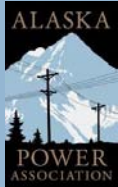


Emerging Energy Technology Forum

Programs & Opportunities for Alaska





Alternative Residential Heating Methods: Solar Thermal

Kotzebue Electric Association

Jesse L Logan

Project Manager

Project Summary

- ❖ Lead Organization: Kotzebue Electric Assoc.
- ❖ Key Partners:
 - ❖ Kotzebue Community Energy Task Force (CETF)
 - ❖ Denali Commission
 - ❖ Alaska Center for Energy and Power (ACEP)
 - ❖ NANA Regional
- ❖ Location: Kotzebue, Alaska
- ❖ Technology: Solar Thermal
- ❖ Project Goal: (1) Reduce residential fuel usage for domestic hot water (DHW) and space heating.
(2) Test the efficacy of solar thermal in the Arctic.

Technology Overview

- ❖ Solar Thermal is not a new technology
- ❖ Essentially a supplemental way to heat hot water and/or glycol for hydronic baseboard or radiant floor space heating.
- ❖ 20% of the total heating fuel in the Northwest Arctic Borough is used to heat hot water.
- ❖ Solar thermal systems can be designed in a variety of ways.
- ❖ There are two (2) main types of solar collectors.

Technology Overview

Solar Collector

Evacuated Tube
system

Note the angle of the collector...



House Owner: Kassie Driggs
In photo: David Lindeen (SES),
Jesse Logan (KEA)

Technology Overview

Solar Collector

Flat Plate system



House Owner: Lenna Hanna

Technology Overview

Simple design

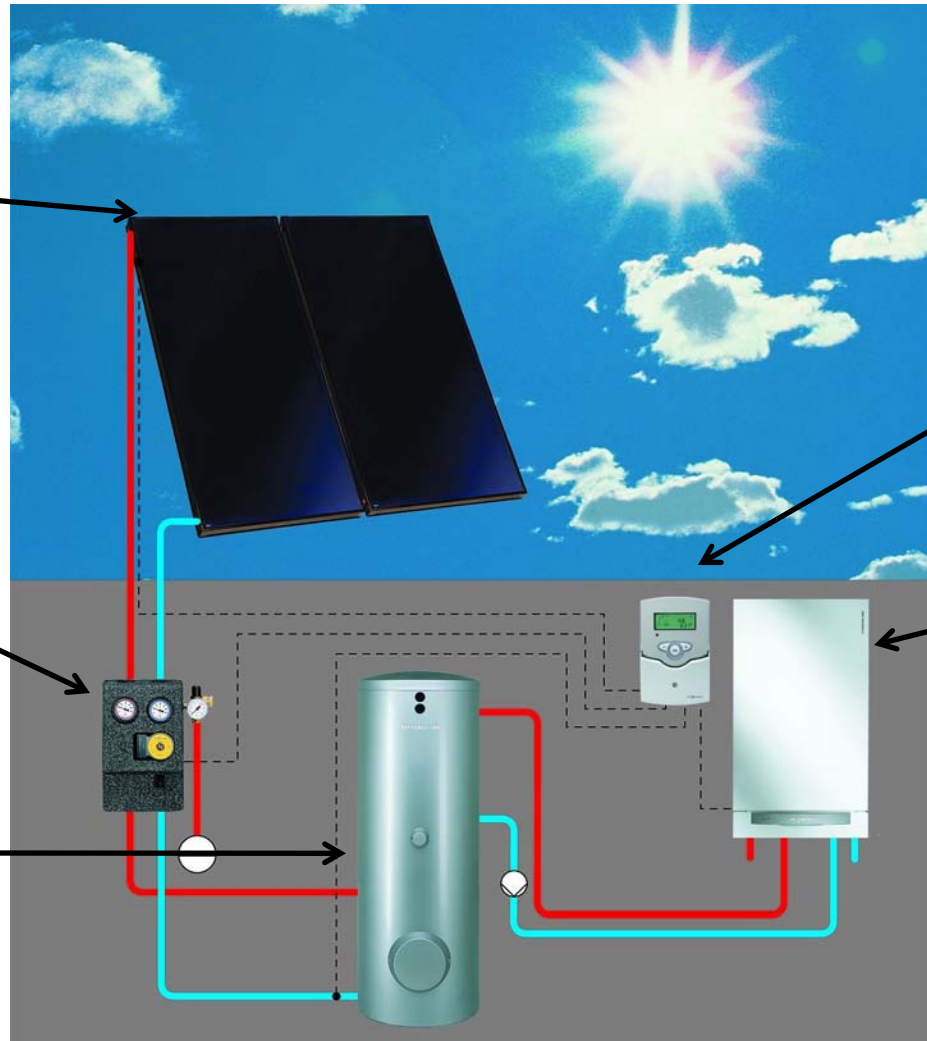
Solar Collector

Control Unit

Pump Station

Storage Tank/
Water Heater

Application:
-Hot Water
-Space
Heating



Alaska Application

- ❖ Opportunities for use in Alaska
 - ❖ (RetScreen)50% solar fraction in the NWAR
 - ❖ Technology transfer
 - ❖ ABS and SES
 - ❖ North of the Arctic Circle



Home Owner: Maryann Mendenhall

In photo: Eddie and Joe (ABS), Claude Wilson (KEA)

Alaska Application



❖ Challenges

- ❖ No one has attempted Solar Thermal above the Arctic Circle.
- ❖ Main challenge is maintaining the systems in cold weather.
- ❖ Availability of qualified plumber

Alaska Application

- ❖ Potential Benefits
 - ❖ 50% solar fraction *could* reduce fossil fuel use by 1/2.
 - ❖ KEA expects 30% reduction for DHW.
 - ❖ DHW and Space Heating



Home Owner: Mae Howarath
In photo: Tim Karka, plumber extraordinaire

Tasks & Timeline

- ❖ Idea began in 2008
- ❖ CETF was formed to help weatherize Elder's homes
- ❖ 2009- Denali EET Grant
- ❖ 2010 KEA and CETF selected Elders homes
- ❖ Installation began in November 2010.



Home owner: Maryann Mendenhall

Project Status

- ❖ KEA and CETF installed a total of six (6) systems
- ❖ Two (2) manufacturers- Viessmann and Heliodyne
 - ❖ One (1) evacuated tube system from each
 - ❖ Two (2) flat plate systems from each
- ❖ Viessmann systems for DHW only
- ❖ Heliodyne systems are combined DHW and hydronic base board heating.
- ❖ All six (6) systems commissioned by Dec 2010

Project Status



Home Owner: Mary Omnik



Home Owner: Enock Sheidt

Project Status

Big Questions:

- Do the systems perform in the Arctic?

YES



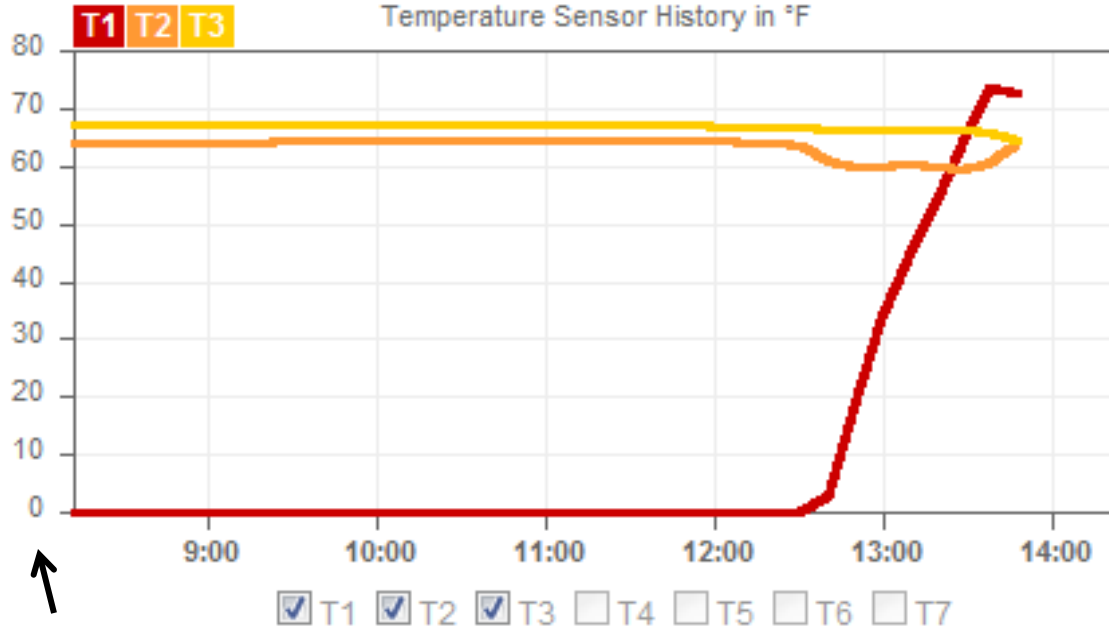
Preliminary Data

(2/12/2011) 1:55pm

SYSTEM

ENERGY

SETTINGS



Solar System Status

Solar differential operation is active

Temperatures

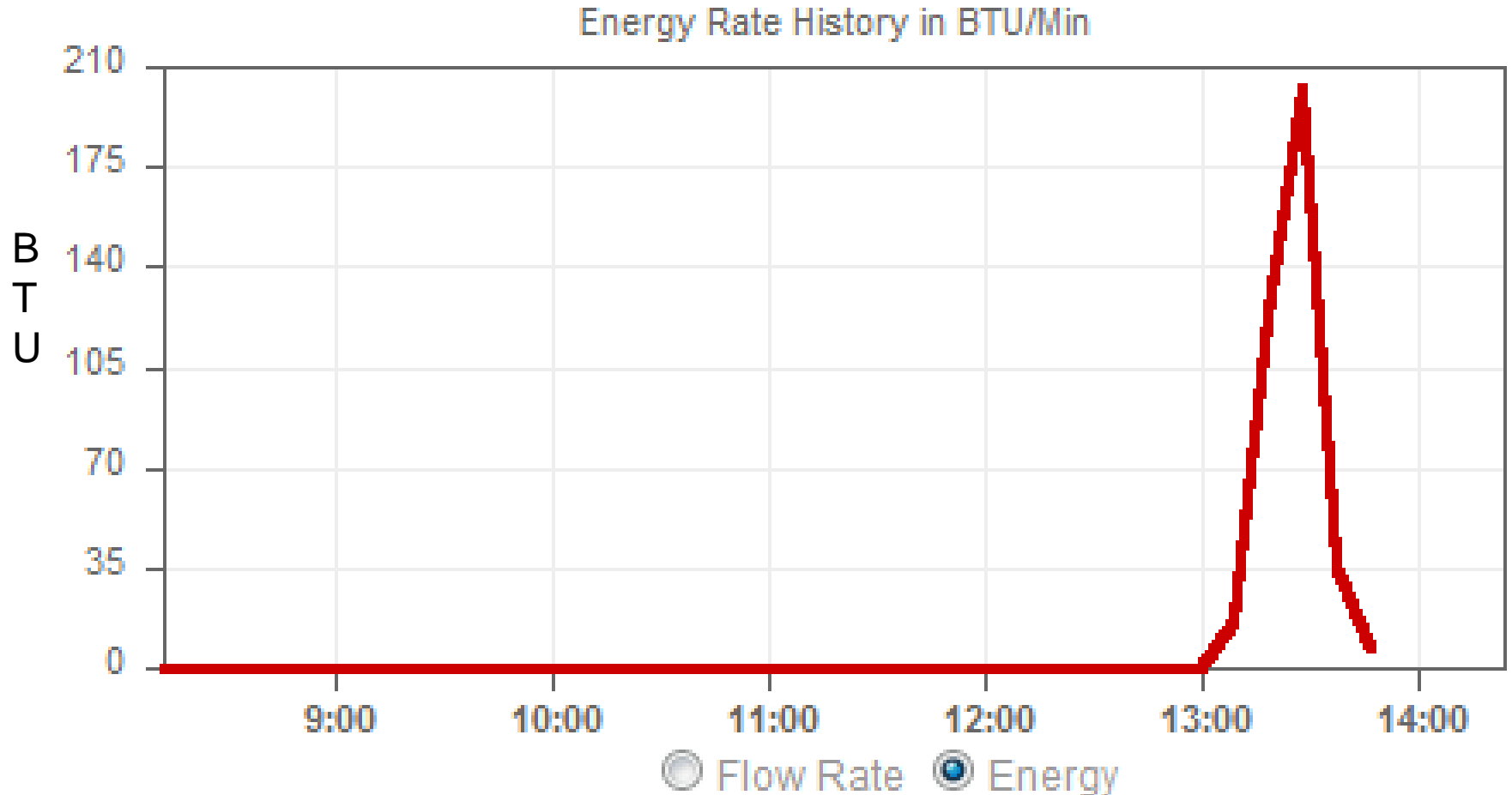
Current Solar Differential	11.8°F
T1: Collector Out	76.0°F
T2: Storage Low	64.3°F
T3: Storage High	64.9°F
T4: Water HX In	77.7°F
T5: Water HX Out	81.1°F
T6: Glycol HX Out	74.5°F

Flow

VFS Sensor 1.5GPM

Preliminary Data

(2/12/2011) 1:55pm



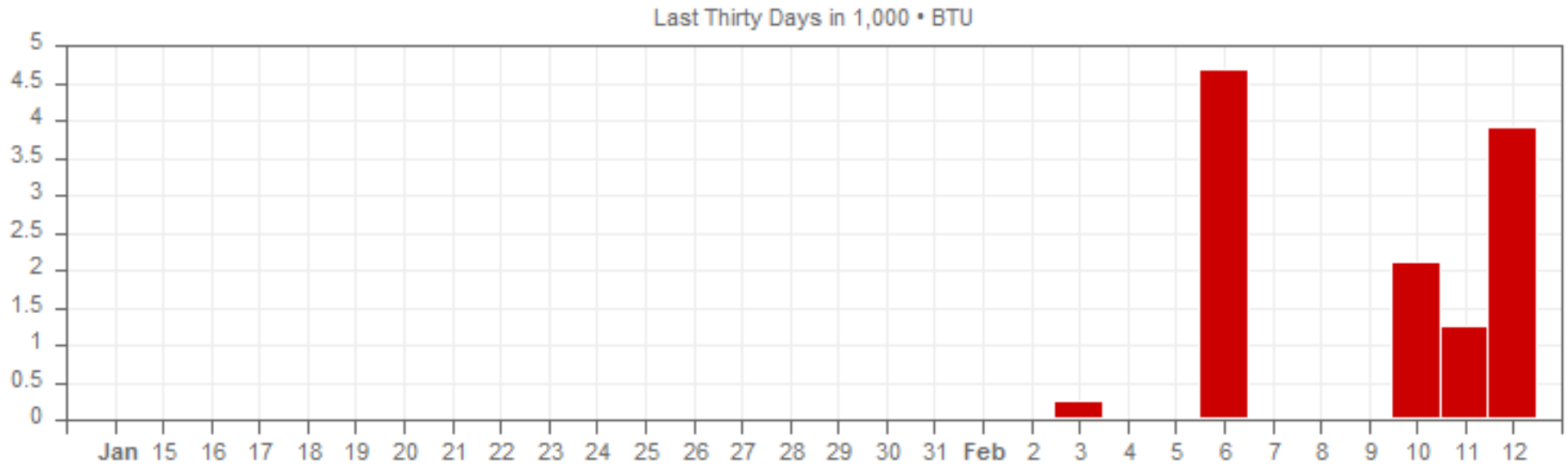
Preliminary Data (2/12/2011) 1:55pm

Last 30 Days in 1,000 * BTU

SYSTEM

ENERGY

SETTINGS



Data collected at 1:55pm

Project Status

Big Questions:

❖ Do the systems perform in the Arctic?

YES

❖ How much fuel will be saved?

We need 12 months of data

❖ What is the simple payback period?

Conservative Est. 6-10 years

Depends on Fuel Prices

Again: We need 12 months of Data



(Sunset on the Chukchi Sea)

Questions?



Alternative Residential Heating Methods: Solar Thermal Above the Arctic Circle

- Kotzebue Electric Association
- Kotzebue Community Energy Task Force
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