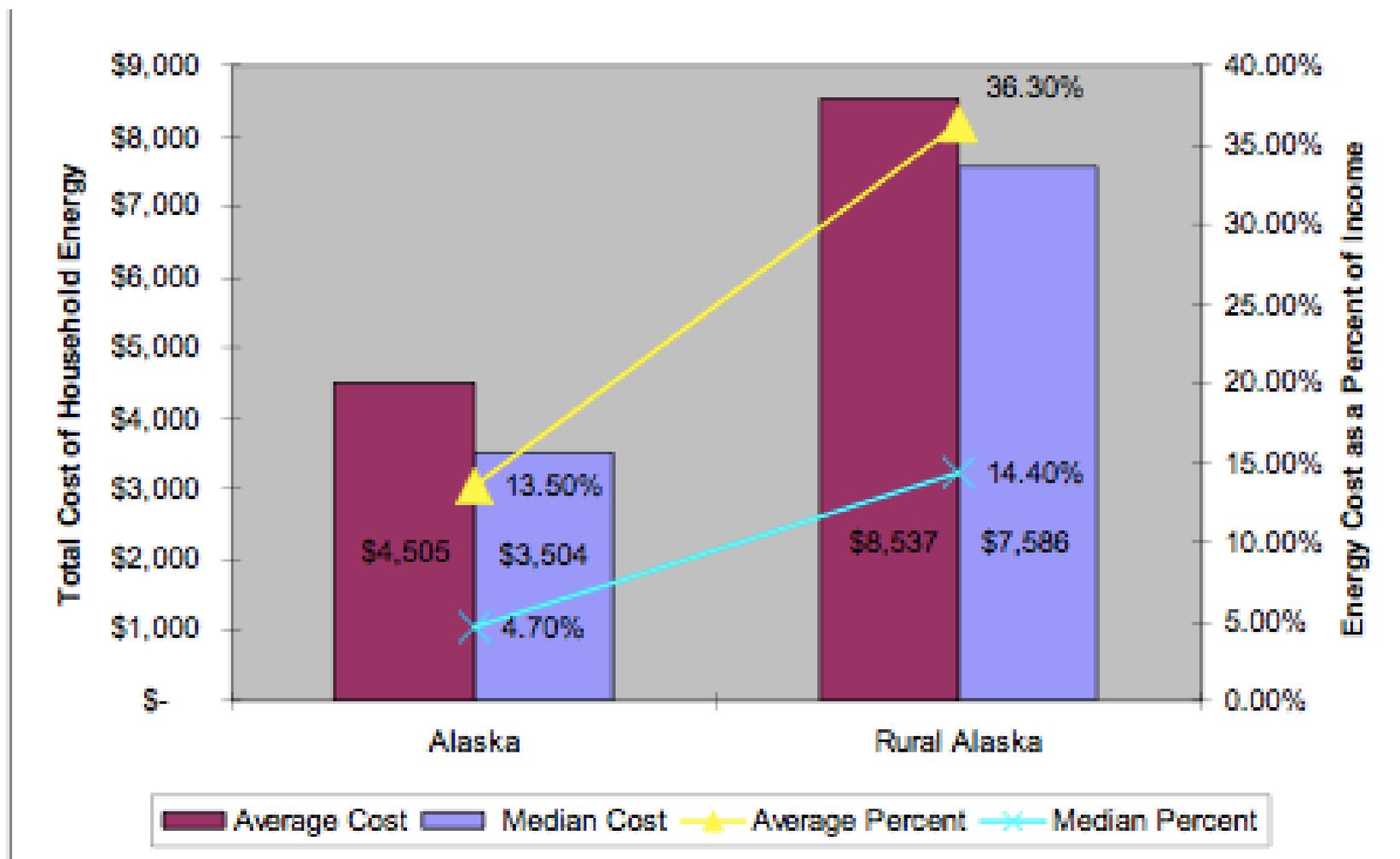
A photograph of a sunset over a flat landscape. The sun is a bright, glowing orb on the left side of the frame, casting a warm orange and yellow light across the sky. The horizon is a dark, straight line. In the distance, several power lines are visible against the sky. The overall scene is serene and evokes a sense of natural energy.

Solar/Thermal Home Heating Project

Kotzebue Electric Association
Community Energy Task Force
NANA Economic Development

Rural Vs Urban Energy Costs



Data from recent ISER studies (Saylor, B., Haley, S. "Effects of Rising Utility Costs on Household Budgets, 2000-2006, March 2007; Haley, S., Saylor, B., Szymoniak, N., "Estimated Household Costs for Energy Use, May, 2008).

June-July 2008 Energy Cost

Energy Source	Average	Middle	High
Gasoline (per gallon)	\$6.68	\$5.75	\$9.97
Stove oil (per gallon)	\$6.15	\$4.85	\$9.96
Stove oil used (gal/winter month)	118	106	600
Total stove oil cost (\$/winter month)	\$630.34	\$533.50	\$4,372.50
Wood (per month)	\$118.57	\$60.00	\$400.00
Electricity (per month)	\$294.69	\$250.00	\$900.00

Community	Cost of gas per gallon			Cost of stove oil per gallon			Monthly electric bill	
	Average	Middle	City	Average	Middle	City	Average	Middle
Ambler	\$8.18	\$8.24	\$8.24	\$5.78	\$4.62	\$7.85	\$347.85	\$305.00
Buckland	\$5.71	\$5.75	&7.00	\$9.77	\$9.79	\$7.00	\$187.00	\$200.00
Deering	\$5.17	\$5.15	\$3.86	\$3.95	\$3.86	\$12.15	\$292.54	\$230.00
Kivalina	\$5.29	\$5.25	\$5.85	\$4.85	\$4.85	\$4.85	\$291.54	\$250.00
Kobuk	\$7.25	\$7.25	\$	\$7.06	\$7.00	\$	\$215.00	\$200.00
Noatak	\$9.44	\$9.29	\$	\$8.13	\$7.95	\$	\$406.73	\$430.00
Selawik	\$5.19	\$5.19	\$5.19	\$4.61	\$4.61	\$4.61	\$209.75	\$155.00
Shungnak	\$	\$	\$7.99	\$5.23	\$4.79	\$8.09	\$	\$

Kotzebue Elder Winterization Initiative

70 Homes were weatherized by teams using two Kotzebue locals and two Anchorage volunteers



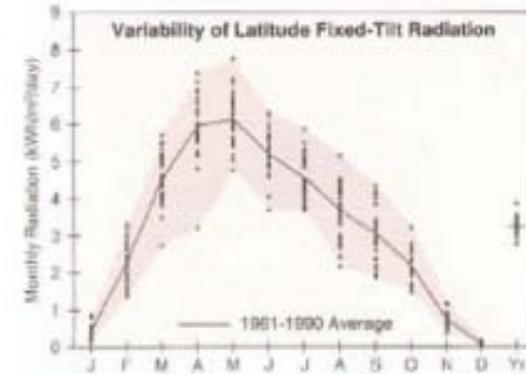
VOLUNTEERS:

Shell	SWACO
NANA	Schlumberger
Halliburton	North Star
Beacon	Bald Mt. Air
Choust	ASRC
NMS Workforce Solutions	American Marine
Carlile	AT&T
Total Safety	

Kotzebue Solar Fraction of 49.6%

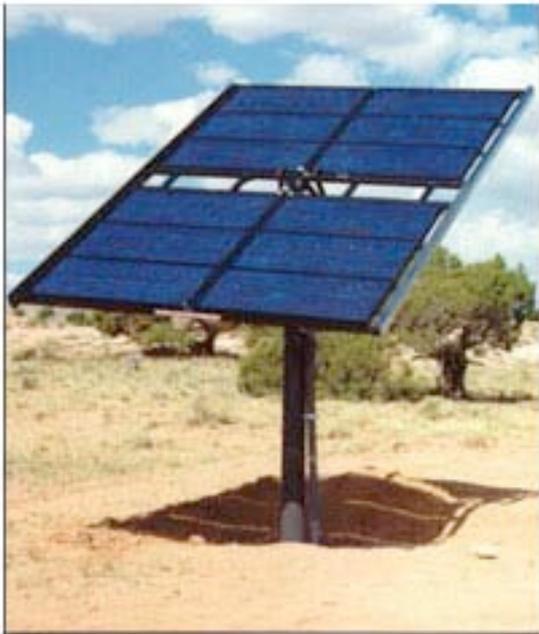
TABLE 6: ANNUAL PERCENTAGE OF ENERGY FOR HOT WATER PRODUCED BY 150 SQUARE FEET OF STANDARD¹ SOLAR COLLECTORS FOR VARIOUS ALASKAN LOCATIONS.

Location	Latitude °N	Annual Percentage of Solar Hot Water Heating ² %
Annette	55°2'	52.3
Barrow	71°20'	36.5
Bethel	60°49'	48.4
Big Delta	64°0'	57.9
Bettles	68°55'	53.1
Fairbanks	64°49'	54.0
Gulkana	62°9'	58.3
Homer	59°38'	58.0
Juneau	58°37'	41.3
King Salmon	56°41'	56.1
Kodiak	57°45'	55.7
Matanuska	61°34'	62.6
McGrath	62°58'	49.3
Kotzebue	66°52'	49.6
Nome	64°30'	48.9
Summit	63°39'	51.8
Yakutat	59°31'	40.9



From Solar Design Manual for Alaska by Rich Seifert

Flat vs. Evacuated Tube

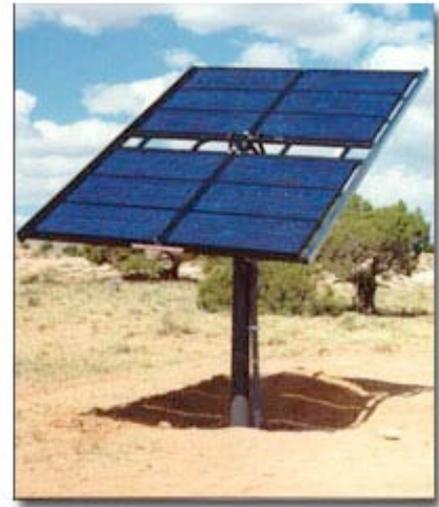
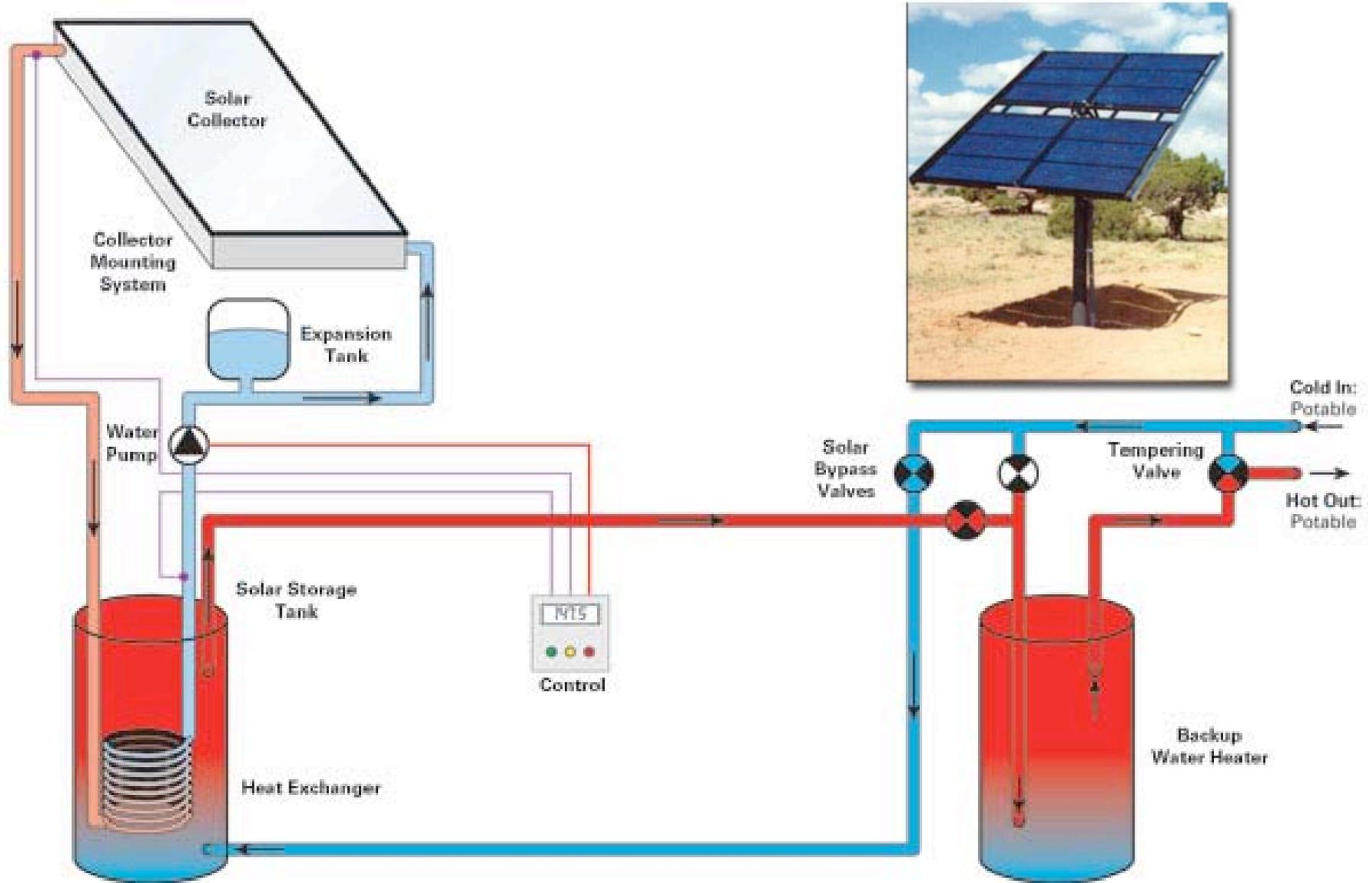


Ten Elder Homes

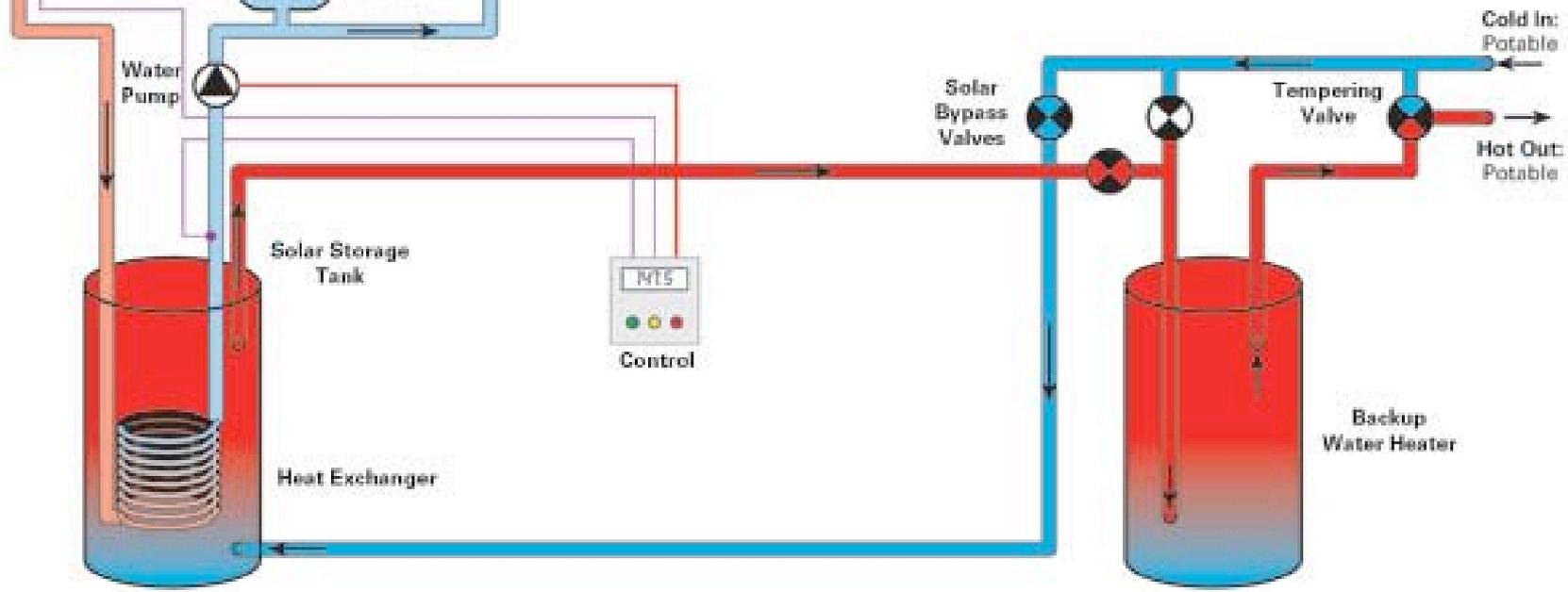
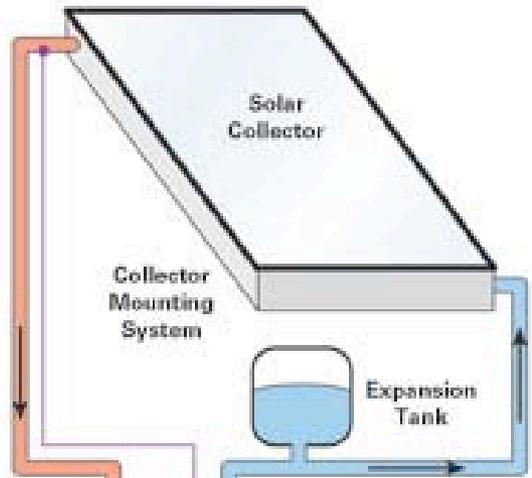
- *Community Energy Task Force to provide volunteer force for installation.*
- *Kotzebue Electric to provide engineering and overall project management.*
- *Elder homes selected based upon agreed upon criteria.*
- *Data acquisition done by CETF, KEA, OTZ Telephone and Alaska Technical Center*



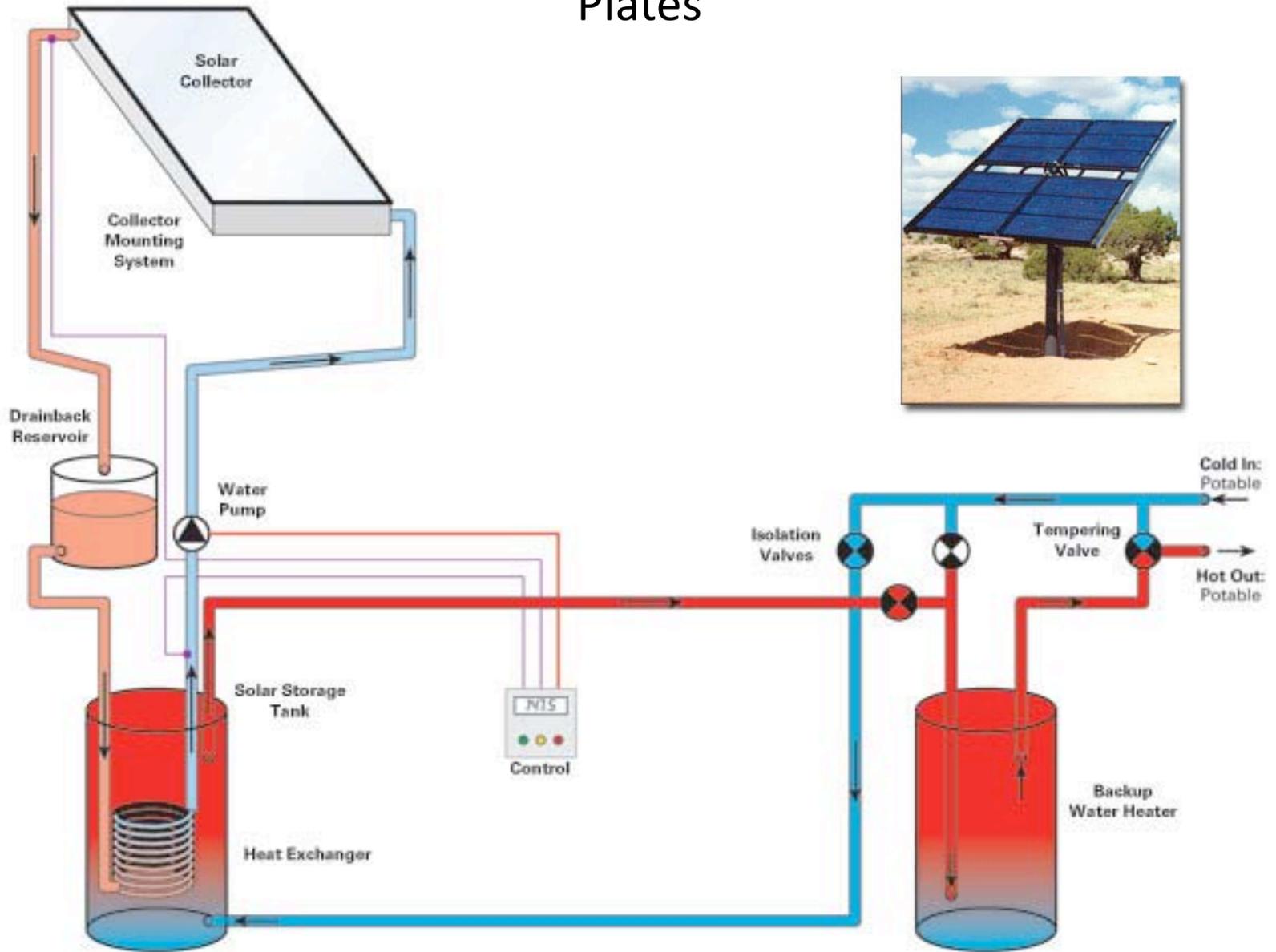
Home One-Solar Thermal Hot Water, Pressurized with Flat Plates



Home Two-Solar Thermal Hot Water, Pressurized with Evacuated Tubes



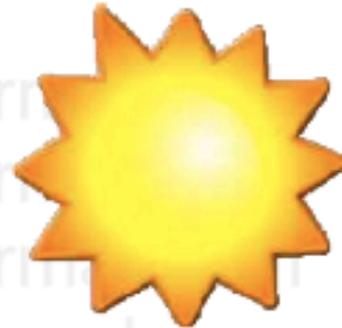
Home Three: Solar Thermal Hot Water-Drainback with Flat Plates



Home Four/Five: Solar Hot Water and Space Heating with Flat Plate

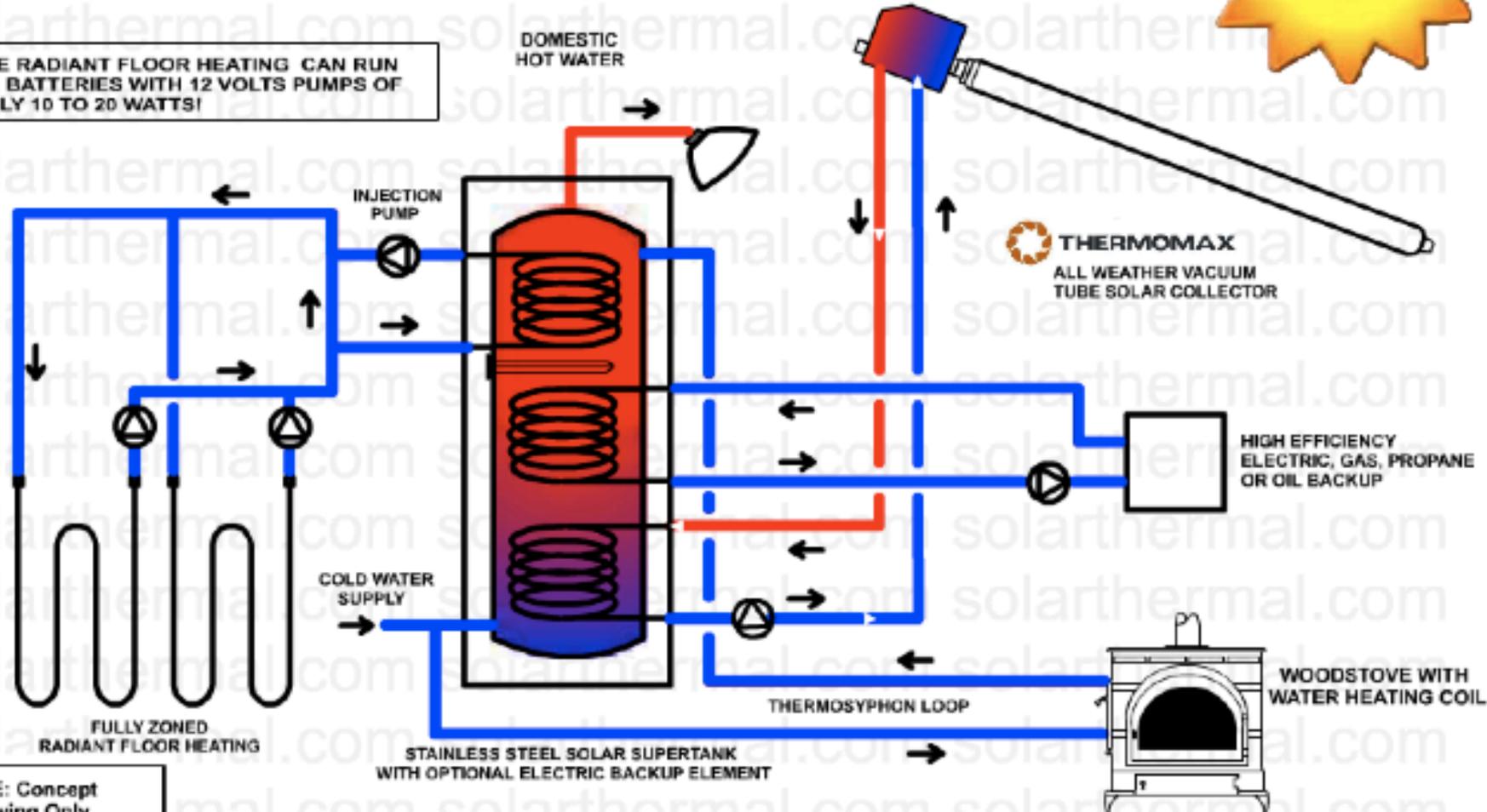


THERMOMAX



SOLAR HOT WATER & SPACE HEATING OVERALL CONCEPT

THE RADIANT FLOOR HEATING CAN RUN ON BATTERIES WITH 12 VOLTS PUMPS OF ONLY 10 TO 20 WATTS!

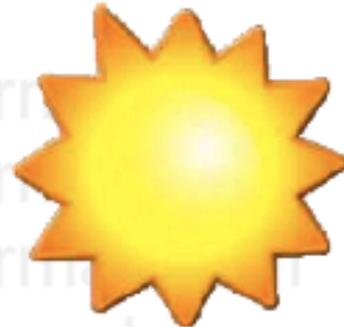


NOTE: Concept Drawing Only
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Home Six: Solar Hot Water and Space Heating with Evacuated

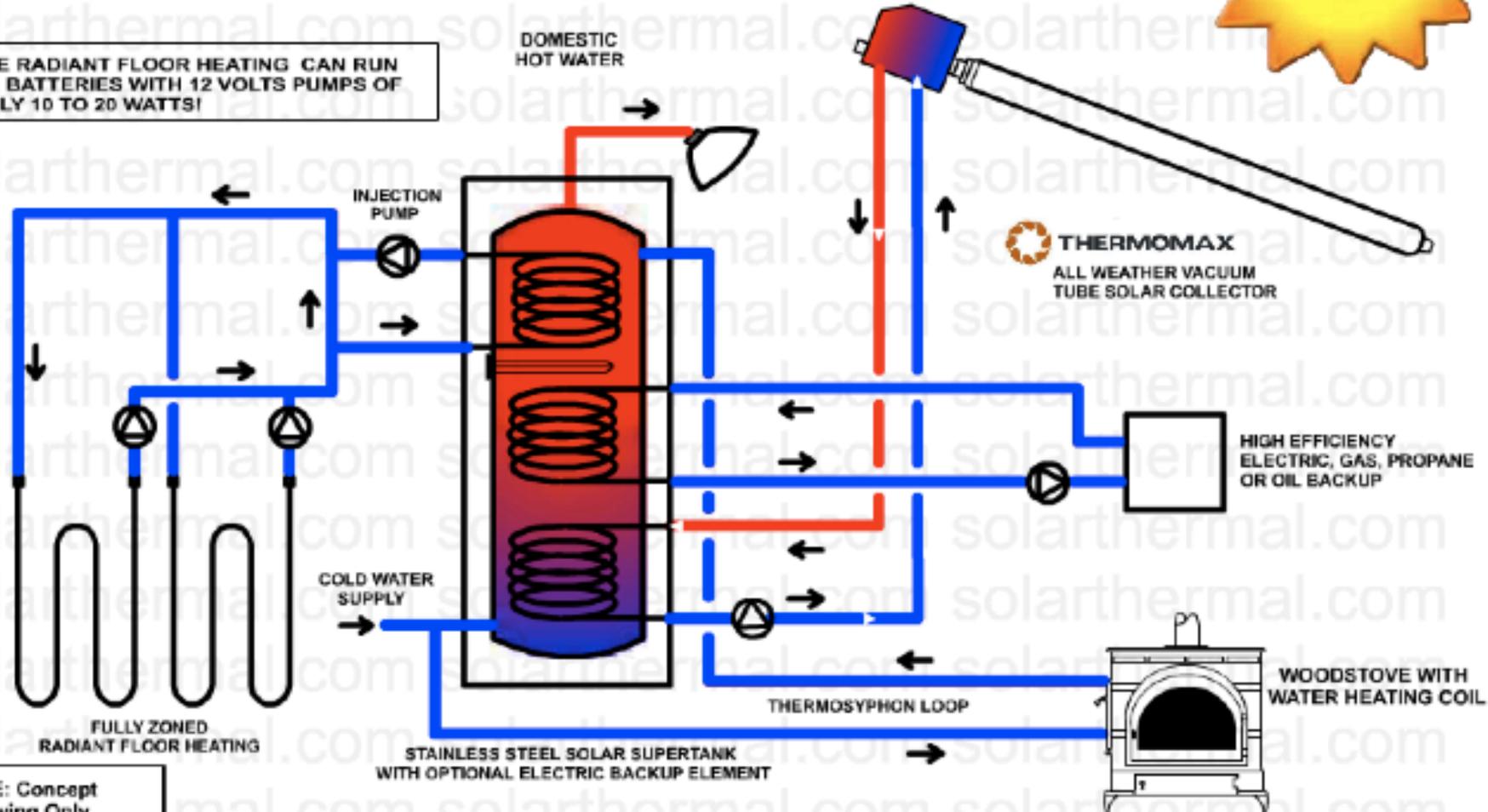


THERMOMAX



SOLAR HOT WATER & SPACE HEATING OVERALL CONCEPT

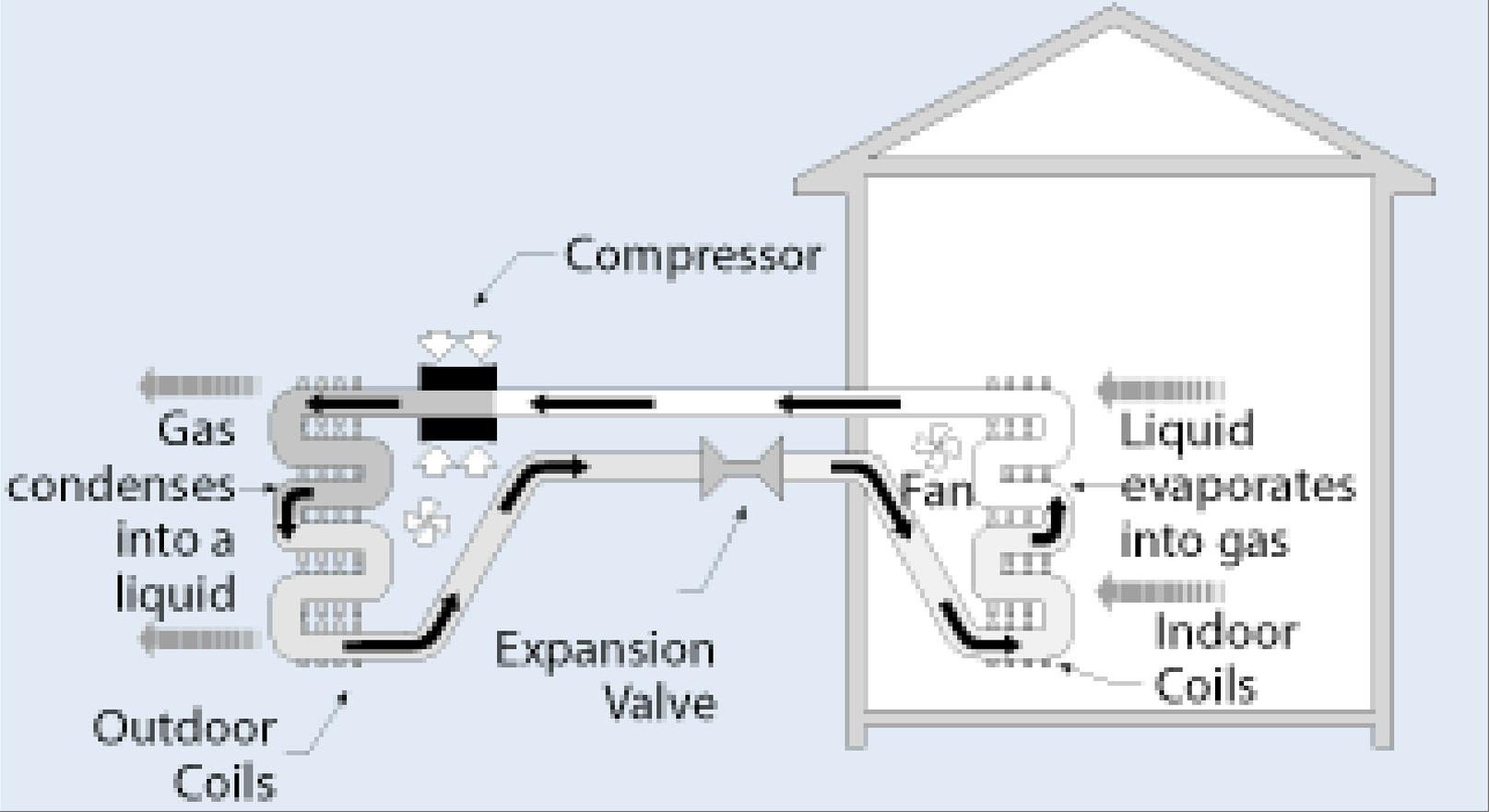
THE RADIANT FLOOR HEATING CAN RUN ON BATTERIES WITH 12 VOLTS PUMPS OF ONLY 10 TO 20 WATTS!



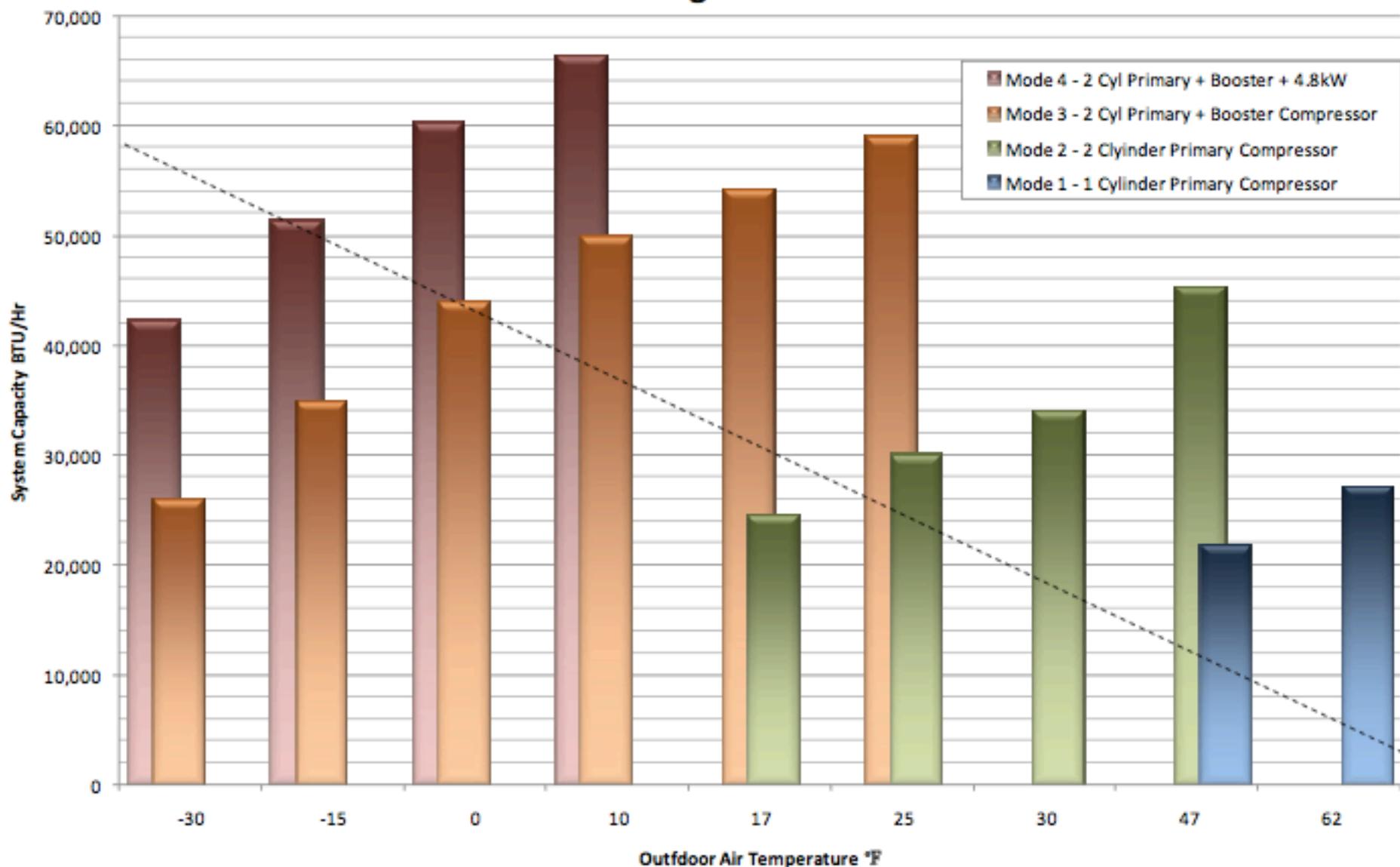
NOTE: Concept Drawing Only
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What are Air Source Heat Pumps?

A split-system heat pump cooling cycle



Acadia 048 Heating Performance Chart



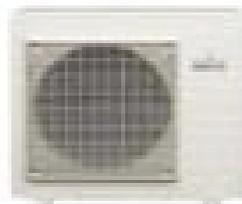


3/4 kW
ambient temperature

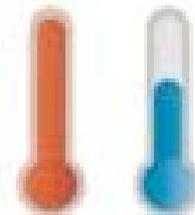
+



1/4 kW
electricity



4/4 kW
energy



Home Seven and Eight

- Air Source Heat Pump-Hallowell



Home Nine and Ten

- Air Source Heat Pump-
Daikin



Conclusion

- Final design will be determined after initial planning meetings
- The Alaska Technical Center may be used as a initial test site if the air source heat pumps benefit is questionable
- The goal is to test equipment for future wide-spread deployment
- Manufacturers claims will be verified as to actual cost effectiveness