Exceptional service in the national interest

SAND2012-6352P

Sandia National Laboratories

Mitigating Climate Change on a Tribal Level

Colleen A. Cooley
Northern Arizona University
Climate Science & Solutions Master's Program
Expected Grad. Date: 12/14/2012
Anthony Martino and Sandra Begay-Campbell (Org. 6124)
Sandia National Laboratories, NM - U.S. Department of Energy
August 2, 2012

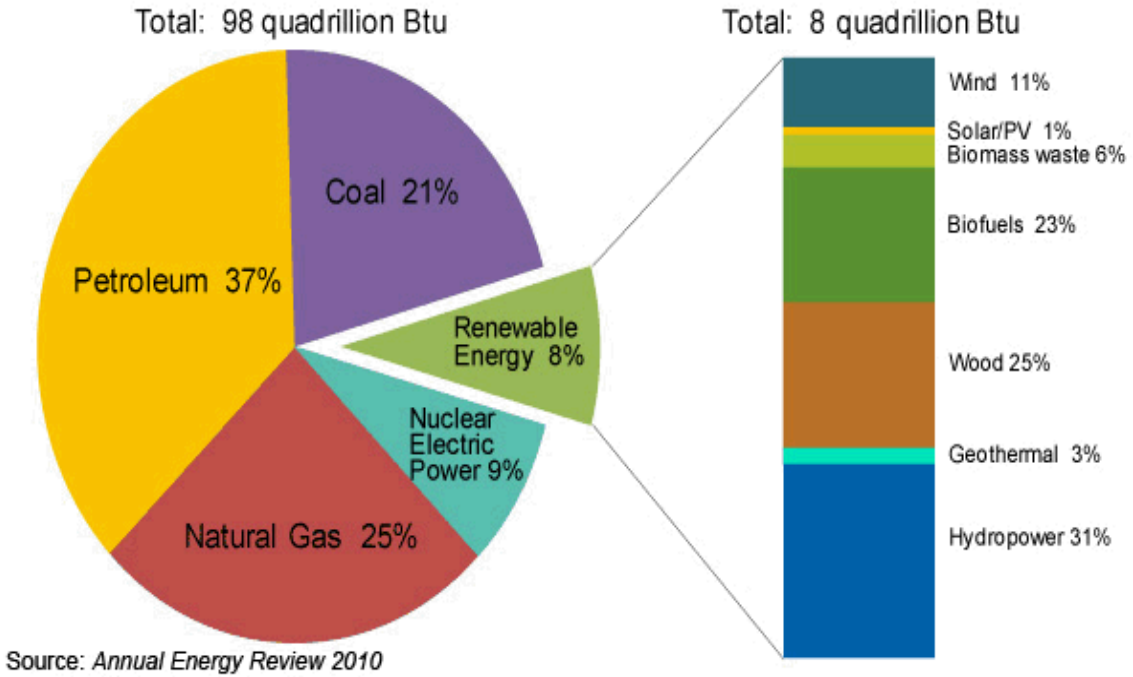
U.S. DEPARTMENT OF ENERGY | NNSA Nuclear Security Administration

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND NO. 2011-XXXXP

Abstract

Climate change is occurring on a global level and affects both humans and the environment. Since the 18th century, humans began burning fossil fuels and deforesting lands to provide energy needs and this has changed the composition of the Earth's atmosphere, resulting in a changing climate. Native American tribes are extremely vulnerable to changes in the Earth's climate because their culture and sustenance are dependent on the natural environment. About 14.2% of Native American households are still living without electricity compared to 1.4% of all U.S. households. Therefore, my research will focus on national energy use and the effects of climate change on humans and the environment. I will discuss the renewable energy potential and provide some examples of renewable energy installations on Tribal lands. Finally, I will discuss the benefits of "Green Tags" and LEED buildings as a means for mitigating climate change on a Tribal level.

U.S. Energy Use



Source: *Annual Energy Review 2010*

Tribal Climate Change and RE Potential

Sandia National Laboratories

- **Climate Change**
  - Most vulnerable due to culture & sustenance
  - Humans are part of nature
  - Alaska tribes – glaciers melting; erosion due to permafrost
  - Navajo – sand dunes shifting; current drought conditions

- **Renewable Energy Potential**
  - 5% of U.S. land with 10% of all energy sources
  - 535 billion kWh/year of wind energy
  - 17,600 billion kWh/year of solar energy
  - Solar energy is best option to reduce GHG emissions; more efficient than kersone and candles

Tribal Renewable Energy

- **Augustine Band of Cahuilla Mission Indians**
  - 1.1 MW PV solar array
  - 15,000 panels produces 1,900 MWh annually
  - 25% of tribe's casino energy needs
  - $2.6 million in rebates from Imperial Irrigation District

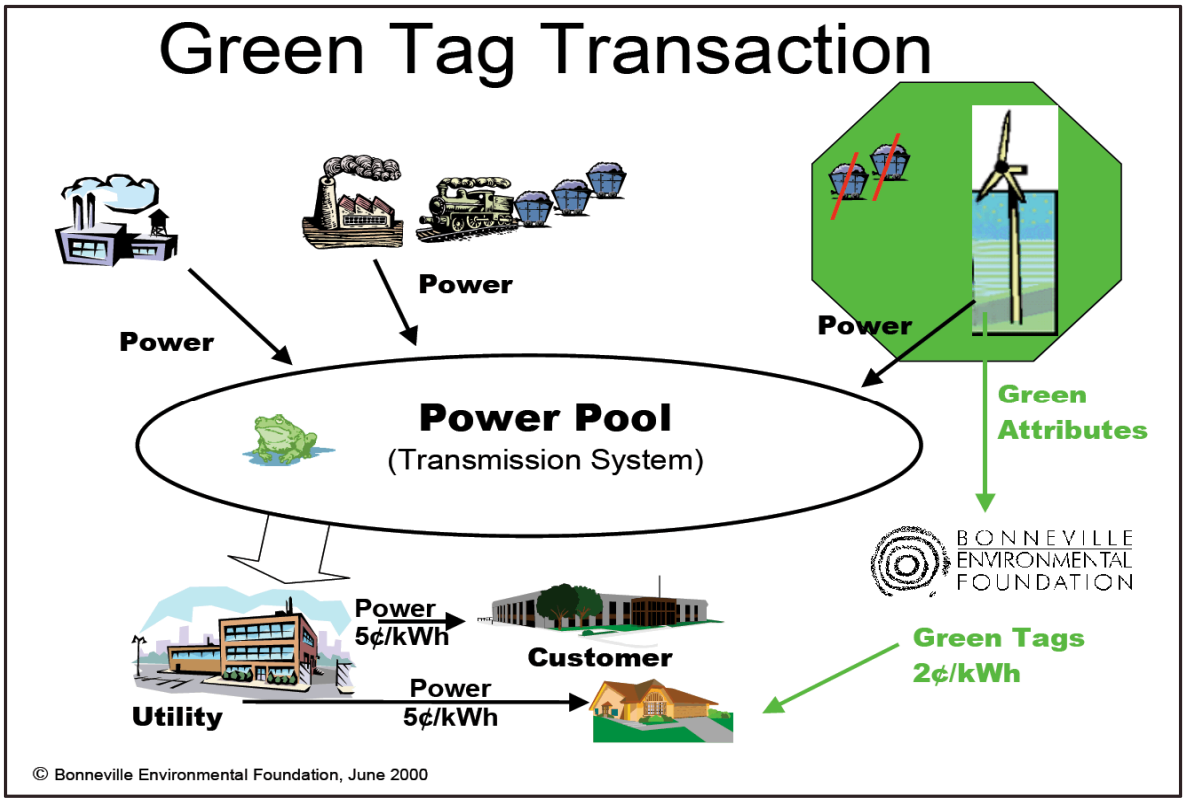
Source: http://www.epa.gov/region9/climatechange/tribes.html

- **Campo Band of Kumeyaay Nation**
  - 50 MW large-scale wind farm
  - 25 turbines provides elec. for 35,000 homes in San Diego county
  - Lease land, don't own turbines

Photo courtesy NREL

Green Tags

- REC's, measured in Megawatt-hours
- Alternative to tax incentives for Tribes
- Environmental attributes



Rosebud Sioux Tribe

- First native-owned **750 kW** wind turbine installed in Feb. 2003
- 2 million kWh annually~200-250 homes
- First sale of "**Green** Tags" to *Native*Energy

Source: http://www.nativeenergy.com/

Sells "green tags"

- Reduced 5,000 tons of CO_2 in one yr.
- Help fund wind turbine

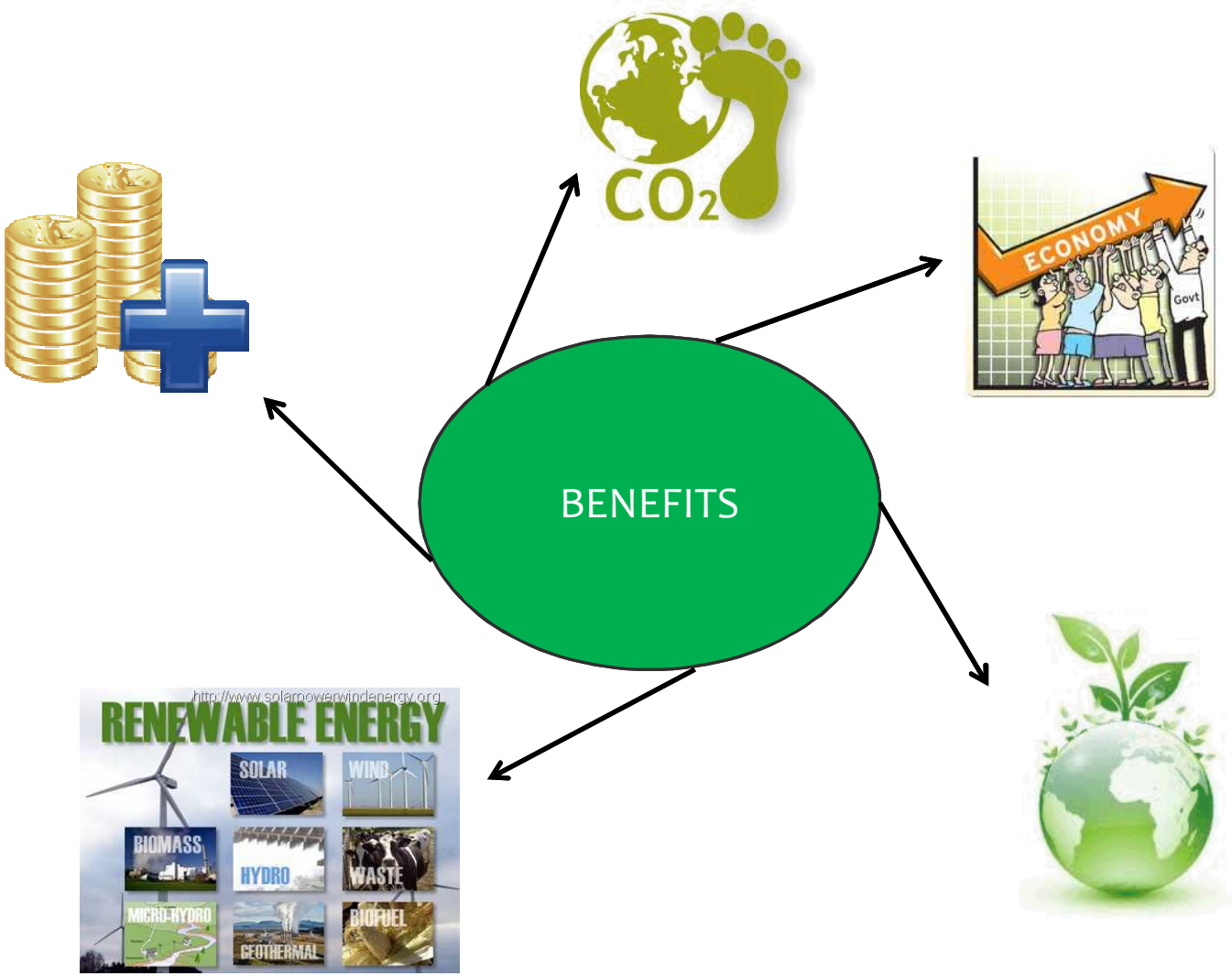
Buys "green tags"

Donates "green tags"

native energy

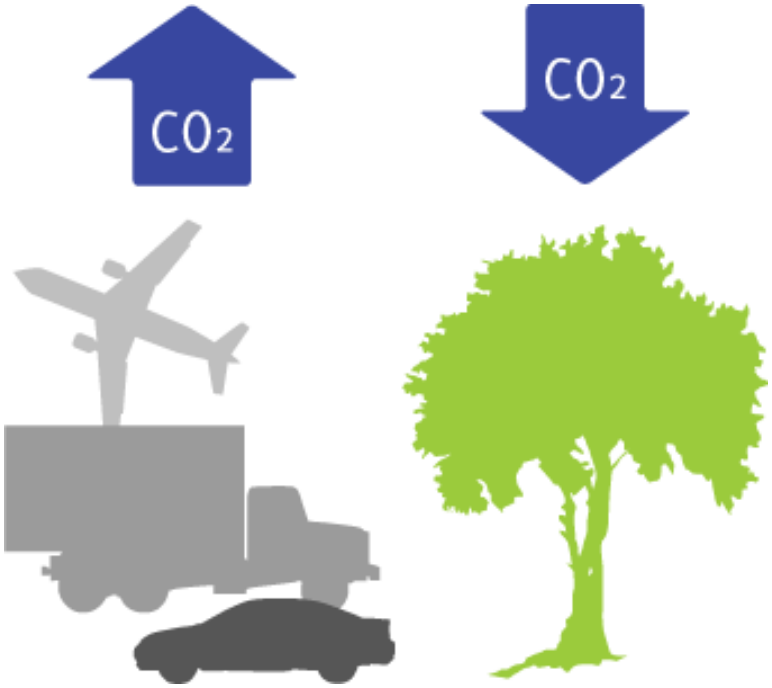
CLEAN AIR COOL PLANET

Benefits for Tribes



Source: google.com images

Carbon Offsets



Source: http://co2r.com/beannorth/

- Generation of clean energy or tree planting efforts create carbon offsets
- Measured in metric tons and third-party verified
- Anyone can purchase to reduce CO_2 footprint from travel, hotel rooms, elec. use
- Tribes can create/sell carbon offsets from RE projects to help fund development

Navajo Nation and LEED

Photo courtesy Navajo Times - Donavan Quintero

- NTUA Chinle, AZ district office
- Two 34.5 kW solar arrays (69kW)
- LEED-gold standard
- 30% of building needs

Photo courtesy Chelsea Chee

- NTUA Crownpoint, NM district office
- Two 34.5 kW solar arrays (69kW)
- LEED-platinum standard

LEED: "**Leadership in Energy and Environmental Design**" - program for building construction, seeks to promote "green building" sustainability for building owners.

Conclusion

- **Tribal RE potential:**
  - → lead to RE projects, carbon offsets, additional funding, and environmental/economic benefits
  - → Rosebud Sioux wind turbine
- **Tribal Projects:**
  - → Navajo: NTUA LEEDing by example
  - → California: Tribes develop large scale wind/solar
- Projects are and will continue to mitigate climate change