

Webinar

Pumping Up Sustainability: Embracing Heat Pumps in Commercial Real Estate

Date: September 20, 2024

00:00:00 --> 00:00:03: All right, is a little past the hour, please.

00:00:03 --> 00:00:05: Welcome to U Lies.

00:00:05 --> 00:00:10: Pumping up sustainability, embracing heat pumps in commercial real estate.

00:00:11 --> 00:00:13: My name is Kara Kokernak.

00:00:13 --> 00:00:16: I'm a senior director in the Center for Sustainability with a focus on thought leadership.

00:00:16 --> 00:00:18: And I'm really excited to moderate this panel today.

00:00:18 --> 00:00:22: Before we get in and introduce our amazing panel of great experts, I wanted to make everyone on the webinar aware, if you are not already about you allies net 0 mission priority.

00:00:24 --> 00:00:27: I find it quite interesting that some folks don't even know we have a net 0 mission priority that really focuses on decarbonizing the real estate sector and accelerating our progress to net zero.

00:00:27 --> 00:00:31: So a lot of our content and our Center for sustainability comes out about how to do that, how to make the business case for green buildings and attaining net net 0.

00:00:31 --> 00:00:35: And we do that in a very specific way.

00:00:35 --> 00:00:36: And if you have been on any type of webinar presentation with me or are you a LIE team, you have seen this graphic that we have updated it.

00:00:36 --> 00:00:40: This is how you LIE defines the journey to net zero.

00:00:40 --> 00:00:43: We define net zero or net zero building portfolio or net zero building as one that is highly efficient and fully powered by on site and off site renewable energy

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00:01:23 --> 00:01:27:

00:01:27 --> 00:01:28: sources and offsets.

00:01:29 --> 00:01:32: And this journey can take us through energy efficiency, making

00:01:32 --> 00:01:35: sure your building is up to date with the latest

00:01:35 --> 00:01:39: systems, most energy efficient systems, most energy efficient building envelope.

00:01:39 --> 00:01:42: And then we move on to what can your building

00:01:42 --> 00:01:44: attained in terms of on site renewables.

00:01:44 --> 00:01:46: What type of roof space do you have?

00:01:46 --> 00:01:48: Are you utilizing geothermal?

00:01:48 --> 00:01:50: We're going to talk a little bit about that later

00:01:50 --> 00:01:51: today.

00:01:51 --> 00:01:56: And then #3 being grid interactivity, working with utilities on

00:01:56 --> 00:02:01: demand response programs and also electric your building or portfolio.

00:02:01 --> 00:02:03: We're also going to be talking about that quite a

00:02:03 --> 00:02:03: bit today.

00:02:04 --> 00:02:08: And then moving on to the remaining emissions being offset

00:02:08 --> 00:02:12: by off site renewables, wrecks or other offsets.

00:02:12 --> 00:02:15: And then at the end, I call it last but

00:02:15 --> 00:02:19: not least, but very important is making sure that owners

00:02:19 --> 00:02:22: and tenants are aligned on their ESG and sustainability and

00:02:23 --> 00:02:24: net zero goals.

00:02:24 --> 00:02:27: So both building user and building owner are moving in

00:02:27 --> 00:02:28: the same direction.

00:02:29 --> 00:02:31: And then last on that list, though sometimes we can

00:02:31 --> 00:02:32: shift it to the beginning.

00:02:32 --> 00:02:35: And I won't spend too much time on embodied carbon,

00:02:35 --> 00:02:39: but all the the carbon emissions associated with the development

00:02:39 --> 00:02:41: of a building or portfolio.

00:02:41 --> 00:02:45: So your transportation, your building materials, your construction sites.

00:02:45 --> 00:02:47: So this is what we consider our journey to net

00:02:47 --> 00:02:47: zero.

00:02:48 --> 00:02:52: Today's webinar is really focused on our recent report

00:02:52 --> 00:02:57: pumping up sustainability, myth busting heat pumps and commercial Real estate

00:02:57 --> 00:02:59: and we will drop in the chat a link to

00:02:59 --> 00:03:00: that report.

00:03:00 --> 00:03:03: I also have a link later on in the presentation.

00:03:04 --> 00:03:07: And right before I get into introducing our great panelists

00:03:07 --> 00:03:10: today, I wanted to let all the participants know that
00:03:10 --> 00:03:12: we do have the chat open for Q&A.
00:03:13 --> 00:03:16: There's not currently a separate Q&A box, but you're able
00:03:16 --> 00:03:20: to chat direct questions to panelists, but I think we
00:03:20 --> 00:03:23: would prefer you to chat those questions to everyone.
00:03:24 --> 00:03:26: And then at the end of the session, probably about
00:03:26 --> 00:03:29: 10 or 15 minutes to the hour, we will stop
00:03:29 --> 00:03:29: for Q&A.
00:03:29 --> 00:03:32: So you can add them during the conversation, we'll get
00:03:32 --> 00:03:34: to them at the end or you can wait to
00:03:34 --> 00:03:37: the end and we will address your comments in the
00:03:37 --> 00:03:37: Q&A section.
00:03:38 --> 00:03:42: So now I would love to introduce our fantastic group
00:03:42 --> 00:03:43: of panellists.
00:03:43 --> 00:03:45: Here you can wave and say hello.
00:03:45 --> 00:03:47: We are all spotlight to our webinar.
00:03:47 --> 00:03:53: Jonathan Arnold, Principal at Arnold Development, Laura
00:03:53 --> 00:03:58: Humphrey, Senior Director
00:03:58 --> 00:03:58: of Energy and Sustainability at L&M Development Partners
00:03:58 --> 00:04:02: and Stet
00:03:58 --> 00:04:02: Sanborn, VP Director of Climate Impact at Smith Group.
00:04:04 --> 00:04:07: And really quickly, I was going to ask one of
00:04:07 --> 00:04:12: our panelists to do a little, you know, quick explanation
00:04:12 --> 00:04:15: of what is a heat pump and how does it
00:04:15 --> 00:04:15: work.
00:04:15 --> 00:04:17: But let me tell you what I was afraid of
00:04:17 --> 00:04:20: that we'd get too deep into the technical side of
00:04:20 --> 00:04:20: heat pumps.
00:04:20 --> 00:04:23: And I was like, we'll hold that off a little
00:04:23 --> 00:04:25: bit until later in the conversation.
00:04:25 --> 00:04:27: So I just wanted to get a quick overview with
00:04:27 --> 00:04:30: this graphic and explain for folks on the call or
00:04:30 --> 00:04:33: folks on the webinar who don't know what a heat
00:04:33 --> 00:04:34: pump is.
00:04:34 --> 00:04:38: Heat pumps are a building system and it's able to
00:04:38 --> 00:04:40: both heat and cool spaces.
00:04:40 --> 00:04:45: Heat pumps offer electric low carbon alternatives to gas
00:04:45 --> 00:04:47: furnaces,
00:04:45 --> 00:04:47: boilers and air conditioning or AC units.
00:04:48 --> 00:04:50: So they act as an all in one heating and
00:04:50 --> 00:04:54: cooling mechanism that runs in both modes of operation.
00:04:54 --> 00:04:57: So when the weather is warm, air source heat pumps
00:04:57 --> 00:05:01: function as traditional air conditioning units, pumping heat out

of
00:05:01 --> 00:05:04: a building to circulate cold air inside a building.
00:05:04 --> 00:05:07: And when the weather is cold, they change the direction
00:05:07 --> 00:05:10: of the refrigerant flow, drawing heat from the outside into
00:05:10 --> 00:05:11: the building.
00:05:11 --> 00:05:14: So yes, there is heat outside even when the temperature
00:05:14 --> 00:05:16: is colder than colder outside than inside.
00:05:16 --> 00:05:19: Which is a little fun fact about air temperature and
00:05:19 --> 00:05:21: indoor air quality too.
00:05:21 --> 00:05:24: Ground source and water source heat pumps, which we'll be
00:05:24 --> 00:05:27: talking a little bit about today, operate the same way,
00:05:27 --> 00:05:30: but they transfer heat from the ground or the water
00:05:30 --> 00:05:32: regardless of the energy source.
00:05:32 --> 00:05:35: The process does use refrigerant and a compressor to move
00:05:35 --> 00:05:38: the heat from one location to the other.
00:05:38 --> 00:05:41: So that's sort of your real quick heat pumps one
00:05:41 --> 00:05:43: O 1 on what we're talking about here.
00:05:44 --> 00:05:48: But what we really want to focus today's conversation on
00:05:48 --> 00:05:51: is again, that report and in that report, we framed
00:05:52 --> 00:05:55: heat pumps as busting myths that you often hear about
00:05:55 --> 00:05:56: heat pumps.
00:05:56 --> 00:05:59: So heat pumps have been around for decades.
00:05:59 --> 00:06:02: Folks have used heat pumps in their building successfully.
00:06:02 --> 00:06:04: I mean all types of buildings.
00:06:04 --> 00:06:07: But there is there have been some myths about heat
00:06:07 --> 00:06:10: pumps that we chose to debunk or bust.
00:06:10 --> 00:06:14: This list here are all very detailed in the report.
00:06:14 --> 00:06:17: So #1 being that heat pumps are not cost effective,
00:06:18 --> 00:06:21: my utility bill will go up by switching to heat
00:06:21 --> 00:06:24: pumps #2 Heat pumps are not a viable option for
00:06:24 --> 00:06:26: properties in cold climates.
00:06:26 --> 00:06:30: Not true #3 Heat pumps are not commercially proven.
00:06:30 --> 00:06:33: They are too new #4 Heat pumps are only for
00:06:33 --> 00:06:37: single family homes or small commercial and don't work for
00:06:37 --> 00:06:40: mid rise, high rise or industrial properties.
00:06:40 --> 00:06:44: We're going to show a few examples today that bust
00:06:44 --> 00:06:48: that myth #5 Heat pumps can only be implemented in
00:06:48 --> 00:06:54: new construction, not in retrofits or renovations #6 Electric
heat
00:06:54 --> 00:06:57: pumps do not heat as well as gas systems #7
00:06:57 --> 00:07:00: that there is only one type of heat pump.
00:07:01 --> 00:07:03: And #8 heat pumps are just too loud and take

00:07:03 --> 00:07:06: up too much space to make them an effective choice.
00:07:06 --> 00:07:08: So those are all the myths that we bust in
00:07:08 --> 00:07:08: the report.
00:07:08 --> 00:07:11: And if you want more detail on them, please read
00:07:11 --> 00:07:11: the report.
00:07:11 --> 00:07:13: Let us know if you have any questions.
00:07:13 --> 00:07:16: But we're going to take a few of these myths
00:07:16 --> 00:07:19: and do a deep dive today with our guest panelists
00:07:19 --> 00:07:22: and talk about why this is not true and some
00:07:22 --> 00:07:25: success they've had with sharing some case studies and
examples.
00:07:26 --> 00:07:30: So we're not going to hop into every single myth,
00:07:30 --> 00:07:32: but the first one we are going to talk about
00:07:33 --> 00:07:33: is myth 1.
00:07:34 --> 00:07:37: Heat pumps are not cost effective and my utility bill
00:07:37 --> 00:07:39: will go up by switching to heat pumps.
00:07:40 --> 00:07:43: So Jonathan, let's let's bust that myth and tell us
00:07:43 --> 00:07:47: about some of the work you're doing at Arnold Development
00:07:47 --> 00:07:48: Group.
00:07:48 --> 00:07:48: Sure.
00:07:50 --> 00:07:50: Thank you, Karen.
00:07:52 --> 00:07:57: So the Arnold Development Group, we've been working on
reaching
00:07:57 --> 00:08:01: net zero for 22 years and we focus on transit
00:08:01 --> 00:08:06: oriented high performance buildings built now to the passive
House
00:08:06 --> 00:08:09: standard with the mixed income components.
00:08:10 --> 00:08:18: Next slide project that we finished in 2020 is 276
00:08:18 --> 00:08:24: units transit oriented in Kansas City.
00:08:25 --> 00:08:29: It went on to win the NAA National Apartment Association's
00:08:29 --> 00:08:31: award for the best new construction community.
00:08:32 --> 00:08:36: One of the things that this project did was embraced
00:08:36 --> 00:08:38: envelope efficiency first and foremost.
00:08:39 --> 00:08:42: And so we've really reduced our heating and cooling loads
00:08:42 --> 00:08:46: by following the Passive House standard, which is basically
super
00:08:47 --> 00:08:51: insulate your envelope, use great windows to eliminate
thermal bridges.
00:08:51 --> 00:08:54: And then by doing that, you you reduce the amount
00:08:54 --> 00:08:56: of heating and cooling you need to start with to
00:08:56 --> 00:08:57: be doing.
00:08:57 --> 00:08:59: So if you look at our roofs, you can kind
00:08:59 --> 00:09:01: of see the small boxes.

00:09:01 --> 00:09:03: Those are the heat pumps that are needed to heat
00:09:03 --> 00:09:04: the coolest building.
00:09:04 --> 00:09:06: And one of the things that that does it frees
00:09:06 --> 00:09:09: up a tremendous amount of roof space to do other
00:09:09 --> 00:09:09: things.
00:09:09 --> 00:09:11: You can see we've got rooftop gardens.
00:09:11 --> 00:09:14: We have about 55,000 square feet of outdoor space on
00:09:14 --> 00:09:18: the building, in part because we didn't need to fill
00:09:18 --> 00:09:22: up our roofs with too many air conditioning units.
00:09:22 --> 00:09:22: Next slide.
00:09:29 --> 00:09:33: So we are huge proponents of building buildings that last
00:09:34 --> 00:09:34: a long time.
00:09:34 --> 00:09:38: And so we really rail against this hyper focus on
00:09:38 --> 00:09:42: lowest first cost and really looking at the total building,
00:09:42 --> 00:09:44: how is it going to operate?
00:09:45 --> 00:09:47: And so we don't build out of stick.
00:09:47 --> 00:09:50: We we've seen too many, you know, water and, and
00:09:50 --> 00:09:51: mold issues happening.
00:09:51 --> 00:09:55: Instead, we we build a more resilient materials, mainly
00:09:55 --> 00:09:56: precast
00:09:55 --> 00:09:56: concrete panels.
00:09:57 --> 00:10:00: So instead of building really thin walls and large air
00:10:00 --> 00:10:03: conditioners and and heaters that run all the time, our
00:10:03 --> 00:10:04: walls are super thick.
00:10:04 --> 00:10:07: We have tiny little heaters that barely have to run.
00:10:07 --> 00:10:11: And so we've got tremendous energy savings in addition,
00:10:11 --> 00:10:16: because
00:10:11 --> 00:10:16: we're not building buildings that are combustible, our
00:10:16 --> 00:10:19: insurance premiums
00:10:16 --> 00:10:19: are half of what a stick built building is.
00:10:19 --> 00:10:22: And so by we, we figured out a way to
00:10:22 --> 00:10:25: capture both the energy savings and the insurance savings.
00:10:25 --> 00:10:28: And then we use ITC and and IRA, all of
00:10:29 --> 00:10:33: the incentives that are now in the Inflation Reduction Act
00:10:33 --> 00:10:36: to help finance these projects efficiently.
00:10:37 --> 00:10:38: Next slide.
00:10:43 --> 00:10:47: So just a little deeper dive comparing second of Delaware
00:10:47 --> 00:10:50: to a glass high rise building built at the same
00:10:50 --> 00:10:53: time the same climate, you can see that there's just
00:10:53 --> 00:10:57: an order of magnitude reduction that you can get by.
00:10:57 --> 00:10:59: First, just focusing on envelope.
00:11:00 --> 00:11:04: And we think that we really need to move away
00:11:04 --> 00:11:08: from glass boxes and more to energy efficient skins.

00:11:08 --> 00:11:09: Next slide.

00:11:12 --> 00:11:16: So diving into heat pumps, specifically when it comes to

00:11:16 --> 00:11:20: the ITC, one of the things that we recently discovered

00:11:21 --> 00:11:24: and we're super excited about is the fact that when

00:11:25 --> 00:11:29: you combine a geothermal system with a heat pump system,

00:11:29 --> 00:11:33: you can actually pick up investment tax credits.

00:11:33 --> 00:11:36: And those investment tax credits are normally, we think about

00:11:36 --> 00:11:39: those for solar, only, solar, rooftop solar.

00:11:39 --> 00:11:44: Now what's happened with the Inflation Reduction Act is if

00:11:44 --> 00:11:49: you combine a heat pump with a geothermal system, you

00:11:49 --> 00:11:53: can pick up easily up to 40% ITC tax credit.

00:11:53 --> 00:11:54: And so we've got two columns here.

00:11:54 --> 00:11:55: 1 is for market rate.

00:11:56 --> 00:12:00: This is for a high rise historic adaptive reuse in

00:12:00 --> 00:12:03: a in a kind of complex site.

00:12:03 --> 00:12:06: So the first cost is going to vary a lot

00:12:06 --> 00:12:08: based on your project.

00:12:09 --> 00:12:11: You might not have \$34,000 in first cost.

00:12:11 --> 00:12:14: I just picked a project we're working on.

00:12:14 --> 00:12:17: And so don't run to the hills when you're seeing

00:12:17 --> 00:12:18: that first cost.

00:12:18 --> 00:12:20: This is very expensive project.

00:12:20 --> 00:12:22: I picked kind of a difficult one, if you will.

00:12:23 --> 00:12:26: So if we take the market rate at \$34,000 and

00:12:26 --> 00:12:29: you take the investment tax credits, you have a base

00:12:30 --> 00:12:31: tax credit, 30%.

00:12:31 --> 00:12:33: If you buy things that are built in America, you

00:12:33 --> 00:12:35: can add 10% on to that.

00:12:35 --> 00:12:36: So that's 40%.

00:12:37 --> 00:12:40: And then the 45 L tax credit, I assumed that

00:12:40 --> 00:12:43: we're not doing prevailing wage.

00:12:43 --> 00:12:46: And so that's \$1000 tax credit that you get for

00:12:46 --> 00:12:47: the project.

00:12:49 --> 00:12:53: And then there's ADOE heat pump that is state by

00:12:53 --> 00:12:57: state rebate program that for most projects that kind of

00:12:57 --> 00:13:01: fall into that \$4000 range if you were doing A4

00:13:01 --> 00:13:03: bullet double S to 8000.

00:13:04 --> 00:13:07: So you can see where when you take all of

00:13:07 --> 00:13:10: these tax credits, you can drop that \$34,000 down to

00:13:10 --> 00:13:11: 15,000.

00:13:12 --> 00:13:14: On the low to moderate income side, you get additional

00:13:14 --> 00:13:17: tax credits in the form of low income housing tax
00:13:17 --> 00:13:17: credits.
00:13:17 --> 00:13:21: And one of the things that the Inflation Reduction Act
00:13:21 --> 00:13:23: did is it allowed you to use both of those
00:13:23 --> 00:13:26: tax credits and not have to choose one or the
00:13:26 --> 00:13:27: other.
00:13:27 --> 00:13:31: And so for a low to moderate income project, you
00:13:31 --> 00:13:35: can see the cost of your heat pump per unit
00:13:35 --> 00:13:36: is \$23.
00:13:36 --> 00:13:37: I mean, it's basically free.
00:13:37 --> 00:13:40: And so there's no reason why a low to moderate
00:13:41 --> 00:13:45: income project today with the tax credits that are available
00:13:45 --> 00:13:49: should not be doing geothermal plus heat pumps next.
00:13:50 --> 00:13:54: Just a quick note there, \$23, I mean that's busting
00:13:54 --> 00:13:56: the meth right out of anywhere.
00:13:56 --> 00:13:59: So I really appreciate you sharing Jonathan these these
00:13:59 --> 00:14:00: details
00:14:00 --> 00:14:01: and numbers.
00:14:01 --> 00:14:01: So thank you for that.
00:14:04 --> 00:14:06: So we're going to get into a couple more numbers.
00:14:06 --> 00:14:10: So stepping back out now at the building scale, we've
00:14:10 --> 00:14:15: compared conventional stick cost at \$223 a foot.
00:14:15 --> 00:14:18: Two of our passive has concrete cost of 252.
00:14:19 --> 00:14:22: So we're spending \$29.00 more per square foot.
00:14:22 --> 00:14:23: OK.
00:14:24 --> 00:14:27: But what we've also discovered is that most people, most
00:14:28 --> 00:14:31: people won't pay more to live in a green building.
00:14:31 --> 00:14:33: We've kind of made that as a baseline assumption, but
00:14:33 --> 00:14:35: they don't expect to pay less.
00:14:35 --> 00:14:38: So if someone comes into our leasing center and across
00:14:38 --> 00:14:41: the street there's a one bedroom for \$1500 and in
00:14:41 --> 00:14:45: our building we'll say we'll rent you that same \$1500
00:14:45 --> 00:14:48: unit, but across the street you're paying \$200 in utilities.
00:14:49 --> 00:14:53: Here you pay a \$1700 and we'll pay the utilities.
00:14:53 --> 00:14:55: It's the same cost.
00:14:55 --> 00:14:59: The tenant loves it because they have one fixed bill
00:14:59 --> 00:15:01: and, and it's consistent.
00:15:01 --> 00:15:03: Especially seniors and people that are on fixed income, they
00:15:03 --> 00:15:06: absolutely love this one bill they've got to pay.
00:15:06 --> 00:15:08: But our cost is only \$73.00.
00:15:08 --> 00:15:11: So we get if, if you look on the bottom
00:15:11 --> 00:15:16: kind of full horizontal table, we get \$124.00 a month

00:15:16 --> 00:15:21: in additional revenue because of this energy efficiency savings, which

00:15:22 --> 00:15:25: is \$14188 per year times 276 units is \$410,000.

00:15:25 --> 00:15:28: If you put a cap rate of 5 1/2 on

00:15:28 --> 00:15:32: that, you have \$7.5 million of added value to the

00:15:32 --> 00:15:37: building or \$23 a foot, which is it's almost that

00:15:37 --> 00:15:39: \$29.00 in additional value.

00:15:40 --> 00:15:42: If you go up to the upper right, you've got

00:15:42 --> 00:15:44: the energy savings.

00:15:44 --> 00:15:48: But then when you look at the insurance savings that

00:15:48 --> 00:15:52: if you build a resilient non combustible building, which is

00:15:52 --> 00:15:56: another \$215,000 and you cap all of those savings at

00:15:56 --> 00:15:59: 5 1/2 percent, you are not only making up for

00:15:59 --> 00:16:02: the \$29.00 and additional dollars.

00:16:02 --> 00:16:04: You know this money that we spent on this better

00:16:04 --> 00:16:06: building, but you are having more profit.

00:16:06 --> 00:16:09: So the at the bottom, the easy math is you

00:16:09 --> 00:16:14: spend \$29.00, you get \$44.00 more in value, giving you

00:16:14 --> 00:16:15: \$15.00 more in profit.

00:16:15 --> 00:16:18: And so we really think that this is the way

00:16:18 --> 00:16:20: that we need to be thinking about how we re

00:16:20 --> 00:16:24: urbanize the country and and build going forward because it

00:16:24 --> 00:16:27: just makes both financial sense and environmental sense.

00:16:28 --> 00:16:30: I think that might be the end of my slides.

00:16:32 --> 00:16:32: It is.

00:16:32 --> 00:16:33: Thank you, Jonathan.

00:16:33 --> 00:16:37: Before we move on to myth #2, Stat or Laura,

00:16:37 --> 00:16:42: any other comments or stories to share about the cost

00:16:42 --> 00:16:47: effectiveness of heat pumps, feel free to hop.

00:16:47 --> 00:16:49: On in yeah, I would just add that the the

00:16:49 --> 00:16:52: efficiency first piece is so key and in a lot

00:16:52 --> 00:16:57: of buildings that are bumping up against an electrical service

00:16:57 --> 00:16:58: constraint.

00:16:59 --> 00:17:01: So we hear another myth that you always have to

00:17:01 --> 00:17:03: replace your electrical switch gear if you're going to do

00:17:03 --> 00:17:05: either a retrofit or upsize it like crazy for new

00:17:06 --> 00:17:06: construction.

00:17:07 --> 00:17:10: That same passive house approach, making tiny heat pumps

00:17:10 --> 00:17:12: also,

00:17:10 --> 00:17:12: you can pull that thread all the way up through

00:17:12 --> 00:17:14: your electrical infrastructure.

00:17:14 --> 00:17:17: And that's a key strategy to reducing the size of

00:17:17 --> 00:17:19: the infrastructure needed to support your project.

00:17:20 --> 00:17:22: And for folks that are bumping up against those limits

00:17:23 --> 00:17:25: on switch gear, Transformers or a feed from a utility

00:17:25 --> 00:17:28: that they're saying, oh, we can't get you power efficiency

00:17:28 --> 00:17:31: first really helps push down that peak connected load.

00:17:31 --> 00:17:33: And you might be able to avoid any of those

00:17:33 --> 00:17:34: upsizing to begin with.

00:17:34 --> 00:17:36: So it's, it's a triple win.

00:17:36 --> 00:17:39: It's tiny heat pumps, left refrigerant, but also less electrical

00:17:39 --> 00:17:42: infrastructure and less upstream things that we don't think of

00:17:42 --> 00:17:43: as our fault.

00:17:43 --> 00:17:45: You know, some big power plant needs to happen or

00:17:46 --> 00:17:47: a big growth in solar somewhere.

00:17:48 --> 00:17:49: Efficiency first.

00:17:49 --> 00:17:51: That thread is just a beautiful thread the further you

00:17:51 --> 00:17:52: pull it.

00:17:54 --> 00:17:55: Fantastic, Laura, any thoughts?

00:17:57 --> 00:18:00: Yeah, I agree with all the points made and thank

00:18:00 --> 00:18:02: you for walking us through that amazing project.

00:18:02 --> 00:18:05: And I think the only other thing to add is

00:18:05 --> 00:18:09: also consider what the alternatives would be.

00:18:09 --> 00:18:12: And a lot of times the alternatives are more expensive

00:18:12 --> 00:18:12: to operate.

00:18:12 --> 00:18:15: So if you are not on a natural or gas

00:18:15 --> 00:18:18: system or that would cost a lot to bring to

00:18:18 --> 00:18:22: your property, what are the other alternatives?

00:18:22 --> 00:18:24: Like on the East Coast, we have a lot of

00:18:24 --> 00:18:28: oil buildings and almost always it's an incredible payback to

00:18:28 --> 00:18:28: to electrify.

00:18:29 --> 00:18:31: Likewise around the country, we have a lot of buildings

00:18:31 --> 00:18:34: that have electric systems that are pretty much as as

00:18:34 --> 00:18:37: inefficient as they could be just because of that's what

00:18:37 --> 00:18:38: the technology is.

00:18:38 --> 00:18:41: And so another way to think about heat pumps just

00:18:41 --> 00:18:44: to simplify it is like it's a very energy efficient

00:18:44 --> 00:18:48: electric resistance, you know, alternative to electric

00:18:48 --> 00:18:50: resistance.

00:18:48 --> 00:18:50: It's just a really improved version of that.

00:18:50 --> 00:18:53: It's a really efficient way to do air conditioning.

00:18:53 --> 00:18:56: So if you're in a really cooling load dominated part

00:18:56 --> 00:18:59: of the country, you know, you can really simplify it

00:18:59 --> 00:19:01: like that and really just think about these heat pumps

00:19:01 --> 00:19:05: as an efficiency measure and putting aside even the electrification

00:19:05 --> 00:19:05: pieces.

00:19:07 --> 00:19:08: Fantastic.

00:19:08 --> 00:19:08: I love that.

00:19:08 --> 00:19:11: And that really speaks to, again, that efficiency thread, you

00:19:11 --> 00:19:11: know, talking about.

00:19:11 --> 00:19:14: That's your first step, making sure all your systems and

00:19:14 --> 00:19:16: your building itself is as efficient as possible.

00:19:17 --> 00:19:20: OK, let's move on to Myth 2.

00:19:20 --> 00:19:25: Heat pumps are not a viable option for properties in

00:19:25 --> 00:19:26: cold climates.

00:19:27 --> 00:19:29: So stat, I know you have some examples to share

00:19:29 --> 00:19:30: about this myth.

00:19:31 --> 00:19:31: Yeah.

00:19:31 --> 00:19:35: So I'd be happy to talk through through a bunch

00:19:35 --> 00:19:36: of options.

00:19:36 --> 00:19:39: So I think one of the myths that's overlaying a

00:19:39 --> 00:19:42: lot of these is that there's only one heat pump

00:19:42 --> 00:19:45: option, like it's either something or a heat pump.

00:19:45 --> 00:19:48: And the reality is there's 20 heat pump options.

00:19:48 --> 00:19:49: Like you can find a heat pump, they can do

00:19:49 --> 00:19:50: all sorts of things.

00:19:51 --> 00:19:53: So I wanted to go through and this is a

00:19:53 --> 00:19:56: little bit of an intersection between hard to retrofit and

00:19:56 --> 00:19:59: cold climates, the angst, but the market is changing really

00:19:59 --> 00:19:59: quickly.

00:20:00 --> 00:20:03: I would say in the last five years, we went

00:20:03 --> 00:20:06: from very almost no options in the retrofit market to

00:20:06 --> 00:20:08: now a whole host of them.

00:20:08 --> 00:20:12: And so when we see typical rooftop package units, which

00:20:12 --> 00:20:15: I'd say are most found in low rise, maybe two

00:20:15 --> 00:20:18: to four story buildings like commercial.

00:20:19 --> 00:20:21: It's a commodity product and it is as cheap as

00:20:21 --> 00:20:22: you can go.

00:20:23 --> 00:20:24: It used to be that you couldn't find a heat

00:20:24 --> 00:20:25: pump replacement for that.

00:20:26 --> 00:20:29: Not only can you now find them where it's either

00:20:29 --> 00:20:31: an all in one rooftop unit or VRF Plus do.

00:20:31 --> 00:20:34: As you know, VRF has been in the market forever.

00:20:34 --> 00:20:36: Turns out VRF has a heat pump.

00:20:36 --> 00:20:38: It uses a lot more refrigerant, but it's a heat

00:20:38 --> 00:20:38: pump.

00:20:39 --> 00:20:41: And so those options are totally on the market.

00:20:42 --> 00:20:45: The RTU or rooftop package unit, like the image in

00:20:45 --> 00:20:48: the middle upper part, those are coming on the market

00:20:48 --> 00:20:51: really quickly right now, even within the last year and

00:20:51 --> 00:20:51: a half.

00:20:52 --> 00:20:56: And there's an amazing challenge that DOE is leading right

00:20:56 --> 00:21:00: now to actually drive high efficiency cold climate retrofit RTU's

00:21:00 --> 00:21:01: into the market.

00:21:01 --> 00:21:03: And so my guess is by the middle of next

00:21:03 --> 00:21:06: year or the year after, you're going to see at

00:21:06 --> 00:21:10: least six more major manufacturers rolling out entire families of

00:21:10 --> 00:21:13: rooftop cold climate replacement heat pumps.

00:21:13 --> 00:21:15: And so the myth of, Oh my gosh, it's cold,

00:21:15 --> 00:21:17: we can't make things hot.

00:21:17 --> 00:21:21: Is is going to go out the window next?

00:21:22 --> 00:21:25: Can I just jump in there that that similarly to

00:21:26 --> 00:21:31: the RTU's, there's similar efforts happening in New York State

00:21:31 --> 00:21:34: and we think other places to do that for in

00:21:35 --> 00:21:36: unit heat pumps.

00:21:36 --> 00:21:39: So think about through the wall air conditioner.

00:21:39 --> 00:21:42: There's a lot of push, you know, especially being led

00:21:42 --> 00:21:45: by the New York City Housing Authority to find those

00:21:45 --> 00:21:48: kind of commodity products for heat pumps and they're already

00:21:48 --> 00:21:49: being implemented.

00:21:49 --> 00:21:52: So I agree, in the next one to two years

00:21:52 --> 00:21:55: there's going to be lots of other options.

00:22:01 --> 00:22:03: And then one of the things that I just wanted

00:22:03 --> 00:22:06: to highlight for when we look at cold climate is

00:22:06 --> 00:22:10: that it's also an opportunity, you know, Jonathan mentioned geothermal

00:22:10 --> 00:22:12: systems, which is essentially a heat pump that's using a

00:22:13 --> 00:22:15: more stable source than, you know, cold outside air using

00:22:15 --> 00:22:16: the ground.

00:22:17 --> 00:22:19: Cold climate also asks you to look for other unconventional

00:22:19 --> 00:22:21: places that you can steal heat from.

00:22:21 --> 00:22:25: So if you're in the multi family market or small

00:22:25 --> 00:22:29: commercial, like a like small commercial more on the education

00:22:29 --> 00:22:32: side, maybe like a gym or a rec center that

00:22:32 --> 00:22:34: has a lot of shower usage.

00:22:34 --> 00:22:37: Wastewater is a tremendous place to steal heat from.

00:22:37 --> 00:22:40: So in multifamily projects with all the shower usage, that's

00:22:41 --> 00:22:43: the biggest demand for heating is domestic hot water.

00:22:43 --> 00:22:45: It can be upwards of 40% of your load.

00:22:46 --> 00:22:49: There are systems now, there are sanitary water heat exchange

00:22:49 --> 00:22:51: systems or Swede systems.

00:22:51 --> 00:22:54: They literally are a heat pump that's connected to the

00:22:54 --> 00:22:55: wastewater line of your building.

00:22:56 --> 00:22:58: And so all that beautiful warm shower water that's leaving

00:22:58 --> 00:23:00: your building, it steals the heat right out of it,

00:23:00 --> 00:23:03: concentrates it and gives it back to you in domestic

00:23:03 --> 00:23:03: hot water.

00:23:04 --> 00:23:07: These systems in cold climates can be twice as efficient

00:23:07 --> 00:23:08: as an air source heat pump.

00:23:08 --> 00:23:11: So when you look at operational costs, it's super stable

00:23:11 --> 00:23:14: across the entire year because your waste from the shower

00:23:14 --> 00:23:16: is almost the same temperature year round.

00:23:17 --> 00:23:19: It gives you really consistent operating cost, very tiny heat

00:23:19 --> 00:23:22: pump because you're pulling heat from something that's

00:23:23 --> 00:23:24: already warm.

00:23:23 --> 00:23:24: So the heat pump doesn't have to be that big.

00:23:25 --> 00:23:29: So if you're space constrained, cost constrained, or utility

00:23:29 --> 00:23:32: cost constrained, a wastewater heat pump is an amazing source

00:23:32 --> 00:23:34: to especially in multifamily buildings.

00:23:35 --> 00:23:37: But it's like ideal in cold climates.

00:23:37 --> 00:23:40: If if I were doing anything north of Saint Louis,

00:23:40 --> 00:23:43: I'd say this is my go to system in multifamily

00:23:43 --> 00:23:44: for domestic hot water.

00:23:48 --> 00:23:49: Fantastic.

00:23:49 --> 00:23:51: I think we have a couple more slides, but I

00:23:51 --> 00:23:52: can move on set.

00:23:52 --> 00:23:53: Do you want to talk about these here or?

00:23:53 --> 00:23:56: Yeah, and and Jonathan touched on it a little bit,

00:23:56 --> 00:24:00: but another cold climate option that is getting a ton

00:24:00 --> 00:24:03: of attention now that you know, I was doing 20

00:24:03 --> 00:24:06: years ago in my own parents house is geothermal.

00:24:06 --> 00:24:09: And for cold climates, geothermal cannot be beat from a

00:24:09 --> 00:24:10: performance standpoint.

00:24:11 --> 00:24:14: Now with the investment tax credits supporting it from the

00:24:14 --> 00:24:16: cost first cost standpoint, it's kind of a no brainer
00:24:16 --> 00:24:19: if you have the footprint, if you have the space,
00:24:19 --> 00:24:20: more challenging in retrofits.
00:24:21 --> 00:24:23: But there are a bunch of companies now that are
00:24:23 --> 00:24:26: doing retrofit geothermal with directional bores.
00:24:27 --> 00:24:30: So in your dense urban areas, even underneath buildings
with
00:24:30 --> 00:24:34: very small parking garage depths, they're actually able to do
00:24:34 --> 00:24:36: below grade drilling operations.
00:24:37 --> 00:24:40: In the example on the screen here, there's actually a
00:24:40 --> 00:24:42: hospital that we're doing in a very cold climate that's
00:24:42 --> 00:24:43: going full geothermal.
00:24:44 --> 00:24:47: So even complex buildings, these are on the table and
00:24:47 --> 00:24:50: the scale of these are getting much, much larger.
00:24:50 --> 00:24:53: So it's not just your your house, you know, with
00:24:53 --> 00:24:54: a couple three ton bores.
00:24:54 --> 00:24:57: But now we're going up and we're seeing systems as
00:24:57 --> 00:25:01: large as you know, 1000 tons, 5000 tons, full campuses.
00:25:02 --> 00:25:04: So really great technology and cold climate.
00:25:04 --> 00:25:06: And it gives you better performance in the summer as
00:25:06 --> 00:25:07: well for cooling.
00:25:07 --> 00:25:10: Because if you're in a mixed climate that gets really
00:25:10 --> 00:25:13: hot during the the summer months, the ground is a
00:25:13 --> 00:25:15: more stable source to dump heat into as well.
00:25:15 --> 00:25:17: And so geothermal gives you a a Big Bang for
00:25:17 --> 00:25:20: the buck both in summertime and winter time.
00:25:22 --> 00:25:25: That's, that's a great segue that goes into our myth
00:25:26 --> 00:25:26: #4 here.
00:25:26 --> 00:25:29: So your example of a hospital setting this myth is
00:25:29 --> 00:25:33: heat pumps are only for single family or small commercial
00:25:33 --> 00:25:36: and don't work for mid rise, high rise or industrial
00:25:36 --> 00:25:37: properties.
00:25:37 --> 00:25:39: I mean, instead you just gave an example of a
00:25:39 --> 00:25:42: hospital building that is disproving this myth.
00:25:42 --> 00:25:46: Laura, you have some examples to share about Myth 4.
00:25:46 --> 00:25:47: Please please share.
00:25:49 --> 00:25:52: Sure and this is building on a lot of examples
00:25:52 --> 00:25:54: already shared both sets and Jonathan's.
00:25:55 --> 00:25:59: But L&M, you know, our favorite not, not that we
00:25:59 --> 00:26:03: can pick our favorite heat pumps like favorite children, but
00:26:03 --> 00:26:07: if we did it would be geothermal, don't tell air
00:26:07 --> 00:26:08: source.

00:26:08 --> 00:26:12: And, and, and as a result, especially on new construction,
00:26:12 --> 00:26:16: but even on retrofit, it's, it's our first, it's the
00:26:16 --> 00:26:18: place we look to 1st.
00:26:18 --> 00:26:21: Of course there's geology and especially where we develop
mainly
00:26:21 --> 00:26:24: in New York City, there's all sorts of things underground
00:26:24 --> 00:26:26: like subways that can make it not feasible.
00:26:27 --> 00:26:31: But but that aside, we're really leaning on this technology
00:26:31 --> 00:26:35: because of its efficiency and its ability also to generate
00:26:35 --> 00:26:39: hot water very efficiently within the with utilizing the same
00:26:39 --> 00:26:40: wells.
00:26:41 --> 00:26:44: So this is just one example of a community scale
00:26:44 --> 00:26:47: development that we're working on, which is in East New
00:26:47 --> 00:26:51: York and it's a redevelopment of an old hospital site.
00:26:52 --> 00:26:56: There's some details about about this on the on the
00:26:56 --> 00:26:58: side, but it's a 28 acre site.
00:26:59 --> 00:27:03: It will have about over 2,000,000 square feet, mainly for
00:27:03 --> 00:27:08: housing, over 2400 units of affordable and supportive
housing as
00:27:08 --> 00:27:12: well as re reinstating the the healthcare clinics that had
00:27:13 --> 00:27:16: been there before in a new and improved space.
00:27:16 --> 00:27:19: And all of these buildings will be on their own
00:27:19 --> 00:27:22: geothermal system and will address all of the thermal loads
00:27:22 --> 00:27:24: including domestic hot water.
00:27:25 --> 00:27:27: So this This Is Us thinking big.
00:27:27 --> 00:27:32: We have another community scale development in Queens
that is
00:27:32 --> 00:27:37: 32 acres similar in terms of the commercial and affordable
00:27:37 --> 00:27:39: housing footprint.
00:27:39 --> 00:27:42: And there we're using a district geocouple system.
00:27:43 --> 00:27:47: So you know that that's a technology that we really,
00:27:47 --> 00:27:51: we obviously really like and we think it really scales
00:27:51 --> 00:27:51: very well.
00:27:51 --> 00:27:53: But certainly the same could be true.
00:27:53 --> 00:27:56: But air source if we'll see some examples of those
00:27:56 --> 00:27:56: later.
00:27:59 --> 00:28:00: Fantastic.
00:28:02 --> 00:28:04: I have a couple of your slides in here if
00:28:04 --> 00:28:05: you want to address this.
00:28:05 --> 00:28:06: With Jonathan.
00:28:06 --> 00:28:06: Any comments?
00:28:07 --> 00:28:07: Yeah.
00:28:07 --> 00:28:09: And this is kind of as you step into those

00:28:09 --> 00:28:11: larger scale systems, you know, we I've heard a lot
00:28:11 --> 00:28:13: of like, oh, we don't have heat pumps that are
00:28:13 --> 00:28:15: big for commercial buildings.
00:28:15 --> 00:28:19: As somebody that mostly does large scale commercial
buildings, I
00:28:19 --> 00:28:21: can tell you that's not true that now we can
00:28:21 --> 00:28:24: get heat pumps that scale up quite a bit.
00:28:24 --> 00:28:28: So we have heat pumps that are typically modular and
00:28:28 --> 00:28:30: going up to 1000 tons.
00:28:30 --> 00:28:32: You know, that's kind of the point which you start
00:28:32 --> 00:28:35: to switch over to heat recovery chillers and larger large
00:28:35 --> 00:28:36: scale district systems.
00:28:37 --> 00:28:39: But we have heat pumps now that are doing courthouses.
00:28:39 --> 00:28:41: We have ones that are doing large commercial buildings.
00:28:41 --> 00:28:44: We're doing, you know, large schools.
00:28:44 --> 00:28:47: So I haven't done a project with natural gas on
00:28:47 --> 00:28:50: it in probably 15 years and all the products that
00:28:50 --> 00:28:52: I have available to me can hit that spot.
00:28:53 --> 00:28:55: So I'd say the market, if you, if you think
00:28:55 --> 00:28:59: there isn't a heat pump for that, I'd, I'd encourage
00:28:59 --> 00:29:02: you to go to the HRI, you know, trade show,
00:29:02 --> 00:29:03: walk the floor.
00:29:03 --> 00:29:04: It is all heat pumps.
00:29:04 --> 00:29:07: It is heat pumps, floor, ceiling, wall to wall.
00:29:07 --> 00:29:09: You know, you'll take five days to walk through and
00:29:09 --> 00:29:10: see all the heat pumps.
00:29:11 --> 00:29:14: So the market is going is definitely pumping up with
00:29:14 --> 00:29:16: heat pumps, so to speak.
00:29:16 --> 00:29:19: But the scale issue I think is, is moot.
00:29:19 --> 00:29:23: We can even see small modular heat pumps now that
00:29:23 --> 00:29:24: are 170 ton modules.
00:29:24 --> 00:29:26: So the scale.
00:29:26 --> 00:29:29: The scale is there to match almost anything you're trying
00:29:29 --> 00:29:29: to do.
00:29:31 --> 00:29:36: Jonathan, any comments on the heat pumps are only for
00:29:36 --> 00:29:38: single family small commercial?
00:29:40 --> 00:29:43: Or just to reiterate that it's not been our experience.
00:29:43 --> 00:29:46: I mean the project that I mentioned was that I
00:29:46 --> 00:29:49: showed was 330,000 square feet of conditioned space.
00:29:50 --> 00:29:53: We're now working on one with 650,000 square feet of
00:29:54 --> 00:29:57: space in one building, all heat pump geothermal driven.
00:29:58 --> 00:30:01: And the nice thing about the geothermal system is that

00:30:01 --> 00:30:04: it's a 2 pipe system as opposed to A4 pipe
00:30:04 --> 00:30:08: system, so that you're you have less complexity, less less
00:30:08 --> 00:30:11: pipe to maintain, and your first cost is lower.
00:30:13 --> 00:30:16: And does that type of system help in a retrofit
00:30:16 --> 00:30:17: situation as well?
00:30:17 --> 00:30:19: I mean, that is our our next myth that we're
00:30:19 --> 00:30:22: coming up here, which is heat pumps can only be
00:30:22 --> 00:30:25: implemented in new construction, not in retrofits.
00:30:26 --> 00:30:28: And I know, Jonathan, you have some examples of that
00:30:28 --> 00:30:30: that you've already shared a little bit, but maybe you
00:30:30 --> 00:30:32: could dig a little bit deeper into this piece.
00:30:33 --> 00:30:33: Sure.
00:30:33 --> 00:30:38: About half of our work is historic adaptive reuse and
00:30:38 --> 00:30:43: on our last two projects that are retrofits, we've used
00:30:43 --> 00:30:48: solar heat pumps both, both in combination with geothermal.
00:30:50 --> 00:30:52: Any sort of retrofit is going to be dependent on
00:30:52 --> 00:30:56: chase availability and and there are going to be some
00:30:56 --> 00:30:57: limiting factors.
00:30:57 --> 00:31:01: But the myth it's just says you know, this completely
00:31:01 --> 00:31:02: cannot work is just false.
00:31:03 --> 00:31:04: We do it all the time.
00:31:06 --> 00:31:07: Laura Orstet.
00:31:13 --> 00:31:14: You're on mute step.
00:31:15 --> 00:31:17: I just echo all of that.
00:31:17 --> 00:31:22: We're doing retrofits in entire campuses, building stand
alone.
00:31:23 --> 00:31:26: It's I don't know the the game, the name of
00:31:26 --> 00:31:28: the game is there's a heat pump for that.
00:31:30 --> 00:31:31: You can you can do it.
00:31:32 --> 00:31:34: I love that there's there's a heat pump for that.
00:31:34 --> 00:31:35: Fantastic.
00:31:37 --> 00:31:40: OK, so the the last myth that we're going to
00:31:40 --> 00:31:43: cover really in depth before we get into some final
00:31:43 --> 00:31:46: thoughts and some Q&A from the panelists is myth #7
00:31:46 --> 00:31:49: there is only one type of heat pump, which set
00:31:49 --> 00:31:52: you just busted before we even got to it, that
00:31:52 --> 00:31:54: there's a heat pump for that.
00:31:55 --> 00:31:57: So let's talk about that a little bit more that,
00:31:57 --> 00:31:59: you know, there's what you know, heat pumps.
00:31:59 --> 00:32:01: There's not just one type.
00:32:01 --> 00:32:05: There's multiple types of heat pumps for multiple types of
00:32:05 --> 00:32:05: situations.

00:32:05 --> 00:32:07: And Laura, I know you have a couple examples able
00:32:07 --> 00:32:08: to share as well.
00:32:10 --> 00:32:12: Yeah, I mean, you know, none of this is news
00:32:12 --> 00:32:15: for everyone who's been here so far, but this is
00:32:15 --> 00:32:18: just a couple of snapshots of three of the developments
00:32:18 --> 00:32:19: that we've built.
00:32:20 --> 00:32:24: I think the oldest one is Beach Green 2, which
00:32:24 --> 00:32:28: TCO D in 2019, which is a geothermal system.
00:32:28 --> 00:32:31: Marcus Garvey extension, which is the one kind of along
00:32:31 --> 00:32:33: the bottom is also geothermal.
00:32:33 --> 00:32:34: That's phase one.
00:32:34 --> 00:32:37: Phase 2 is being built now also be geothermal.
00:32:37 --> 00:32:42: And then we also have Sendero Verde, which is the
00:32:42 --> 00:32:46: building on the right, which uses the RF system.
00:32:46 --> 00:32:50: And this is, I'll try to get the credential right.
00:32:50 --> 00:32:55: It is the largest all electric passive house multi family
00:32:55 --> 00:32:58: building in North America or or in the US I think
00:32:58 --> 00:33:02: Vancouver like beat us like sort of recently.
00:33:02 --> 00:33:04: So we kind of represent them, but in the US.
00:33:05 --> 00:33:09: So certainly lots of options that and we're having success
00:33:09 --> 00:33:11: at at all of these sites.
00:33:12 --> 00:33:14: And just to if you want to go to the
00:33:14 --> 00:33:18: next slide to talk about retrofit, this is I thought
00:33:18 --> 00:33:20: this is kind of an interesting one to share.
00:33:21 --> 00:33:25: Most of the times when we retrofit we have residents
00:33:25 --> 00:33:28: in place, we almost never are doing.
00:33:28 --> 00:33:32: I wish we could do adaptive reuse or work on
00:33:32 --> 00:33:33: vacant buildings.
00:33:33 --> 00:33:37: We haven't had that opportunity quite yet, but this is
00:33:37 --> 00:33:40: a great example of a building where we were taking
00:33:40 --> 00:33:43: an old, we're taking an old steam system.
00:33:43 --> 00:33:49: We're replacing it completely with in unit air source heat
00:33:49 --> 00:33:49: pumps.
00:33:49 --> 00:33:53: So we call those package terminal heat pumps or PTHPS.
00:33:54 --> 00:33:58: And you'll seeing in this picture is kind of cool
00:33:58 --> 00:34:01: because you can see that we did EFIS, which is
00:34:01 --> 00:34:04: exterior insulative cladding on the outside.
00:34:04 --> 00:34:06: So you can see on the left the old brick
00:34:06 --> 00:34:09: and on the right with the building will look like
00:34:09 --> 00:34:10: with the insulation.
00:34:10 --> 00:34:12: So that efficiency first.
00:34:13 --> 00:34:15: And you can also see in that picture the louvers

00:34:16 --> 00:34:19: on the outside of that building and that's where the
00:34:19 --> 00:34:22: package terminal heat pumps are getting the outdoor air to
00:34:22 --> 00:34:24: do the heat exchange with.
00:34:25 --> 00:34:27: And this is all done with residents in place the
00:34:27 --> 00:34:28: entire time.
00:34:28 --> 00:34:30: No one was vacated from their units.
00:34:31 --> 00:34:33: I can't say it was always easy or pretty, but
00:34:33 --> 00:34:36: we did it when we're and we're currently doing it.
00:34:36 --> 00:34:39: So we're really pushing the envelope on what's possible in
00:34:39 --> 00:34:41: lots of different situations.
00:34:41 --> 00:34:44: And as I noted, for folks who are interested in
00:34:44 --> 00:34:48: this type of application, definitely look at the program called
00:34:48 --> 00:34:51: Cleaning for All that the New York City Housing Authority
00:34:52 --> 00:34:52: is doing.
00:34:53 --> 00:34:56: Because they're really trying to use their buying power as
00:34:57 --> 00:35:00: the largest public Housing Authority in the country to get
00:35:00 --> 00:35:04: manufacturers to create products that are easier to apply in
00:35:04 --> 00:35:06: these types of situations.
00:35:06 --> 00:35:09: And again, you know, they're out in the market right
00:35:09 --> 00:35:09: now.
00:35:09 --> 00:35:11: They're being tested and used.
00:35:11 --> 00:35:13: So there's there's a lot that's going to change with
00:35:13 --> 00:35:15: this package trouble heat pump market.
00:35:19 --> 00:35:21: Great, fantastic.
00:35:21 --> 00:35:23: So we we busted a bunch of myths.
00:35:23 --> 00:35:26: We have some more in the report before we go
00:35:27 --> 00:35:30: to the audience Q and AI have a few questions
00:35:30 --> 00:35:33: for you all based on our conversation here.
00:35:33 --> 00:35:37: So it was interesting to hear on one side that
00:35:37 --> 00:35:40: there isn't just one type of heat pump, but then
00:35:40 --> 00:35:44: there's also seems to be a little bit of favoritism
00:35:44 --> 00:35:47: on what works best in certain situations.
00:35:47 --> 00:35:51: So I'd like to hear from the three of you,
00:35:51 --> 00:35:55: what is your favorite heat pump or project or success?
00:35:55 --> 00:35:57: And if you can't pick a favorite child, I, I
00:35:57 --> 00:35:59: want you to just try for us today.
00:35:59 --> 00:36:01: Like where, where, where did you, you know, implement heat
00:36:01 --> 00:36:03: pump technology in a project?
00:36:03 --> 00:36:05: And you said, wow, you know, a plus.
00:36:06 --> 00:36:08: This is this is the project I want to share.
00:36:09 --> 00:36:10: Jonathan, do you want to start?
00:36:13 --> 00:36:15: I think the the, the most, the project I'm most

00:36:15 --> 00:36:18: excited about if we're going to use this analogy is
00:36:18 --> 00:36:19: in utero.
00:36:19 --> 00:36:23: It's it's a project that we're under we're about to
00:36:24 --> 00:36:28: start construction on and it is going to be geothermal
00:36:28 --> 00:36:33: more than likely to district level 2 pipe system going
00:36:33 --> 00:36:37: into a very simple heat pump system in each unit.
00:36:37 --> 00:36:41: And the reason why I'm picking that is because if
00:36:41 --> 00:36:45: you stick with a a standard heat pump as opposed
00:36:45 --> 00:36:49: to a VRF, they typically are non proprietary so that
00:36:49 --> 00:36:52: you can get anyone to work on them.
00:36:53 --> 00:36:57: And it's the VRF systems in our experience.
00:36:57 --> 00:37:00: Reason why that's not my favorite is it's sort of
00:37:00 --> 00:37:01: like your car.
00:37:01 --> 00:37:03: You used to be able to work on your own
00:37:03 --> 00:37:03: car.
00:37:03 --> 00:37:05: You used to be able to, you know, get in
00:37:05 --> 00:37:06: the carburetor and clean it.
00:37:06 --> 00:37:10: And now there's some computer that you don't have access
00:37:10 --> 00:37:12: to and you have to bring it to one dealer.
00:37:12 --> 00:37:17: And there could be a little bit of monopolistic tendencies
00:37:17 --> 00:37:19: that, that show up.
00:37:19 --> 00:37:22: So we like tried and true heat pumps, just standard
00:37:22 --> 00:37:26: hook them up to a water source, super efficient because
00:37:26 --> 00:37:28: we're in very hot and cold climate.
00:37:30 --> 00:37:32: And so that, that's, that would be our pick.
00:37:33 --> 00:37:36: And oh, and you get, you get the, all the
00:37:36 --> 00:37:37: ITC tax credits on it.
00:37:37 --> 00:37:40: And if you don't, if you do that, then you're
00:37:40 --> 00:37:42: leaving a lot of money on the table.
00:37:43 --> 00:37:44: Thank you for that reminder.
00:37:44 --> 00:37:47: And I, I like your, your, your favorite being sort
00:37:47 --> 00:37:50: of the tried and true easiest method so that you
00:37:50 --> 00:37:52: know, more folks can get on board.
00:37:52 --> 00:37:55: So that's really important when we're, we're talking about
00:37:55 --> 00:37:58: technology
00:37:58 --> 00:37:59: that, you know, we're, we're clearly busting myths for a
00:37:59 --> 00:38:03: reason.
00:38:03 --> 00:38:05: And the education piece is really important step.
00:38:03 --> 00:38:05: Who is your favorite heat pump?
00:38:06 --> 00:38:09: Oh man, I mean, I, I don't know if I
00:38:09 --> 00:38:10: could name a favorite.
00:38:10 --> 00:38:13: I have favorite for all the applications.

00:38:13 --> 00:38:17: I mean, definitely wastewater heat pumps are my, for me,
00:38:17 --> 00:38:19: the gold standard for a multifamily.
00:38:20 --> 00:38:23: I did a project years ago in Boulder, Co.
00:38:24 --> 00:38:28: So cold climate, you know, high elevation cold climate, air
00:38:28 --> 00:38:31: source heat pumps can struggle, but that wastewater heat
pump
00:38:31 --> 00:38:34: is just, you know, steady, really cheap hot water for
00:38:34 --> 00:38:35: showers.
00:38:36 --> 00:38:38: But I'll say on the other far end of the
00:38:38 --> 00:38:42: spectrum, we have two projects on the Eastern seaboard that
00:38:42 --> 00:38:45: are each over 1,000,000 square feet that we are doing
00:38:46 --> 00:38:49: retrofits on high temperature water systems and buildings.
00:38:50 --> 00:38:53: And so that market right now is kind of the
00:38:53 --> 00:38:56: Holy Grail for CO2 heat pumps and that's next class
00:38:56 --> 00:38:59: of CO2 heat pumps that are a little bit more
00:38:59 --> 00:39:03: flexible on the temperatures that they work at, but they
00:39:03 --> 00:39:07: they can become drop in replacements in that 170?? supply
00:39:07 --> 00:39:08: water world.
00:39:09 --> 00:39:12: So it's just really opening up options for the tough
00:39:12 --> 00:39:13: to retrofit market.
00:39:13 --> 00:39:16: So I'm super excited to see the growth in that
00:39:16 --> 00:39:20: market because yeah, the city is those are the building,
00:39:20 --> 00:39:23: the dense urban cities and cold climates.
00:39:23 --> 00:39:25: These are the places that are quote hard and the
00:39:25 --> 00:39:27: products are coming on the market now that that are
00:39:27 --> 00:39:28: letting us do that.
00:39:29 --> 00:39:29: Fantastic.
00:39:30 --> 00:39:31: And Laura, what about you?
00:39:31 --> 00:39:33: What is your your favorite system or favorite heat pump?
00:39:35 --> 00:39:35: Yeah.
00:39:35 --> 00:39:37: So again, hard to pick.
00:39:37 --> 00:39:41: We're really enthusiastic about geothermal for all the reasons
that
00:39:41 --> 00:39:42: were said earlier.
00:39:43 --> 00:39:46: But just to build on set, what might be my
00:39:46 --> 00:39:49: favorite one in a year or two is the high
00:39:49 --> 00:39:55: temperature, the innovations that are happening around
circulating high temperature
00:39:55 --> 00:39:56: of water.
00:39:56 --> 00:39:59: And that's a lot in part because of things that
00:39:59 --> 00:40:03: Jonathan was saying, which is that we all understand
hydronic
00:40:03 --> 00:40:06: lines, we all understand fan coil units.

00:40:06 --> 00:40:09: There's all these kind of basic kind of commodity parts
00:40:10 --> 00:40:12: that we can leverage if we just change.
00:40:12 --> 00:40:14: What's in the boiler room or what's on the roof?
00:40:15 --> 00:40:17: And so I'm really excited about that.
00:40:17 --> 00:40:20: Also, that allows us to reduce your refrigerant use
dramatically
00:40:20 --> 00:40:24: compared to running refrigerant lines through the building,
which is
00:40:24 --> 00:40:27: of critical importance because if a refrigerant leak could undo
00:40:27 --> 00:40:30: any environmental benefit you might have made by putting in
00:40:30 --> 00:40:33: the heat pumps, it's really important to monitor those.
00:40:34 --> 00:40:37: The more packaged and I'm isolated those refrigerants are or
00:40:37 --> 00:40:39: alternative refrigerants are used, the better.
00:40:41 --> 00:40:42: So we're really looking at that.
00:40:42 --> 00:40:45: And also, you know, in urban areas where we have
00:40:45 --> 00:40:49: a lot of grid constraint, having a centralized unit that
00:40:50 --> 00:40:54: we can control, potentially attach additional tanks to, to, to
00:40:54 --> 00:40:58: do thermal storage and kind of protect ourselves from
electric,
00:40:59 --> 00:41:01: electric cost peaks and things like that.
00:41:02 --> 00:41:03: I think they're all really promising.
00:41:03 --> 00:41:07: It's new days, but I'm excited for that technology.
00:41:08 --> 00:41:08: Thank you.
00:41:08 --> 00:41:10: And I think it's great that all of your answers
00:41:11 --> 00:41:13: really speak to the diversity and applicability of heat pumps
00:41:13 --> 00:41:15: to so many different projects.
00:41:15 --> 00:41:17: So there's a lot of favourites that we mentioned and
00:41:17 --> 00:41:20: a lot of different applications with a lot of different
00:41:20 --> 00:41:20: systems.
00:41:21 --> 00:41:24: And that really speaks to the intention of this report
00:41:24 --> 00:41:27: is to educate and share success stories so that folks
00:41:27 --> 00:41:30: that are not comfortable or or still feel these myths
00:41:30 --> 00:41:33: are are valid, can start to get comfortable with heat
00:41:33 --> 00:41:36: pump technology and start to implement it on a wider
00:41:36 --> 00:41:37: scale.
00:41:37 --> 00:41:42: So with that, this is our deep dive into myth
00:41:42 --> 00:41:44: busting heat pumps.
00:41:45 --> 00:41:46: The QR code will take you to the report.
00:41:46 --> 00:41:48: We also dropped it in the chat.
00:41:48 --> 00:41:50: So please take a read.
00:41:50 --> 00:41:52: We are going to take some Q&A right now.
00:41:52 --> 00:41:54: The Q&A has been blowing up.
00:41:54 --> 00:41:55: There's tons of questions there.

00:41:55 --> 00:41:59: So I'm hopeful that we'll get through most of them.

00:41:59 --> 00:42:01: We have about 15 minutes left, so I will go

00:42:01 --> 00:42:04: through them and then step Jonathan and Laura.

00:42:04 --> 00:42:07: Feel free to jump in and answer the question if

00:42:07 --> 00:42:07: you can.

00:42:08 --> 00:42:11: So the first one is from Carrie Tan.

00:42:11 --> 00:42:15: She agrees on the cost efficiency and payback and wants

00:42:15 --> 00:42:19: to know if anyone has insights on where the HVAC

00:42:19 --> 00:42:23: industry is on driving down the upfront purchase cost as

00:42:23 --> 00:42:28: the technology improves and there is more competition and

00:42:28 --> 00:42:28: or

00:42:28 --> 00:42:28: demand.

00:42:28 --> 00:42:33: And her question is specific to commercial office buildings on

00:42:33 --> 00:42:36: the West Coast, existing building stock.

00:42:39 --> 00:42:41: Well, I can jump in because I'm on the West

00:42:41 --> 00:42:42: Coast, so go West Coast, West Coast.

00:42:43 --> 00:42:46: But I will say that we're we are actually seeing

00:42:46 --> 00:42:47: prices stabilize.

00:42:47 --> 00:42:50: I'd say coming out of the pandemic just supply chain

00:42:50 --> 00:42:54: limits were causing all sorts of crazy pricing on HVAC

00:42:54 --> 00:42:57: equipment across the board and MEP equipment in general.

00:42:58 --> 00:43:00: But we're seeing prices on heat pump stabilize.

00:43:01 --> 00:43:02: They are.

00:43:02 --> 00:43:05: The heat pump market is new in terms of a

00:43:05 --> 00:43:08: commodity product for large commercial buildings.

00:43:08 --> 00:43:12: So the residential side I'd say it's a commodity product.

00:43:12 --> 00:43:13: It is out there, you can get a dime a

00:43:13 --> 00:43:14: dozen.

00:43:14 --> 00:43:18: The commercial sector for doing larger scale heat pumps I'd

00:43:18 --> 00:43:21: say is in probably year 2 of kind of that

00:43:21 --> 00:43:25: cost curve coming down and getting more to

00:43:27 --> 00:43:29: commoditization.

00:43:27 --> 00:43:29: I will say that five years ago when I was

00:43:29 --> 00:43:32: walking the show floor for HVAC equipment, you know, there

00:43:32 --> 00:43:35: was probably maybe 3 vendors that had heat pumps out

00:43:35 --> 00:43:38: and they were the, the names that you're very used

00:43:38 --> 00:43:38: to seeing.

00:43:39 --> 00:43:41: Last year when I walked the floor, every vendor, even

00:43:41 --> 00:43:44: vendors who have never made a heat pump in their

00:43:44 --> 00:43:46: life, they were bringing heat pumps to the market.

00:43:46 --> 00:43:49: So old gas boiler companies where they've made making gas

00:43:49 --> 00:43:53: boilers for 120 years, they were bringing heat pumps to

00:43:53 --> 00:43:54: the market.

00:43:54 --> 00:43:56: And so that rapid scale up of vendors that are

00:43:56 --> 00:43:59: playing the space, I think it's going to do 2

00:43:59 --> 00:44:00: things.

00:44:00 --> 00:44:02: It's going to help with the supply chain of getting

00:44:02 --> 00:44:05: more suppliers into the market, doing the small bits and

00:44:05 --> 00:44:08: pieces, but also that competition piece.

00:44:08 --> 00:44:10: When you have more than three people that you get

00:44:10 --> 00:44:11: to go talk to, prices are going to come down.

00:44:13 --> 00:44:15: Thank you, Stet, that's great.

00:44:15 --> 00:44:19: Our next question really refers back to myth #2 that

00:44:19 --> 00:44:23: heat pumps are not viable for properties in cold climates.

00:44:23 --> 00:44:27: David Marsh wants to know how do you define said

00:44:27 --> 00:44:30: cold climate and says that where where he is, they

00:44:30 --> 00:44:33: have -30??C temperature events in the winter.

00:44:34 --> 00:44:37: And one myth that he's heard of is that heat

00:44:37 --> 00:44:40: pumps do not work well beyond -20??C.

00:44:40 --> 00:44:42: And can someone speak to that?

00:44:45 --> 00:44:45: I'll jump in.

00:44:45 --> 00:44:49: I know Laura's got experience doing retrofits and cold

00:44:49 --> 00:44:54: climates.

00:44:49 --> 00:44:54: There are, there are classes of heat pumps that trip

00:44:54 --> 00:44:57: out at you know, 20??C so or -20 Celsius, so

00:44:57 --> 00:44:59: you know, 5??F.

00:45:00 --> 00:45:03: But the and so it's depend on which heat pump

00:45:03 --> 00:45:03: you pick.

00:45:04 --> 00:45:07: So there are heat pumps that are classified as cold

00:45:07 --> 00:45:08: climate heat pumps.

00:45:09 --> 00:45:12: Those ones are typically going to include inverter driven

00:45:12 --> 00:45:14: compressors

00:45:12 --> 00:45:14: and what we call enhanced vapor injection.

00:45:14 --> 00:45:17: So those are two technologies that live inside the heat

00:45:17 --> 00:45:20: pump that actually give it an extended range as outside

00:45:20 --> 00:45:21: temperatures go down.

00:45:22 --> 00:45:24: And so those those are in terms of being widespread

00:45:24 --> 00:45:27: in the market are really within the last three to

00:45:27 --> 00:45:27: four years.

00:45:28 --> 00:45:30: A lot of the legacy information that you have are

00:45:30 --> 00:45:33: based on sort of the last generation constant speed

00:45:33 --> 00:45:36: compressor

00:45:33 --> 00:45:36: heat pumps that just couldn't, doesn't really work down there.

00:45:36 --> 00:45:39: Now capacity and efficiency does drop with outside air temp

00:45:39 --> 00:45:40: when you have an air source heat pump.

00:45:41 --> 00:45:42: So I'm not going to try to tell you that
00:45:42 --> 00:45:43: that doesn't occur, but it does.
00:45:44 --> 00:45:46: But the new class of heat pumps have a much
00:45:46 --> 00:45:49: wider operational window as you go South, especially within
the
00:45:49 --> 00:45:50: last three years.
00:45:52 --> 00:45:52: Great.
00:45:52 --> 00:45:53: Thank you.
00:45:53 --> 00:45:56: Laura, any thoughts there on on very cold climates, I
00:45:56 --> 00:45:57: guess we could say?
00:45:58 --> 00:45:58: Yeah.
00:45:58 --> 00:46:00: I mean, you know, I'll just point out that, you
00:46:01 --> 00:46:03: know, I think nationally that Maine is actually like per
00:46:03 --> 00:46:06: capita the highest adopter of heat pumps in a residential
00:46:06 --> 00:46:08: setting than anywhere else.
00:46:09 --> 00:46:10: So it's too cool for me up there.
00:46:10 --> 00:46:13: But I think maybe it's somewhere that climate sound that
00:46:13 --> 00:46:14: you're talking about.
00:46:14 --> 00:46:17: And similarly, I think also Montreal and and Quebec have
00:46:17 --> 00:46:20: like very, very high rates of adoption, in part because
00:46:21 --> 00:46:23: they have a lot of electricity generation up there.
00:46:23 --> 00:46:26: So, so I think, yeah, just building on sets, you
00:46:26 --> 00:46:29: can see people doing this and, and building it.
00:46:30 --> 00:46:32: That being said, I think there's a lot of interesting
00:46:32 --> 00:46:35: things to think about around hybrid electrification.
00:46:35 --> 00:46:38: I don't know if anyone's totally cracked the code on
00:46:38 --> 00:46:41: this, but at least in New York City, you know,
00:46:41 --> 00:46:44: our, our climate is changing before our eyes like everyone's
00:46:44 --> 00:46:45: is.
00:46:46 --> 00:46:51: So maybe it's not exactly the same climate that the
00:46:51 --> 00:46:56: that the questioner had, but has, but we're seeing that,
00:46:56 --> 00:47:00: you know, our, our heating degree days that are lower
00:47:00 --> 00:47:04: than 20?? are in a condensed part of the year.
00:47:05 --> 00:47:09: And so we're actually considering as an industry and as
00:47:09 --> 00:47:12: as a kind of a city where we could apply
00:47:12 --> 00:47:15: less costly heat pumps that don't go down quite so
00:47:15 --> 00:47:19: much and then just use an ancillary system for, you
00:47:19 --> 00:47:22: know, the 30 days out of the year where we
00:47:22 --> 00:47:23: have to.
00:47:23 --> 00:47:27: And then that would also help with demand response
potentially
00:47:27 --> 00:47:27: as well.
00:47:28 --> 00:47:30: So I don't know if we've all cracked the code

00:47:30 --> 00:47:33: here in New York City, but it's definitely something that
00:47:33 --> 00:47:36: we're looking at and that can help with upfront costs.
00:47:38 --> 00:47:40: Yeah, Kara, I had, I can't remember if I shared
00:47:40 --> 00:47:42: a slide, but I had one that had this crazy
00:47:42 --> 00:47:43: graph on it.
00:47:43 --> 00:47:47: And the idea was to show that sometimes the heat
00:47:47 --> 00:47:51: pump isn't actually a a heater, it's changing out your
00:47:51 --> 00:47:52: air conditioner.
00:47:54 --> 00:47:56: No, I think the next one that had like a
00:47:56 --> 00:47:56: bunch of colors.
00:47:59 --> 00:47:59: You passed it.
00:48:00 --> 00:48:00: I passed it.
00:48:03 --> 00:48:05: I've been, I think, oh, there it is, there it
00:48:05 --> 00:48:05: is.
00:48:05 --> 00:48:08: So this is an example of a mixed climate zone
00:48:08 --> 00:48:11: and we always think about air conditioning and heating as
00:48:11 --> 00:48:12: these separate things.
00:48:12 --> 00:48:15: But when you get to buildings of scale, heat recovery
00:48:15 --> 00:48:18: chillers are a heat pump and your waste heat that
00:48:18 --> 00:48:21: normally you dump through a cooling tower can actually
offset
00:48:22 --> 00:48:23: your heating load.
00:48:23 --> 00:48:26: And so sometimes the retrofit is actually not adding a
00:48:26 --> 00:48:29: heating system heat pump, it's actually changing your cooling
system
00:48:29 --> 00:48:30: to a heat pump.
00:48:31 --> 00:48:33: And so in a lot of buildings that are dense,
00:48:33 --> 00:48:36: dense commercial office buildings, they may not need that
much
00:48:36 --> 00:48:39: supplemental heat because there's so much heat that's
generated in
00:48:40 --> 00:48:43: the building from computers, laptops, IT equipment, AI, you
know,
00:48:43 --> 00:48:46: data racks that waste heat actually can be recaptured and
00:48:46 --> 00:48:48: used to heat the building on the facade or the
00:48:48 --> 00:48:49: perimeter zone.
00:48:49 --> 00:48:52: So sometimes it's changing your mindset that you can
actually
00:48:52 --> 00:48:55: offset, you know, upwards of 30% of your heating load
00:48:55 --> 00:48:58: actually by just changing out your cooling chiller to something
00:48:58 --> 00:49:00: that can recapture that heat.
00:49:01 --> 00:49:03: So all the yellow zone here on this graph is
00:49:03 --> 00:49:06: actually showing where waste heat from the cooling system

can
00:49:06 --> 00:49:07: offset your heating system.
00:49:08 --> 00:49:10: So even in the dead of winter, you can reduce
00:49:10 --> 00:49:12: your heating demand by say 20 or 30% just from
00:49:13 --> 00:49:15: your own waste heat, which means maybe you keep your
00:49:15 --> 00:49:18: boiler in place because it's just there to help with
00:49:18 --> 00:49:21: some peaks and let the waste heat offset, you know,
00:49:21 --> 00:49:23: the emissions from 80% or so of your, of your
00:49:23 --> 00:49:24: heating.
00:49:24 --> 00:49:26: So it's not always about adding the heat pump.
00:49:26 --> 00:49:29: Sometimes it's actually about switching out an AC unit into
00:49:29 --> 00:49:31: a heat pump that can do heat recovery.
00:49:33 --> 00:49:34: Fantastic.
00:49:34 --> 00:49:36: The new question, the next question is going to speak
00:49:36 --> 00:49:37: to refrigerants.
00:49:37 --> 00:49:40: I know that there's been some chatter in the chat
00:49:40 --> 00:49:42: about this, but I wanted the whole group to hear
00:49:42 --> 00:49:46: Erin Swain's question about new refrigerants and design
implications of
00:49:46 --> 00:49:47: new refrigerants.
00:49:47 --> 00:49:50: Specifically, will CO2 be an option for a multi family
00:49:50 --> 00:49:51: system?
00:49:55 --> 00:49:57: Laura, I know you mentioned something in the chat, but
00:49:57 --> 00:49:59: if you wanted to elaborate for the rest of the
00:49:59 --> 00:49:59: group.
00:50:00 --> 00:50:02: I could, but I'm going to throw it to stat
00:50:03 --> 00:50:04: because I know that CO2 refrigerant.
00:50:06 --> 00:50:06: Yeah.
00:50:06 --> 00:50:09: So the refrigerants were in the middle of a transition.
00:50:09 --> 00:50:11: If you haven't run into this, you're going to.
00:50:11 --> 00:50:15: So we were all operating in 410-A134B refrigerants.
00:50:16 --> 00:50:19: We're slowly in this coming year transitioning to the next
00:50:19 --> 00:50:23: classification of what we call low global warming potential
refrigerants.
00:50:23 --> 00:50:26: So those are coming into the market, but the question
00:50:26 --> 00:50:28: directly of like where is it going?
00:50:28 --> 00:50:30: We are trying to move the entire industry to natural
00:50:30 --> 00:50:31: refrigerants.
00:50:31 --> 00:50:34: That is the goal, ultra low GWP refrigerants that are
00:50:34 --> 00:50:37: PFAS free, which is a very persistent chemical that can
00:50:37 --> 00:50:38: impact our bodies.
00:50:39 --> 00:50:40: And so that's the drive.

00:50:41 --> 00:50:43: You know, it takes time to transition entire industry in
00:50:44 --> 00:50:46: that direction, but you're going to see as codes and
00:50:46 --> 00:50:49: standards get updated, you're going to see more mono block
00:50:49 --> 00:50:51: heat pumps that can run on propane as a heat
00:50:52 --> 00:50:53: pump or as a refrigerant.
00:50:53 --> 00:50:55: Very low global warming potential.
00:50:55 --> 00:50:56: It is flammable.
00:50:56 --> 00:50:59: So it's not for every application, but you're going to
00:50:59 --> 00:51:02: see more options in the market for ultra low GWP
00:51:02 --> 00:51:03: refrigerants.
00:51:03 --> 00:51:07: CO2 is, I would say, largely going to be isolated
00:51:07 --> 00:51:10: to domestic hot water and very high temperature systems.
00:51:11 --> 00:51:13: It's like you're not going to be pumping CO2 around
00:51:14 --> 00:51:17: a building a ton, but in mono block equipment, absolutely.
00:51:17 --> 00:51:18: It's a great refrigerant.
00:51:22 --> 00:51:23: Fantastic.
00:51:23 --> 00:51:23: Thank you, Stet.
00:51:24 --> 00:51:27: A quick note that someone iPhone two said that he
00:51:27 --> 00:51:28: pumps for the wind.
00:51:28 --> 00:51:30: So that is a great pumping question.
00:51:32 --> 00:51:37: Let's see, there is another good question in here that
00:51:37 --> 00:51:42: hold on one second that talks about precast concrete was
00:51:43 --> 00:51:46: mentioned versus stick built buildings.
00:51:46 --> 00:51:48: Concrete has gotten a bad rap due to its high
00:51:48 --> 00:51:50: carbon emissions content.
00:51:50 --> 00:51:54: Is green concrete or low carbon concrete?
00:51:54 --> 00:51:58: Is there green concrete or low carbon concrete there for
00:51:58 --> 00:52:00: use in precast panels instead?
00:52:00 --> 00:52:03: And from what I know, yes, we have a whole
00:52:03 --> 00:52:06: study on embodied carbon and low carbon concrete.
00:52:06 --> 00:52:09: So there are certainly options out there in the market.
00:52:09 --> 00:52:10: I don't know if any of the three of you
00:52:10 --> 00:52:14: have experience with utilizing low carbon concrete in your
00:52:14 --> 00:52:16: projects
00:52:14 --> 00:52:16: as well and if you can speak to that question.
00:52:19 --> 00:52:23: So our understanding that you can specify certain types of
00:52:23 --> 00:52:29: aggregate and replacements for like our high, intense, high
00:52:29 --> 00:52:33: carbon,
00:52:29 --> 00:52:33: intense materials like Portland cement with fly ash to reduce
00:52:33 --> 00:52:38: the carbon footprint of concrete by at least 50% without
00:52:38 --> 00:52:41: really adding cost to the to the the concrete.
00:52:41 --> 00:52:44: So it's really about the specification.
00:52:44 --> 00:52:46: You can cut that by 50%.

00:52:46 --> 00:52:50: And then there was another question there about how do
00:52:50 --> 00:52:53: we get the cost of concrete construction to only be
00:52:53 --> 00:52:55: thirteen percent higher.
00:52:55 --> 00:52:57: One of the things that we do is we eliminate
00:52:57 --> 00:53:00: a lot of materials when you are using concrete.
00:53:00 --> 00:53:02: So we have no flooring, Most of our ceilings are
00:53:02 --> 00:53:03: just exposed concrete.
00:53:04 --> 00:53:06: Our exterior walls are exposed concrete.
00:53:06 --> 00:53:08: Our exterior is just a very simple finish on that
00:53:08 --> 00:53:09: precast.
00:53:09 --> 00:53:13: So when you are comparing the cost of one versus
00:53:13 --> 00:53:15: the other, look for the deducts.
00:53:16 --> 00:53:18: There's a lot of things to in a lot of
00:53:18 --> 00:53:21: materials that do a lot of off gasoline that also
00:53:21 --> 00:53:24: have really high carbon intensity that you can eliminate.
00:53:25 --> 00:53:28: And then you have maintenance savings as well because
00:53:28 --> 00:53:32: you
00:53:28 --> 00:53:32: know you're not ripping out carpet and they're pretty durable
00:53:32 --> 00:53:33: and resilient for maintenance.
00:53:35 --> 00:53:36: Thanks, Jonathan.
00:53:36 --> 00:53:38: And then there's a question that's a bit of a
00:53:38 --> 00:53:41: follow up, not directly, but Esther Bobbin asks, when you're
00:53:41 --> 00:53:44: deciding what type of heat pumps to implement in your
00:53:44 --> 00:53:47: construction design, is the potential GHG impact
00:53:47 --> 00:53:49: improvement part of
00:53:47 --> 00:53:49: the decision making process?
00:53:49 --> 00:53:52: When you compare models or brands of heat pumps, do
00:53:52 --> 00:53:55: you use any tools to model that or compare heat
00:53:55 --> 00:53:55: pump solutions?
00:53:56 --> 00:54:00: And I think this goes back to an integrated design
00:54:00 --> 00:54:00: process.
00:54:00 --> 00:54:03: So looking at the design at the very beginning and
00:54:03 --> 00:54:07: figuring out what makes sense for your region and your
00:54:07 --> 00:54:09: climate zone and your particular building.
00:54:09 --> 00:54:12: But curious to hear if any of you all have
00:54:12 --> 00:54:16: any particular tools or applications that help you make these
00:54:16 --> 00:54:17: decisions.
00:54:20 --> 00:54:22: I mean, you know, if you're comparing heat pump models,
00:54:22 --> 00:54:24: like we'll look at like a, you can put in
00:54:24 --> 00:54:27: different things into whatever energy model you're using, like
00:54:27 --> 00:54:29: a
00:54:27 --> 00:54:29: treat model or whatever it is and compare.

00:54:30 --> 00:54:33: I don't know, like I've never really seen a project
00:54:33 --> 00:54:35: change a lot once you decide what type of heat
00:54:35 --> 00:54:36: pump you're doing.
00:54:38 --> 00:54:42: But I will note that another factor to think about
00:54:42 --> 00:54:44: is who's going to use it.
00:54:46 --> 00:54:49: You know, like a lot of current heat pumps on
00:54:49 --> 00:54:53: the market require like in the multifamily setting require a
00:54:53 --> 00:54:56: relatively sensitive and expensive piece of equipment to be in
00:54:56 --> 00:54:57: an apartment unit.
00:54:58 --> 00:55:01: So I think it's thinking of thinking also through like
00:55:01 --> 00:55:02: how is The Who is the user?
00:55:02 --> 00:55:03: Is this a senior building?
00:55:03 --> 00:55:04: Is it supportive housing?
00:55:04 --> 00:55:05: Is it market rate?
00:55:05 --> 00:55:06: Like what is it?
00:55:06 --> 00:55:08: What are their expectations?
00:55:08 --> 00:55:09: Where can you put the thing?
00:55:10 --> 00:55:11: What's the maintenance like?
00:55:11 --> 00:55:14: All of those things seem like day seven questions, but
00:55:14 --> 00:55:17: they actually really need to be day one questions because
00:55:17 --> 00:55:20: the whole parts of the system is going to change
00:55:20 --> 00:55:22: a lot if you install it in a way such
00:55:22 --> 00:55:25: that the filters can't be cleaned or that it's really
00:55:25 --> 00:55:27: hard to clean filters like things like that, or if
00:55:27 --> 00:55:30: it's senior housing and you have this really crazy control
00:55:30 --> 00:55:33: panel, you know, things like that need to be thought
00:55:33 --> 00:55:34: through.
00:55:34 --> 00:55:36: And I think that can have more impact on the
00:55:36 --> 00:55:39: eventual efficiency of the design than anything else.
00:55:41 --> 00:55:43: Thank you, Laura, and thank you for bringing up the
00:55:43 --> 00:55:47: the maintenance aspect too, because there was another
question in
00:55:47 --> 00:55:49: the chat focused on that asking for someone to speak
00:55:49 --> 00:55:52: to the maintenance aspects of heat pumps and the cleaning
00:55:52 --> 00:55:53: schedules.
00:55:53 --> 00:55:57: And this is something that could be considered another myth
00:55:57 --> 00:56:01: as this this person heard that heat pumps are susceptible
00:56:02 --> 00:56:04: to mold if filters aren't cleaned monthly.
00:56:05 --> 00:56:07: So this could be something we add on as an
00:56:07 --> 00:56:08: addendum.
00:56:08 --> 00:56:10: Have any of you heard of that or had that
00:56:10 --> 00:56:11: issue on your projects?

00:56:15 --> 00:56:17: I would say that if you're running into a mold
00:56:17 --> 00:56:20: problem on your project, it's likely not because of the
00:56:20 --> 00:56:23: heat pump, it's likely because you have a moisture control
00:56:23 --> 00:56:25: issue which often comes from oversized equipment.
00:56:26 --> 00:56:29: If your if your air conditioner or heat pump is
00:56:29 --> 00:56:32: too big for the space that it's in it it's
00:56:32 --> 00:56:33: short cycles.
00:56:34 --> 00:56:36: So I'm talking to the hot humid folks out there.
00:56:36 --> 00:56:39: Short cycling equipment doesn't run long enough to help
dehumidify
00:56:40 --> 00:56:40: the air.
00:56:40 --> 00:56:42: Like it'll cool the space down really quickly, but it
00:56:42 --> 00:56:45: won't pull the moisture out, so that's likely the root
00:56:45 --> 00:56:45: cause.
00:56:45 --> 00:56:47: It's independent of whether you have a heat pump or
00:56:47 --> 00:56:48: air conditioner.
00:56:50 --> 00:56:51: Great, fantastic.
00:56:51 --> 00:56:54: We are one minute to the hour, so I'm going
00:56:54 --> 00:56:56: to stop the share so we can see each other
00:56:56 --> 00:56:57: and I can.
00:56:57 --> 00:57:00: Thank you Stet, Laura and Jonathan.
00:57:00 --> 00:57:02: We appreciate your time today and the rest of the
00:57:02 --> 00:57:05: ULI team and the folks that have joined us to
00:57:05 --> 00:57:08: learn more about myth busting heat pumps.
00:57:08 --> 00:57:10: Please read the report and let us know if you
00:57:10 --> 00:57:11: have any questions.
00:57:11 --> 00:57:16: This recording will be available as well as the questions
00:57:16 --> 00:57:18: and recorded answers.
00:57:18 --> 00:57:19: Everyone have a great Friday.
00:57:20 --> 00:57:20: Thank you all.

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