ZOMEWORKS CORPORATION

PASSIVE ENERGY PRODUCTS

ESTABLISHED 1969

MADE IN THE USA

800-279-6342

How to Cool and Heat with pure water...

… without using any energy or moving parts

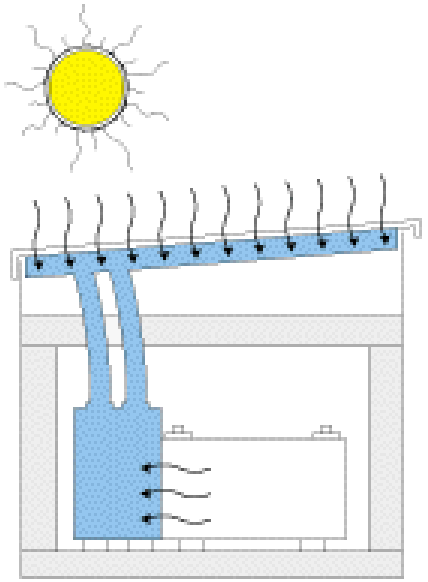
Cool Cell Technology

- Cool Cells are highly insulated metal boxes used to protect batteries and sensitive electronics from overheating in the summer and from excessive cold in the winter

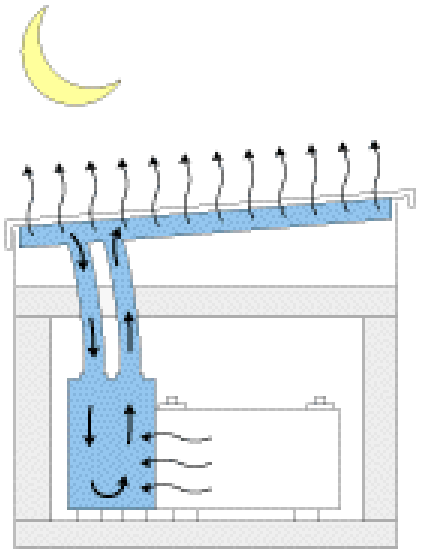
- At one location, battery life went from 1-2 years to over 18 years!

- Cool Cells rely on the intrinsic properties of water: high specific heat, natural convection due to temperature differences, and the latent heat of fusion (energy required to change state from liquid to solid form)

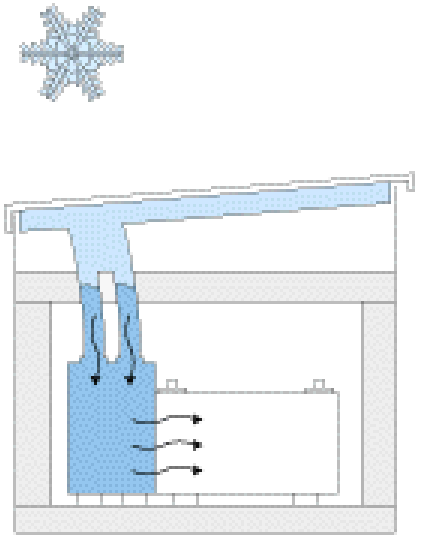
How it works



- Water absorbs heat from components and from environment
- During the hot day, circulation does not occur
- The thermal mass of water keeps the temperature inside from rising excessively



- At night warm water circulates through the lid. Heat is radiated to the night sky
- Cooled water replenishes the inside tank



- The maximum density of water occurs in liquid phase at 39°F.
- Water will first freeze at the top
- The latent heat of fusion prevents the inside from falling below 39°F for up to several days in very cold weather

Selected Cool Cell Examples

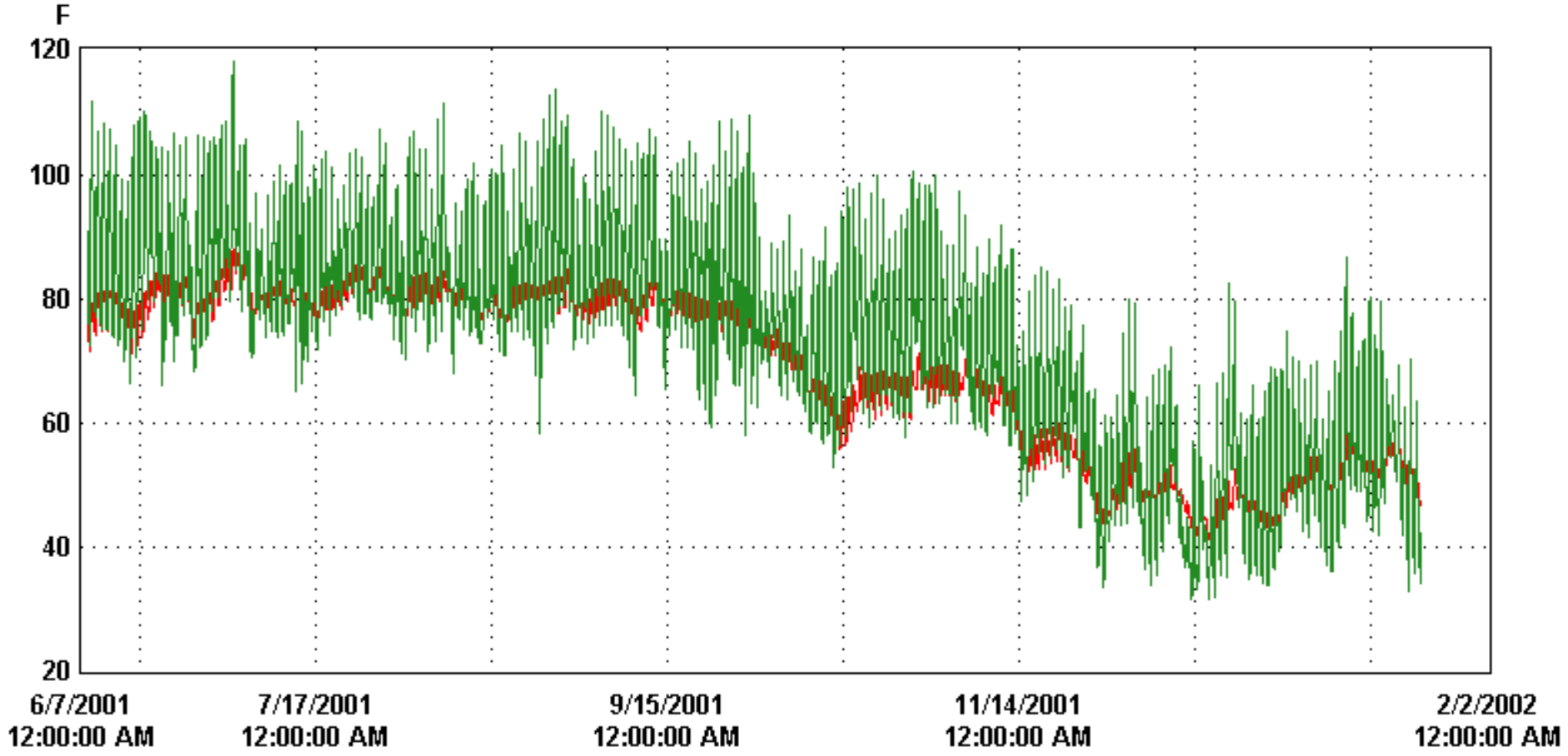
Locating the batteries outside creates more space inside and improves battery access. Zuzax substation, Zuzax, NM.

Two medium-sized Cool Cells are used to provide power for environmental monitoring equipment. Mono Lake, CA

SCADA monitoring system on gas pipeline, Otowi, NM

Telecom site, Yuma, AZ

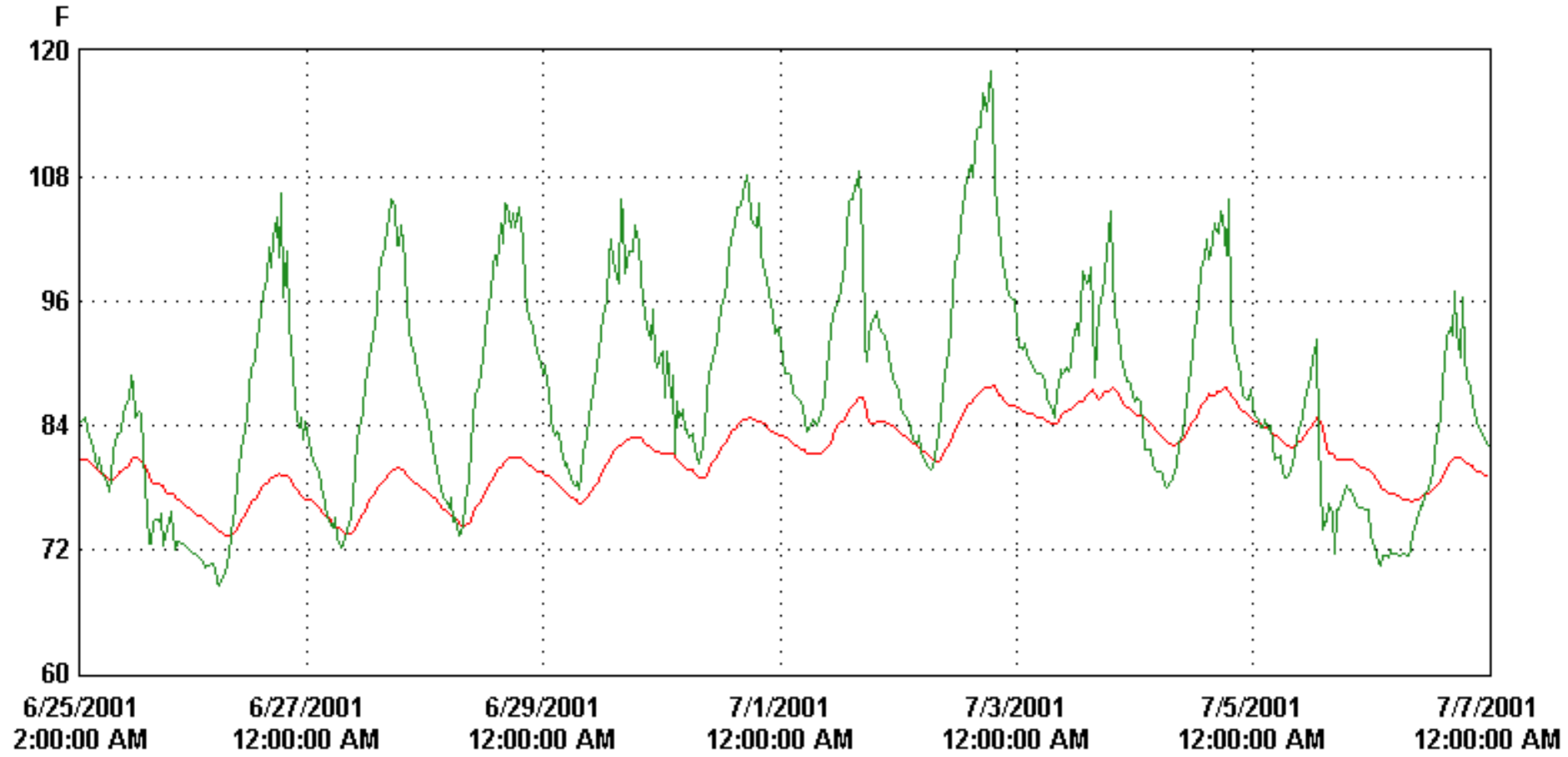
How well does it work?
Independent data – Tucson, AZ



30 days/div 240 days (M/d/yyyy h:mm:ss tt) Graph file: C:\SPECTRUM\Cray0102.spg

LN	Serial #	CH	Units	Description	Logger file	Logger description
1	10051096	1	F		C:\SPECTRUM\CC0102.SPL	Craycroft Coolcell
2	10051096	2	F		C:\SPECTRUM\CC0102.SPL	Craycroft Coolcell

Tucson, AZ - Performance Detail



2 days/div 11 days 22:00:00 (M/d/yyyy h:mm:ss tt) Graph file: C:\SPECTRUM\Cray0102.spg

LN	Serial #	CH	Units	Description	Logger file	Logger description
1	10051096	1	F		C:\SPECTRUM\CC0102.SPL	Craycroft Coolcell
2	10051096	2	F		C:\SPECTRUM\CC0102.SPL	Craycroft Coolcell

What else can be done?

- The principles used to keep Cools Cells cool can also be used to keep houses and shelters cool
- Zomeworks' Double Play structures and Container Cool Cell use the same principles to cool a living / working space
- The Double Play structures and Container Cool Cell also use solar thermal collectors to heat the spaces in winter

Double Play Structures

- The Double Play structures are built using standard construction techniques and feature overhead tanks of water with louvers for adjusting radiated heat during the winter.
- In the summer, water passively circulates through the roof at night, radiating its heat to the sky.
- In the winter, water passively circulates through the solar collectors during the day, heating the water.
- No electricity, no moving parts!

Container Cool Cell

Container – Key Components

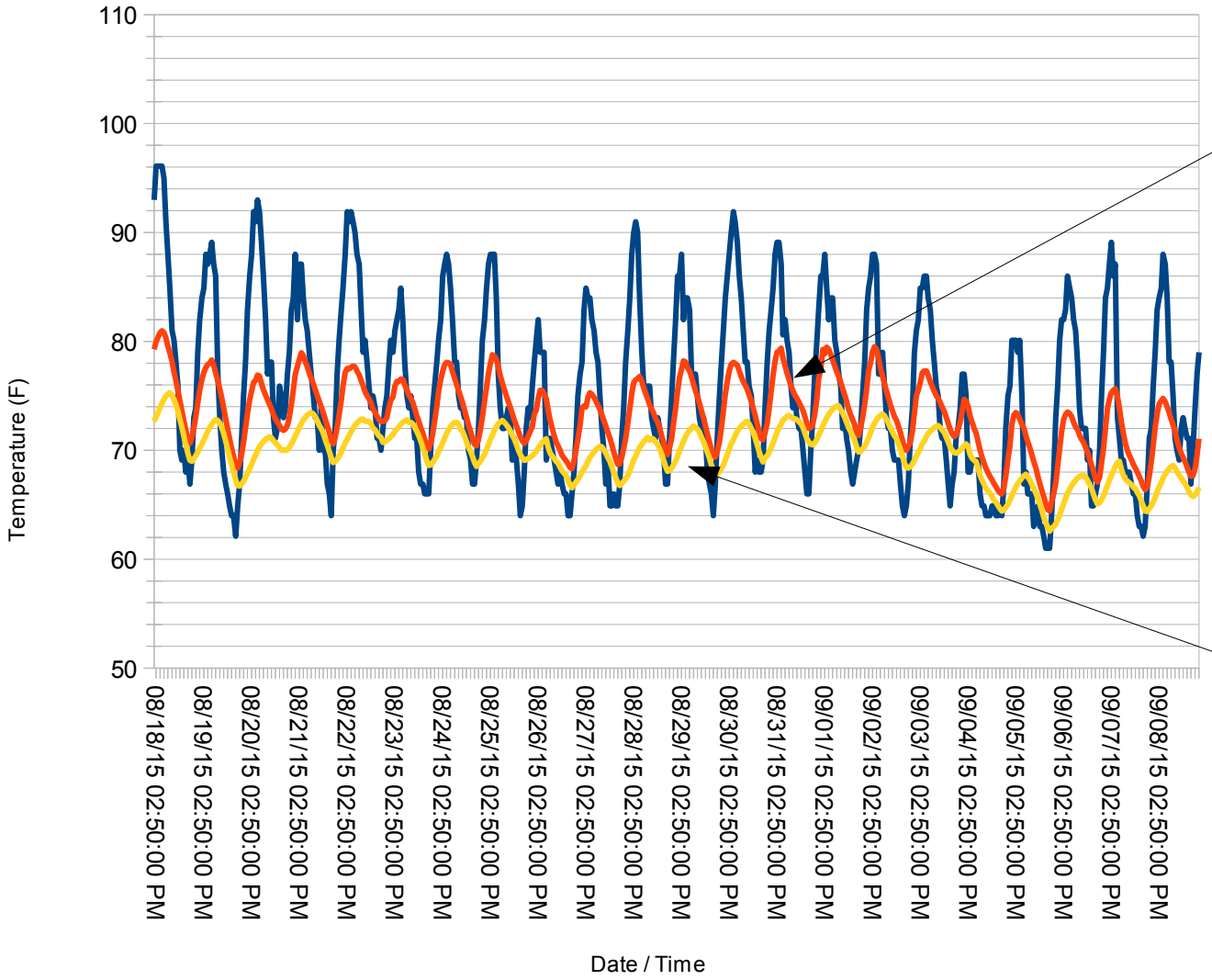
Heating system lines (will likely be external in later versions)

PV tracker provides power to Container Cool Cell. System is off-grid

Solar collectors are oriented to provide heat during winter months

Tanks above the ceiling provide thermal mass which moderates temperatures

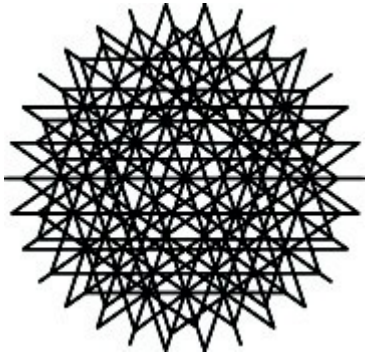
Container Performance



Inside air temperature rises during the day due to heat input from windows. Awnings or window shades would help.

Water temperature typically resides in lower quarter of daytime highs and lows.

Thanks for watching!



If you would like more information, contact Zomeworks at 505.242.5354 or visit our site: www.zomeworks.com