critical equipment, waterproofing, etc., to reduce damages and loss of operations
- **Preparedness:** Prepositioning of restoration crews, equipment, back-up generaon
- **Demand Response:** Compensate customers to conserve energy when the electric grid is stressed
- **Energy Efficiency:** Upgrades to heating/ air conditioning units and lighting systems, as well as appliance replacement programs
- **Smart Grid***:* Expanded use of smart meters to speed identification of faults and service restoration
- **Renewable Energy and CHP:** An incentive program for solar energy installations and geothermal heating projects, as well as installation of combined heat and power systems, which simultaneously produce electricity and heat from a single fuel source and can operate independently from the grid when it fails
- **Energy Storage:** Battery-based energy storage for electricity produced when electricity demand is low for use when demand is high, easing the burden on the electric grid at those times

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Adaptation to Climate Change: Infrastructure Hardening

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Adaptation to Climate Change: Infrastructure Hardening

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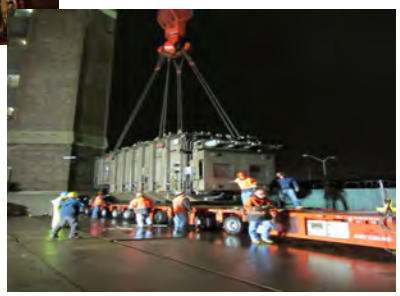
Adaptation to Climate Change: Preparedness



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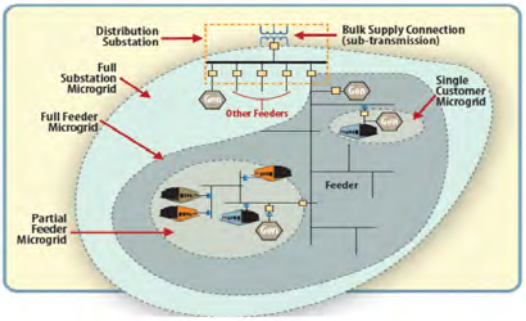
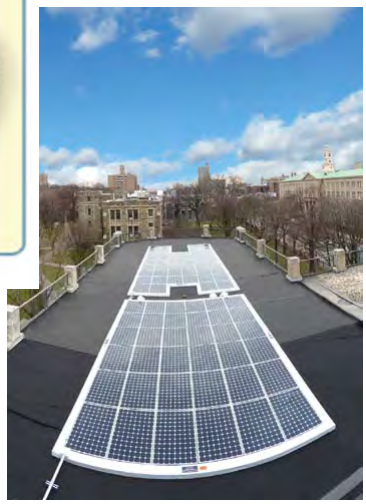
Adaptation to Climate Change: Microgrids and Distributed Energy





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For Additional Information

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