Engineering Grid Resiliency for a Changing Climate

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www.energy.umd.edu
What Drives Energy Demand?

Standard of living!

What happens when the larger populations of India and China obtain the US standard of living?

Per capita GDP vs per capita annual energy usage. Data from Hoffert et.al and derived from Hammond.
Due primarily to inefficient utilization of fossil fuels
Resulting in a Changing Climate
Which is Linked to Storm Intensity

Hurricane intensity vs. ocean temperature

Source: Hurricanes: A global warming connection? Kerry Emanuel, Professor of Meteorology at MIT
Dramatic Impact on Economy

U.S. 2012 Billion-dollar Weather and Climate Disasters

Source: National Oceanic and Atmospheric Administration
Changing Climate Impacts

9:30 - 10:00  Tony Busalacchi, Director
Earth Systems Science Interdisciplinary Center

10:00 - 10:30  Anand Patwardhan, Professor
School of Public Policy
Impact of Climate on Grid Resilience

Observed Outages to the Bulk Electric System, 1992-2012

Source: Energy Information Administration
Impact of Climate on Grid Resilience

ECONOMIC BENEFITS OF INCREASING ELECTRIC GRID RESILIENCE TO WEATHER OUTAGES

Executive Office of the President

August 2013

Need for Major Grid Infrastructure Overhaul
The confluence of increasing storm intensity and an aging grid is a recipe for disaster.
Engineering a New Grid

Grid Technologies
11:00-11:30  Aris Christou
11:30-12:00  Alireza Khaligh

Distributed Storage
1:00-1:20    Lianbing Hu
1:20-1:40    Gary Rubloff
1:40-2:00    Chunsheng Wang

Distributed Generation
2:00-2:20    Marina Leite
2:20-2:40    Jeremy Munday
2:40-3:00    Eric Wachsman
Engineering Sustainability Workshop 2015
Engineering Grid Resiliency for a Changing Climate

Agenda

Morning Sessions:
9:30am-10:30am Climate Impacts
- Tony Busalacchi, Director of the Earth System Science Interdisciplinary Center (ESSIC)
- Anand Patwardhan, School of Public Policy – “Resilience in a Changing Climate”
11am-12pm Microgrid/ Smart Grid
- Aris Christou – “Reliability of OSW Devices and Impact on Grid Performance”
- Alireza Khaligh – “Plug-in Hybrid Electric Vehicles”

Afternoon Sessions:
1pm-2pm Distributed Storage
- Liangbing Hu – “Low-Cost Batteries with Sodium Ion and Wood Materials”
- Gary Rubloff – “Designing Better Batteries at the Nanoscale”
- Chunsheng Wang – “Sustainable Li-Ion Batteries”
2pm-3pm Distributed Generation
- Marina Leite
- Jeremy Munday
- Eric Wachsman – “Distributed Generation & Storage to Improve Grid Resiliency”

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