**Andy Cockburn:** NAIMA Canada is a nonprofit association representing mineral fiber manufacturers in Canada and North America. Our primary mandate is the promotion of energy conservation, energy security, and housing affordability with the optimized use of mineral fiber insulation.

And we also touch on the periphery of things that are in that same that same category. Really, building envelope is what we're very much in. Today Gary and I are opening the conversation about how we are going to build our way to net zero. How are we gonna get there? The construction and renovation industry have been tasked with meeting lofty targets.

All new construction is set to be net zero by around the early 2030s while the energy performance of existing buildings is going to be part of future iterations of national code, and we'll talk a bit about that. The umbrella theme for today's session is translating on how those targets are going to work in tactile elements.

We'll talk about our top priorities and concerns for retrofits, how we're gonna conserve energy, reduce emissions, and increase the overall comfort and long-term health of coccupants. We'll touch on how some buildings will be challenging in our quest to reach net zero. And finally, we'll have a look at some examples of projects that have attained high performance through energy retrofits.

**Gary Sharp:** Something you may hear talked about from time to time are these buildings that are known as energy pigs. And I, think, you know, most of you will recognize them around the country as you, as you drive about. These range from anything from, you know, a hundred year old farm houses and and homes that have not been upgraded.

They have mechanical systems that are substandard or at least out of date at this stage. Those are the ones that are gonna be first on the list to try and get fixed up. So the other thing that you'll see from time to time is houses will be divided up, or buildings will be divided up into pre 1980 buildings and those buildings that are built post 1980.

The reason for that is because in Canada we have approximately 14 million houses on the ground. Half of those houses are pre 1980 and the other half are post 1980. So of course these pre 1980 houses, some of considerations for them is that they have little or no insulation in the basement in general. They have little insulation in the walls. The air tightness is poor. Some of the older buildings I've seen air tightness on houses that I've tested up to 15 air changes per hour. As I mentioned, the mechanical systems may be low in terms of efficiency, somewhere around 50 to 60%.

And they may be fired with electric baseboard heaters and, and that type of thing. So where do we want to go with these? We want to be able to take these things to net zero ready. So we know from the work that has been going on with the Canadian Home Builders Association they started a program in 2017 where builders were invited to build homes voluntarily to meet the Net Zero or net zero Ready standard.

Some of the things that we are seeing there is R 37, for example, in the basement walls, R 10, under the basement floors, R 35 to R 40. In above grade walls are 60 plus in the ceilings and triple and quadruple glaze windows and air tightness of less than 1.5. Many of the builders are trying to get air tightness down to 0.5 if they can aid with the with the performance of the house. The other thing that we're moving towards is getting rid of fossil fuel burning appliances and specifically furnaces, so oil furnaces and natural gas furnaces. The way we're doing that is by making the house so energy efficient that solar energy can be used to provide the power for that house. Alternatively, if the house is grid connected, we're looking for grid electricity that is non greenhouse gas producing. So electrical energy that is coming from hydroelectric nuclear or coming from wind turbines or solar. And this is back over to you, Andy.

**Andy Cockburn:** Yeah. And we're, we're looking at what buildings are going to give us for the most bang for our buck. This is kind of one of those pieces that we're going to look at today. Where is funding going to come from, and most importantly, how do we bridge that gap between government mandates and boots on the ground, translating it so that the people that are actually executing the work are able to do so with confidence.

Looking at those, like Gary mentioned, the building's older than 1980. Those ones are gonna have the most impact. Looking at also buildings, like multi-units. Those two, three-story, four-story buildings that might have anywhere from six to 24 apartments in them that are relatively Boxy and may have elements that we could correct and make them more energy efficient.

Small to medium commercial as well. The small stores and buildings like you see on this street scape. This is in a, a town in Central Ontario, and these are the kinds of buildings that we might be looking at and saying, okay, how do we make these buildings more efficient in terms of impact? Community housing is one of the the types of housing that will have the most impact for occupants just because there will be more sensitivities and more health benefits in the long run for these people, but also, it's going to be easier to operate and easier to maintain these buildings.

And that, that says a lot when it comes to having community buildings. And then lastly, we're looking at. The ones that are easiest to actually make energy efficient are the ones that are relatively boxy cookie cutter shapes. And I'm thinking specifically here of post-war housing that came out just after World War ii.

Those were some of the first factory-built houses that ever came onto the market. And those ones are pretty much all the same size we can get away with, applying some industry-wide strategies to tackle those kind of buildings. Where's the funding gonna come from? We have federal funding that's in place right now called the Greener Homes Initiative, or the Greener Homes grant through the government.

And it needs help in that we need to understand it better. We need to make sure that these funding resources that are coming from government are plug and play so that they can actually be easily accessed, easily used. Some provinces across Canada also have programs that they are offering out to either utilities or to homeowners, to building owners and as well as municipals.

There are some cities around Canada that are offering incentives, and some are quite quite large, that you can access and you can stack a lot of these grants and loans so that you might be able to actually afford to do the entire energy retrofit on an existing building all at once. Or some places you might have to phase it.

It's a program called PACE Financing, and PACE is an acronym that stands for Pro Property Assessed Clean Energy. And what this is in a nutshell is a funding mechanism through a municipality where the municipality is actually acting as the, the body that would provide the funding. And then the payback comes out of the property tax base.

So the building itself would have this fee being paid off. It wouldn't be tied to the owners. It would be tied to the building and to the property taxes of the building. And that's happening in some cities in Nova Scotia. I know is is leading the charge on this thing, but so is gta and there are other places in Canada as well that are trying pace financing.

And I'm gonna let Gary tell you a little bit about what private financing might look like.

**Gary Sharp:** Sure on the private financing. There has been some activity on this in the past. I'm not familiar with anything that's happening right now, but it was happening a lot on small commercial and industrial type of projects.

So where someone was a high energy user a private firm, typically an engineering firm or someone involved in the energy sector, would go in and do a complete energy analysis of the building. They would then decide what made economic sense to do from a cost cost benefit analysis.

And then they would make the offer to the company involved to upgrade their facilities and they would take credit for the energy. So the company that was using the energy, instead of paying money to the utility, they would be paying money to the company that did the energy upgrade. So that could include adding insulation to the building.

Adding solar collectors to the building replacing mechanical systems with more modern mechanical systems. So the, the company would have an overall savings in energy, but it may be 20% of their energy cost. They may save, but the other part the other 80% would be paid to the company that was doing the investment in the energy saving feature.

**Andy Cockburn:** Gary puts a really good point on what this system is like there's complexities involved. Accessing these grants and rebates and incentives, unfortunately, it can be a bit of a complicated mess, especially when we start stacking things and getting into private funding and getting into figuring out where the money is going to be coming from.

Offered through energy providers or through government. We need to have rebate Wranglers, rebate and incentive Wranglers, who could help homeowners and contractors and communities as they navigate the retrofit process. Like I was saying, making it as plug and play as possible so that when a contractor is tasked with a job that they really only are speaking to one person or one particular resource who can take care of all the details.

Bringing builders and renovators into this process is critical to the execution of the energy retrofits at scale as well. And Gary and I were just talking yesterday about how energy advisors who would maybe traditionally have that role of finding out these incentives, they also have their hands full as well.

And there are a few energy advisors who are now employing specifically designated people who are really good with the paperwork to help them out so that they can stay in their lanes, so to speak. For a little while, there's going to probably a lot of handholding that needs to happen and having everything lined up, working smoothly in lockstep with a retrofit schedule is going to need some new talent with well home Last wing techniques.

The other part of it is training. We're going to need to have a streamlined training process for contractors currently in the business and those who are coming up through traits training. The conceptual pieces for net zero retrofits need to be very well understood as well as the fundamentals of construction.

All contractors and trades workers will need to know when they should slow down what kind of fasteners to use, and how to properly sequence control layers. We can easily build on what the construction industry already knows in their ability to expedite large projects effectively. Clear communication and instructions are gonna be very important, and there'll be a special role for those people that can speak construction and who can also interpret the building science concepts into plain language.

That capacity to translate white paper to working drawings opens up another career path for people who are good with people and who can steer the efforts toward the ultimate goals. Adding to our imperatives, our top concerns for practical aspects of energy retrofits and construction work can fall broadly into three categories.

Structure. Building envelope. Mechanicals. For contractors and renovators, these high level elements can help define the amount of intervention that might be required for a project. All three elements cascade into one another, and Gary's gonna talk about this in a little bit, but the preliminary work for energy retrofits will be used. Those three elements will be used to determine the current conditions that exist and whether or how to proceed. That discovery, it might reveal problems with air leakage, insulation, or how moisture is managed, but the auditing process may also discover issues that supersede energy retrofit work, and Gary's gonna hit on that a bit later.

Creating a workable plans with massed energy retrofits is also gonna run into some challenging conversations with building owners and occupants. How do you explain it so that they can relate to the need for improvements? This is where clear communication comes in handy. Designers and contractors will have to focus on increased comfort and potential for better long-term health.

The energy energy savings are likely gonna amortize over 30 to 50 years in terms of payback with the building, which runs a little bit contrary to what we're used to when we perform alterations to our buildings. Tapping into that desire to save the planet is paramount. But, we're going to have to be quite convincing when we're up against granite countertops in additional closet space.

It's a, it's just a reality. We got our work cut out for us. We're at a position where we have to ask ourselves, how are we gonna gently disrupt the living and working spaces of millions of people to perform these energy retrofits from a builder renovator point of. We're really gonna have to be aware and prepared to deal with all kinds of buildings in those situations.

And I'll let Gary explain a bit more.

**Gary Sharp:** Sure. So, for example, here's a a 1950s era building. Probably at least a duplex, if not a triplex with the the basement unit. We, we need to be able to identify which of the buildings are going to be the, the best choices in order to. Conduct these deep energy retrofits.

There's challenges associated with all of them. I mean, look at this building, for example, is pretty typical with a concrete block foundation brick exterior or could be structural brick could also be wood studs could be balloon framed from the foundation to the ceiling.

The flat roof, of course. It makes it difficult to add insulation in that, in that space. Just a lot of challenges associated with these building. However, with the cookie cutter shape, you know, where the walls it's basically a rectangle. There's a lot of options here for what can be done to the building, both in terms of pre-fabrication, bringing exterior walls or additions to the exterior wall, to the site.

And also you know, doing work inside. So that last building probably has a a shared H V A A C system. You can look at the running down the side of the building there as an electrical where the electricity system was probably upgraded. Andy and I were also noticing the wires by the front windows. That's probably cable TV being installed that had been installed at some point. And you notice the air conditioners in the front windows that these houses didn't have central air. So this one typical townhouse. Probably from the 1980s or or so.

You can tell from the from the back there you can see a, a couple of chimneys. So it's expected that each of these units had their own heating systems. Brick veneer over wood frame. Typically all, all of these houses with the low slope roof, of course it's going to gonna be relatively difficult to get insulation in the attic space at the wall level above those windows where you can already see that the roof or you can see that the roof is having some issues there in the valley due to the snow sitting there.

I would expect that this building is also showing signs of ice DAMing in the, in the wintertime.

This one is a 1960s era type building. This could very well have been concrete block on the exterior walls with concrete floor slabs that create the balconies. Of course, if that is the case, if the balconies are not, are connected to the main floor system of the house, then those act as very good thermal bridges. And so there's, there would be quite a bit of heat loss there at the balcony. They essentially work just like a cooling fin on a, on a motor. These houses may well have also used steel studs inside to separate the units in between there. Electric baseboard heaters, I only see one furnace there, or a chimney I mean that may have been used for heating, but I would expect that this is almost all electric baseboard heating in this. We've got some flat roof again and also coniferous trees there in the front. And I believe that there's some des deciduous trees in, in the. And the full basement with apartments in the basement as well.

And, and this one, as you can see, this house, Notice the high number of windows in front. So the window to wall ratio here is very high. This may well have been one of the earlier attempts at building a solar house if that side of the building faces south, there would be quite a bit of overheating.

We would expect some overheating on that building. The other question is how that glass wall is how the second story of that building is being supported, unless those posts in the glass wall are actual structural posts carrying a beam across there. Otherwise it may be cantilevered from a wall inside of the building that may well have been finished with brick to make a a tro wall type of thermal storage there for all the sunlight that was coming in through that, through that building. You can also see their chimney. So it's expected that that house likely has a wood fireplace. Wood fireplaces, of course, are notorious for the amount of energy that goes up the chimney. And a negative factor in creating an energy efficient house.

So a couple of other things that we've got here at the Canadian Home Builders Association have been involved with are the adaptive Home Manual, which is a a manual for making modifications to houses to allow people to live in their homes longer making the houses more accessible and the, and the Renovators manual.

The Renovators manual has a section in there that deals with a renovator hierarchy. And the renovator’s hierarchy is basically to look at each house and evaluate whether the structural sufficiency and whether or not there are products in that house that could make you sick. So by that I'm referring to things like asbestos, lead paint, radon, that type of thing. So if the house is not structurally sufficient and if the house has things in it that can make you sick, then what does it cost to fix those houses up so that you can then start to do the renovation? That may trigger the fact that the building is too expensive to save.

It may be better to actually take that building down and construct a new energy efficient building there. The other three parts of the renovator hierarchy is to make sure that the renovation is durable, make sure that it's energy efficient, and make sure that it has good indoor air quality.

Back over to you

**Andy Cockburn:** Andy. Thanks, Gary. Gary brings up an excellent point here, and this is something that I think it is worth mentioning it. NAIMA Canada works closely with other associations to we're all, we're all aiming for the same goal, and so, when we talk about this, this retrofit effort and getting to net zero, there are a lot of people involved and there are a lot of really good resources out there, like the books that that Gary mentioned.

And with that checklist approach in mind, there's some big hurdles to jump over when we court that idea of energy retrofits across the whole country. We're only gonna get one shot at this because most of the work. probably won't get another look for maybe 50 years or even more.

So springing off the breakdown that Gary's provided, let's consider the major components working from the foundation upwards, we'll need to ensure that the building and site drainage is functioning well for resilience and durability, and that the foundation is well sealed and insulated, especially as we future proof, proof our homes for what's coming down.

In terms of climate change or weather extremes or energy prices and working from the foundation upwards, we need to ensure that the building is the wall systems openings and extended parts of the buildings may need creative approaches when it comes to applying new control layers. For example, in the photo that's showing here, we've got an existing house with concrete brick veneer and possibly attached to wood framing.

Immediately as a builder, you ask that question, how do we make this building envelope more thermally efficient? Do we have to tear all that concrete off? Can we do it with the veneers still intact? When we look at the roof, as Gary mentioned before on one of the examples, we're dealing with that typical low slope framing, possibly rafter construction or maybe trusses. Optimizing the insulation and air tightness of attic spaces is normally one of the first options for a lot of building owners. It's one of the easy ones that people can do, but we've gotta make sure that we're doing this correctly. If we set our targets to creating a, a continuous thermal and airtight barrier around the entire building, we could potentially reduce energy demands for heating and cooling.

Prospect for retrofitting so many buildings, speaking of other associations and initiatives, the prospect of doing this work has been on a lot of minds across the country, and the people at the housing division at NRCAN a few years ago created a system called PEER. And PEER is an acronym that stands for Panelized Exterior Energy Retrofit.

In plain language, it means that they applied insulated structural panels to a building's exterior to create new, more effective envelope. Now, there's a, a new initiative, a nonprofit group out of Nova Scotia called the Recover Initiative that has spearheaded a campaign to bring the peer panel method across into the mainstream, capitalizing on already well understood materials and processes that contractors and renovators are familiar with. Making this effort to grow to a national scale might look like small or large shops in towns and city across the country, churning out high performance retrofit systems and providing for local jobs and trades.

And we have proof of this because this is, this sprouts off of an idea that came out of Europe the Energy Sprong initiative. And when you dive into the individual projects, even getting more granular here, it becomes apparent that quickly, what type of management and orchestration will be required for many of these retrofits.

The spaces that we're working in will map out our logistics for us, whether we're working in a sizable yard with a driveway or on a tightly crowded urban street. We will need heavy equipment, delivery trucks, scaffolding, other equipment that has to be there in order for us to do this work. We'll also need adequate spaces for storing materials and parking dumpsters for waste removal, or better yet for recycling metal, shingles, wood, whatever we can recycle out of a project.

On some projects, there might be the need for weather protection structures that allow us to keep working through the rain and snow. The term "industrialized retrofits" is something to think about. It's, you know, a term that you're probably gonna hear more often as you think about this. And it implies a massive scale of work that is required and industrializing it, making it a stamping kind of process.

It goes through a factory. This level of project management is already pretty familiar in the ICI sector, the institutional Commercial industrial, and developers are also familiar with this kind of process, and they could be an excellent resource, an executor for this kind of project. And I'll let Gary explain what we're, what we're dealing with in terms of getting billings to net zero.

**Gary Sharp:** So what's the main driver behind all this? Well, the, the Canadian government was part of the Paris Accord. And in that Paris Accord, what they did was they decided upon, and they agreed upon a level of greenhouse gas reduction that Canada was going to achieve by 2030.

And there were sections for transportation. There are sections for buildings. The section that dealt with building. The way that we are looking to achieve our greenhouse gas reductions there in new buildings is through the National Building Code. So the National Building code now has tiers in it of improved energy efficiency. So every two years, for example the tier will be increased until we get to 2030 or 2032.

And by that time, all new buildings will be net zero ready, or full net zero by the building code. The existing building stock, Canada cannot reach, its greenhouse gas reductions without considering those 14 million houses that are out there that already exist across the country.

So we have to do something with that. So there is a code that is being prepared now called alterations to existing buildings. The way that code is expected to work is that whenever someone requires a building permit to make an alteration to their building, it will trigger this code and it will require the owner of the building to improve the energy efficiency of that building.

Now, will it be to the current code level at the time? We don't know that yet. It's, it may be to a tier that is one level below the current code of the day at that time. But some of the things that are gonna come into play there are going to be budget constraints, for example. They have to be very careful and they understand this at the federal government level.

The people that are writing the codes have to be very careful with regard to the budget because you don't want to push builders and homeowners into the underground economy to do their their addition or to do the whatever modification they want to do to their building. Wanna make sure that this stays above ground.

And so they have to be cognizant of that. Some of the physical limitations, of course. Where are the buildings situated? Are they close to property lines? Can we add insulation to the outside of the building without infringing on the property line If we put the insulation on the inside of the building, of course you're going to shrink the floor area.

So there's all those types of things that Have to be dealt with as, as part of the code. And you can see from that that there are pretty significant challenges for how we're going to improve these buildings. Some of the estimates that we're seeing are anywhere from $65,000 to $125-130000 in order to do these renovations.

So our view of this is that the next step for these buildings is to improve the insulation the air tightness, the vapor management before addressing the mechanical systems. So if we look at a typical building, the lifespan, of house, for example, is typically a hundred years, and that house will likely go through two or three major renovations over that period of time.

So let's say the house is renovated at the 30 year mark, or the house is renovated at the 50 year mark. While the house is built in the 1980s, of course would be coming up for that major renovation. Insulation, air tightness and, you know, windows and, and the like. These things tend to last for 30 to 50 years.

Insulation will last for the full life of the house. So it makes sense to do building envelope upgrades first, and then follow that up with properly sized mechanical systems. If you do the mechanical systems first, then you are delivering the energy required for that house in a more efficient manner, but the house is still using the same amount of energy as it was before the mechanical system upgrade. We're seeing at least used in new housing, cold climate, air source heat pumps coming online. And this is part of a push towards decarbonization. So they're asking people as well to retrofit existing houses with these cold climate air source heat pumps. So removing a fossil fuel burning furnace and replacing that with a, an electrical powered cold climate air source heat pump.

But it doesn't make sense to do that prior to upgrading the building envelope. The idea here is make your house heat pump ready by improving the building envelope, then put in a properly sized mechanical system system. And of course, whenever a house is tightened, we want to make sure that that house has got proper ventilation for the people that are going to live.

So high performance is possible. The existing building energy retrofits are challenging, but they're not impossible. And Andy is gonna take a minute now and show you some of the things that have been done out there across the country.

**Andy Cockburn:** thanks Gary. It's inspiring to see the kind of work that I'll, I'll just briefly glance off of because these projects are doing what we're talking about, they're bringing buildings to such a point where they can be powered mainly by renewables or to the point where they're building envelope, the insulation, the air tightness, the moisture management windows and doors are doing such a job that they hardly need great input or they need very little input.

The first example here is Sundance Housing Co-op that was executed by Butterwick Projects in Edmonton, Alberta in around 2019. So they took what were essentially seventies, eighties town homes, and they retrofit them from foundation to roof. They actually replaced the roof on these to get more insulation into the attic space.

And they excavated around the foundation to put about 10 inches of insulation along the foundation wall. And then continued that same thermal layer all the way up and around the building, giving these townhouses a brand-new life. And this is a housing co-op. So the residents were very involved with the process with Butterwick.

The next one is in Montreal, and this is the Benny Farm Apartment Complex. This was built around the 1940s. It's amazing to look at some of the historical documentation on this building where the exterior sheeting the pieces that would actually brace the building are essentially two by sixes.

So it's a very, very solid structure. And this building was originally slated to be demolished. It was a C M H C property. But a bunch of architects and planners and engineers and and energy people got together, and they saved the complex from demolition. And now what it's doing is it's it's hosting families in an energy efficient, healthy environment, and it's got solar.

PV as well as hot water collection on the roof, as well as new exterior insulation to the envelope that serves serves to make these buildings probably good for another hundred years or so. And then lastly ERA architecture out of Toronto has been championing something called the Tower Renewal Partnership, which seeks to perform deep energy retrofits on all of the late 20th century high-rise apartment buildings, which number out to about a million across the country.

The pilot project came in the form of this building in Hamilton. It's just near the harbor in Hamilton. And the building condition was at the point where demolition would've been happening soon. But the architects and the contractor with general contractor who was involved along with a lot of companies who were Who are consulted in terms of making the spaces more workable.

They've now made this building into one of the only but the first passive house certified retrofits in the world. And the units themselves are now accessible with countertops, door sizes change, and each floor has a central ventilation E R V and as well as medical units on the bottom.

So all of these examples point to the fact that Gary just mentioned performing energy retrofits, not without its challenges. In fact, they're enormous, but it is possible we know how to do much of this work. The materials and procedures and systems are things that we, we know about that are common and that we have on hand right now.

There's lots of kinks to iron out, I won't lie, and a ton of mountains to move. But as I mentioned before, about partnering up and walking in, in step with us with our fellow constructors and associations across the country. If we link arms and we all push in the same direction, I think we can get there if we share the word.

Thank you very much for listening today. Thank you on behalf of me and Gary. And we're happy to take questions if you have any.

**Allison Mostowich:** Fantastic. Thanks so much. Let's start with John's question. So many manufacturers have good drawings for their installation systems on new buildings though not necessarily to the levels you're advocating.

How do you see this transitioning to retrofits where there are many different conditions to consider?

**Andy Cockburn:** That's a great question. Yeah. And I think that manufacturers are, are certainly, you know, in the case of the members that we represent in the insulation industry, many of them are just they're at the point where they're say, you know, it's, it's gonna be more of what we already make.

Those details you talk about, how do you address it when you're dealing with a solid brick wall, like a double wide or triple wide brick wall, how do you insulate that type of structure. This is where I think that there's going to be some think tanks involved. There's one in particular that is has been around for a number of years, building Science Corp and R D H Consulting as well.

they are two organizations that deal specifically with those kinds of issues. Whether it's creating details, writing articles, doing webinars and it is going to turn into something where, like I alluded to before, there's gonna be the requisite amount of training and generation of those details.

To make sure that when a contractor approaches a building and says, okay, I know what era I'm dealing with. I have a good idea of what structure I'm dealing with, and I have a good idea of what kind of layers I'm dealing with, what is going to be the best approach here? I'm going to pick package for, from my book of, details on how to do this retrofit and we're gonna follow this method.

It's in the works, people are generating these kinds of details, but it has to be done on a, on a wider scale

**Gary Sharp:** that's at one of the things that Andy and I have been working on is how do we do this at scale? So rather than have an architect or I mean, the way new housing is built, the builders know what to do when they get to the site. We need to make that very similar for renovators when they see a house that is a 1950s era or a 1960s era, that they need to be able to show up on the site and say, here's what has to be done. And they have a system by which they can do that and, and then they can apply that at a mass.

you 1960s bungalows, in 1970s bungalows or you know, 1980s two story houses, whatever. When they see it, they know how it was built and they know how to go about to do the renovations to it.

**Allison Mostowich:** Great. Thanks so much. So we have a couple questions about sales pitches. So someone asked in jest what, how they can convince their partner that energy efficiency is more important than new tile floors. But we do have a couple questions. So next question is what's the best sales pitch you advise to encourage building homeowners to go deeper in their retrofits? I think this is a challenge that we're really facing right now at the macro level.

Are there specific resources or studies you would recommend to address concerns?

**Andy Cockburn:** Yeah, that's an excellent, and and that's a tough nut to crack too. It's because we're competing against things that the average homeowner is looking at either increasing the curb appeal or increasing their comfort level in the building, or, you know, granite countertops walk-in closets, those kinds of things where people are throwing their wallets at contractors.

When you talk about the guts of a building, it's not as sexy. But the language that we have to use in order to make this happen. We have to sort of switch ourselves away from the technical speak and or trying to wow people with our building science knowledge and talk about those human conditions.

Can you walk across that tile floor in the winter in bare feet, and then go sit beside your favourite window and prop your feet up on the windowsill and read a book comfortably in your building. If your building is, is well sealed, well insulated, and performing well, that's going to be something that people can relate to that, that, that level of comfort.

Although it's, it's something that we certainly needs more study and I think we're at a really good point in history as well that data collection is gonna help us with that messaging as well. The further along we go, the, the more data we can collect about this community was retrofit on a wide scale and is using this much less energy than community B over here.

It might be a sense of pride in the community about having members of the community who are avidly promoting the idea of bringing buildings to a new performance standard. It, it is a tough one, and I know that the, the marketing guy in me is always thinking about, okay, how do you, how do you make this so people don't glaze over?

It's a tough one.

**Gary Sharp:** I've always tried to sell the comfort, you know, do, do you want to, do you want a house that's more comfortable? Do you want good indoor air quality? Do you wanna save money on energy bills and that type of thing? And just do all that for selfish reasons. And you've also got an advantage of somebody phones and they say, look, my basement is leaking, and I have to do something about it.

And, you know, you determine that it's the, the weeping tiles are, are plugged or whatever the case may be. But if you're gonna have to dig up around the foundation in order to, you know, fix a drainage problem, then that is an ideal time to put some insulation on that house, you know, exterior insulation around the foundation.

And, and that's usually a fairly easy sale to do once they've bought onto the fact that they don't wanna have to replace their furniture in their basement every time they have a big rainstorm.

**Allison Mostowich:** Great. Fantastic. And so I think you shared an example about the high-rise passive house, certified retrofit and where people could sort of find information about the costs of constructing new net zero buildings.

So I'll just kind of throw that out to both of you.

**Andy Cockburn:** Yeah. And. While the like Gary mentioned code is moving ever closer as we go through the next iterations to having all buildings, new buildings will, will be built to net zero ready or net zero standards. Passive house and net zero share a lot of common targets.

Both right now are voluntary programs, but NetZero has the the advantage in, in that they are integrating with code. When you get to the point where you are considering those kinds of retrofits, that level of retrofit or even new Engaging with someone who's experienced in net zero or in passive house is integral that someone who can help you through the process.

And I'm, I don't think I'd be telling tales at a school whether the costing of, of whe whether a net zero project or a passive house project is going to be exorbitant compared to compared to just building a A code house. I have heard numbers in around five to 15% premium for these kinds of buildings. But it's, it's foggy just because you get to a certain point, like Gary had talked about earlier was get to a certain point where you insulate new air seal to such a point where you can then see the price drop because you're, you're, downsizing or right sizing your mechanicals.

So costing is hard. But Gary, I I'll turn it over to you, just because I think you've got a better take on this.

**Gary Sharp:** Well, I mean, if you think back for if there's anybody there listening who can remember back to the R 2000, you know, the early 1980s a lot of different building products and tapes and caulking and foaming and all that kind of thing a lot of that was developed to help make the insulating and air sealing of houses better.

As we move into the 2030s and we're building houses to net zero and net zero ready, some of the things that we're starting to see more of are things like modular manufacturing, manufacturing either complete sections of houses or walls or whatever in factories in quality control areas, and then getting them to the site.

And stitching them together in order to make them even more airtight and more more insulation. So the industry has been very innovative in the way that it's been able to change and construct buildings. And I don't see any reason why it isn't gonna continue to do that. They, they know what the goal is and we've got like lots of smart people in this country who, who will start to put that all together.

**Allison Mostowich:** Okay, so we've got lots and lots of questions left in here. And before we leave Andy, I might just get you to share your screen with your contact information cuz we're not gonna get to all of the questions unfortunately. So maybe what I'll do is I'll ask one more question of you guys and then when Andy shares that screen, I'll just encourage everybody, anything that wasn't answered today or anything you wanna chat with Gary and Andy about, just reach out to them.

So Pam has of course a great question about what training and education NAMA is delivering across Canada around deep energy retrofits. So for those of you that don't know, name or NAMA does deliver quite a bit of, of training and education. So this is your chance to highlight it. Gary and Andy, I'll hand it to you.

**Andy Cockburn:** Yeah, thanks. We have developed over the last few years a series of free online educational pieces. The content is self-paced. It's all online, and it has to do with the topics that we're talking about today, whether it's to do with insulation and air sealing or even retrofit, what that looks like.

Throughout the content, there is examples of whether it's detailed drawings, things that you could potentially see in retrofit. Or what we've tried to do as well is collect a lot of resources to go with that training and education. So for example, we have listings of institutions across the country that would offer further training in building science, trades, architecture, engineering, that kind of thing.

As well as our, our colleague Jillian MacArthur, who's probably li listening in today, she's done an amazing job in developing an incentive in rebate database for Canada and. That goes in tandem with the training that we have. And you can go to our website at naimacanada.ca and you can see right on the first page there where you can get directly into our courses.

And everything's free. Our take on this is that we wanted to have the rising tide lift all boats because this is something that all contractors, all students, all architects, energy advisors, need to know about. And we wanted to help in that process and that's why we developed the education. So please sign on, use it.

I'll see you there.