Navajo Nation Solar Air Heater Project

Presented by:

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Renewable Energy Development and Finance Workshop - July 29, 2015

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Presentation Overview

1) Project background
2) How solar air heating works
   - Construction
   - Benefits
   - Challenges
3) Next steps

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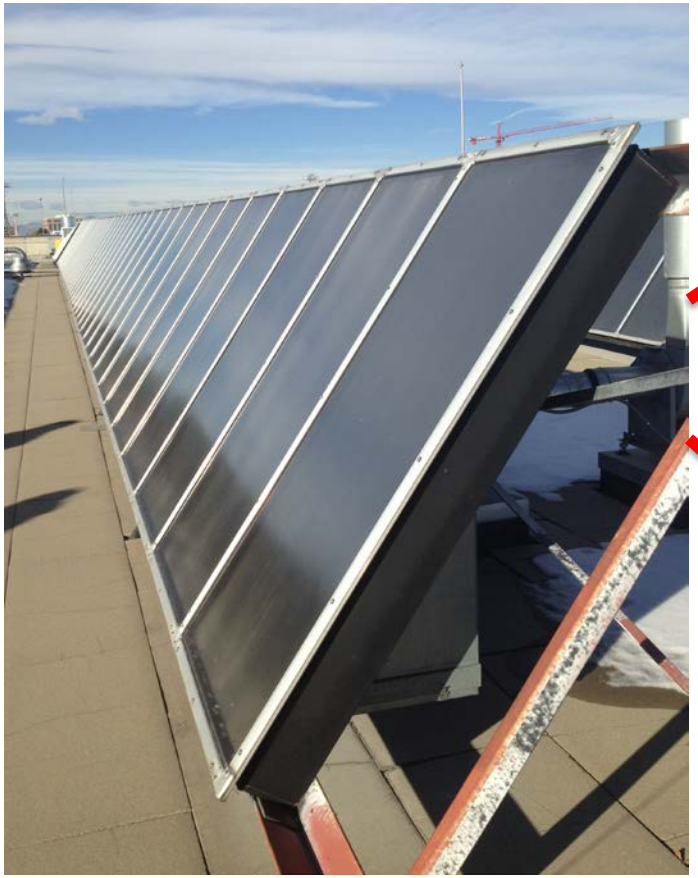
1300 collectors were removed from a building in Denver and distributed to chapters on the reservation.



Recipient	Org. Type	# Shipped
Crown Point College	College	112
Eagle Energy	Non-Profit	104
Forgotten People	Non-Profit	53
Gallup Solar	Non-Profit	112
Ind. Energy Center	Business	224
Leupp Chapter	Gov.	112
Ojo Encino Chapter	Non-Profit	224
San Juan College	College	48
Tsidi To'ii Chapter	Gov.	232
Tolani Lake Chapter	Gov.	112
	Total:	**1333**

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.

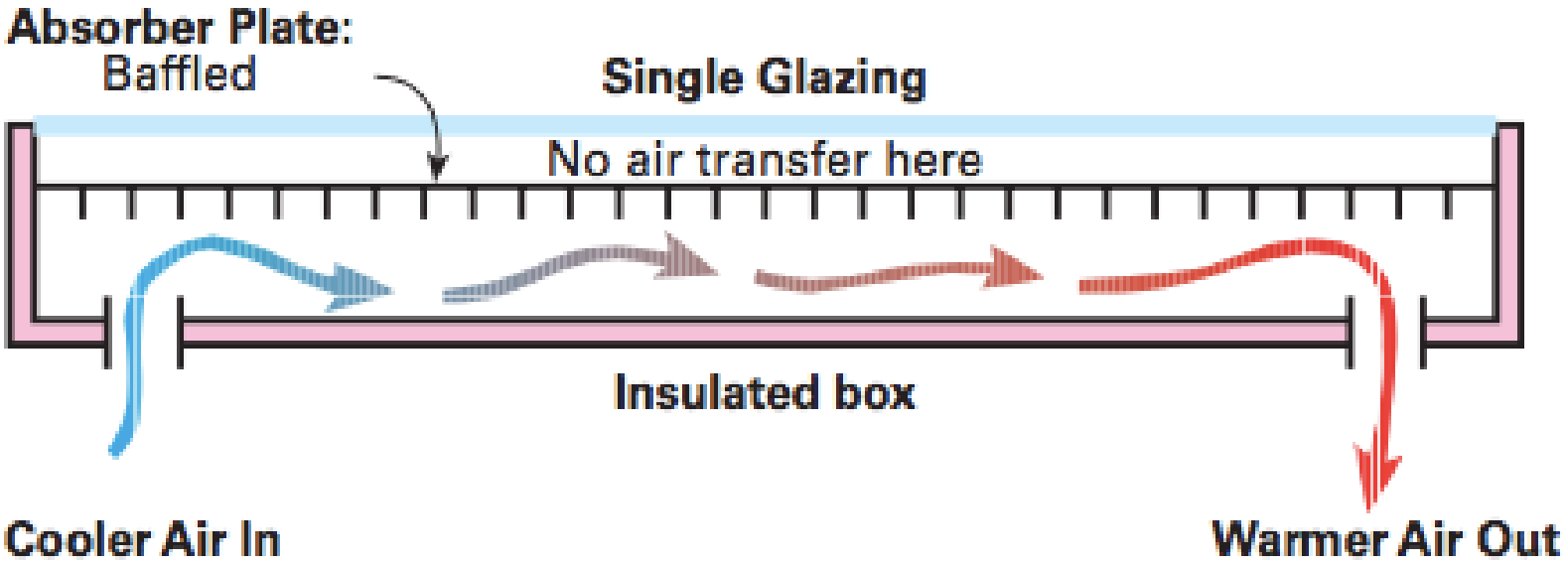
Inside the air collectors

Old fiberglass insulation needs replacement

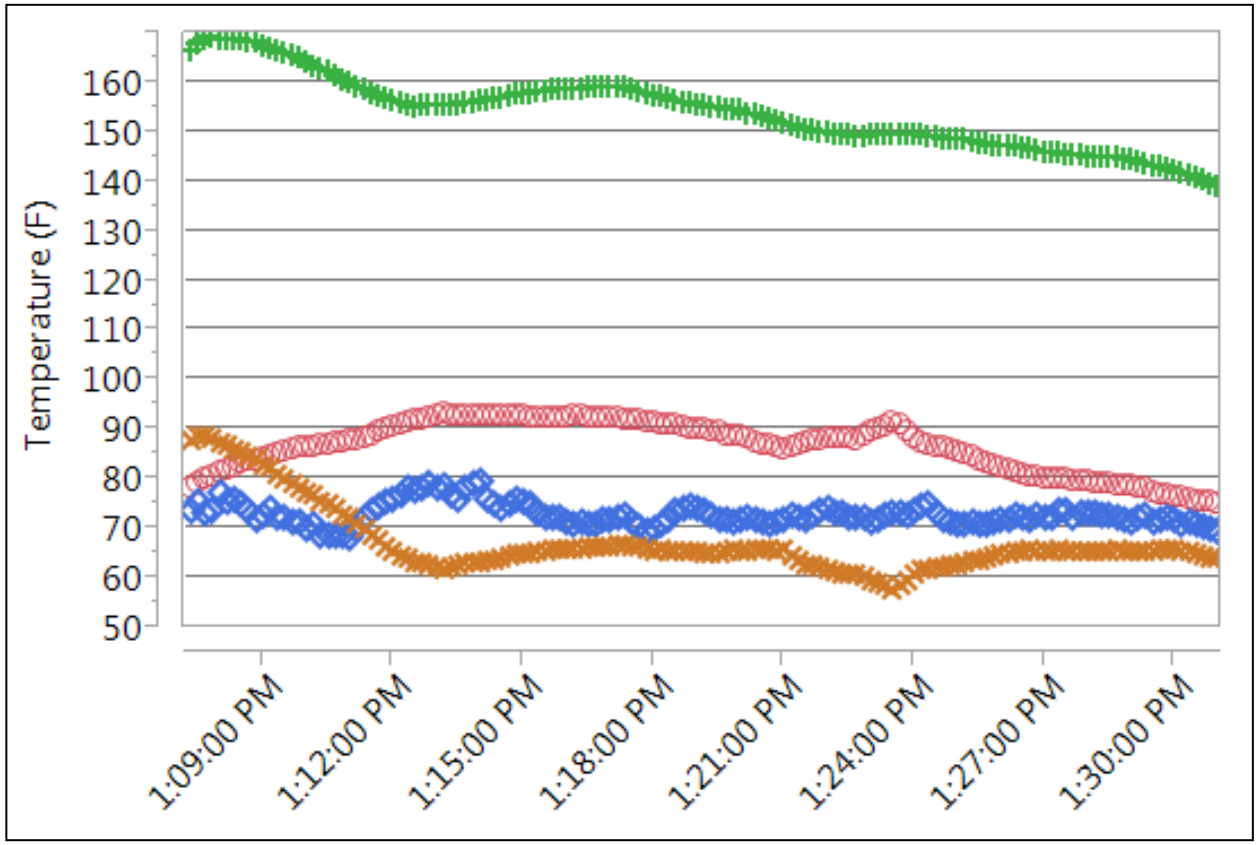
Black chrome metal surface

(absorbs 95% of the sun's energy)

Air flow inside the collector:

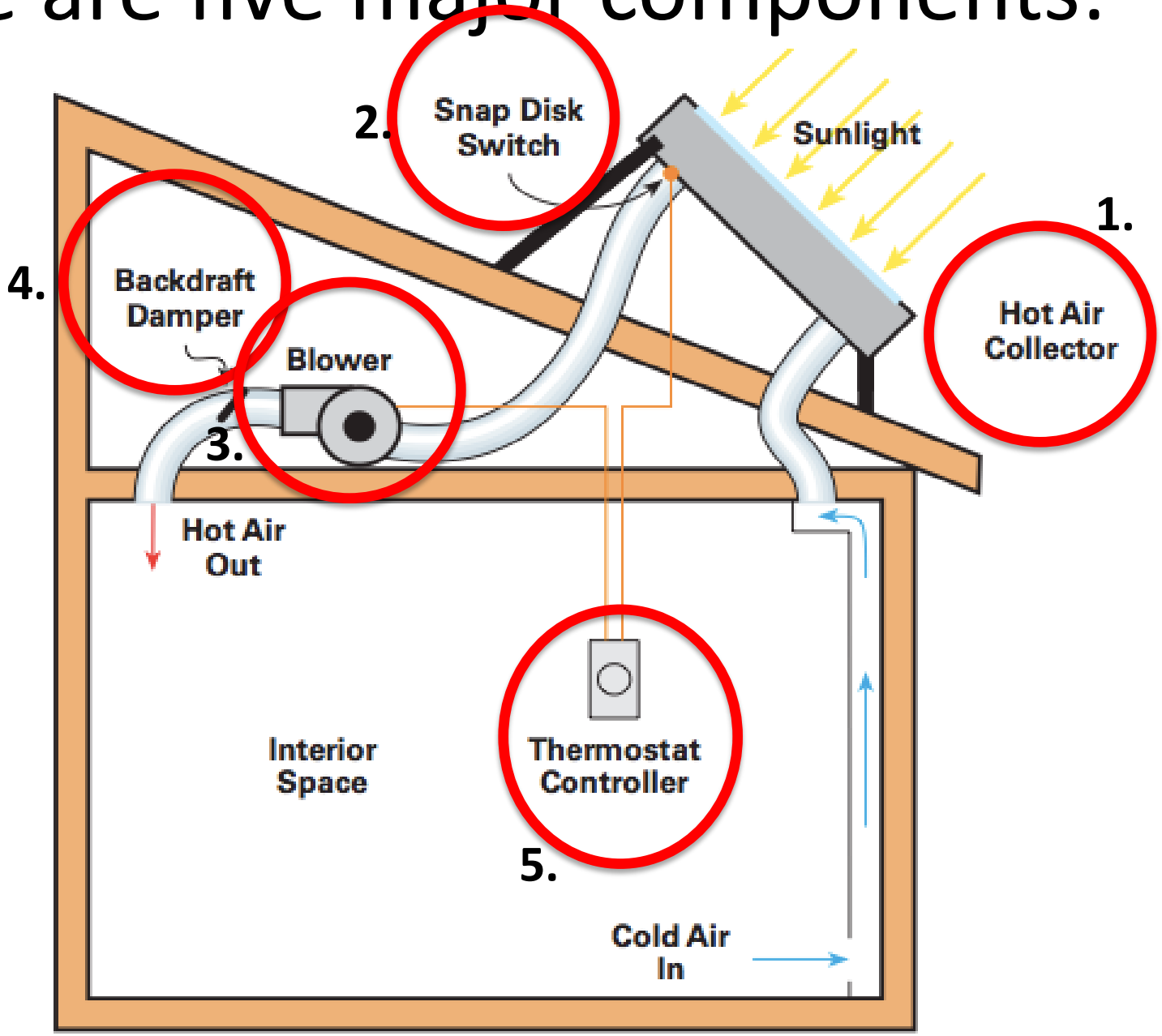


One collector can heat outside air by 60 to 90 degrees Fahrenheit.



Data collected in Albuquerque, February 2014

There are five major components:



Source: Home Power Magazine (#98)

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 (ft^2).
  - We think 8 cfm/ft^2 is sufficient
    - Example: 144 cfm for an $18ft^2$
  - 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.

TREES. WATER & PEOPLE
Helping people and the planet

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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