Rebuilding for Sustainability: Case Studies in the Making

SOLAR 2013

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Dedicated Solely to Advancing Energy Efficiency and Renewable Energy

- Physical assets owned by the U.S. Department of Energy
- Operated by the Alliance for Sustainable Energy
- 1750 staff and world-class facilities
- More than 350 active partnerships
- Campus is a living model of sustainable energy
NREL: From Science through Deployment

Energy Efficiency
- Residential Buildings
- Commercial Buildings
- Personal and Commercial Vehicles

Renewable Energy
- Solar
- Wind and Water
- Biomass
- Hydrogen
- Geothermal

Systems Integration
- Grid Infrastructure
- Distributed Energy Interconnection
- Battery and Thermal Storage
- Transportation

Market Focus
- Industry
- Federal Agencies
- State and Local Governments
- International
The Growing Impact of Natural Disasters

• On average, natural disasters annually affect nearly a million people and cause $17 billion of economic loss in the United States.
• Over the last 20 years, number of natural disasters has tripled or quadrupled (depending on the source).
• Katrina – Economic loss of $134 billion; Federal expenditures of $127 billion (NOAA)
• Hurricane Sandy– Recovery costs near $100 billion; over $60 Billion of Federal funds already authorized
Outlines how Federal Agencies work together to support disaster situations (launched September 2011)
NREL Case Studies in Disaster Recovery

Greensburg, KS

New Orleans

New York - New Jersey
NREL’s Role in Rebuilding New Orleans: 2007-2009

- Rebuilding and Remodeling Schools
- Residential Rebuilding Support
- Energy Policy Support
Rebuilding, Remodeling New Orleans Schools

What we did:
• Partnered with the State Public School Department

What we accomplished:
• Rebuilt 40 schools 30% more efficient than code
• Provided efficiency audits for 35 existing schools
• Capacity building for high efficiency design

What we learned:
• Schools a critical community infrastructure
• High profile projects that enabled lower profile energy redevelopment efforts
Residential Rebuilding Support in New Orleans

What we did:

• Partnered with largest developers in the city: Habitat for Humanity and Green Coast Designs to encourage energy efficiency in redevelopment

What we accomplished:

• Cost neutral home design energy efficiency recommendations, specific to the climate
• 100 High efficiency homes
• 60 Energy Star Homes built by Habitat for Humanity annually in region

What we learned:

• Balance between thoughtful planning and timely rebuilding
Energy Policy Support in New Orleans

What we did:
• Provided policy evaluation support to City Council and Mayor’s Office
• Worked with community stakeholders on strategy development

What we accomplished:
• Emphasis on strategic planning for long term policy impact
• Voluntary Green Building Options
• Energy Smart New Orleans
• PV Permit Streamlining and inspector/installer training

http://www1.eere.energy.gov/office_eere/de_neworleans.html
Greensburg, Kansas

- Typical Midwestern farming community
- Population peaked at 2,000 in 1960; declined to 1,400 by 2006
- Older population: median age 45.6
- Low income population: $18,054 average per capita; 8.4% below the poverty line
May 4, 2007, 9:40 PM
DOE/NREL Work Scope in Greensburg

- **Assist Energy Planning**
  - Community Master Plan

- **Reduce Building Energy Use**
  - High-Performance Homes
  - High-Performance Public and Commercial Buildings

- **Use Renewable Energy**
  - Renewable Energy – Community Scale
  - Renewable Energy – Distributed Scale

- **Reduce Gasoline/Diesel Use**
  - Alternative Transportation
  - Biomass Utilization

- **Tell the Greensburg “Green” Story**
  - Publications, Outreach Documents, Websites, Webinars, Conferences/Speaking Engagements, Journals
  - Onsite Coordination /Project Mgmt
Planning for Energy in Community Master Plan

http://www.greensburgks.org/recovery-planning
Greensburg Residential Building

- New homes rated averaged ~43% energy cost savings compared to code (HERS ratings)
- Renovations rated averaged 25% energy cost savings
- 32-unit townhome rentals; about 20 Mennonite Housing single-family; six followed NREL-designed plans for 50% energy cost savings
Greensburg Commercial Buildings

- First city to pass ordinance requiring all major government buildings meet LEED Platinum standard
- Most LEED certified buildings per capita in the world
LEED Platinum: School, Hospital, Largest Business

Greensburg K-12 School

Kiowa County Memorial Hospital

John Deere Dealership
Proof: Commercial Buildings’ Energy Bills

Thirteen Greensburg buildings are saving a combined total of $200,000 in energy costs per year.
Saving Energy: LED Streetlights

• 40% more energy efficient
• 70% less operating costs
Utility-Scale RE: Greensburg Wind Farm

Class 5: 7.8 mps at 50 meters
9.1 mps at 85 meters

- 12.5 MW (ten 1.25 Suzlon turbines)
- About 4,000 homes
- Kansas Power Pool is the purchaser
- Greensburg receives the renewable energy credits for their usage
- Funding through USDA, John Deere Renewables, and Native Energy
Distributed RE: Geo, PV, Wind

- Several **ground source heat pumps** on commercial and residential buildings
- **Photovoltaics** on four buildings
- **50-kw wind turbines** at school, hospital (two), John Deere, and Best Western

Drilling geothermal wells at the Courthouse

7 kW Photovoltaics (roof, top right) on Sunchips Business Incubator

2 kW Photovoltaics for GreenTown Eco-Silo Home
Sharing the Lessons and Telling the Story

http://www1.eere.energy.gov/office_eere/de_greensburg.html
New York/New Jersey: Hurricane Sandy, Oct 2012

- Onsite NREL teams in New York and New Jersey, February to April 2013
- Assisted Recovery Support Function leads in FEMA, HUD, Army Corps, Commerce; state government officials; NGOs
- Provided information and online tools related to energy efficiency (EE) and renewable energy (RE) technologies, microgrids, energy opportunities, policies, financing
New York/New Jersey (continued)

• Contributed energy expertise to Recovery Support Strategy reports for New York and New Jersey
• Developed and evaluated economic development opportunities related to EE and RE
• Facilitated partnerships regarding energy opportunities (NYSERDA, EPA brownfield development, Partnership for Sustainable Communities)
• https://www.zotero.org/groups/disaster_recovery
Selected Outcomes and Impacts

- **Government agencies working together more effectively**
  - e.g., Partnership for Sustainable Communities; National Disaster Recovery Framework

- **Specific major companies now doing business differently**
  - e.g., John Deere, many architects and engineers, Habitat for Humanity and similar NGOs

- **Specific government agencies directly impacted**
  - e.g., USDA, FEMA, HUD, EPA

- **Demonstrated that disasters do provide an opportunity to do things differently**
  - In all parts of the country

- **Assisted DOE Program goals**
  - E.g., Hospital Advanced Energy Design Guide
Thank You!

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