SMB_BR1_Decarbon

Wed, Aug 07, 2024 2:37PM 47:47

SUMMARY KEYWORDS

manitoba, solutions, megawatts, electricity, electric vehicles, building, natural gas, greenhouse gas emissions, vehicles, energy, heat, buildings, electrical, export, work, infrastructure, fossil fuels, reduce, demand, utility

---

00:00

Okay, so, yeah, my name is Chris Hewitt. I'm an electrical engineer with SMS engineering, and I've had an interest in sustainable buildings going back 2025, years. I want to preface everything I'm saying here under the heading of I am completely in agreement that we are facing a climate catastrophe, and that global warming is definitely not a myth. I'm going to present some things today that might suggest that we have some challenges, which I think we all know about, but the primary heading of my presentation is we're on track to decarbonize Manitoba with electricity alone. And I just wanted to tell a little bit of a story about how I got here. Before Christmas, I was thinking, maybe it's time to change my vehicle. And I thought maybe now's the time for an electric vehicle. So I borrowed one for a couple of days. I live out of town, so I recognize that maybe I'm not your typical EV driver, but I immediately started to notice some some limitations with with the vehicle and range and that kind of thing. But as I was driving, I got thinking about the way our electrical system is going to react to the proliferation of electric vehicles, and then further, how that might be impacted by our need to move off of fossil fuel for heating buildings. And I prepared around Christmas time a blog called Exploring the complex considerations surrounding electric vehicles. And a lot of that blog was was subjective calculation. So I thought, well, you know what? I better put my money where my mouth is, and I better actually bring some engineering rigor to my my subjective calculations, and that's how I got here today. So as I said, My title is we're on track to decarbonize Manitoba with electricity alone, and I want to explore whether that is a myth or whether that is a potential fact. Such So historically, in Manitoba, our electrical system has probably been one of our greatest assets. We usually, I think, safe to say, we considered it to be an infinite source of energy. We have an abundance of capacity, and it will serve us way off into the future, and we don't need to worry about it. Current and previous governments have made great investments in our generating capacity, and we are where we are today. But I think as an electrical engineer, I've been able to take a little bit of a back seat in building design and watch my mechanical colleagues and my building envelope colleagues really take a lead in how to make buildings more sustainable. But today I'm here to show you, I think that those without change, those days are gone, and really now electrical engineers and electrical engineering is on the critical path to decarbonization. We need to understand that our electricity and electrical system is a finite resource, and we need to use it more wisely. So a little bit of electrical history for you. We started building electrical power stations here in our province in and around 1900 so about 100 years ago, we have 16 hydroelectric power stations generating something of the order of 6100 megawatts of electrical power. We use within our province somewhere between 4000 505,000 megawatts, depending on the time of the year. But the peak demand is in that

range. Think our record peak demand was in 2019 January, 2019 in addition to the to the amount of power that we use, we also export about 1600 megawatts. I'm only looking at winter exports because we are a winter heavy province. Our winter demand is higher than our summer demand and our peak demand. When you combine what we use as Manitobans and what we export is around about 6060 megawatt so we're essentially operating at peak capacity. We have revenues. Hydro has revenues in the range of $2.6 billion a year, of which 1.1 billion comes from exporting electricity predominantly south of the border, but also to the west, to Saskatchewan as well. Those exports are long term contracts. I think the furthest one out expired in and around 2052 and then the one closest to expiring is around 2027 remember that export number? I'm not an accountant, but something of the order of about 50% of our revenues comes from exports. When you look at Manitoba, Idaho website, they tell you that our rates would be around about 20% higher if we didn't export electricity. So there's clearly a reason why you. We export electricity, it has made great sense for us as Manitobans, we have reaped those rewards for decades, and we've enjoyed lower than market energy electrical energy rates as a result of, in part, those exports and as a result of the investments that current and past governments have made. Those days are coming to an end, though, we are a province that predominantly heats using natural gas. I'm an electrical engineer, but I will through through research here, we use something of the order of 72 million cubic meters of gas per year. That equates to an equivalent 7000 gigawatt hours of electricity. Now I can play around with these numbers any month from Sunday, I can play around with these numbers, but generally speaking, that equates to something between seven and 8000 megawatts of electrical demand if we were to completely electrify our natural gas infrastructure. Now we can't talk about electrification without talking about electric vehicles. I think in Manitoba, we're sort of standing at the bottom of the mountain, looking up the cliff face as it as it comes to electric vehicles, each year, we have something like 44,000 new vehicles registered on our roads. If all of those were electric vehicles, that would equate to something like 95 megawatts of electrical demand. If 30% of them were plugged into level two charges at any one time, we have close to a million vehicles on our roads. If we electrified all 1 million of them, that would be about 2000 megawatts of electrical demand, again, based on that 30% load factor. Now the federal government has mandated that by 2035 all new vehicles will be zero emission at source. And clearly, on that date, in 2035 we're not going to suddenly step change from gasoline powered vehicles to electric vehicles. So assuming roughly a 10 year life cycle, 10 to 15 year life cycle for for a vehicle, by 2035 we're going to see an electrical demand in and of the range of about 600 megawatts. If we assume all these vehicles are passenger vehicles, that's not really realistic, because we do have commercial vehicles on the road. We have a mining and resource sector that uses an awful lot of vehicles also. At present, it's my opinion, it's not practical to electrify the commercial stock, particularly some of the remote locations, whether it be forestry or whether it be mining. In the mining sector, a typical rock truck, large rock trucks are at 3000 horsepower diesel engine, consuming about a million gallons of diesel each year. So converting that in a remote location to a battery powered vehicle and finding the energy to recharge that will be very impractical, likely will require burning fossil fuels to make that electricity. So I'm just considering electric vehicles and for this presentation, really just considering the energy usage through through recharging those vehicles. But I think it's worth noting that when you look at greenhouse gas emissions, you have to look at the complete life cycle of both internal combustion engines and electric vehicles. It's something between 50 and 100,000 kilometers to get to that break even point, based upon a benchmark Volvo study. So electric vehicles are not necessarily the answer, and we're going to have a challenge in recharging them.

08:41

So when you do the simple math,

08:45

look at peak demands. We have a current capacity of about 6100, megawatts. We're using about 40, 460 within the province, another 1600 outside the province. Right now we have about 40 megawatts available. I'm ignoring the spot markets right now, spot markets are obviously useful to trade energy, but it's a given that if we need energy in peak demand times, we're probably going to be paying a higher price in our free market economy. Electric vehicles by 2035 I'm estimating will consume something like 600 megawatts and converting all of our natural gas infrastructure to resistance based heat is something of the order of seven to 8000 megawatts, so we have a shortfall in excess of our current generating capacity. So we are less than halfway to what we would need to be in order to supply this required demand. So the myth is well and truly busted. We cannot electrify our way out of carbonization, at least not based on this maths. The usual solutions as well that I hear from people don't work either. So the usual solutions is Oh, but that's okay. We'll divert our export capacity. The and we'll use it within the province. The problem is, is that's committed contracted capacity, some of which goes out to 2052 there are significant source of revenue, and sure some of that revenue would be assisted if we were to consume that energy within our province. But hydro Zone website says we save something like 20% on our current rates by exporting so it's a given that probably rates would need to increase if we diverted that capacity as it became available. The other thing I hear is, let's just, let's just put solar panels everywhere. Let's build big solar farms. Our peak demand occurs in winter, where a day to night variance is only of the order of about 500 megawatts without storage, that solar power has limited effectiveness. We can use the storage of our our hydroelectric systems to store water behind the dams while the solar system is available, but solar power is an interruptible source of power. It's fine when the sun is shining, but in the winter time when the sun angles are lower, or during cloudy days or during night time, obviously it has limited effectiveness. And also here, let's just build wind generating stations. Now, wind is cheaper to market than hydro power, but it too, is also an interruptible source that has similar limitations to solar. So there might be a peak demand day when the wind isn't blowing. It's a very calm minus 30 or minus 40 day the wind isn't blowing, or it's a howling gale, and there's too much wind for the wind turbines to operate. So we have that sweet spot that we may be operating outside of how do we get out of this? I don't profess to have the answers. Bethany will be talking in a bit more detail afterwards about what some of the answers will be. But remember this film. This is Apollo 13. For those that don't remember, think about the way these guys, these are actors in this case, but think about the way the astronauts got back from the moon, and how important economical and prudent and sustainable use of electrical energy was, if you remember, they kept overloading the battery, and they had to find different ways to innovate and to work around the problem. The days of abundant electricity had gone. The days when we could finance our way to low electricity rates are gone. We need to invest. And I put it to the group that probably we need, or definitely we need to increase our utility rates. So what are some of the answers? And I say, I don't profess to have all the answers. We have an existing building stock that is using something of the order of 50 to 60% efficient natural gas heating systems. I'll show you in a couple of slides time this huge opportunity to reduce greenhouse gas emissions from these buildings. And I put it to you that we may need to still continue to use efficient, much more efficient natural gas with heat recovery and better building envelopes to significantly reduce greenhouse gas emissions from these buildings, we need to consider other forms of making heat in buildings using electricity. So it's a hypothetical joke here that resistance is futile. In this case, it is. I cannot tell you how

many projects I see go through offices, design offices where resistance heat, heating using electric boilers, is proposed with huge electrical demands. We need to be considering energy storage. So whether that be geothermal in the ground, whether that be storing energy behind dams, or whether that be using other forms of storing energy, whether that be high temperature energy storage producing steam and steam turbines to generate electricity, we need to innovate. We need to look at smart renewables. Use solar and wind, along with our abundance of hydroelectricity. Power generation that we have using dams are storage when there is solar on wind energy available to supplement the electrical system. We need to think about smart metering. I hate this covid term, but we need to flatten the curve, and smart metering is one way that we can do that, allowing the utility to make decisions about when certain electrical equipment is operating. And we need to invest. We need to raise our electrical and natural gas rates. We need to look at the carbon tax and find a way to effectively create a bank account that we can draw upon to green and to better use the infrastructure that we have and to reduce our reliance upon fossil fuels and invest now in our power generation system and our distribution system. I haven't even talked about the 1950s infrastructure that we have in downtown Winnipeg that is barely able to supply what we're doing today. The level of investment that we need to electrify our our energy system is huge, and we. We need to be thinking now, and frankly, 30 years ago, we needed to be thinking. Sidebar, my father was VP of Engineering for our utility in the UK, and 30 years ago, he was saying we cannot supply the demand that electric vehicles will be bringing in the future. And here we are today. The ships already sail, the barn door is already open. So here's some proven examples before I hand over to Bethany. So they're interested in building simply by changing boilers and moving from a steam to a hot water based system, 28% reduction in greenhouse gas that's still using natural gas boilers. I realize that in long term, is not where we want to go, but I think we have to be looking at how we get through the short term while we invest in the long term. Negan and center, using the benchmark model from the Richardson building, we'd be looking at roughly at 34% greenhouse gas emissions, still using natural gas boilers, a major office campus downtown has seen a benchmark proven 40% greenhouse gas reduction and a major high rise building, using heat pumps to move energy around the building and using a small electric boiler, is is forecasting that they'll see a 92% reduction in greenhouse gas emissions. So while greenhouse gas emissions are not just what we're talking about, there are ways that we can still use natural gas to help us through this, this problem that we have today. So according to you, we can't electrify ourselves out of this issue. We need to use our electrical resource wisely. We need to think like those astronauts on Apollo 13, our electrical infrastructure is essentially already run out, and we haven't really started the decarbonization process, so it's already too late. It's very unpopular. Need to invest. We're going to invest. We need to raise our rates. I'll hand over to Bethany. She has some of the answers. Thank you. Applause.

17:04

Hello, everybody. I am just going to get my screen set up here. You

17:27

great. So as already mentioned, my name is Bethany Damon, and I am the Communications Manager with Manitoba climate action team, and I'm here to specifically talk about this point in this myth about we are on track to decarbonize Manitoba with electricity alone. And I think as I was having conversations ahead of this about what this myth means and what this means

within the context and the importance of electricity within decarbonization, the point that I really want to highlight here is that Manitoba, no, we are not currently on track to decarbonize with electricity alone. However, that is a huge part of the solution, and we want to work towards getting on track to make sure that the solutions that I am talking about here are possible. Um, so here is a photo of the Climate Action Team. We are a group of policy and environmental organizations who are working together to advocate for and document climate solutions that would help all Manitobans affordably meet their essential needs without the use of fossil fuels. As a coalition, we are incredibly concerned about the human impacts of increasing extreme weather events. So we came together after the IPCC 1.5 report came out, calling on policy makers to document evidence based solutions, because we hadn't seen anything from the provincial government that would help us get even remotely close to the emission reduction targets that were being called for by the IPCC, which in this report, if you haven't heard of it before, essentially, there are scientists from All around the world who have come together and documented the levels at which regions around the world need to reduce their emissions and ultimately get to net zero emissions by 2050 in order to prevent catastrophic, extreme weather events and challenges associated with climate change. Within the context of what we are doing here at the Climate Action Team, we're acknowledging that at this point, most Manitobans, including myself, who is sitting in my South Osborne home with a relatively inefficient heating system old windows because I am unable to I don't have the capital in order to retrofit my home. Home on my own and get to the point where I need to be and and as a coalition, we're recognizing that this is the place that a lot of Manitobans are in, and so that's kind of influenced everything that I'm going to talk about today. There's two quotes that I wanted to quickly share with you that are just really significant in the work that I'm doing as I as I look towards solutions here in Manitoba, one of those is, as climate change impacts intensify, life will become even less affordable. That's from the Canadian climate Institute. And the other one is just simply that the biggest threat to everyone's health and well being is climate change, which is from a local retired public health nurse who I've been working with on campaign strategies to help make climate solutions more possible here in Manitoba. So knowing that climate solutions exist, the climate action team has spent the past five years documenting these solutions that would help lead to zero emissions here in Manitoba, we've worked with area experts and policy makers to collectively find strategies that would not only help reduce emissions here in Manitoba, but also reduce energy costs for Manitobans. So we've taken all these solutions that we've collected and we've compiled them into a report series called The road to resilience. It has five different volumes in it, well, I guess three volumes, and then within the third volume, there's three sub volumes. And we continue to come back to this question in the volumes, and we're trying to answer this question, what do we need to do to reduce Manitoba emissions, and how can we do it? So in the first volume, we asked, What do we need to do? And what we determined is that we need to heat all of our buildings, old and new, affordably without fossil gas, often commonly referred to as natural gas. We need to move all goods and people without gasoline and diesel, and we need to ensure that Manitobans have access to affordable food that has been produced without synthetic fertilizers and without diesel for machinery. So we focus on these three areas, buildings, transportation and food, because this is where the majority of Manitoba emissions come from these are all incredibly important things, but the reality is that alternatives do exist to be able to meet these needs without the use of fossil fuels. So as we looked into what are the solutions, the next report, after our initial community pathway with which outlines and asks the questions of what we need to do here in Manitoba, we needed to start answering the questions exactly, how can we do this? So in Volume Two of the road to resilience called energy solutions, we outline a number of different solutions, and I obviously won't have time to highlight them all today, but I am going to go through as many solutions as I can here, and then I'll leave you a resource to be able to look more into the road to resilience and additional solutions if you're interested. So the

first thing we highlight in the energy solutions report is the importance of making all of our buildings as energy efficient as possible. We talk about heating and cooling our buildings electrically on district geothermal systems, so that there's shared heat between different buildings and communities. We talk about the importance of reducing the need for vehicle transportation and making all vehicles electric. So adding on to the point that that Chris made, the reality is, right now, we don't have infrastructure set up, and systems are not in place for for everything to be electric. So that's a huge piece of the puzzle, is being able to ensure that we have, we have the electrical requirements here in Manitoba to make this possible. But of course, another big, significant piece of this is reducing our reliance on vehicle transportation so as much as possible, having shifts so that people are using shared public transportation, both rurally and urban. Anyone who is able to cycle, focus on carpooling. All the things that we can do to reduce our reliance on vehicles, and then any remaining vehicles that are essential and left on the road, we would be making electric. We also talk about the importance of increasing local electrical generation, primarily through wind power, and then developing thermal and electrical energy storage systems to ensure that at times of peak capacity, or at times when there isn't necessarily as much wind or potentially solar available, we have enough energy stored up so that demands are still able to be met. Following the release of the energy solutions report, we started getting into a sub series called the policy solution series. So volume 3.1 of the road to resilience series. There's lots of. Have lots of different layers to the series, so we have an outline of it on our website if you're interested. But the first volume in the policy solution series talks about coordination and finance. So we talk about the importance of establishing a target of zero greenhouse gas emissions by 2050, or sooner, and implementing concrete actions to make it possible to meet that target. From a financing perspective, we talk about returning the carbon tax to Manitoba and using this revenue to finance climate solutions while still rebating the lowest 40% of households to ensure that they don't experience and that loss. And to Chris's point earlier, I don't know if anyone saw in the chat, but our lead author of the road to resilience, Curt Hall, who is also an electrical engineer and on the board of efficiency Manitoba, he noted in the chat that the reason that exports reduce domestic rates is because we have surplus and that capacity would otherwise not be used. If we consume that power domestically, it will actually increase hydro revenue, because it will be sold at nine cents per kilowatt hour, instead of the export price of three to five cents. And so that is another piece that could potentially be evaluated and considered when talking about funding and financing sources for the solutions that we're talking about, one of the big things going back to my point about me currently living in a relatively inefficient home is the importance of financing to ensure that all Manitobans are able to make the changes on their homes that they're Need to even if they don't have the upfront capital. And one example of this is PACE financing, which we've seen work well in other jurisdictions. One of the other points that we recommend in the coordination and finance volume is updating efficiency Manitoba mandate to reduce Manitoba greenhouse gas emissions through the efficient use of electricity, and then also creating a thermal thermal energy services utility who would also maintain a district heating system. So geothermal setups wouldn't be something done on an individual basis, but rather a part of a larger system that connects and shares heat and cooling as well.

27:24

We would also encourage there to be continuing to have progress towards climate goals that are reported on regularly. And then if, all of a sudden there is a failure to meet these targets, which is a very strong possibility, then action needs to be taken to evaluate what changes need to be made to ensure that we can get back on track to meet these targets, we talk about adopting the highest tiers of National Energy Code for buildings that are achievable by the

construction industry, and then executing a plan to achieve higher tiers as soon as possible. And then, of course, prohibiting the use of fossil gas in any new construction specifically related to buildings, again, using the most economical combination of building envelope improvements, geothermal and on site solar energy to retrofit each building to achieve the energy savings required to ensure financial savings exceed amount of PACE loans, and then finding ways to employ solar energy and waste heat recovery economically to reduce the need for grid power for water heating. And then finally, we did. We do have a chapter specifically on vehicle transportation. There's a lot of challenging conversations within this. If you're interested in learning more. Again, you can read the full report. We go back to as much as possible, decreasing the need for transportation through affordable, safe and reliable rural and urban public transportation, and then back to this point of ensuring that any vehicles left on the road are electric, so we we've done a lot of evaluating of polls throughout Canada, specifically here in Manitoba, and then globally as well. The reality is that the majority of Manitobans are concerned about climate change, and that 75% believe that climate should be considered in all policy decisions. We commissioned a poll through probe research last year, which left us with those results. What we need now is policy makers to implement these solutions. So all of these things led to the launch of the consider climate campaign, which you may have seen signs for around your neighborhood. We're not actively distributing signs right now, just due to funding constraints and people not getting quite as excited about them when we're not in an active election time, but it's something that we are still actively campaigning on, and we're really working with policy makers and elected officials and everyday Manitobans to you. Make these climate solutions a reality, so that we can all, as Manitobans, live affordably without the use of fossil fuels. So I have left a QR code here if you're interested in learning more about the road to resilience. We've got information on our website related to advocacy opportunities as well. We currently have a postcard campaign going if you're interested in advocating for more of these solutions, and we're continuing to work with area experts. So if you have ideas that you're wanting to contribute, you can also feel free to reach out anytime. And we continue to work with with elected officials to implement these solutions to make life not only affordable, but also possible without the use of fossil fuels.

30:53

Well, thank you so much for all that incredible information you guys both shared here today. Really appreciate it, and I can tell that people in the chat also appreciated it, as we have some questions. So to start, does Manitoba hydroelectricity displace or add to fossil fuel based electricity in adjoining jurisdictions?

31:18

Well, I think, as I recall, Saskatchewan does use some fossil fuels. So, I mean, we are exporting from our predominantly hydroelectric infrastructure. I honestly don't know the answer as to what proportion they generate using fossil fuels. To be able to calculate that south of the border, yes, definitely some of the coal states that would be importing from us, and I do believe some states are mandating that they import from areas that have wind, for example, as a means of generating

31:59

Hey, Great. So there's a question here. Are you equating that the primary energy, oh, that as a primary energy or as the actual useful energy for heat pumps are three to four times more efficient as users of primary energy?

32:13

That's a really good question. My number was in there for headline effect, because we need to, we need to deal with this. And frankly, we're not. So I'm I'm assuming resistance heat, so I'm not assuming geothermal that would essentially reduce that. What did I say? Seven to 8000 megawatts? It would reduce it down, obviously, considerably, due to the coefficient of performance there.

32:41

Okay, great. And if people want to learn more about the heat pump world, that's next week, so check in then, if you can. So when talking about ng slash electrical supply and peak, any idea on the split between heat and other processes, or residential, commercial and industrial.

33:04

I Bethany, you may also want to answer this, but I just had a quick look on the federal government's Stats Canada page. It's roughly a third, a third, a third, from residential to commercial to industrial, not exactly, and it depends on the time of the year, but something of that order. I can share the site that I went to for that.

33:27

I am going to pass this over to my colleague, Kurt Hall, who is the lead author of the road to resilience, if he wants to add anything here.

33:38

Well, no, the road to resilience. Work has did focus on residential because we focused, and we focused most of the analysis that we did on trying to manage the ability to meet peak demand and being able to heat buildings is sort of like a time constraint challenge. You can't wait to heat up your building so much. Whereas a lot of the commercial and industrial is is a power demand that that can be potentially in sort of emergency situations or whatever move to another time when the when off of the peak, it's this dispensable power is that? What they call it, something like that, like where you you can make arrangements with the with the power users that basically with costing structures to encourage them to not demand power when the rest of the grid is challenged to meet the peak demand.

34:42

Excellent. Sense. All right, so what are the impacts on operational costs in the greenhouse gas reductions examples?

34:53

Well, I can tell you, the Richardson building went from 50% 50 to 60% efficient boiler. Something in excess of 80% fish and boilers. So for offshore, there was a reduction in operating costs. I don't have a slide in front of me now, but the forecast for Negan is some Negan and is something like a 30% reduction in operating costs. Now there is a an initial upfront investment in capital, but that particular client has been extremely successful in attracting federal government incentives to help them convert over from the current very inefficient systems over to new systems.

35:37

Thank you. Okay, so are there any jurisdictional precedents that have successful, successfully implemented the urban, rural, affordable, ubiquitous, public transit.

35:47

So I am going to defer this. Well, maybe I'll ask Laura if she can send out a follow up email to people. We have a rural transportation study that is going to be coming out in the next couple of weeks that answers all of these questions. I am not the author on this. I actually, personally haven't even read the draft yet, so unfortunately, I don't feel very qualified to answer and give you specific examples, but I do know that our our our research lead on this has been evaluating a number of different regions where this has been successfully done, and it's absolutely possible to do. There is also a significant need. I was a part of a number of the consultations within rural communities here in Manitoba over the past couple of months. And there is a need for this. They have a number of solutions. It just comes down to funding and so, so I hope that answers that question, but you can stay tuned and sign up for email updates on the Climate Action Team website, and as soon as that research study is out, then that'll have a little bit more information on that.

37:01

Yeah, and we can drop that into the SBM newsletter when, that's when that comes out as well. So yeah, you'll get the information if you're paying attention. Follow on the socials, all right, so there's some good conversations happening in the chat. Just a question about, why is spray insulation being featured?

37:22

I saw that question, and I can answer that question honestly. It's a it's a stupid, sheepish answer. It was I was working on this way to last minute, and I just took the literal first stock photo of insulation and plopped it into the presentation without critically thinking about it. I

would not call myself an expert on deep energy retrofits. So this is a very good point to be highlighted for me, I do a lot of the communicating of these things. So this is very important, an important reminder for me that I need to think, think a little bit closer. But there is, there was nothing. There was no thought put into that. It was just a matter of it was too late as to when I was inputting the photos into this presentation

38:10

that is incredibly relatable to me. Great answer. Okay, so there's a little bit of this coming out in the chat, but I just want to give everybody a space to talk about a little bit more. But are you proposing district heating for single family residential or primarily for multi family?

38:28

What we're proposing is every, ultimately, every building in Manitoba. And so the reality is that we've got a lot of excess heat from a variety of different sources. One example that we've seen here in Manitoba is community centers with hockey rinks. They've got excess heat coming out. We can use that excess heat to be able to now heat our homes, so connecting entire district systems, whether that's homes, whether that's schools, whether that's community centers, whether that's hospitals, and being able to share that heat so that everything is as efficient as possible, which obviously is a massive undertaking, and so that's part of the solutions that we're working on, proposing and advocating for in the road to resilience. And

39:10

maybe, if I can just add to that, the one building that I mentioned on my last slide that was is expecting to see a 92% reduction in greenhouse gas emissions is a building with a lot of data infrastructure throughout its high rise, and so being able to take that what is effectively waste heat in one room and move it to another room that needs heat is one of the ways by which they are hoping to enjoy that game. If you look at clients like pull apart, for example, substantial amount of that building is actually heated and cold using heat pumps. And they do move energy around the building so that they take from people with excess heat and give to those that need the heat, instead of just setting it out through the rooftop equipment.

39:57

And if there's Is there any examples of this? Level of district heating elsewhere in the world.

40:04

So Kurt would be able to answer this a little bit better, but my understanding would be that this is what we have seen. Is it's been done on neighborhood levels, but we haven't necessarily seen it done on like a whole provincial level, primarily. Because we don't have a utility in most places to be able to manage it. So someone who and Chris looks like there's something he wants to add there.

40:34

Before moving to Canada, I used to travel around Europe a lot, and so Stockholm uses a system that heats about 80% of the city using seawater Moscow, although it's not a great system, they have a district heating system. They turn it on and off the same two days of the year, regardless of temperature, but it is a district based system. If it happens to be cold when they turn it off, top lock, but it does distribute energy throughout the city, and there are other Eastern European examples of that, I think, where in the older days, when the government was the one that provided everything, that was the approach that they took and invested significantly in that infrastructure, but the stock going model is in use today. It's 80 to 90% of the heating and cooling demand is provided through that system. Um,

41:24

Laura, are you okay if I answer this question related to, how would district heating affect mortgages? Um, so the the point, I think, the point that is really resonated with me in trying to understand this concept, is that we currently have a utility that manages hydro. And so we have people who are able to get financing for their natural gas furnaces through Manitoba Hydro. And that doesn't necessarily affect your that doesn't affect your mortgage. This is just part of I mean, yes and no. I guess there's examples where if you have a loan that's not necessarily paid off when you sell your house, you have to make decision about what route to go there. But the infrastructure itself does not affect your mortgage. The natural gas infrastructure under your home does not affect your mortgage. It's the furnace in your home that is that would influence the value of your house in the same way that a a ground source heat pump would be the infrastructure within your home, but the actual, the actual infrastructure underground. I don't know if Laura and or Kurt wants to add to that or clarify any of that. I

42:42

think that was a good answer. And there's some of these things that like will have to be market tested to know for sure. Kurt anything. No, that's,

42:49

that's exactly Bethany. You got it thing on that, that the analysis we tried to do is to maintain the affordability of like, rather than individual building owners spending $20,000 and maybe recouping that that expense over the course of decades. We're talking about a utility taking it on, and then we pay it back on a monthly basis, but we but we pay a net no no more than what we're paying now net than what we're paying for energy, because we're doing it more efficiently and combating climate change at the same time, but but doing it in a way that

43:26

is affordable.

43:28

I like to build on what Kurt says as well. If you if you just consider electricity as energy, natural gas as energy, or hot water as energy, it's all the same thing. So how you get that energy and what you do with it. How it gets to your home, if you have an energy utility, as opposed to an electrical and a natural gas utility, then it starts to open up those potential avenues to bring hot water into a home. And consider it just like we do electricity

43:56

and a key, like an a strategic element of of the of the the geothermal approach is that we, we store energy when we have an abundance of it, which is in the summertime, and we or and we put it into into the ground, we store it and then draw it out when we need it. So it's, it's a change from complete always expending energy instead to making a more circular approach to energy usage.

44:29

Hey? Well, this pretty much ends our time for this session, but I can see that there was some attention to one comment in the chat about the myth of the carbon tax and carbon pricing. Do either of you want to comment on that at all just before we close it up? Because this is, you know, in Manitoba, they're saying that, Oh, we invested in green energy, so we should pass on the carbon tax. Any comments on that one?

44:53

I would probably, oh,

44:55

no, no, go for it.

44:59

I. It, I don't, I haven't seen the exact comment. So was it specifically related to, well, I can just speak to the carbon tax in general, and the point that we, we made in there. So the first thing just kind of quick, quick summary and general understanding for those folks who might be new to understanding. Oh, thank you for whoever posted this.

45:36

Yes, this is a very good point. I want to definitely validate whoever originally commented This,

the majority like when we're talking about green energy here in Manitoba, first of all, there's a lot of complexities that come with the environmental and human impact of hydro. But in addition to that, the reality is that a large portion of our fossil fuel and or greenhouse gas emissions is coming from heating our buildings using natural gas and also transportation. And so for us to say this is, is definitely, is definitely what I would consider greenwashing,

46:16

and

46:18

Manitoba is not doing super well is if we think about where we're at in emission reduction targets compared to other regions. Currently, Manitoba and Alberta are the only two provinces who have not decreased their emissions below 2005 levels, despite the federal government having targets that are 40% below 2005 levels by 2030 which would be one and a half election year cycles away for our provincial government. And so what we are recommending within our solutions is that we would actually bring the carbon tax back home to Manitoba to be able to use the revenue here, based on our understanding the solutions that we've presented into the in the road to resilience would qualify for us getting off of the federal backstop program and being able to use this revenue revenue here in Manitoba. But we as a as a Climate Action Team, are very open to any financing solutions that are feasible. We just feel like based on every economic argument that we have heard and analysis from other economists this, this appears to be the most affordability minded, human minded solution. So I would happily talk about the carbon tax anytime with anyone, which is probably a weird thing to say. I think most people want to avoid it, but I'll leave it at that for now. I.