

Gary Klein, Domestic Hot Water2: 2021-07-27

Summary of the Links and Product references in the chat:

08:57:00 Michael @ Eastern PA: ASHRAE compiled study of sleep vs bedroom CO2:

https://images.magnetmail.net/images/clients/ASHRAE//attach/AJ_Newsletter/56-61_IEQ_Wargocki_et_al.pdf

09:06 AM Dylan Ingui

Here's the link to the discord server! <https://discord.gg/kcFbDkpcv4>;

Remember to sign up for discord as well otherwise you may have trouble getting into the server. (You can sign up at <https://discord.com>) To use discord you can use either their online website or their downloadable app available on IOS, Android, PC, Linux, and Mac (aka basically any phone or computer). If you have any questions please feel free to either message me on Discord, or email me at dylan@passivehouseaccelerator.com :D

09:14 AM Shannon | New Hope

Here's the link to Gary's PHirst presentation Enjoy!

<https://youtu.be/9iS0tOCU3pU> Connect with Gary on LinkedIn <https://www.linkedin.com/in/gary-klein-b112592/>

09:58 AM Michael @ Eastern PA self learning plug to make ANY *pump** "smart"

<https://www.supplyhouse.com/Taco-SP115-1-Taco-SmartPlug-Instant-Hot-Water-Control?gclid=Cj0KCQjw3f6HBhDHA RiAD i3D TnfWkWeC7ili6V8TB6545Jsd-XtH IOM1DwS7kembB2xmP0kbyNa8aAgarEALw wCB>

10:00 AM Michael @ Eastern PA @laura – how's this: <https://www.tacomocomfort.com/product/taco-genie/>

10:00 AM Michael @ Eastern PA @laura, or if you'd prefer the electronics In the basement, you just need the check valve at your fixture for this one:

<https://www.tacomocomfort.com/product/hot-linkplus-e-ecm-high-efficiency-instant-hot-water-system/>

10:22 AM Shannon | New Hope

<https://gothotwater.com/>

10:34 AM Shannon | New Hope

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10:47 AM Shannon | New Hope

<https://www.garykleinassociates.com/PDFs/Protocol%20for%20Evaluating%20a%20HWDS%202014-10-10.pdf>

10:48 AM Yassen Roussev

<https://chilipeppersales.com/> here is another company out of NV

10:52 AM Shannon | New Hope

<https://www.neoperl.net/oem/products/aerators/waterconservation/pcatechnology.html>. Another discord channel

Abbreviations and Technical Terms used in the chat:

DM – Direct Messaging

DHR – Drainwater Heat Recovery

DHW – Domestic Hot Water

Duck curve – A **duck curve** is a graph of daily power production illustrating the timing imbalance between peak [renewable energy](#) production and [peak demand](#) (with peak demand occurring after renewable energy production has ceased). The name comes from the graph's resemblance to a duck. (Description from https://en.wikipedia.org/wiki/Duck_curve#/media/File:Duck_Curve_CA-ISO_2016-10-22.agr.png)

HWC – Hot Water Cylinder

IOS - > **iOS** - A phone or computer operating system used by mobile devices manufactured by Apple

deltaT – a difference in temperature between two points, either spatially or in time

exterior hose bib – a small faucet or tap on the external wall of a building

ft/s – feet per second – a measure of water velocity through pipes

gpm – gallons per minute – a measure of water volume through pipes

"turndown ratio" – A system's 'turndown' is the ratio between its maximum and its minimum output, describing the system's ability to run at less than full capacity. A system capable of throttling back its energy use to a low level, then ramping up again as needed, uses less energy over time than does a system capable of being only 'on' or 'off'. A heater with a 10:1 turndown and a maximum input of 100,000 BTU/H, can also be 'turned down' to supply any quantity of heat between 10,000 – 90,000 BTU/H. A similar example of energy savings vs waste is city driving: maintaining a constant low speed, then picking up the pace as traffic clears ('turned down' then turned up again.) uses less energy than driving in stop-and-go traffic ('on' or 'off'), as all the energy generated during the 'go' phase is lost when the car stops. (Description from

<https://www.ohplumbingboiler.com/blog/understanding-the-turndown-ratio-of-a-boiler>)

tankless water heater - A 'point of delivery' water heating system using gas or electricity to quickly generate hot water directly from a cold water intake. Tankless heaters are much smaller than hot water heating tanks, heating only as much water as will be used at one time. (Description from

<https://australianhotwater.com.au/tankless-water-heaters/#>)

rise/run ratio – Pipes must be installed with a slight downhill slope for proper drainage. The gradient of the slope may be expressed as a ratio, for example, 1:100 indicates that for every 100 units of distance horizontally, the pipe's slope increases (or decreases) by 1 unit of distance vertically.

water hammer arrestor – A sliding piston seal within the air chamber of a water hammer arrestor absorbs the shock waves ('hammer') generated when freely flowing water suddenly stops or changes direction.

The chat: (Note: time signatures are Australian Eastern Standard Time)

[08:55 AM . . to Me: (DM) Hi Barbara, just noticed your Welsh mug. Hwyl dda!

[08:56 AM Me to . .:(DM) Hwyl dda!

08:57 AM Michael @ Eastern PAASHRAE compiled study of sleep vs bedroom CO2:

https://images.magnetmail.net/images/clients/ASHRAE/attach/AJ_Newsletter/56-61_IEQ_Wargocki_et_al.pdf

09:02 AM Michael @ Eastern PAthey grow up so fast! straight past millennial and Gen X to boomer!

09:04 AM Shannon | New Hope 1000%! translation for the gen xers and boomers: DM = direct message

09:05 AM Zack Semke Well done, Shannon!

09:05 AM Shannon | New Hope The only thing as cool as Dylan is his Avatar ;)

09:06 AM Michael @ Eastern PAso.... its slack?

09:06 AM Dylan Ingui Exactly :) it's better slack :P

09:06 AM Zack Semke Similar to Slack. But not Slack.

09:06 AM Dylan Ingui Here's the link to the discord server! <https://discord.gg/kcFbDkpcv4>;
Remember to sign up for discord as well otherwise you may have trouble getting into the server. (You can sign up at

<https://discord.com>) To use discord you can use either their online website or their downloadable app available on IOS, Android, PC, Linux, and Mac (aka basically any phone or computer). If you have any questions please feel free to either message me on Discord, or email me at dylan@passivehouseaccelerator.com :D

09:06 AM Peter H. Molenaar	Accord about Discord !
09:07 AM KARIENA's iPhone	Nice, thanks his will be great! Thanks Dylan!!!
09:07 AM Shannon New Hope	Pin shaun so you can see the house!
09:07 AM Graham Irwin	Not looking too sunny!
09:08 AM Zack Semke	The Open Air Collective makes very powerful use of Discord, btw
09:08 AM Shannon New Hope Stunning	Wow 2x as smoky as yesterday! Shame you can't share the view it's SOO
09:08 AM jeff spiritos	Great haircut Shaun! Lookin good
09:10 AM Ben Larsen	One here
09:11 AM S Lindsay Klein	OK I am loving this already!!!
09:12 AM Shannon New Hope	@Lindsay ~ great to see you! *Time to Tap!
09:13 AM S Lindsay Klein	@shannon - that's the way I feel about you!
09:14 AM Shannon New Hope	Here's the link to Gary's PHirst presentation Enjoy! https://youtu.be/9iS0tOCU3pU Connect with Gary on LinedIn https://www.linkedin.com/in/gary-klein-b112592/
09:14 AM Michael @ Eastern PA	looks like California's electrical grid "duck curve"
09:15 AM Graham Irwin	Duck curve & DHW use are closely tied to occupancy patterns...
09:15 AM Shannon New Hope	Thanks Graham :) Such a cool project
09:24 AM Shannon New Hope	Oh Architects!
09:25 AM Reid Rowlands	Careful @shannon – you're an architect
09:26 AM Shannon New Hope	Hahahaha
09:27 AM Graham Irwin	You missed the other kitchen sink!
09:27 AM Shannon New Hope	Good spot Graham!
09:27 AM Graham Irwin	architect! ;-)
09:28 AM Sara Wareing	Is it more efficient to use electric resistance point-of-use water heating than a heat pump HWC with a longer pipe run?
09:28 AM Shannon New Hope	Great question Sara~ I'll save it for after the presentation :)
09:31 AM Reid Rowlands	I have a "gravity" recirculating line - no pump. Designed by accident. Question for Gary - how do you design one on purpose?
09:31 AM Shannon New Hope	Thx Reid ~ Got it!
09:33 AM Graham Irwin	In our California Passive House designs, we've found it better to keep the hot water storage tank in an attached room near/at the exterior of the house that is well-insulated but thermally separated from the conditioned space because of the large cooling load in summer from having the DHW tank inside the envelope...
09:35 AM Ian	Where do the point of use water heaters under sinks?

09:38 AM Shannon | New Hope thx Ian "Get rid of the unintended waste that you didn't want in the 1st place" - Gary Klein

09:40 AM S Lindsay Klein what is no one 1 inch pipe?

09:40 AM Scott Kennedy Can we not use a small electrical hot water heater under each lavatory?

09:40 AM Graham Irwin I've found an unintended consequence in my efficient plumbing system - the shower head is very low flow and we have drainwater heat recovery and a central tankless electric water heater. As the shower continues, the drainwater heat recovery reduces the hot water demand and it falls below the minimum hot water draw to turn the tankless water heater on... The shower then turns cold.

09:42 AM Jay Murdoch This is so awesome

09:42 AM Ian Actually Graham, thank you for explaining that, I think that my tankless does that sometimes without me having the DHR

09:42 AM Shannon | New Hope Gold Star!

09:44 AM Michael Ingui Great - Thank you !

09:44 AM Shannon | New Hope PHirst questions up from: Sara Wareing; Reid Rowlands; Graham Irwin - comment? (2)

09:45 AM Sara Wareing Yes please

09:45 AM Michael @ Eastern PA@Graham, what model do you have? You need a higher "turndown ratio" to keep the unit on, and a lower minimum flow rate (some tankless units get up to 20:1 turndown and 0.3gpm minimum)

09:45 AM Graham Irwin I'm happy to comment~

09:45 AM Shannon | New Hope thx!

09:45 AM Graham Irwin @Michael, don't recall the model # but it's a Steibel-Eltron, pretty large to run several showers at once. 3x 40 AMP circuits...

09:46 AM Michael @ Eastern PAoh, wow- instant electric- I had assumed gas

09:47 AM KARIENA's iPhone My question and can you ask for me: are these runs including tapping into utility main lines

09:48 AM Graham Irwin That sink hardly ever gets used, volume-wise.

09:49 AM Tomi Strugar Will one save energy by using a faucet with separate hot and cold water control handles rather than a mixer tap?

09:50 AM Brian Keech In what situations does it make sense and not make sense to use a tankless water heater?

09:50 AM Eric Schieb gravity induced would also need temperature loss?

09:52 AM Shannon | New Hope Eric sounds like you're ahead ;) InPHur the deltaT

09:56 AM Graham Irwin Because the hot water events are so "clumped" in hours of the day, better to go with schemes that don't have heat loss all day long... PUMP!

09:57 AM Eric Schieb solenoid valve on the return?

09:58 AM Graham Irwin I think recirc pumps have check valves in them...

09:58 AM Michael @ Eastern PAself learning plug to make ANY **pump** "smart"
https://www.supplyhouse.com/Taco-SP115-1-Taco-SmartPlug-Instant-Hot-Water-Control?gclid=Cj0KCQjw3f6HBhDHA RIsAD_i3D_TnfWkWeC7ili6V8TB6545Jsd-XtH_IOM1DwS7kemB2xmP0kbyNa8aAgarEALw_wcB

09:58 AM Shannon | New Hope Cool!

09:59 AM Laura Blau We have a master bath that takes too long for hot water to get to. How difficult is it to add an on demand local to that bathroom? How big a unit would be needed?

10:00 AM Michael @ Eastern PA@laura – how's this: <https://www.tacomfort.com/product/taco-genie/>

10:00 AM Tommy Manuel Thanks, Gary!

10:00 AM Bob in Chicago Q: do you find you get adequate pressure with 3/8" lines?

10:00 AM Michael @ Eastern PA@laura, or if you'd prefer the electronics In the basement, you just need the check valve at your fixture for this one:
<https://www.tacomfort.com/product/hot-linkplus-e-ecm-high-efficiency-instant-hot-water-system/>

10:01 AM Eric Rehm What is a standard water flow rate for kitchen sink / bath sink hot water?

10:02 AM Moe's iPad @Gary: What is the rise/run ratio that works best? Sorry, I can't stay on to hear the answer, but I'll be sure to review the recording.

10:03 AM Shannon | New Hope comment? (2); Ian; Lindsay Klein 10K Downloads congrats PHA! Next questions up from: Graham Irwin -

10:03 AM Zack Semke @Shannon woot woot! Almost 50k all time. Exciting.

10:03 AM dan Schumacher Thank you again

10:04 AM Shannon | New Hope That's a CHALLENGE! Can we create a discord channel?

10:04 AM Barbara in Oz I'm in!

10:05 AM Brett Sagert, Vancouver plans are that we're currently using I feel like it is worth even putting it in to showcase how bad some of the

10:06 AM Shannon | New Hope @Brett hahaha

10:07 AM Tommy Manuel Great point

10:07 AM Eric Schieb heat pump one?

[10:10 AM Me to Graham Irwin: (DM) I'm designing my own home in Canberra, Australia. Thanks for your [observation on where to place the hot water heater in a warm-climate PH! I'd put the heat pump outside the 2/F [laundry room where I'd placed the DHW, but I'll reconfigure to put the DHW outside the laundry room also.

10:12 AM Bob in Chicago Q. On the heels of wondering about 3/8 water pressure adequacy Is there a well-designed shower head which compensates for a low flow situation? I've tried and failed looking for a decent shower head. You can't tell how it works until you buy and install it...

10:12 AM Shannon | New Hope Next questions up from: Ian; Lindsay Klein; Scott Kennedy

[10:13 AM Me to Graham Irwin: (DM) Just re-read my message to you: by outside I mean outdoors, on the roof of [a small room outside my thermal envelope.

10:13 AM John Snell West Marin of SF Bay Area Doesn't heat pump water heater cool the house while heating the water?

10:14 AM Shannon | New Hope 3 ways to win ;)

[10:15 AM Graham Irwin to Me: (DM) We insulate the room that holds the water tank well, but it is either an add-[on space to the building or at the outside of the building and I insulate that room as well as the rest of the house [and as well between the water heater and the rest of the house. Also, make sure your cold water feed for the house [DOES NOT go through that room or all your cold water will be lukewarm...

[10:16 AM Me to Graham Irwin: (DM) Thanks! excellent tip about the cold water!

10:16 AM Peter H. Molenaar Pipe length is definitely not measured "as the crow flies".

10:17 AM Graham Irwin @John Snell. Heat pump water heaters with the compressor on top (vs. a split system with the compressor outside, like the Sanden) do move heat from the space into the water tank, but there's no extra cooling, it's all moving heat from one place to another, and not at 100% efficiency.

10:17 AM Shannon | New Hope ...& The largest offenders are the showers. thx Graham ~ peter lmk if you want to expand on your question w/ Gary?

10:19 AM Graham Irwin One other "Lesson learned" with the super-insulated water tank storage room - DO NOT route the cold water supply for the house through that room! The plumber did this on one house and the cold water is lukewarm because the storage room is typically over 100 °F.

10:20 AM Shannon | New Hope Great share!

10:20 AM Michael @ Eastern PA how else am I supposed to know how long to brush my teeth? everyone knows dentists recommend brushing until the shower is warm.

10:21 AM Shannon | New Hope Demand activated recirc pump for remote locations

10:21 AM Michael @ Eastern PA @graham, are the pipes insulated too?

10:21 AM Norm in Pennsylvania When Gary asked at the beginning of the presentation if you expected hot water when you turned on the hot tap, my response was "no." I'm totally conditioned to being underwhelmed...

10:22 AM Shannon | New Hope <https://gothotwater.com/>

10:22 AM Eric Schieb My memory is that it pumps water from the hot pipe to the cold pipe when there is hot water demand. . . .

10:22 AM Graham Irwin @Michael, hot water pipes are insulated.

10:23 AM Shannon | New Hope Next up: Lindsay Klein; Scott Kennedy; KARIENA's iPhone (I'll ask for you :)

10:23 AM Graham Irwin Gary, I suspect that I'm the only person in 8 years to notice the other sink that also had the gall to mention it! :-0

10:24 AM Graham Irwin Gotta go, great presentation, thank you!

10:24 AM Shannon | New Hope Have a great night Graham

10:26 AM S Lindsay Klein So for the CHALLENGE please let us know if exterior hose bibs should also be identified - thanks

10:26 AM Shannon | New Hope Next up: Tomi Strugar; Brian Keech; ...back to reid's question; Eric Schieb

10:26 AM Michael @ Eastern PA use the stacked wet rooms to route your ERV trunks too!

10:27 AM Shannon | New Hope Make that: Brian Keech; Eric Schieb; Michael @ Eastern PA; Laura Blau;

10:29 AM Shannon | New Hope thx Michael :)

10:31 AM Michael @ Eastern PA 30 seconds for a gas water heater to get preheated.... not including distribution....

10:32 AM Shannon | New Hope Next Q's from: Eric Schieb; Laura Blau; Bob in Chicago.

10:34 AM Shannon | New Hope Connect with Gary on LinkedIn:
<https://www.linkedin.com/in/gary-klein-b112592/>

10:35 AM Shannon | New Hope Welcome Eric!

10:38 AM Shannon | New Hope PHistory!

10:39 AM S Lindsay Klein I think I missed the PH Course that Gary Klein will be providing - can someone put a link in the chat?

10:39 AM Tommy Manuel Geez

10:40 AM Hesham Ahmad I was going to ask for the same. He mentioned some white papers in the start of presentation

10:42 AM Peter H. Molenaar All this wisdom needs to be taught in Fluid Dynamics courses for Mechanical Engineers and all Plumbers!

10:42 AM Sara Wareing I just looked at one of the plans I am working on. The plumbing ratio is 74% trying to use an outdoor heat pump HWC, it drops to 38% with an electric resistance indoor HWC.! Wow

10:42 AM Michael @ Eastern PA throw in a water hammer arrester...

10:43 AM Shannon | New Hope Next questions from: Bob in Chicago; Eric Rehm; Moe's iPad

10:43 AM Reid Rowlands Depends - is that for water leaks?

10:45 AM Shannon | New Hope Thx Michael I didn't know those were an option!

10:45 AM Michael @ Eastern PA its basically just a super small expansion tank

10:45 AM Shannon | New Hope Homework! Like boost mode for hot water

10:47 AM Michael @ Eastern PA sounds like we need home-automation....

10:47 AM Peter H. Molenaar When I first visited Netherlands about 45 years ago, many houses had flow-triggered natural-gas-fired water-heater at or near the kitchen sink. It would also serve the shower and lavatory directly upstairs.

10:47 AM Reid Rowlands Forget the button: How about a sensor that sees you got out of bed

10:47 AM Shannon | New Hope <https://www.garykleinassociates.com/PDFs/Protocol%20for%20Evaluating%20a%20HWDS%202014-10-10.pdf>

10:48 AM Yassen Roussev <https://chilipeppersales.com/> here is another company out of NV

10:49 AM Shannon | New Hope PHamily tree twig & branch

10:51 AM Peter H. Molenaar Once again, it depends!

10:51 AM Shannon | New Hope 1 more question if we have time from Moe's iPad. thx for your patience Moe :)

10:52 AM Brian Keech in Pittsburgh Thanks Gary. Great presentation.

10:52 AM Shannon | New Hope <https://www.neoperl.net/oem/products/aerators/waterconservation/pcatechnology.html>. Another discord channel

10:56 AM S Lindsay Klein The first time I used a (SUPER) low flow shower head it felt I was in a sandstorm on the beach - I am all in for the Gary Klein shower evaluation !

10:57 AM Michael @ Eastern PA Another reason to "right size" the pipe? keep the air entrained

10:58 AM Peter H. Molenaar So, the suggestion is to "burp" the building.

10:58 AM Shannon | New Hope Lindsay yes! ~ Sorry for the delayed answer, Gary will be back with more sessions in the "Time to Tap" series with us :)

10:58 AM Michael @ Eastern PA maintain 2ft/s to keep the air in solution

10:59 AM Ben Larsen Great info for sure!

10:59 AM Shannon | New Hope

Save the chat with the 3 buttons to the right -->

10:59 AM Moe

Thank you all. Great session as always.

10:59 AM Daniel Levy

Thank you Gary! Always enjoy hearing about your research etc.

11:00 AM Shannon | New Hope
WE'LL C U IN SEPT!

Thanks to all PHor coming tonight! We'll miss you in August so STAY COOL &

11:00 AM Peter H. Molenaar

This has been a veritable PHire-hose of wisdom! Thank you, Gary!