County of Los Alamos
BCC Meeting Minutes - Draft
Environmental Sustainability Board

1000 Central Avenue
Los Alamos, NM 87544

Joseph Chandler, Chair; Hermann Geppert, Vice-Chair; Shannon Blair; Armand Groffman; Erik Loechell; KokHeong McNaughton, and Dina Pesenson

Thursday, January 18, 2024 **5:30 PM** **1000 Central Avenue, Council Chambers and Zoom**

NOTE: This meeting is in person and open to the public. However, for convenience, the following Zoom meeting link and/or telephone call in numbers may be used for public viewing and participation:

Please click this URL to join. https://us02web.zoom.us/j/85656951187

Or One tap mobile:
+17193594580,,85656951187# US
+16694449171,,85656951187# US

1. CALL TO ORDER - ROLL CALL

5:30 p.m. - Member Loechell absent

2. PUBLIC COMMENT

None

3. APPROVAL OF AGENDA

Motion to agenda minutes as amended by Member Pesenson, seconded by Member Chandler - the motion approved unanimously.

4. APPROVAL OF MINUTES

Motion to approve minutes as amended by Member Pesenson, seconded by Member Chandler - the motion approved unanimously.

18251-24 Approval of the December 11 2023, Environmental Sustainability Board Minutes

Presenters: Shannon Blair

5. BOARD BUSINESS

18254-24 Election of Environmental Sustainability Board Chair and Vice-chair

Presenters: Shannon Blair

Elections for Chair and Vice-Chair were held, Member Chandler was elected chair by a roll call vote of 4 -2 for chair and Member Geppert was voted for vice-chair 6-0.

18252-24 Open Meetings Act and Inspection of Public Records Presentation

Presenters: Katie Thwaits

Deputy County Attorney gave a brief training on the Open Meetings Act and Inspection of Public Records.

18253-24 Heating Alternatives to Natural Gas by Hermann Geppert

Presenters: Hermann Geppert

Vice-chair Hermann Geppert gave a presentation on Heating Alternatives to Natural Gas. Presentation is attached.

6. REPORTS

A. Chair's Report - Shannon Blair

Member Blair reported that the Eco station would be on Friday, January 19th, at 2:00 p.m. There was an op-ed written by the LAHC Eco club published January 2, 2024 they will be presenting a plan to the Los Alamos Public Schools on February 13, 2024 at 5:30 p.m. at the Los Alamos Public Schools School Board Meeting, recommended attending the meeting if possible in support.

B. Board Member Reports

1). Board of Public Utilities - Armand Groffman/Erik Loechell

Member Geppert reported that at the January 17, 2024 Board of Public Utilities (BPU) meeting elections for chair and vice-chair were held, Robert Gibson is now chair and Eric Stromberg is vice-chair. Utilities Manager report was they have been addressing comments on the proposed power line for additional power, many comments from Santa Fe and neighboring tribal members. Also looking at the close out of the Los Alamos County agreement for the green nuclear power management, Los Alamos County shares are approximately $240K. Looking into solar, solar by day and natural gas by night not committed to it, looking into. San Idlefonso meeting with Jemez Electric looking into proposing a power line up Guaje Pines canyon to provide power to Los Alamos from their solar array that the are planning on building. Ongoing discussion with Foxtail Fox project in the Four Corners area, presentation to BPU at their February meeting. BPU has started reviewing the LARES recommendations and tabled, one member opposed due to no natural gas hookups for new construction. Some discussion on budget by Karen Kendall.

2). Transportation Board - Hermann Geppert/Erik Loechell

Vice-chair Geppert reported the construction project on the DP road with new utilities, (electricity, sewer, etc.). Presentation on bike share systems and how to implement, good input was they would be used if good infrastructure and if stations are convenient between destinations. Presentation on trial runs and recommendations from the bicycle working group, on intersection closest to the Omega bridge they want to test new surfacing for bike paths, such as a different color to differentiate from roads or shoulders.

3). Parks and Recreation Board - Dina Pesenson/Shannon Blair

None

4). County Council Liaison - Suzie Havemann

Councilor Havemann reported that at the League of Women's Voters January 18th meeting Clay Mosley, DPU gave a presentation that would be of interest to the board, talk was on the electricity load and how it is distributed and challenges and dilemma and what we face from a policy standpoint and from an operations and maintenance standpoint. At the January 30, 2024 Council meeting the Boards and Commission Working Groups liaisons will be finalized, it will be determined if Councilor Havemann will remain as liaison. Also at the February 6, 2024 Council meeting there will a discussion and possible action to implement food waste composting at the Eco Station presentation by Angelica Gurule, Sustainability Manager and Public Works Director Juan Rael. February 27, 2024 the Foxtail Flat Solar project will be presented to Council.

C. Team Reports

1). Bee City Team/Seed Library - KokHeong McNaughton

Member McNaughton reported that the Bee City Committee met on December 19th, 2023 hand hired Dana Ecelberger as a Project Director to work for 10 hours a week. Also discussed was how to use the grant money, including giving out trays of native plants free to gardeners and other organizations who are interested in growing pollinator gardens, working with the San Ana Pueblo nursery supporting our neighbors as well. All ready have three groups of people who are interested in creating pollinator gardens, first one is the high school Eco club, second group the Unitarian Church of Los Alamos, and the third is Los Alamos Cooperative Market. The Bee City resolution was on the January 9, 2024 County Council agenda and was unanimously approved to 6-0 with one Councilor absent. They will now proceed with the application to become affiliated with the Bee City of USA, that includes submitting all kinds of documents, including the signed resolution and a fee of $200.00. The Community Seed Library the steering committee meet and changed the name to the Los Alamos Library Seed Committee. Worked on programming for the coming year, very exciting because there are several events.

2). Zero Waste Los Alamos - Angelica Gurule/KokHeong McNaughon

Sustainability Manager Angelica Gurule reported that the Zero Waste Los Alamos meet on Wednesday, January 17th, 2024 and talked all about the what Member McNaughton and the Bee City are doing. Started discussing how the Los Alamos Alliance Sustainability could contribute to the LARES action plan. One thing could be along with ESB is to develop a plan to address education and outreach. Trying to reach the public where they are at, SALA, movies, social media, farmer market, workshops, etc. They will be looking at the consumption data and messages for this approach and will mostly be targeting citizens. Also giving people the tools calculate their own carbon footprint to determine how they can reduce their emissions. Ryan Ramaker from PEEC is working on drafting soil health and soil restoration article and is participating in Leadership Los Alamos he is working to start building bridges around food sources in community identifying food pantries and food waste prevention information. Jody Benson is helping to coach the Eco Club have three different teams one being the electrification team working with the schools and the County to make request, met Senator Leo Jaramillo to have him help them get an electric bus. They are doing research on how to make the school all electric. Member McNaughton is teaching their planting team about Xeriscape kits, they are also researching a bag ban, and are planning on attending the environment day at the Round House, particular the Global Warming Express will be there as well. There will be a seed swap at the Unitarian Church on February 3, 2024 at 9:00 a.m., also the Eco club is presenting to the School Board on February 13th.

3). Bee City Team

7. STAFF REPORT

18255-24 Sustainability Manager Updates

Presenters: Angelica Gurule

Sustainability Manager Angelica Gurule reported that they are working on the Climate Action Plan and are about half done with the process, next step will be to present to County Council on March 5th with an update with several budget options which Council could choose to fund to this coming fiscal year. Will be presenting to Council in February on food composting. Bad news did not receive the EV infrastructure grant but we will continue looking into funding opportunities. There was a LARES Council working group that focused on identifying LARES action that could be tracked in the interim while working on the Climate Action Plan. Five of the items as budget options for FY25 budget cycle.

8. PREVIEW OF UPCOMING AGENDA ITEMS

-Downtown Master Plan Update
-Artic Presentation by Joel Rowland
-BioSolid Composting Program Update by Joshua Silva
-Bailing Twine Feasibility

9. ADJOURNMENT

8:00 p.m.

If you are an individual with a disability who is in need of a reader, amplifier, qualified sign language interpreter, or any other form of auxiliary aid or service to attend or participate in the hearing or meeting, please contact the County Human Resources Division at 662-8040 at least one week prior to the meeting or as soon as possible. Public documents, including the agenda and minutes can be provided in various accessible formats. Please contact the personnel in the Community Services Administration Office at 662-8163 if a summary or other type of accessible format is needed.

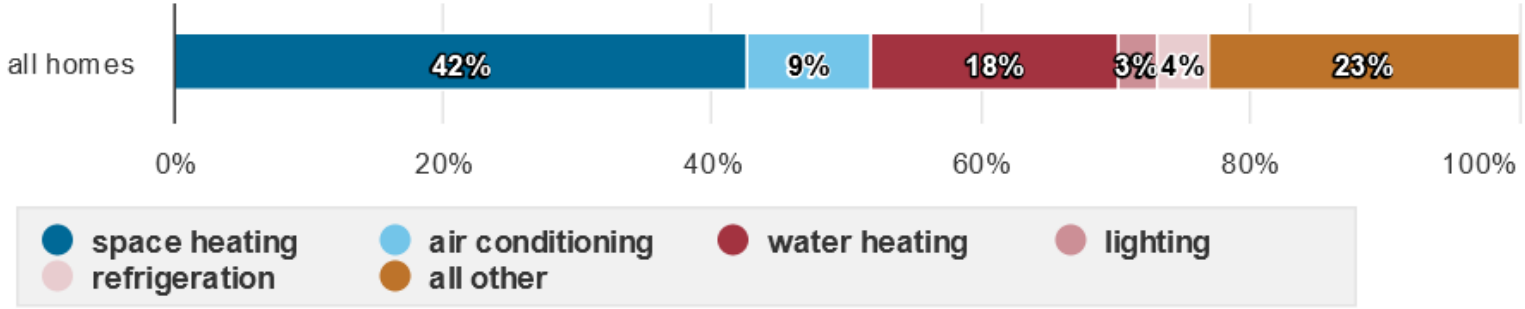
Heating Alternatives to Natural Gas

How much energy do we need and what for?

- Average house built in the US has 2300 square feet.
- Total energy consumption 50,000 kWh/year → 171,000,000 BTU
- Electricity 11,000 kWh/year
- Heating 21,000 kWh/year → 72,000,000 BTU
- Hot water 9,000 kWh/year → 31,000,000 BTU

} mostly fossil fuels

End-use consumption shares by type of U.S. home, 2020



Source: US Energy Information Administration

How do we lose or gain heat?

Load calculation for our house by Steven Booth.

R21 walls R49 ceilings.
Double pain windows.
Roofs designed to shade most windows in summer.

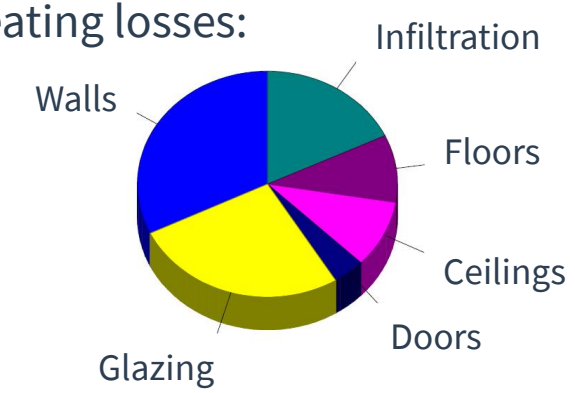
Heating:

- Thicker insulation in the walls, better glazing, and air tightness provide the greatest gains for heating.

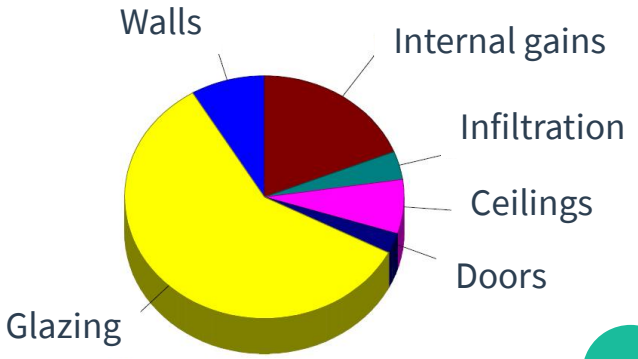
Cooling:

- Windows have the biggest impact on heat gain.

Heating losses:



Heat gain:

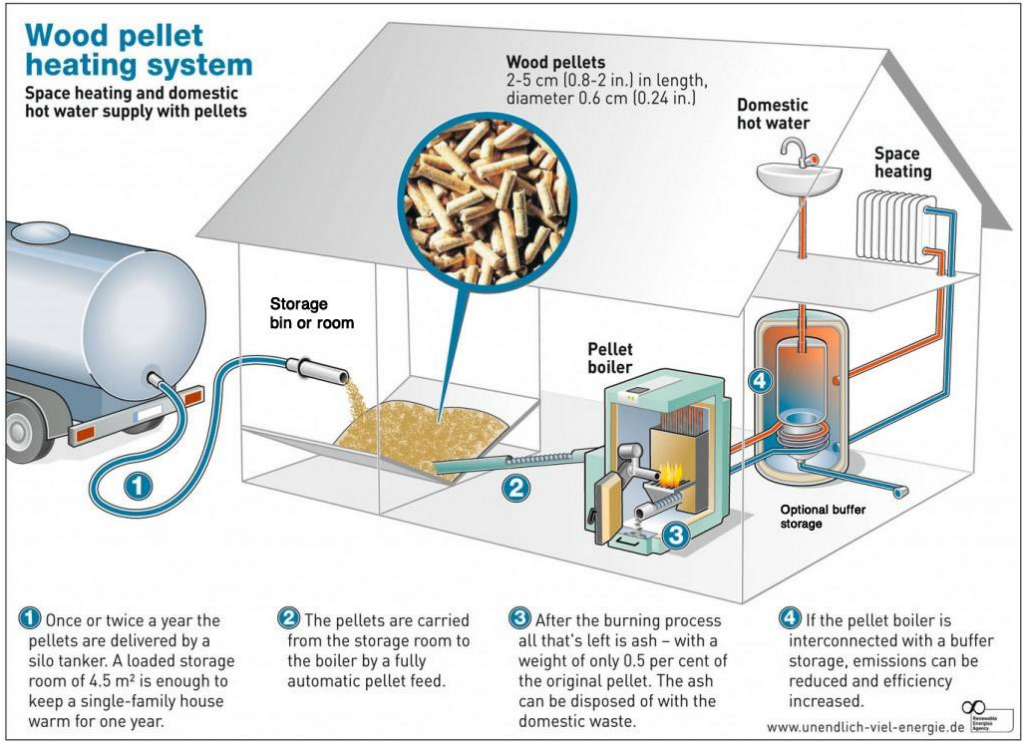


Natural gas

- $1246+$142=$1388/year
  - assuming $1.13/therm + $11.08/month (Austria ~1.88/therm)
- Cheap to install.
- Easy to find products and contractors.
- A lot of choice.
- A lot of (leaky) infrastructure needed.
  - Methane is 80 times as climate active as CO_2 and 9% leak into the air source: Nature 493, 12 (2013)
- Not climate neutral.
- Doesn't burn that clean.

Can we burn other stuff? Yes, pellets and wood.

- $350 per ton ≈ 4,800 kWh/ton
  Mt. Taylor Manufacturing, NM
  $260 per ton in OH → $1,634/year
- Regionally produced.
- $15,000 installation cost.
- $2,200/year for heating and hot water for average household.
- Needs a lot of space 6m² per year.
- Not that climate neutral.



Source: pellergy.com

Not the smartest use electricity

- Resistive heating has **only** 100% efficiency.
- Very reliable.
- Can be installed without much structural change.
- **Expensive $3,990/year**

Base board (DOE)

Infrared heater (DOE)

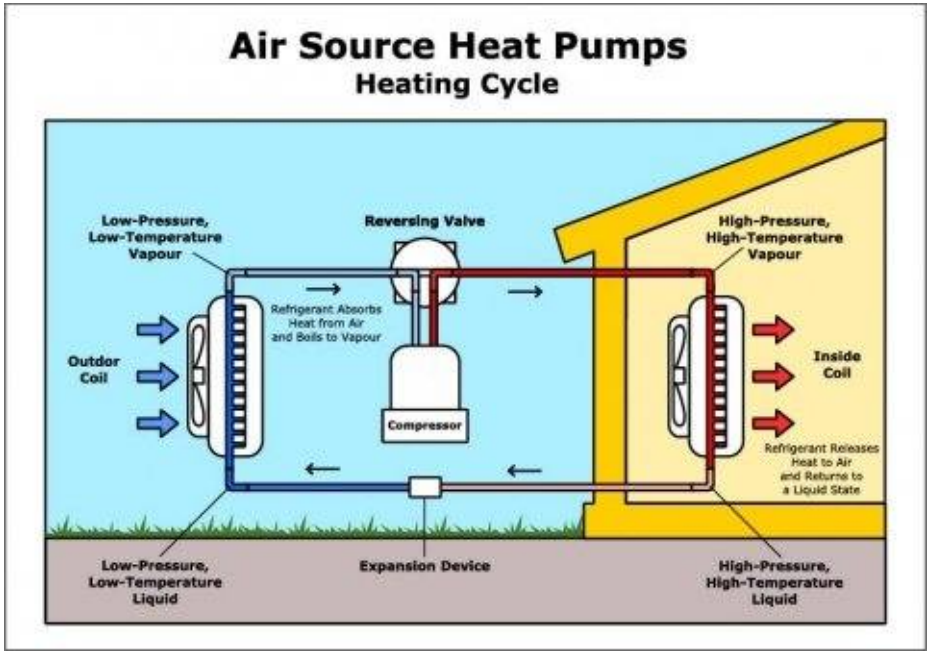
In-floor (warmzone.com)

Can we do better? Yes! Heat pumps!

Heat pumps can heat and cool your home and produce hot water.

Heat sources:

- Air (available around the world)
- Ground (can be unfit)
- Water (if you have a lake nearby)



Heat deliver:

- Duct air heating
- Mini split
- In-floor heating
- Wall heating

Source: energy.gov

Heat pump are vary efficient but not always

Efficiency SpacePak Solstice		Outside temperature [F]		
		60	30	0
Delivery temperature [F]	100	430%-410%	390%-310%	310%-235%
	120	340%-320%	300%-280%	200%-240%

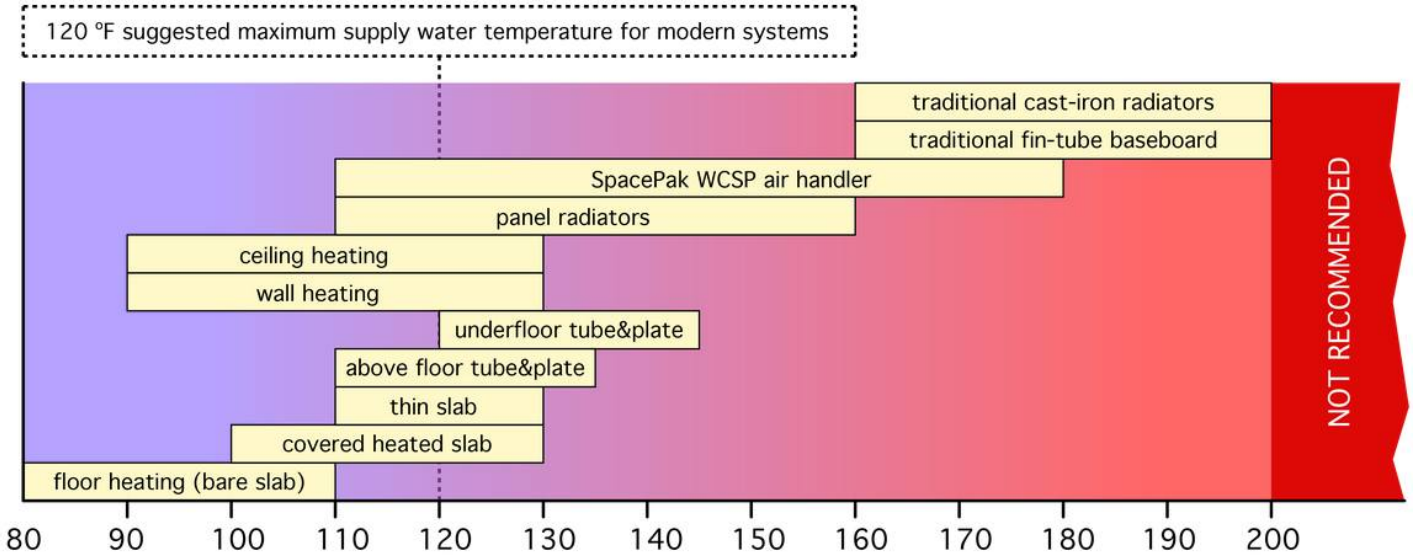
Temperatures in Los Alamos

	Mean daily max	Mean daily low	Mean
January	40.3	20.5	30.4
July	82.5	56.7	69.6

Source: NOAA

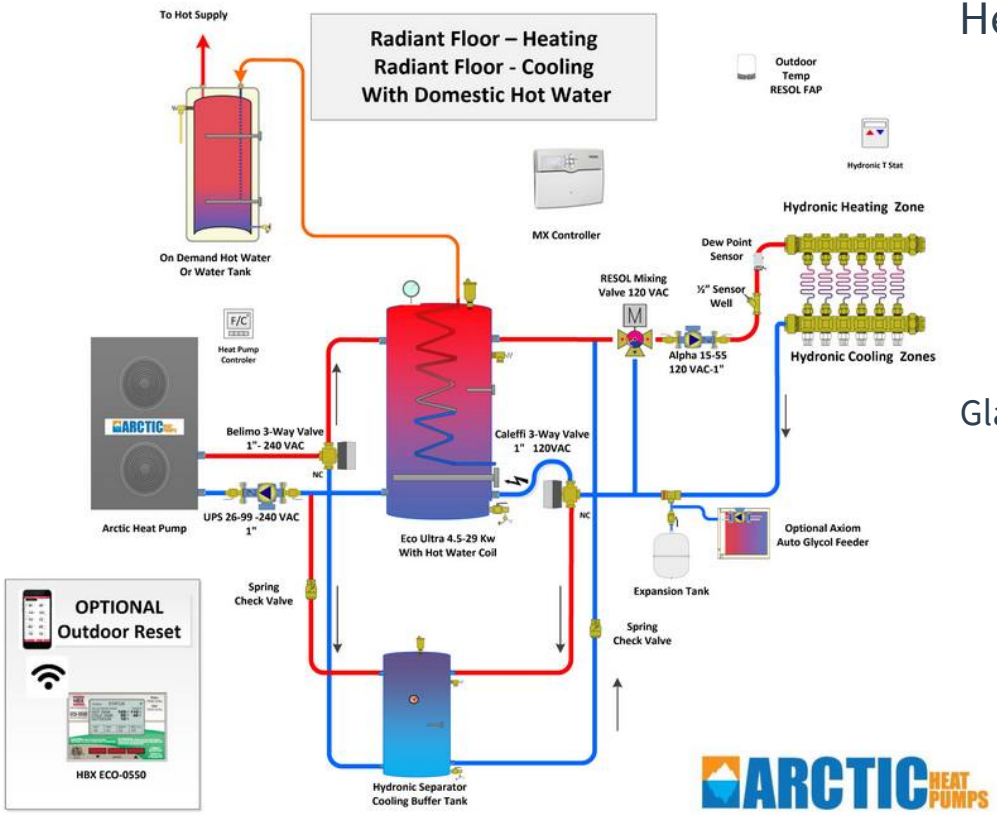
- At 300% efficiency $1,330/year.
- More need for heating the colder it is.

How we heat matters!

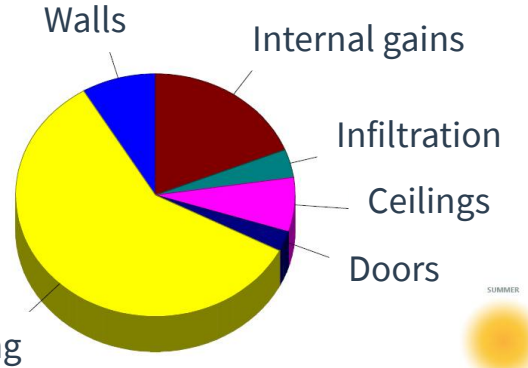


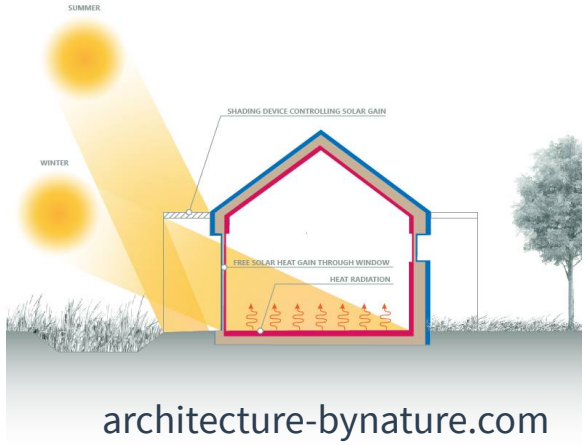
- Radiant in-floor heating can run at the lowest temperatures. Flooring type matters.
- The heated slab provides thermal mass to gap periods where running the heat pump is inefficient.
- Thermal mass limits the ability to reduce temperature when nobody is home or at night.

Many heat pumps can cool your home.



Heat gain in summer:

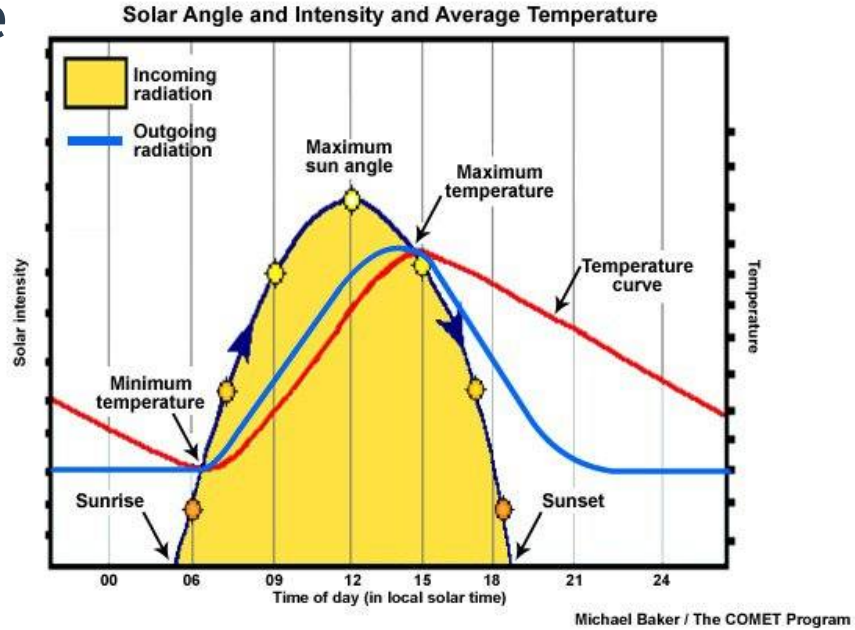




architecture-bynature.com

Getting the most out of your heat pump!

- Heat an energy buffer when the outside temperature is highest.
- Empty the energy buffer when the temperature is the lowest.
- Photo-voltaic panels tend to produce power during the warmer hours of the day.



Even smarter? Yes, batteries can help a lot!

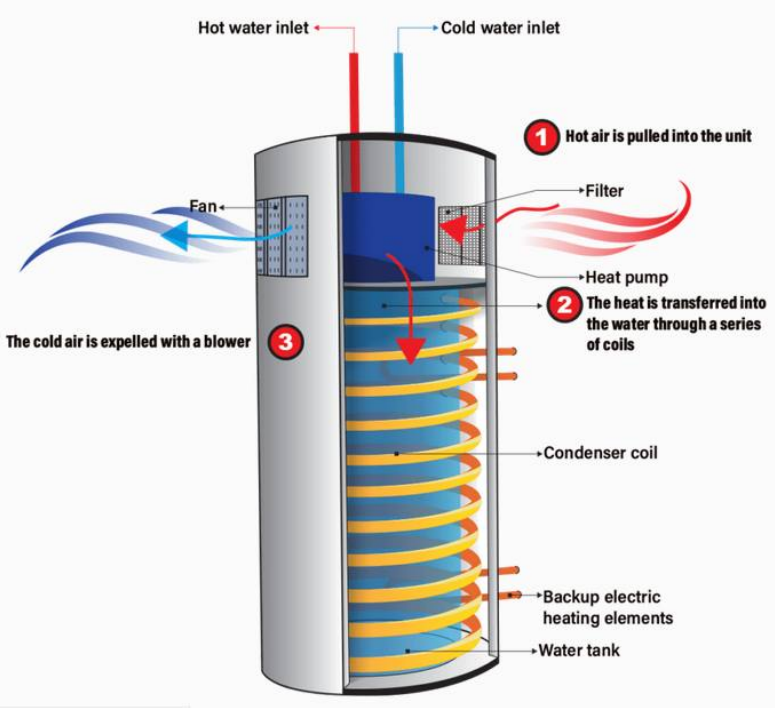
- Electric batteries can provide energy for many different uses.
- Simple to integrate.
- Can bridge power outages.
- 14 kWh capacity (~48,000 BTU).
- Expensive per kWh (Tesla $630/kWh).
- Capacity loss with use.

Powerwall

Source: tesla.com

A water tank can be a battery.

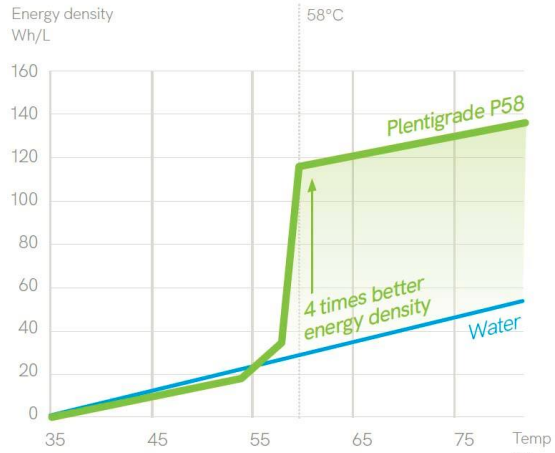
- 80 gal water tank has a heat capacity of 670 BTU/°F.
- Or ~33,000 BTU for 50 °F higher water temperature than your heating system requires.
- According to the load calculation our house will need 22,000 BTUh on the mean coldest day and 12,000 BTUh in April.
- Not the best energy density available.



Heat pump water heater

There are other batteries!

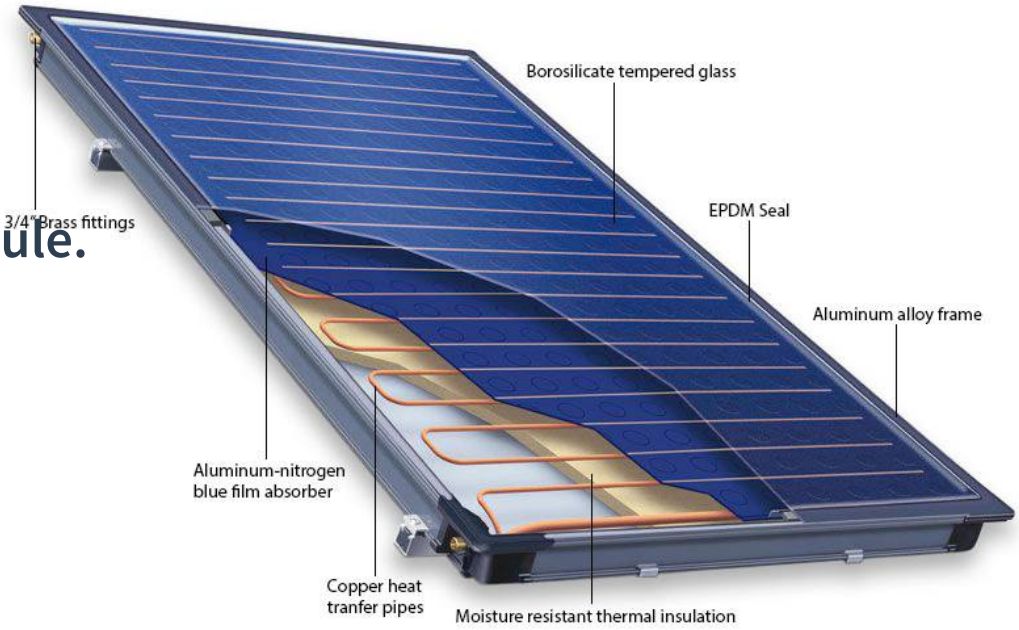
- Phase change batteries take advantage of latent energy. (4x waters energy density)
- Can be charged by hot water or electrical heating.
- Edible sodium acetate used.
- The higher energy density leads to less surface area and less heat loss then storing the same energy in water.
- With two cycles a day medium will last >50 years (>35,000 cycles).
- 10 years warrenty in the US.
- ~3x as much energy per $ spent stored as in a Tesla power wall and will not loose capacity.



Source: Sunamp

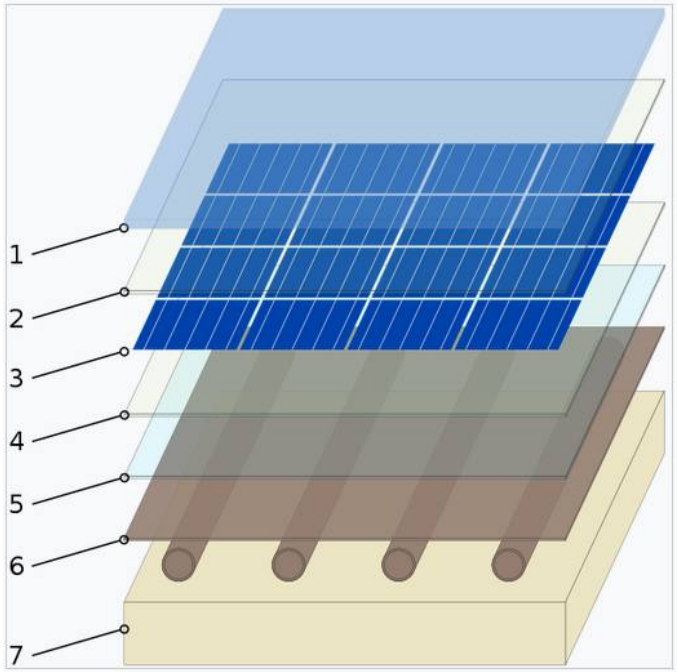
Solar thermal collector. A low tech supplement.

- Very low tech and fairly cheap (can be home made).
- Some are very easy to recycle.
- Efficiency 60% - 75% (PV 20%).
- Can be combined with PV in single module.
- Fairly easy to integrate with an existing system.
- Access heat can be used for cooling in summer with adsorption cooling.



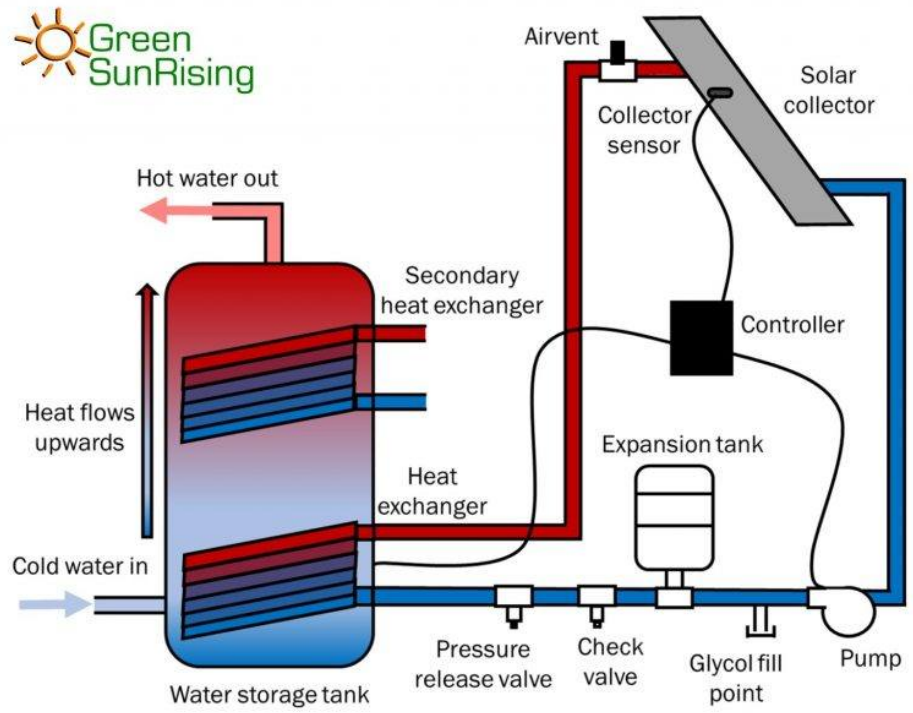
Solar thermal collector. A low tech supplement.

Home built pool heater.



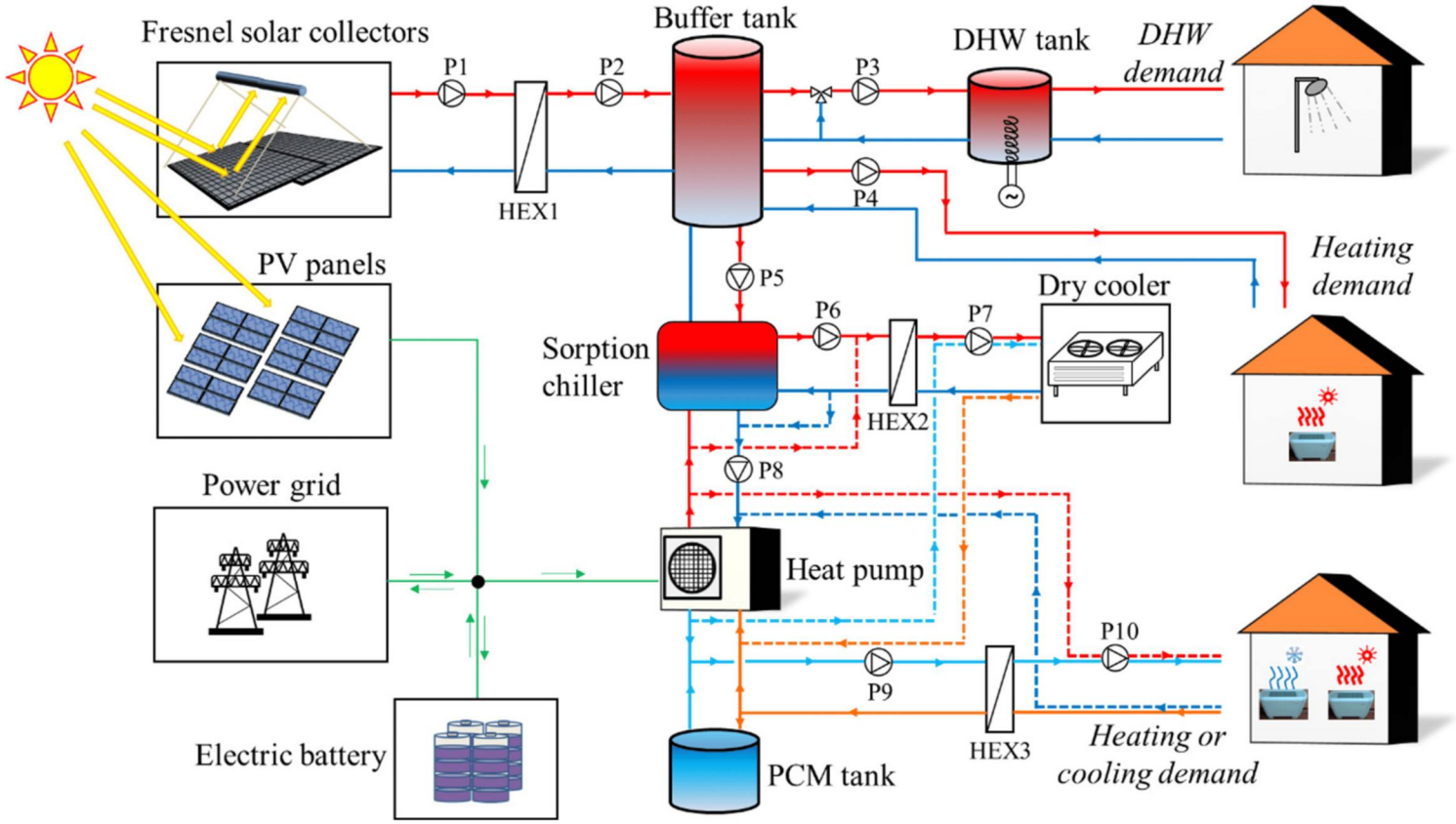
3. PV layer
6. Solar thermal collector

Solar thermal collectors integrated in a heating system



- Solar thermal collectors are most efficient when heating cold water.
- Using the lower heat exchanger will optimize efficiency.
- Primary heat source will only need to top off.

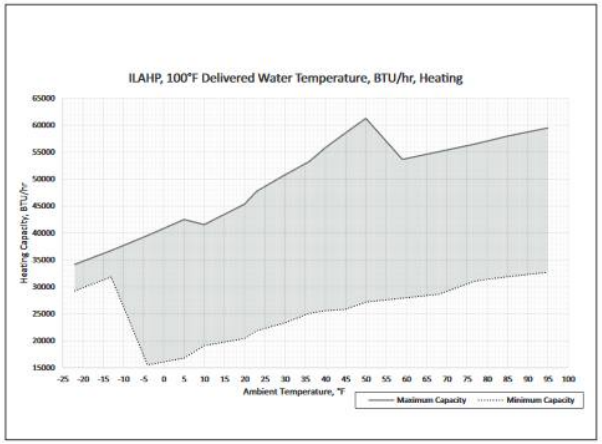
The only reasonable heating solution ;)

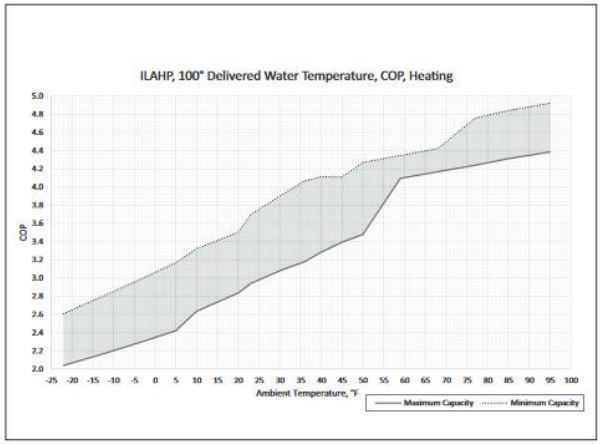


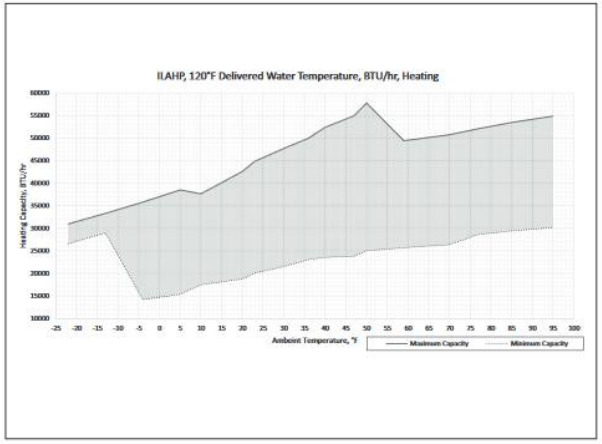
"Deep Learning Optimal Control for a Complex Hybrid Energy Storage System", Buildings 2021, 11(5), 194;

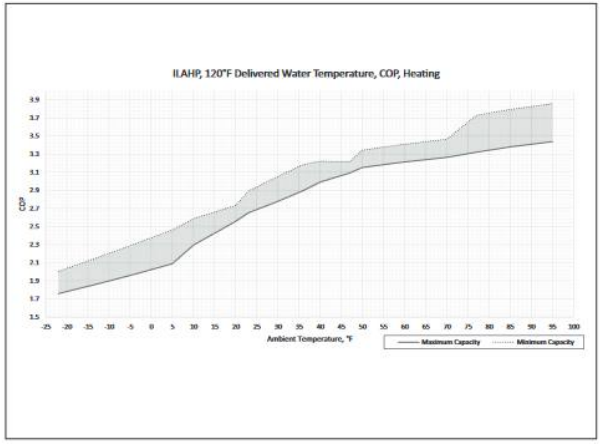
Disclaimers

- It is easier to have an idea than to find somebody willing to build it.
- The more elements are combined into a heating and cooling system, the harder it is to program it and gains diminish.
- More elements yield redundancy


ILAHP, 100°F Delivered Water Temperature, BTU/hr, Heating
Heating Capacity, BTU/hr
Ambient Temperature, °F
Maximum Capacity
Minimum Capacity


ILAHP, 100° Delivered Water Temperature, COP, Heating
COP
Ambient Temperature, °F
Maximum Capacity
Minimum Capacity


ILAHP, 120°F Delivered Water Temperature, BTU/hr, Heating
Heating Capacity, BTU/hr
Ambient Temperature, °F
Maximum Capacity
Minimum Capacity


ILAHP, 120°F Delivered Water Temperature, COP, Heating
COP
Ambient Temperature, °F
Maximum Capacity
Minimum Capacity