



WEBINAR TRANSCRIPT
POWERING THE FUTURE: ELECTRIC VEHICLES AND THE TRANSITION TO ALTERNATIVE FUELS
HOSTED BY CANADIAN COLLEGES FOR A RESILIENT RECOVERY
APRIL 8, 2021

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[David Wheeler, Moderator, begins.]

Well, good morning, good afternoon, wherever you are, across Canada or maybe beyond. It is wonderful that you've been able to join this first webinar in the Canadian Colleges for a Resilient Recovery webinar series which will be running for the next few months.

My name is David Wheeler and I'm an academic and a practitioner in sustainability. I am exquisitely excited to be involved with Canadian Colleges for Resilient Recovery which is a really important initiative for Canada and a game changer for schools' agenda for the recovery.

C2R2, as we call it for short, Canadian Colleges for a Resilient Recovery, is a coalition of leading colleges, polytechnics, cégeps and in particular, institutes across Canada who are known for the sustainability who came together about seven, eight months ago for to advocate for and practice resilient recovery may look like in Canada.

And, in particular, to focus on the skills that will be needed to deliver a more sustainable, more resilient recovery in years to come.

So these leading institutions, already with a great reputation, and they're present in every jurisdiction across the country.

We are focussed on training and education but also in search and development and in demonstration projects.

And if you want to know more about C2R2, you're invited to go to the website which is www.resilientcolleges.ca, and you can find out all about coalition and what we're trying to do today.

Today's seminar is hosted by Red River College in Manitoba and I'm delighted to say the Red River College also is a national leader in sustainability and has special expertise in the topic for today which is powering the transition to zero emissions vehicles.

Red River College is situated on the unseated territories, the organize lands of the Anishinaabe, the Cree, the Oji-Cree, Dakota and Deni peoples and the homeland of the Meti nation.

And, of course, wherever you are in Canada today and will be very conscious of your presence on unseated territories wherever are you. And I think it is really important to see too and every participate in this webinar that we recognize the importance of indigenous inclusion in everything we do. Especially in building back together, especially in delivering a better future in years to come.



In that vein, I also wanted to know that for our founding partners that everything we do is about our students, it is all about our future generations of leaders who are going to drive the resilient recovery not just in the next few years but beyond. If we get a true sustainable, resilient out of this terrible tragedy, the pandemic, we will at least be rescuing some good from very, very tragic circumstances.

And we wanted to highlight just one student, just to make the point, really, on behalf of Red River College and coalition, that as we do you ever work and as we think a resilient recovery, we do need to think about the individuals that can shine in the resilient recovery. Here we're spotlighting just one amazing individual who is Ernestine Ledoux. And she, as you can see there [refers to slides], is currently taking social innovation and community development at Red River College. She's a strong advocate in environment and after graduation her goal is to develop greenhouses in northern Manitoba and raise awareness about the effects of climate change.

And Ernestine is going to be one much those leaders in her community who make a real difference, and it is our pleasure and our privilege to support students like Ernestine in her studies and in her future career.

So again, wanted to of emphasize the importance of individuals and their ability to make a difference this everything that CR2 does, and I'm sure the panel will be reflecting on the importance of supporting the students like Ernestine. And the many, many other students who will be driving Canada forward in this recovery.

So now let me quickly move now to our panelists.

And I am absolutely over the moon to introduce what is an incredibly powerful panel for this webinar. We have Jojo Delos Reyes from Red River College who is research program manager at Red River College and very involved in the zero emissions vehicles work that Red River College is doing.

We have the very well-known Jim Stanford who is the director of the Center for Future Work, and those of you that have followed Jim's work over the years with the labor movement and beyond will know that he is one of Canada's leading a economist and we very much look forward to Jim's contribution on the panel.

We have Cara Clairman of Plug N' Drive, who has an interesting background, for many years was with OPG and definitely knows the power industry extremely well.

But Cara has recently set herself free from the corporate world and has become one of the leading advocates for electric vehicles, not just in Ontario but nationally and internationally, so Cara will be telling us more about her work on the panel.

And John DeBoer. John brings a very, very welcome private sector to this panel and he's head of Siemens e-mobility business solutions. Siemens is a progressive company that is leading the way, really, with just a handful of others internationally on pursuing zero emissions as a corporation, not just in 2050 which is promise but much early so we should recognize Siemens and John DeBoer for Siemens in Canada.

So welcome to all of our panelists and I think we're going to have a range of very, very powerful inputs from all of our panelists.

But it is my job to get us to the panel discussion efficiently as well.

The panelists' contributions will be relatively brief, around 10, 12 minutes, in each case, and then we'll move as promptly as we can to the interactive parts of the event where



participants in the audience can also find their questions via the Q & A function, the chat function is actually disabled for today, so use the Q&A function at the bottom of the screens.

And if you have questions for any of the panelists, then please enter them in the Q & A function as a panelist is speaking and we'll try to pick all of those up during the interactive panel discussion.

I should also mention that we have sign language support from colleagues at Red River College today, and you can probably see Mandy there. I don't have it on the screen but she's just next to me on my screen. So Mandy, thank you very much for offering to provide the sign language support today. That's really important, again, the commitments we have and everything that C2R2 does.

So with that, I think this is probably no more introduction required other than to say that the topic for today could not be more important. As we all know, transportation is a major source of green house gas emissions in Canada and it goes back to our lifestyle, links to our culture, dependency on automobiles and while that might have driven the economy in the 20th Century, there will have to be big, big changes to vehicular transportation and indeed all other aspects of transportation in coming years.

If we're going to bare down on reducing greenhouse gas emissions across Canada and particularly this very, very important source of emissions for our country. We know how much trucking goes on in Canada. We know how many people own private vehicles. There are important policy and financing questions that come up. So this could not be a more important topic and I'm delight it had is the inaugural topic from our webinar series with C2R2.

With that I'm going to hand it over to Jojo who is going to share with us some of the work he does and introduce himself and his role at Red River College. So Jojo, over to you.

JoJo Delos Reyes

Thanks, David. Would somebody bring up the slides, please?

Thanks again and welcome, everyone. I've been to, as David mentioned, I'm Jojo. I'm a research program manager at Red River College and I'm with the college for more than ten years now.

I started as a researcher and have been involved in different sustainable research, including electric vehicles. Now I lead a small team who are continuing to work on related to EV. Next slide, please.

Red River College is one of the founding partners of the Canadian Colleges for a Resilient Recovery and we are proud to join the partners from across the country.

Can you move to the next slide, please?

Red River College is Manitoba's largest institute of applied learning and research and the only one in the province.

The college applied research model can be best described as developing and implementing solutions. The approach is more on answering the "hows" instead of the "why's". And if you're familiar with technology level, they tend to work on Level 4 and upwards. The College Applied research model can be best described as developing and implementing innovative solutions to real-world challenges. The approach is more on answering the "How's" instead of the "Why's" and if you are familiar with the Technology Readiness Levels or TRLs, Colleges tend to work on TRL 4 and upwards. As a technique, our

programs encourage learning by doing, developing the practical skills and expectancies in today's work, and giving the graduates a leg up in the labor market.

What does it mean to be a polytechnic? Our programs encourage learning by doing, developing the practical skills and competencies required in today's workplaces, and giving our graduates a leg-up in the labor market. We are Innovation-oriented. Our students work with local, national and international firms to solve technology-related challenges while building innovation-enabling skills through participation in applied research. For more than a decade now, RRC has been involved in advanced transportation-related research and demonstration initiatives that support zero emission vehicles. Next slide, please.

It is helpful to go back to 2010 when the Electric Vehicle Technology Roadmap for Canada was released through Natural Resources Canada. The roadmap includes an ambitious goal of 500,000 light-duty electric vehicles on the road by 2018. Obviously, this goal was not met, but we have made significant progress. Embedded in the roadmap are Canadians' perceptions of EVs, and the main concern back then are the effective range and the battery and charging concerns. We will revisit this page again after a couple of slides.

Understanding the effective range and other operational aspects of an electric vehicle has been the main focus of the Electric Vehicle Technology & Education Centre (EVTEC). Established in 2011 at Red River College with funding support from the Province of Manitoba, the mission of EVTEC is to support innovation, enhance education at RRC and increase public awareness of electric vehicle technology.

At that time, RRC, through EVTEC, had full access to an early version of the Mitsubishi iMiEV. We also had limited access to a Nissan Leaf and a Chevrolet Volt (a plugin hybrid). The multi-year operational testing enabled us to establish what we call the EVTEC model.

The model shows the minimum effective driving range from -20C and below and the linearly varying range in warmer temperatures similar to the performance curve from the Geotab.

One key experiment performed on both iMiEV and Leaf was the drive to depletion experiment. The question was at zero state-of-charge (SOC), can the vehicle still run and for how long. We have proven that it still can for a few kilometers, which essential to know as you look for the nearest charging station. The full report can be accessed through our website. Another operational aspect is access to charging stations. With support from the Natural Sciences and Engineering Research Council, RRC established the first Level 3 fast charger in the province. With the intent of understanding the impact on the grid as well as cold-weather operation.

One of our student-supported projects is to enable Level 1 charging. It may sound easy, but the way our powered parking stalls are configured created a welcome challenge to our student team before L1 charging was enabled. The goal of this project is to showcase a potential low-cost solution for workplace charging.

Now, let us go back to the roadmap.

The roadmap was timely and is still a good reference as we push for more light-duty EVs in Canada, but something is missing. The document does not include the roadmap for Heavy-Duty Vehicles. Next slide, please.

Under the radar, Canada and Canadian companies have emerged as leaders in heavy-duty vehicles' electrification. Over the last five years, that leadership is evident across the



country. To name a few, New Flyer and Nova Bus had their electric transit bus offerings; Lion electric, with its electric school buses and recently, launched their electric class 8 trucks; Dana TM4 is leading the way in its electric motors and electric drive systems; and Ballard is leading the way in fuel cell technology.

The electrification of heavy-duty vehicles and alternative fuel technologies represents an important area where Canadian Colleges can make a big difference. Colleges can support applied research initiatives, demonstration and testing, and lastly, training and workforce development.

Although Red River College certainly has been involved with light-duty electric and other vehicles, an essential aspect of our focus today has been on heavy-duty applications.

In 2005 and 2006, Red River College's involvement with heavy-duty alternative vehicle activities strongly began providing refueling stations and operational assistance for two major hydrogen-related bus demonstrations. Winter testing of the Hydrogen Hybrid Internal Combustion Engine (HHICE) transit bus and Hybrid Fuel Cell Bus demonstration.

Starting in 2011, the College played a vital role in developing and demonstrating the prototype electric bus. The College also supported the follow-up on-route pilot of four second-generation electric buses starting in 2014 with Winnipeg Transit. Two out of the four buses used the RRC redesigned battery packs from an international partner - Mitsubishi Heavy Industries.

Next slide, please.

So far four busses used the RCC design or battery packs from a international partner.

Next slide, please.

This slide shows one of the four.

Our involvement in the demonstration project led to the second led application of used batteries.

For motive applications, EVs and e-buses would typically replace batteries when the battery state of health reaches 80%. SOH is a "measurement" that reflects the general condition and its ability to deliver the specified performance compared with a fresh battery. We are currently working on the project to reconfigure older bus batteries into something similar to the eCamion battery-based charging station shown on the slide. We hope that once we prove the viability of repurposing used batteries, it will create opportunities for a low carbon, low-cost energy storage option specially if coupled with solar or wind energy as an alternative to diesel generators in remote communities

We hope that once we prove the viability of the batteries, it will create opportunities for a low carbon, low cost, energy storage option, especially if coupled with solar or wind energy as an alternative to these wind generators.

Next slide, please.

Manitoba has the biggest cluster of heavy vehicle manufacturing, and Red River College is prepared to support the heavy vehicle industry. Our Jan den Oudsten Vehicle Technology & Research Centre is where our new important asset is located - Motivelab.

The vehicle technology and research center is where our newest important asset is located, the lab.



A big thanks to our funders, Western Diversification, Canada Foundation for Innovation, and the Strategic Infrastructure Fund from ISED. Motivelab is a 7000 square feet climatic chamber with an integrated dynamometer testing facility. The facility can accommodate large vehicles, for example, a 40ft bus or a class 8 truck. The chamber can be set from -40C to +50C and can maintain it's setting within +/- 1C. It is essentially a freezer with a treadmill in it. The integrated 3-axle chassis dynamometer with regenerative AC motors allows for a fast response time and can simulate different ground topologies. It means we can simulate a vehicle driving uphill or different road terrains—ideal for testing EVs. It is worth mentioning that a 150kW DC fast charger from Siemens will be installed just outside the chamber within the next two months. Heavy-duty EVs that are being tested inside the chamber can be charged inside via pass-through access. Next slide, please.

In closing, there are many opportunities available in heavy-duty vehicle electrification that are extremely important for Canada. Colleges can play a significant role, primarily through ongoing training. It is worth mentioning that next week, RRC will be rolling out an e-bus basic training program developed for Winnipeg Transit staff. The goal is to bridge the knowledge gap and provide the necessary foundation for maintaining the electric bus. Finally, our focus is on "applied research" and practical implementation that are critical if electrification efforts are to succeed within Canada. It takes much hard work, and Colleges are positioned to help make it happen. Thank you.

It is worth mentioning next week RCC will be rolling out a training program developed available for Winnipeg. The goal is to have the knowledge gape and provide necessary skills for existing staff for maintaining the electric bus want

And finally, our focus is on applied research and practical implication that the critical electrification efforts are to succeed in Canada.

David Wheeler - Well, thank you, JJ. That was a really a tour he did force of the background to your work and the very excite things that are happening amount Red River College.

And you referenced the importance of training. And of course, one of the great things that C2R2 is take the amazing training you guys are going to develop for to support work in the industry and then share that across the country very, very quickly. So that's part of the beauty of the model I think we're building and it is great to have Red River College at the heart of that.

Because for sure there's going to be a lot of vehicle technician and other forms of training required that will be somewhat different to the vehicle technician training of the past. So wonderful that you'll be spearheading that not just in Manitoba but in the country and I'm sure maybe people will pick up on it beyond Canada as well.

So thank you for that.

If participants have questions for Jojo, I'll remind them that they can put them in the Q&A session while they're fresh in your mind so we can recycle them later. So thanks again, Jojo.

So at this point I'd like to move on to John DeBoer. And John, as I mentioned, it is head of Siemens future grid and e-mobility solutions, and we very much look forward, John, to your remarks.



John DeBoer:

First I want to say thank you so much for inviting me here today. I want to note that Siemens is quite impressed by the efforts that are being undertaken both at Red River College and across Canada to lead the charge for electrifying transport. You know I will fully acknowledge that a change of this scale is difficult.

And it requires industries that have existed for over a hundred years to evolve. And a key facet of that is the people, it is the training, it is the technologies, all coming together in a way that's exciting for customers, exciting for citizens and forms great add and modern cities.

So maybe just to share briefly about when we talk about electrifying transport, what sort of scale are we talking about?

And it is changing everything. It is changing public transportation. It is changing the fueling stations and pumps that we've been used to for the better part of a hundred years. It is changing workplaces. It is changing factories. It is changing plazas. It is the change of logistics centers, and parking garages, and public transportation so that there is a social equity associated with this movement.

But when we, at Siemens, look at electrifying transport, what we see that all of these elements are ultimately necessary for the success.

And I really, and I want to reemphasize the comments from Jojo, that Canada is an amazing leader in the electrification of the bus movement. I think the Canadian Infrastructure Bank is investing one and a half billion. The 5,000 busses that are planned sends a tremendous market signal towards the future of this change.

And I can say at Siemens we are also very hungry as a customer to change our company. We have a personal goal that by 2030, we will be net carbon neutral and I'm proud to say that as of 2021, we're over halfway to that journey.

But as we look over our next decade and really achieving the result for a large multinational company, electrifying transport is one of our own internal barriers, because what we see is this entire ecosystem has to change. So I'm really excited to be a part of this panel today. I hope over the next few slides I can share maybe a few of the challenges that are ahead of us.

And it is not to scare but rather to say how important the initiatives are that are acting at Red River College and ultimately throughout Canada are to our mutual long-term success.

John, this is David here. I wanted to let you know that your sound is coming in and out a little. Which may be because you have another device.

Nothing I can do about it. Sorry about that.

That's all right. Maybe just stay as close to the mic and as still as you can.

Will do.

Thank you. John.



Will do. Absolutely.

Sorry about that.

Can you hear me okay?

Yes, indeed. Yes.

Excellent. So the first thing I wanted to reflect on as we begin to electrify transport is that there is a very well-established system. But that system is predominantly associated with the vehicle. So when we oftentimes picture electrifying transport, we talk about the car. We talk about the truck. We talk about the van. We talk about the bus. These are the things that often time comes to our mind.

But when we really start to look at the new world, what we see so that there is a new infrastructure that is critical for the success. We start to talk about how do we work with electric utilities for supplying the power and how do we ensure that that power is resilient with the right micro grid and islanding approaches.

We start to see that the charging infrastructure, the chargers themselves, become a critical facet of delivering and ensuring reliable service.

And, as importantly, we start to talk about the people. And we realize that re-skilling a new generation of workforce both to run the vehicles but also to manage this new critical infrastructure is of utmost importance.

And then finally we look at the business models where we recognize that there are changes and in policy that will be necessary, that there are new ways to be made for delivering this complete ecosystem so that our society can continue to deliver both people and goods in the most effective way possible.

So for the purposes of today, I'd like to just briefly highlight some of the challenges that are associated with infrastructure and training and the exciting things that are coming at Red River College.

So the first is on the technologies. And when we start to talk about electrifying cars, advance, busses and trucks, we have to recognize that there is an entire suite of charging technologies that are necessary to accomplish this goal.

And the most visible part about that is the chargers themselves. So they'll range, you know, from small chargers like you'll see on the left-hand side that fit in the palm of your hand, all the way through the infrastructure for charging busses like what we're doing at Red River College where these equipment will weigh 7,000 pounds and are a key piece of city infrastructure, they're a key facet of urban planning in many respects and they're a new form of critical infrastructure.

But we go beyond the chargers.

What we actually tend to see as we transition from a parking lot and fuel pumps to an electrified future is something that we like to refer to in Siemens is "plug to grid." The complete transition of the supply for these new vehicles.

And it gets into the charging stations. It gets in to a whole array of infrastructure devices that we oftentimes in the industry have [unclear] to the make ready equipment or the



low and medium voltage electrical equipment. We get in to battery storage and the ways that we ensure that these new pockets are resilient and available.

And incredibly importantly we get into how this fits into an amazing and diverse electrical utility infrastructure that ultimately powers our homes, businesses and our lives. So when we talk about success and really bringing at scale the electrification of transport, it is important that we look at this entire conversion of infrastructure and all of these pieces and we recognize that behind the scenes there are new skills that are required both in the technologies, in the design principles and how we build and construct in the amazingly diverse and critical software and applications that are associated with running this new ecosystem. And left it be forgotten in the service. Because what we find is that the need for cities as they go through this transition is to have a new great and modern workforce that is capable of keeping this equipment up time and available 24 hours a day and seven days a week.

So I'm really eager to get into the panel discussions later but I first have to acknowledge and highlight Red River College. You know, I can say on behalf of Siemens we're excited to work together to go through factors such as future environmental testing, interoperability testing, looking at the evolution of firmware and software, using this as a highlight for the amazing power of Canada as a leader in the leader of transport. And for me from a most passionate perspective, developing the next generation workforce. Because when we take examples like the Canada infrastructure thing and the run and a half billion that's planned for the busses, what we quickly see is that there are over 5,000 new drivers that will need to be trained, retrained, or positioned for their roles and over 500 new individuals that will have to work in over 200 cities to support that infrastructure. So I'm excited to see what will come from the programs here, and I look forward to the journey that we're heading on together. So thank you so much.

David Wheeler: Thank you John, and again, a big thank you for reinforcing the training and the training you have with Red River College which is indeed pretty special.

I did want to, again, emphasize for participants what it is a big deal it is that Siemens has this 2030 goal and that is driving the entire strategy of the organization. There is literally just a handful of the major corporations around the globe that share Siemens ambitions in that regard so it is a real pleasure to be able to reinforce John's message and to recognize and acknowledge the importance of the strategic leadership that Siemens is showing both in Canada and globally, it really is a big deal. So thank you for that, John, and for your remarks.

And now I'm delighted to introduce Cara Clairman who as I mentioned before at the career in the corporate sector as well but is now absolutely driving the agenda around the uptake of electric vehicles in Ontario and Canada generally. So thank you for joining us today and we look forward to hearing what you have to say.

Cara Clairman:

Thank you, David. And thank you so much for the invitation to be here. I'm pleased to be here and talk a little bit about Plug N' Drive and about the resilient recovery and the role of colleges. So thanks so much for those earlier remarks from JoJo and from John, really, amazing to see what's happening at Red River College and hopefully at all of the colleges across Canada.

I'm going to step back just for a moment to make sure that this point doesn't get missed. It is sort of, assumed, I think, and it is underlying a lot of why we're even talking about EVs at all. But not everybody knows it. Which is I think David, you alluded to transportation as a large emitting sector but I think people sometimes don't realize that transportation is actually the largest emitting sector in many jurisdictions. This [on the slide] is numbers from Ontario. But every where in Canada transportation is number one or number two. And so we really can't hit our climate goals at all if we don't tackle transportation. Certainly Canada can't come anywhere close to its climate goal that it set for Paris Accord if it doesn't tackle transportation. So that is why initiatives like you're hearing about from Jojo and John are so important that we speed it up. And not just that we, you know, let the market sort of happen on its own but we have to do things to speed that transition up.

And I can another real advantage we have in Canada is we have a relatively clean electricity grid. This is again, is Ontario [referring to slide], where we have mostly nuclear and hydro on the grid with small amount of renewables, a little bit of natural gas running at the peak. Then you take Manitoba, British Columbia, Quebec, almost entirely hydroelectric. And so across Canada, about 80% of the grid is low to no emitting. So we have this huge advantage where if we're going to plug in electric vehicles, may they be cars, busses, trucks, we are going to be plugging in to very low emitting electricity and dropping these greenhouse gas emissions in many jurisdictions by as much as 90% or more. So this is the reason so many of us are working on this issue and why it is so important.

And you know, take Ontario as an example with electric vehicles, such a perfect fit with electric cars because most people are going to plug those cars in at night and at night, in most jurisdictions, the electricity is actually cleaner than it is in the day because you're running base load electricity, typically fossil fuels are peaking operations and they run more at peak times and less at night.

So for all of these reasons, just makes so much sense for us, for Canada to be a leader and to move quickly to electrify its transportation fleet in all areas.

And you know, it's interesting because, you know, I've been at this for about ten years, and we talk a lot about the environmental message. But there are a lot of other reasons that EVs make sense.

Certainly it is exciting to be in a position to be able to say like we've got loads of makes and models to choose from these days. We're up to about 40 plus now and all predictions will say that Canada will have as many as a hundred by the end of 2022, if all of the models that have been announced, you know, come to pass.

And so this issue of there isn't one I like or I'm waiting for the truck or the SUV or whatever, these are issues we used to hear. About those issues are pretty much in the rear view mirror.

And same with range. We used to get a lot of people talking about range anxiety, concerns around range. You still hear it but the reality is, this issue is going away because of the infrastructure build out that we're seeing, because the battery ranges are improving and the efficiencies are improving, you know, you got many makes and models of can I lop percent range, many with 400 or more, so that issue is going away. And finally, you know, I talked about the environmental benefit, the economic benefit, is there as well and there's the personal economic benefit in every part of Canada, electricity is much cheaper than gas. It is

about one fourth here in Ontario, in Manitoba it is even better, it is about a six or a seventh even depending on the price of gas. And same for Quebec. So we have a huge opportunity actually to save money.

And the reality is, Canadians, once they realize they're going to save are going to switch en masse.

And this the message we really have to help get out to the consumer because they see that sticker price, the vehicles cost a little bit more, and it is really tough to persuade people, pay now to save later.

And but we have to help them with that. We have to help them understand the benefit of that and, you know, we need some of the banks to step up and offer really innovative financing to show that savings so people aren't showing the pinch up-front because difference in stick sticker price is still persuading people to say not this time, the next vehicle. And if they do that, you lose them forasmuch as seven years.

We don't have time for that. Climate change is urgent. Seven years from now, we're kind of past the point of no return. So we want people who are looking for a car today to be the ones to say no, you know, this makes sense for me and we need to help them with that.

So the you know, I'm not going to spend time on Plug N' Drive. We're mostly about just reach and consumer awareness. We do a bunch of other things in terms of research and policy work but check us out on the web if you're interested.

One thing I will say is we do have our EV Discovery Center, which is a car showroom in the Toronto. If are you in Toronto at some point, probably right now because we're in lock down, but maybe in most, please come and visit us, super fun place toe test drives all of the makes and models with no pressure to guy bye anything. So people love it. We've been running there for four years and the crowd still comes. So please visit us if you can. This is just another view.

We launched this spring a mobile unit talking about resilient recovery because what we realized is not everyone is in striking difference of the greater Toronto area. We actually know Toronto is not the center of the universe. So we built a mobile EV study center on wheels that we can take to different communities. We spent two months in Ottawa in the fall. You can see it is open to the air so perfect for the COVID times. We're heading out to BC in the spring, COVID permitting and we'll travel across Canada from there. So hopefully we'll be in a town near you sometime soon. We love to visit college and university campuses because we want those folks to never drive a gas car and they don't have. I got university aged kids and they've actually never driven a gas car so it is all possible.

So visit us if we're the neighborhood.

In terms of the consumers and resilient recovery, one of the things that we're working on is helping consumers get into is used EVs. And this is really, really important, because what we found in our survey work is that lots of people love the idea of an EV but they think they're just too an expensive.

And, in fact, being too expensive was the number one issue people raised, more than range, more than makes and models, more than anything, about the reason that their not choosing an EV.

And so we were fortunate to partner with a family foundation, the Brigham Foundation, to be able to bring forward a rebate on used EVs. And this is really helping the middle class get



in to EVs, folks who thought they couldn't afford one, used EVs are really affordable. And this is a taunt for people to get one. And most people have sort of, I would say the number one benefit of offering a thousand bucks is not even the thousand dollars but is the awareness raising where people went oh, I didn't realize I could get a used EV. Because people think they're you too new. But there are actually a lot of used EVs available.

So anyway, if you've been thinking about EV and thinking you couldn't do it used makes that possible. We've been lobbying the feds to make it national. It was in the mandate letter but there's a budget coming up so maybe, fingers crossed, let's see.

We also sell chargers on our site just to help people get a home charger, including your Siemens Versa Charge is on there and every other make and model you can think of.

We don't make money doing this stuff. We do it because people don't know what to do and we don't want this to be another reason they say no.

So it's a pretty exciting time in electric cars, you know, for those of us who have been at it for awhile. It is exciting now to be like on the growth curve. I think for awhile it was hard, for those of us in this space who are toiling away and people thought it wouldn't happen. We're past 7 million cars worldwide. A lot of those are in China but growing worldwide which is exciting to see.

And you know, the latest numbers are just more reason to be optimistic. We see 500 makes and models worldwide by the end of '22. That's just like a year and a half away.

So incredible and investments in every country.

Billions and billions of dollars of investments.

So you know, this isn't a if, it is a when and we're just trying to speed up that.

Some, like, I have no crystal ball but some folks, Bloomberg, in particular, are predicting even by 2030 we'll be at, we're at 7 million now, we'll be at about 26 million cars across the globe. Canada is at about 150,000 right now. You know, there's no reason we shouldn't be at a million cars by then.

So you know, big goals, about but, you know, it is possible with the growing models and makes that are available and the increasing supply. Right now Canada's biggest problem is supply. It is hard to get an EV even if you want one. They're just not plentiful. So you got to bug your local dealer to try to get a few on the lot.

And I just like to close out with a little bit about COVID and how is that helping our hurting our resilient recovery.

It looked initially like it was hurting. We did see a drop, next, in the use of public chargers because people weren't driving as much. We did see a lull in sales.

But the data is all pointing in the right direction that everything is rebounding in terms of vehicle sales and use of public traveling.

Now, people are traveling less for sure which, of course, makes sense during a pandemic. But the decrease in range of driving has also got people thinking well, I don't drive very far, maybe an EV is totally fine for me.

And I think when everyone stopped driving, we saw this incredible improvement in our air quality. And if you live in a big city, you noticed it. And then we all thought wow, we have this great air quality all the time. We don't need to go back to that air quality and we should all be moving to EV just for on you other health.



There's also a huge jobs opportunity, the clean energy Canada just put out a study, if you haven't seen it, you should go to the website, it is called the fast line, predicting half of the EVs in Canada it shall excuse me, about half of the vehicles sold in Canada did will be EVs by 2030, and that the jobs right now are in the low 200,000 for EV industries that they will more than double that be by 2030. So lots of career opportunities for new grads.

So this is a field worth getting in to and learning about. We're going to see 20 to 30% growth in the sector every year interest now to 2030. So interesting stats from clean energy Canada.

And as I said, if you're keen to know more about the air pollution angle, we don't talk enough about the health impact of our cars. Clearingtheair.CA has a great study that shows if we all would switch to EVs in the greater Toronto air, we would save hundreds of lives reduce emissions, and save about \$2 billion in social costs, including hospital visits, asthma attacks, medication, etc.

So taking a look at that if you're interested in the health angle but we should all be concerned about that.

And I wouldn't be in the non-profit game if I didn't thank my sponsors. We can't do what it does without the help of all of the sponsors and we really appreciate all of the support, especially during these tough times. [Refers to slides with sponsor logos.]

If there are students on this webinar, I hope you're thinking about EV as a future opportunity, career opportunity. You know, we have three auto makers here in Ontario who are converting their factory manufacturing facilities to EV manufacturing. GM, Ford and Chrysler have all made commitments to make EVs here if Ontario. That's a huge news for Canada. We're going to have a robust auto sector for years to come, and it is a great opportunity for students and with countries banning gas cars and gas stations installing chargers right, left, and center, we know this is going places, it's not turning back.

So I will leave it at that. I look forward to taking your questions.

David Wheeler:

Thank you, Cara. The passion for your cause shines through. Especially on Zoom.

What also shines through, of course, is the absolute object of the argument you're making because it is very hard to argue with all of those benefits, all of the stats that you've mentioned. And thank you again for settling back to the implications to the students.

This is a great area for our students to be pursuing.

And I wanted to mention that the primary catalysts for the pore formation of C2R2 was the publication of the report of the Task Force for a Resilient Recovery, and, of course, I'm sure you were a consultant in that, Cara, because they very pointedly identified kick starting Canada's zero emissions vehicles sectors as one of the five key areas for investment for Canada for the future.

So let us hope that that recommendation is more than fully taken account of in the forthcoming budget and that all of the incentives and all of the support for the growth of the industry that you are advocating for comes through because it clearly, as you said, is a major part of delivering on Canada's green house gas emissions car gets.

So for now, Cara, thank you. And we will look forward to questions coming from our participants in the plenary in 10, 15 minutes.



Meanwhile, I'm delighted to introduce again Jim Stanford who I'm sure will be known to all of you. As someone whose opinions are always taken seriously usually on the economy in Canada.

And Jim is based in BC so no doubt Cara, you'll be seeing Jim at your launch of your advocacy in BC as Plug and Drive goes national.

So Jim, as we mentioned earlier, is head of the Centre for the Future of Work which is a really important role in terms of our agenda. It is just a great pleasure to be able to welcome Jim to this seminar. Jim is not going to use slides. He's just going to talk from the head and from the heart. So Jim, over to you.

Jim Stanford:

David, thank you very much. And the whole team at C2R2 for having me with this panel and just for the incredible initiative of the Colleges for a Resilient Recovery. I just think it is marvelous to see the colleges taking a proactive leadership role in this whole transition and recognizing both the need of young workers in the future in Canada for training that can give them great jobs in a net zero economy and the role of colleges in making that happen.

So I'm just so thrilled with what you're doing.

I have to confess, David, every time I hear C2R2, I immediately think of R2D2. So I've actually brought along my friend with me to join the panel today. So if there are any technical questions about robots and intergalactic affairs, I'll consult with R2D2 here.

And just thrilled to hear the very inspiring words from all three of the other panelists. Everyone, obviously, recognizing this is going to happen.

This isn't an if anymore. This is a when. And recognizing the huge opportunities of the transition to a net zero economy and making sure that Canada has its rightful place as a leader in it, rather than a laggard in it. And Jojo, I thought that was an amazing story about the facility at Red River College and I know Mohawk and the other members of the alliance are just doing great stuff.

So thank you.

Cara, you mentioned your kids have never driven a gas car. So this is great. My university aged kids have never driven a car period. So that's another sign of the times, frankly, in terms of urbanization and public transit and everything. So amazing how the culture is changing before our eyes.

So is this is encouraging.

Now, this is, of course, for me as a labor economist, this is a very exciting time, a very challenging time, but lots of opportunities for us and there is a silver lining in the pandemic despite the horrible harm and suffering that it has caused if terms of forcing us to wake up and smell the cappuccino, if you like, about where the future jobs and opportunities are going to come from.

And all of our challenges about employment transitions and skills and so on now, and for some years to come, are going to be phrased in the context of the pandemic and what it has meant for our labor market. This has just been, you know, obviously a dramatic shock to our labor market, the most dramatic shock to our labor market since the 1930s and unfortunately, we're not done yet. We've got a few months of hard slogging ahead of us want

What started out as the supply shock with shutting down industries that had closed for health reasons, the face-to-face hands on industries like retail and hospitality, transportation, etc., and that's still happening, of course, with the in you shut downs in this terrible third wave.

It is has also merged in to a bigger demand side recession. And even though we've won back a fair share of the jobs that were lost in the initial months of the pandemic, we're still well below where we need to be. And the difference of where we were to where we are, in and of itself constitutes the biggest economic down turn since World War II.

So it feels better economically and employment wise than it did last may May but we're still in the soup.

And the reality is that even if the vaccines were all out tomorrow and everybody took them and they worked, luckily we do think they work, which is great, we'd still have a major problem ahead of us. I think it will be years for us to rebuild the quantity of work in Canada's economy. Just getting the vaccines in people's arms isn't going to have us automatically snap back to where we should be. There's still issues about spending power, business economy, about investment, about exports, that have to be resolved. And government having to have to play the leading role in what I've called kind of a national reconstruction plan for [unclear] years. And I'm hoping the federal budget will again, reaffirm the government agencies recognition and the need for the type of leadership to get the macroeconomic ball rolling. That is the only that has the authority and the ability to act on a national level to make, to get the overall macroeconomic momentum reconstructed or rebuilt.

And as part of that, of course, we need to be thinking about the quality of our economy and addressing issues like the energy transition.

The pandemic, of course, in economic terms has, in a way, highlighted and being a set accelerated the energy transition. That's obvious. We saw a big shock in the energy prices. Some recovery since then. But clearly this episode, this year, has highlighted that fossil fuels are never again going to be an engine of growth for Canada's economy. There are other engines of growth that are out there and we might as well seize those and then think about how we make itself transition from an economy that was traditionally fed by resources of various kinds, fossil fuels is the latest wave in a whole wave of staples or economic waves in Canada's history and start thinking about how we can move to something more diversified, more value added and, of course, more sustainable. We have done some work on the nature of the labor market transitions that will be associated with the changing numbering makeup of Canada's economy, and I'll send around in the chat a link to the report that we did on this subject.

We study in detail where Canadians work in fossil fuels now, what are the prospects for those jobs over the coming decades as those transitions occur, it is not going to happen overnight but as Cara said, we can't waste time here, we have to be moving as quickly as we can. And I, in a way, found some surprising findings, I think, giving the common tone of debate and discourse that we got in Canada where we've got a certain session. Of business leadership and political leadership which argues that we are completely dependent on fossil fuel industries and if we move away from them, we'll suffer mass job losses and mass economic losses.

And I think quite to the contrary, our research has found some surprising findings.

One is that the size of the required transition is smaller than is often argued by some with vested interests in trying to retain or it can to subsidize the fossil fuel sector. We found



that less than 1% have a direct position in follows till fuel production systems. Of course they are not evenly spread across the country. If they were, this wouldn't even be an issue. But because of the regions, Alberta in particular, where 7% have [unclear] employed people have direct jobs in fossil fuels, that makes it a lot more challenging there and a lot more complicated for our federation but still manageable.

We also showed most of the work in these employment transitions over time is achieved not by sort of the direct motion, if you like, of someone from a fossil fueling job to a renewable energy job. It is often termed in phase of someone is going to move from being a roughneck on an oil well to producing windmills in a windmill factory and connecting the dots in that kind of simplistic way is not actually how the labor market works and there's a huge range of ongoing dynamic forces that allow us to adjust to changes in the economy quite effectively managed a multidimensional way.

Remember, less than 1% of employed people working in fossil fuels. There are jobs in renewable energy systems and we're talking about those today and that is about 1% of the economy, of the labor market. So why would we limit ourselves to just taking that 11% and trying to shift it over to this 1%? There's a whole other 98% of the same market that is going to be a key part of the transition that is are involved.

And very few of the transitions are actually going to involve someone doing an old fossil fuel job and moving them into a new renewable job.

Most of the work, if you like, the heavy lifting, in the transition, is going to be associated with the normal adjustments and flows that appear happen in our labor market all the time. People joining the market, people leaving the labor market, people retiring, people changing jobs, changing careers, and so on.

Think about it in Canada today, less about, 20% of employed Canadians, have been in their job for less than a year. So that just gives you a quick input of how flexible and how dynamic the labor market is all the time. And in this context, kind of the transition starts to take on a different idea.

If we can enlist those regular forces of labor market adjustment over time, then we can facilitate this transition very smoothly, I think, if we gave proper planning, proper notice, proper support for all of the workers involved.

Both those who will be leaving non-renewable jobs and fossil fuels in related industries, leaving them for various reasons, including just because they got old and retired, in fact, that's how most of those jobs are going to disappear. And then the new positions that are opening up in new industries like electric vehicles that we're talking about today.

If we plan that whole transition over, say, a 20-year period, we could actually phase out all of those jobs in fossil fuel industries by shifting about 8,000 jobs per year in to another part of the labor market. And 8,000 jobs in the context of Canada's national economy is very small. That's what the economy would normally create in ten days.

So phrased in those terms, in that context, a long run gradual transition where we're enlisting all of those forces of adjustment, you could do it absolutely without destroying people's livelihoods, without disrupting communities, and so on. And there's lots of international examples of planned, gradual, supported, long-term transition that is have been immensely successful in places like Germany, Spain, Netherlands, Ontario is a great example when they phased out coal fired electricity in a planned way.

Cara might have been part of that process, [unclear] a single involuntary lay off, all through transitions, including subsidized early retirements and so on. And this can be absolutely done. And our report, with a link I sent around, has a list for best practices how it can happen. In general, it is not a question of taking someone from a non-renewable job and removing them into a renewable job on the other hand, there are cases where the dots can be connected that easily and electric vehicles is one of them.

So in a in a way this is low hanging fruit for us in terms of thinking about the overall labor transition. We make cars in Canada. We're a leading automotive producer as a country. We have a tremendous reputation for product, skills, and quality. And we can absolutely make electric vehicles. In fact, it is already happening, of course, and Cara mentioned the big investments being made in Canadian electric vehicle production by Ford and GM and Fiat Chrysler, my former union was a big part of that process in terms of getting ahead of the curve and negotiating what the future of those jobs are going to look like rather than sticking your head in the sand and see what changes. That strategy doesn't work very well very often.

We thought about [unclear] the transition from the assembly line process for an electric vehicle is not that different for combustion and there will be some new skills and new practices that have to be hand, particularly around new materials handling things like lithium and the material handling relating to the batteries. Issues around bonding and welding and so on. Those are absolutely the truth.

Anything like industry 4.0 and by the way, a continued effort by the companies involved to try and cheapen and outsource as much as of the skilled work in factories is an aspect. And to be frank, some of them are going to try to use the transition to electric vehicles as an excuse to outsource all of the work and break down traditional skills, requirements and so on. And we have to guard against that. We have to make sure that the skills and the new generation of auto production are high quality, regulated, held to the highest account, not cheapened and outsourced.

Also the big bigger issue, frankly, in vehicle manufacturing, is to make sure we defend the Canadian footprint in our industry. The industry is important but it is not as big as it used to be and there's still pressures around globalization and the companies involved, wanting to move production to cheaper locations that frankly pose a bigger threat to our city than the electrification process. And I do think there is some great opportunities not just to facilitate the transition to electric manufacturing to the conditions that are already here but to think about new companies that could be brought to Canada or built in Canada. Canada has a great all the auto producer, Magna, one of the biggest in the world. It is capable of manufacturing complete vehicles. In fact, it does that in Europe. They would be a great manufacturer to produce electric vehicles for Apple or some other brand name that wants to do it or perhaps to do it in their own name. And government should be right in there with lots of support and co-investments and other support to make those things happen.

The skills challenge will be bigger in the auto parts side of it than in the vehicle manufacturing part of it. And this are more jobs involved in parts splice than there is in final manufacturing. That's where you're going to have entire factories that change from producing engines and transmissions to producing batteries and related systems.

So I think that challenge will be more significant and government and the employers, OEMs, and the colleges have to be right there in the middle of making sure that we preserve as



many capacities in Canada as we can, that the judge generation of auto parks workers is getting the skills and support that they need, and I think colleges are vastly overlooked as a vital part of our labor market infrastructure in Canada.

They don't get the attention or the money that colleges need. And this transition is just one example of why we need colleges. We need colleges to be well funded, to be stable, to be cutting edge, as we saw with the Red River facility, and in partnership with government and industry and unions, they can absolutely make the best of this opportunity that's ahead of us.

I'm generally optimistic and after this panel today, I'm more optimistic than ever about what opportunities are lying ahead. So thanks for all that you're doing.

David Wheeler:

That was fantastic, Jim. Thank you very much.

I think you can count yourself appointed the honorary economist to C2R2 based on those three remarks.

That was great. And particularly good that you could tie in the complimentary roles of labor unions, to government, of course, and the education sector, the colleges, because this can only work given the dynamism of the labor market that you've described it we're all pulling in the same direction.

So many thanks indeed for reinforcing that important systemic question, how do you make sure all of the parts that make for a vibrant environment work together so you avoid breakdowns in the supply of qualified labor. And we got against the erosion of standards with us, you know, employment standards or safety standards or anything else, because we outsource everything. All of those things are real and present dangers and hopefully in Canada we can avoid the down sides of the way markets sometimes operate and we instead put in place the high standards and the opportunities for the young people and not so young people as they pursue their careers in all of these different areas of the greener economy.

So many thanks.

So now we're at the plenary part of the discussion. And so I would encourage participants to add their questions into the Q & A space which you'll find at the bottom of the screen. And if you want to access Jim's link that he's very kindly provided, that's in the answered section.

But maybe if I'll use facilitator's privilege here and kick things off for all of our panelists and ask you to think a little bit about the way Canada works. Because, of course, Canada has not yet covered itself in glory in terms of meeting its green house gas emissions challenges. Although we hope that that changes. And sometimes people think it is difficult to get things done in Canada. Because we're all so nice to each other because we did it ever to the provinces and then we did it ever to whoever is making the most noise from one week to the next.

Any of our panelists can answer this, and I would encourage you to all just unmute yourselves as fast as you can.

Do you think we can get our act together on this transition?

Do you think the 1 million new jobs the unprecedented investment in skills, do you think we can pull that off, given the size and the complexity of the challenge?



Jim Stanford:

Well, David, I'll carry on with my rabidly optimistic view of the world that I just finished speaking about. I absolutely think I can. And I, in discussing this over the last few months, I have used a historical analogy.

I think about World War II and the national reconstruction plan, if you like, effort, that came at the end of World War II. That was another time when we faced an immense national challenge where we through all of the resources that we could into it.

Nobody cared about the deficit when we were fighting Nazis. We knew we had to do this and we had to do it with everything that we could. And we went from chronic depression to full employment almost overnight.

And at the end of the war, in fact, before the end of the war, the government appointed a department of national reconstruction and put C.D. Howe, you know, one of our most revered civil servants, I guess he was a politician at that point, in charge of planning a reconstruction strategy that involved more ambition, more infrastructure, more skills, more social benefits.

And we entered a period of unprecedented growth and inclusion, really. And I think we can do the same thing.

And I'm encouraged by the government's indication that it has an eye on a longer run reconstruction that's not just trying to get through the next few hard months. We've got some money already set aside in the budget for the sorts of investments that are going to be required, including in building new industries like EV and enhancing our skills capacity.

So there will be debate over it, we've already seen debate, we've heard some of the same voices saying government must get out of the way and let private sector do it all and focussing on reducing the deficit. That would be a an owe form us mistake and I don't think Canadians over the last year are going to believe it because they have experience that the government's role in protecting us and leading us through this crisis is absolutely vital. So there's my optimistic take on your question.

David Wheeler:

Thank you, Jim. John.

John DeBoer:

And David, what I might offer to this is a little bit of a challenge here first, you know, I would say from my vantage point here at Siemens I've had opportunities to watch countries like China, countries like Norway, Germany, although it had a slow start, how it sped up.

Go through this transition. So first, it is possible. And it is possible to drastically accelerate the trend for he electrifying trance for the.

Second, is critical and hi that clear that the world is changing. And oftentimes when we look at this, it is looked at in the microcosm of our local governments. But what we have to recognize is that there is a worldwide multi-industry transformation that is happening right now. So when we start to look at the imperative behind that, it is quite sharp, right?

The failure to react has been met in history many times with very difficult consequences.

Now, that being the case, I'm very optimistic for Canada and I'm very, very excited by what I see.

I look at the base of different vehicle manufacturers, we look at some of those previous presentations in clean energy supply and there are many elements that are to go scale against. I have often marveled have at organizations Qtrik up in Canada that are looking at ways of innovating the very business models that are associated with electrifying a transport and it is exciting. But the challenge is still there and it is not a given.

David Wheeler:

Thank you, John. That's again, a great point you made about comparing what's going on internationally.

There's a couple of questions come in, and I think the first one, again, applies to most of our panelists but I think I might start with Cara in answering this one.

So a question that says, if electric vehicles require fewer parts, especially with the lack of complex engines and parts that don't wear out as often, such as breaks due to regenerative breaking, is the parts industry and the service repair industry as a whole facing inevitable contraction?

So does this ever come up, Cara, in your world about some of the unintended consequences, perhaps, in certain parts of the labor market of this transition to electric vehicles

And then I guess probably other panelists will probably have a perspective on that as well.

But let me come to you first, Cara.

Cara Clairman:

Yeah. So it comes up quite often, certainly you hear it as a reason or as a potential reason why dealerships may not embrace EVs. It is never proven as a reason but there's a suspicion amongst EV supporters that dealerships shy away from them because there's going to be a lot less service and that's where a lot of the money is.

I don't really think that's the case. I think most of the reason, if at all, dealerships struggle to promote EVs is they just don't have any, you know.

Our research has shown that if the dealership has some on the lot, they're pretty good about trying to sell them. But of course if they don't, they're going to try to sell something they have. And here in sales, that's a job, to sell what you have. And you can't really blame those folks for trying to sell the gas cars they have on the lot.

So we have to help with the supply.

But on the parts, definitely the folks in the after market are concerned about what will happen.

Now, you know, they will there will be gas vehicles around for quite some time, especially used ones, so it is not anything that is urgent.

But certainly that's a reality.

There are servicing requirements but they're more computer than car. So it is a different skill set but there will still be skills needed. And a of course of course, you are still swapping tires and there's certain things that don't change.



But for the most part they say it is a, you know, really an order of magnitude less, and I can say that I've experienced that myself, having driven EVs now for ten years and have never yet had to have any vehicle I've owned serviced even once. Like at all.

So you don't have to visit anybody. So it is fanning taps particular for the driver. But maybe less fantastic for the service provider.

David Wheeler:

Thanks, Cara. And I guess, Jim, you would probably argue that this is part of the give-and-take, right, there will be certain things that contract slightly over time, certain that I can that may expand slightly?

Jim Stanford:

Yeah. Certainly. And, you know, on the one hand you could say this is a challenge, the fact that electric vehicles are more reliable.

And require less service and break down less often. Is that a bad thing? There is nothing in our lives that we would say gosh, I wish things would break down so we could fix them. So there's going to be issues at the dealership level and maintenance end of things. On the other hand, if consumers save money, and Cara has proven that they will, they are going to save money on other things, to have jobs associated. It isn't to be blithe about the transitions and what they means for mean for the individuals involved, but from a macroeconomic perspective, this is not an issue or this is a good thing, not a bad thing.

And as long as we're supporting people with skills and in the context of an over all, you know, very expansive macroeconomic plan, you know, we have to make sure that people are spending money, and that those jobs are going to be created in other places. Then, you know, honestly, in some ways, we aren't even going to notice these transitions as they occur.

John DeBoer:

One thing I would add on to that that sometimes isn't in the conversation is we see the loss of the spare parts of the vehicle and we see the risk to oil and gas, I mean, these are just very present realistic aspects of the transition.

But when we look across the entire energy spectrum we also have to realize there is a growth in the electrical industry and that those are local jobs at utilities, power generation, local contractors. I mean, there's an entire ecosystem that moves beyond just the vehicle to the entire value stream that's created, and it is a local energy supply, you know. It very oftentimes the power is not generated across the country or internationally. It is generated locally.

And with the powerful transition to clean power, that point is further emphasized. So I would just encourage also looking at that even broader transition that happens in the marketplace and the very exciting premise that as electric vehicles are increasing we also find a higher ability to sustain renewable energy on the grid. We find we can get the grid more resilient and more stable and in many cases there's also the need for local jobs to enable that infrastructure at the next scale.

David Wheeler:

Great points, John. Thank you. And another question has come up and that I think I'll come to you to start, with again, John, but again, other panelists will be invited to chip in their perspectives as well.

And this is about the potential for the misuse of monopoly powers in the vehicle repair markets. So one the question area is one concern I personally have is what degree do private industry use proprietary charging and monopolize the vehicle repair market?

Do our panelists have any insights in to tech [unclear] they can they can. So this speaks to the roll of government in putting on infrastructure everyone can benefit from equally across the country. John, please address that and then we'll open it up to the panelists.

John DeBoer:

Absolutely. That's one that resonates with me very deeply as a ten-year EV market. To be blunt, that is something in north market when you compared compare it Ott rest of the world. North America has had a challenge, I mean Canada and the United States, is that there has about the build out of many proprietary standards system that is are not open and accessible.

So one of the key elements that I'll say we advocate for at Siemens is just one player in it amazing transition is to ensure that as we are funding this infrastructure build out that the infrastructure is open and accessible, and this means things like when you want to use charging infrastructure, you better be able to pull out a credit card and pay for it and we are not be tied to proprietary systems and when that infrastructure is deployed, it works across the different vehicle space in an open way so that they can be enabled. So these are real risks and these are things where if there is no adequate measures put in place, we have found many incidences, within it proprietary standards from very progressive manufacturers or clever local techniques to transition government funds to private interests. These things can develop and it is important that we get ahead of them.

Jojo Delos Reyes:

Yeah. One other thing to add that I think John mentioned is I think Canada with play a crucial role in standard station charging infrastructure. I know that there has been for awhile now a couple of rapid charging standards. And it is a [unclear] charging infrastructure standards that's been used by different auto makers.

If Canada can institute a standard days of charging infrastructure, then that should avoid the monopoly in terms of how to use those infrastructures.

Again, government can play a big role and should play a big role in terms of implementing.

Cara Clairman:

And David, I would just like to add that unfortunately they're not doing that because they have their founding round, third round out as we speak, and there are proprietary systems being installed and they're funded equally to any other, and certainly this issue of beta versus VHS kind of systems still exists and we haven't kind of settled on the one. And then, of course, Tesla has its own, and so we actually are going to have this problem for quite some time because we're continuing to fund sort of this built of a she morgue us board of solutions.



David Wheeler:

Yeah. So that is a real problem, potentially. But maybe it is a topic we can pick up in our conversations with ministers and others as we move through all of this. Because we cannot afford for competition to stand in the way of a public good which clearly the world and Canada needs.

So sadly we're out of time for our panel discussion, but I think we could have easily conditioned for much, much longer. And hopefully we'll get another opportunity to bring our four amazing panelists together for a thoughtful interaction in the future. Maybe when C2R2 is further down the line and we're talking about labor market gaps and opportunities and so on.

So please all let's join together in giving our panelists a virtual round of applause, and for those ever you who are on video so they can see that.

And it really has within a very rich and powerful conversation and my personal thanks and our thanks on behalf of C2R2 and our hosts from Red River College who were such fantastic contributors. Thank you very much.

At this point I'm going to draw things to a close. And just note that as I mentioned earlier, this is the first of a series of seminars, and I think we may have a final slide to show what it is to come.

But if you registered for this event, you will be sent information about future events. We would encourage you all to share your experience with this event. Obviously, please share the record should it would become publicly available to and reach a much bigger audience, and the same would apply to all of our future events.

At this point I am going to again note that we have had fantastic political support from C2R2 from a number of ministers and opinion formers across the country. And one of our most enthusiastic supports has before Catherine McKenna who, of course, is Minister of Infrastructure and Communities and a real dynamo on the climate agenda.

So I'm going to say thank you again to all of our panelists, and to all of you who have attended today. Please tell your friends about this series, and I'm going to sign off and hand over to Catherine McKenna who has recorded a video for C2R2 in this webinar series especially for us. So over to Catherine McKenna and we'll see you all again soon, I hope.

[Video Message from Minister Catherine McKenna, Minister of Infrastructure and Communities:]

Hi. It is great to see that the Canadian Colleges for Resilient Recovery is growing and gaining momentum. I have the fast to first address your group during the inaugural meeting last September. At that time there were eight partner colleges involved. It is great to see that the coalition is now grown to 16 I think so I did I Tuesdays covering the country from coast to coast to coast.

I look forward to seeing the results of your important work as you continue to make progress.

One of the goals for your coalition has been to engage and bring people together from across Canada.

Through this webinar, will you have the ability to bridge our country's huge yes or reach and engage in dialogue about climate action, net zero emissions and best practices in support of a resilient recovery in Canada. What could be more important?

Keep focussing on a small carbon footprint and on big ideas.

I'm joining you today as the minister of infrastructure in communities, welcoming you to the first webinar in what I know will be a provocative and practical series.

Today, you're exploring the strategies, challenges, and workforce issues that are facing Canada in our transition to sustainable, zero emissions transportation occupy our roads. This industry and this pivotal transformation will play a critical role in our resilient recovery. Helping communities invest in zero emissions transportation options has cleaner air, creates jobs and supports Canadian manufacturing. This is a perfect king often for your webinar series. You have a great, engaged panel of industry and sustainable leaders joining you. I really encourage to you turn this discussion and the power of collaboration in to tangible outcomes for your own communities and for all of Canada.

The partners and Canadian colleges for a Resilient Recovery are in a position to help Canada build back better.

Through pride research at colleges, you can help shape the solutions for resilient recovery and through your internationally recognized faculty and facilities you can train the workforce that we need to build that resilient recovery.

Together through events like this we can shape the conversation and plan a better path forward.

And together we can create a stronger more resilient recovery for all Canadians. I look forward to speaking with you again soon.

Thank you.

David Wheeler:

Thank you to Catherine and to all of you again. We'll see you all again soon. Take care.

[Session ends.]

