Navajo Nation Solar Air Heater Project

Presented by:
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Presentation Overview

1) Project background
2) How solar air heating works
   • Construction
   • Benefits
   • Challenges
3) Next steps
1300 collectors were removed from a building in Denver and distributed to chapters on the reservation.

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<td><strong>Total:</strong></td>
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Eagle Energy held workshops to train recipients on proper collector installation.

- Over 50 participants.
- Included instruction on retrofit, use, and installation.
- Part of entrepreneurial program to distribute systems.
Old fiberglass insulation needs replacement.

Inside the air collectors:

- Black chrome metal surface (absorbs 95% of the sun’s energy)

- Old fiberglass insulation needs replacement
Air flow inside the collector:
One collector can heat outside air by 60 to 90 degrees Fahrenheit.

Data collected in Albuquerque, February 2014
There are five major components:
Some general rules on sizing

• One 3’x6’ collector can heat about a 500ft² space.
  – Accurate sizing is really done based on the total heat load of the building (f-chart model).

• The blower is sized based on collector area (ft²).
  – We think 8 cfm/ft² is sufficient
    • Example: 144 cfm for an 18ft²
  – Need to consider the building’s static pressure when sizing the blower (fan curve).
    • A S.P. of 0.75” wg is a typical value for a home/residence.

• The tilt of the collector should be steep (> 55°)
  – Sun is lower in the sky in the winter
  – Better harness the sun’s energy in the early morning.
Some general economics

• The payback period depends on:
  – The site location (solar resource and shading)
  – Type of heating fuel used (LPG, wood etc)
  – Amount of thermal mass in the home (brick, wood etc)

• We estimate the ‘real’ cost of a system is
  – 1 collector system: $800
  – 2 collector system: $1000
  – 3 collector system: $1250

• System offsets about 30% of the heating demand
  – We estimate pay back periods of 4 to 16 years
  – Difficult to quantify the health benefits
Challenges

• Only meets roughly 30% of heating demand.
  – Back up heating sources are required
• The upfront cost is significant for low income individuals and families.
  – Typically not the first priority first renewable energy choice.
  – Grid connection to run the blower.
• Educating potential users about the technology
  – Many people are unfamiliar with it and its benefits
Over 875 solar air heaters have been installed in Pine Ridge, SD. (Lakota)

• Effort led by NGO Trees, Water & People.
• Manufactured and installed by Native Americans.
• 10 day trainings at Red Cloud Renewable Energy Center.

Straw bale housing with solar heating at the Red Cloud Renewable Energy Center in Pine Ridge, SD.
Next steps

• Partner with NREL to dive deeper into technical analysis and feasibility study.
• Recruit entrepreneurs in multiple agencies to help distribute more systems.

Interested in getting a system?
Contact Julia Alvarez
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Technical questions?
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