Dave Bowen: Good day. My name is Dave Bowen. I work for Manitoba Hydro, and I am the director of the Integrated Resource Planning Division. I would like to welcome everyone here today, and thank you in advance for again taking time to be part of our Integrated Resource Planning process. Today we'll be sharing on our initial results.

Before we begin, I'd like to do a Land acknowledgement. Manitoba Hydro has a presence across this province on Treaty 1, 2, 3, 4, and 5 lands, and the original territories of the Anishinabe, Cree, Oji-Cree, Dakota, Dene peoples and Homeland Métis Nation. We acknowledge these lands and pay our respects to the ancestors of these territories. Manitoba Hydro has a long history of interaction with many indigenous communities and groups throughout the province. We value these relationships and will continue in our efforts to establish and maintain strong mutually beneficial relationships with many indigenous people.

I would like to welcome everyone here today, and thank you in advance for again, taking time to be part of our Integrated Resource Planning process. Over the past months, we have taken the four scenarios with the key inputs and started the modeling process. We've been learning how we could meet the potential needs of our customers over the next 20 years.

The purpose of today's session is to share with you the initial results of our IRP modeling. This modeling builds on the previous round of engagement with customers and interested parties that occurred this spring. We've used that feedback to confirm the key inputs as well as the four scenarios that attempted to establish the bookends of the possible energy futures that Manitoba Hydro may need to respond to. That feedback has also been used to explore farther how different variations to the key inputs, resources, and other remodeling aspects will impact the modeling outputs.

It's important that we come to you now to allow you to see and understand the initial results and provide feedback to us so we can use this to finalize these initial results.

There are two items I'd like to point out before we get started. The first is that our study period is 20 years, taking us from today to 2042. Based on your feedback, scenario four represents a pathway towards net zero by 2050.

The second is we spent a lot of time to provide thoughtful cost information. These costs reflect future investments for Manitoba Hydro to continue to provide reliable electrical and gas service in the scenarios. They do not represent or attempt to represent the whole life cost of climate change to our province.

Our team is represented by Lindsay Hunter, the project manager for the IRP project, and Blair Mukanik, leading the technical collaboration who'll be sharing with you today. Thank you in advance for your questions and feedback.

Lindsay Hunter: Hi, I'm Lindsay Hunter. I am the project manager for our IRP development process. And before we get into the details of our initial modeling results from our modeling, we want to first take a few minutes to review some of what we've presented in our last round of engagement, what we heard from customers and interested parties, and how we use that feedback in our IRP analysis.

Why are we doing our integrated resource plan or IRP? At Manitoba Hydro, we supply electricity and natural gas to customers across the province of Manitoba. This means we have to plan to make sure there's enough supply of these energy sources to meet demand. In fact, we have been doing this planning for over 60 years. But now the evolving energy landscape is changing how our customers will use their energy at home for their vehicles, and at work.

Developing an Integrated Resource Plan is one change we've made to evolve our planning process to help us prepare. Developing our Integrated Resource Plan is not a process to decide how the future should unfold, but to ensure that the path forward can respond to how it might unfold. Our IRP is a planning process that is forward-looking over 20 years, is informed by our engagement with customers and interested parties. It identifies a broad range of futures, and it will identify a broad range of options to respond to whatever future might unfold.

These options will be detailed in a roadmap, not a specific development plan, with near term actions to help define the steps for informing potential major decisions on infrastructure development or investments.

Our IRP development process breaks down into five stages as shown on this slide. We are now in the modeling and analysis stage. That means we are reviewing the scenarios we discussed with you last round and their impacts on resources, costs, and other factors through a technical lens. As we finish our modeling and analysis, we will use the information gained to develop the Integrated Resource Plan, including the roadmap and near term actions.

An important part of our IRP development is our conversations with customers and interested parties. The feedback received is informing the development of our IRP. These conversations complement our IRP development process as each engagement phase is aligned with IRP development milestones.

In our previous round of engagement, we discussed the preliminary work to develop our key inputs and scenarios. We hosted a number of workshops to seek feedback. We also presented the same information to the general public and to our list of 5,000 subscribers who have identified they wanted to participate in the IRP development. We also conducted research with some of our larger customers to understand how their energy use may transition in the future.

The initial modeling results we are going to share today use the key inputs and scenarios developed with the feedback from these earlier conversations. Let's review these five key inputs and four scenarios that are the backbone of our modeling.

The key inputs you see here on the left developed to represent the changes that will have a significant impact on future energy needs, their economic growth, decarbonization policy, electric vehicles, natural gas changes, and customer self-generation. The four scenarios use a combination of these key inputs, specifically the amount of change in these key inputs, to represent a specific energy future.

The scenarios were set to represent broad possibilities of what the future may be. We have previously shared how the feedback gathered in the last round of engagement was used, but let's review it here quickly.

First, the key inputs. During our discussions last spring, we received a lot of feedback on the key inputs, feedback that helped us feel confident we had correctly identified those creating the most uncertainty in the evolving energy landscape. We also heard that factors driving net zero greenhouse gas or GHG emissions are top of mind. In addition, we had feedback telling us other inputs are important to consider such as sustainable development, energy efficiency, and factors influencing economic growth.

We've used this feedback in multiple ways. One way was to clarify additional factors that were driving the key inputs, factors such as technology availability and viability, particularly with electric vehicles. We also used this feedback to help refine and finalize our analysis approach, particularly with our sensitivity analysis, which we will discuss later in this session.

Now let's talk about the scenarios. When we asked about the scenarios we presented, the feedback was that they were appropriate bookends for the evolving energy landscape so long as scenario four reflected a path towards net zero GHG emissions. We used this feedback to ensure that scenario four did in fact represent such a path.

We also heard there is potential for futures that are different combinations of inputs between the bookends than what we presented. We used this feedback to help refine our sensitivity analysis, which we will discuss later.

The following few slides are a high-level overview of our IRP modeling information session held a few weeks ago. In that previous session, we shared the IRP modeling process as shown here. The purpose of this modeling process is to simulate the electrical system so that we can explore how best to meet our customers' future energy needs. While the modeling process is mainly focused on the electrical system, assumptions for natural gas have been factored in. Generally the process can be explained as follows.

The model uses some information that is the same for each of the scenarios, the top three right hand boxes, and represent the existing electrical system. All the new resource options the model can select. And the planning criteria.

Shown at the left are the other inputs that are specific to each scenario. In part, these use the key inputs to establish projections for customer electric and net gas demand, which we will share today.

The resource optimization model at center right uses these two groups of inputs to determine when new supply is needed to meet demand. The model optimizes to find the lowest cost way to meet customers' future capacity and energy needs. The output of the model is a portfolio of resources that meet the defined scenario load projection at the lowest net system costs. The outputs also include total greenhouse gas emissions for Manitoba Hydro's electrical and natural gas systems, which we use to explore the total provincial emissions.

Now before moving forward, there are a few key terms that we want to clearly define. These are terms we will use a lot throughout the rest of this session. Simply put, Manitoba Hydro's electrical generation system provides both energy and capacity, which are different ways to think about electricity. To explain the difference, we've included an analogy using transit buses. In this analogy, buses represent the electrical system, and passengers represent electricity.

When we say capacity, we are referring to the maximum amount of electricity that can be made by generators at any particular time. This is typically measured in megawatts. For the bus analogy, it is the maximum number of people that can get on a bus at any one time, limited by the number of seats on each bus. In this example, five buses with 20 seats means you have a capacity of 100 riders.

When we say energy, we are referring to both what is made and what is used over a period of time, so for example, the amount of electricity produced throughout a 24-hour period. This is typically measured in megawatt hours. For the bus analogy, it is how many people are transported in a day using the five buses. During the course of one full day, you might move 1000 riders.

When we say peak demand, this refers to the specific time of day that has the single greatest need for energy. For Manitoba, this happens in the winter when we have customers heating with electricity. For the bus analogy, peak demand is the highest number of passengers at any given point in the day. In this case, you can see peak ridership at 75 people during the morning rush hour.

All three of these concepts have to work together when planning the electrical system. The system has to have capacity to meet the peak demand that customers place on it, so number of rush hour passengers. And it must be able to provide the energy required throughout the whole day. When the peak demand is greater than the system capacity, or energy supplied over time is short, we either need to add more generation capacity to the system, so add more buses during the peak times, or reduce demand, have less people on the bus during peak times. But we still need to make sure that all passengers can be moved throughout the whole day.

When solving for potential resource options to meet a specific load, the model must meet Manitoba Hydro's planning criteria, criteria that are specific to our predominantly hydropower system, and that underpin all our planning decisions. These two specific criteria are included in the model to determine when and how much of each new supply resource is needed to meet demand in each scenario.

The first criteria requires that there is sufficient energy supply to meet demand during a repeat of the worst drought on record. This is called dependable energy. Dependable energy includes hydropower generation as well as generation from wind turbines, natural gas generators, and imported electricity.

The second criteria is for capacity, and requires that there is sufficient capacity to meet Manitoba's peak load on the coldest day in winter, plus any committed export contracts, plus a planning reserve margin. Because equipment does break down from time to time and we do experience extreme weather events, this planning reserve margin increases the required capacity to make sure we are prepared for such events.

The model also includes a broad range of supply resources as summarized on the slide. Some of these are intermittent or variable renewable, which means that they can only produce energy when the right conditions exist, such as the sun is shining. Variable renewable resources are good for energy needs but cannot always be counted on for capacity because they cannot be reliably operated during peak demand.

Other resources are dispatchable, which means they can be turned on and off as needed to produce energy. Not only do dispatchable resources provide both energy and capacity, they are also usually very good options to provide capacity to support variable renewable resources.

The model also includes energy efficiency measures that can be implemented by customers to reduce their total demand. Including these allows the model to explore how energy efficiency can reduce load and contribute to reducing the amount of overall generation required.

Within the model, each of the resource options have different characteristics that define how they are simulated. This allows the model to evaluate the potential role of each resource option in the system. These characteristics include things such as rated capacity, which is the maximum possible output of the resource. Firm capacity, which is the capacity that can be relied upon during peak demand. In many cases, this is linked to the variability of a resource such as wind. Development timelines, which is how long it will take to put a new resource into service. Capital costs to build the resource as well as cost for ongoing operation of the resource. Fuel costs if applicable. And any associated GHG emissions emitted if applicable.

The last piece of background that we want to review here quickly is the information on current energy use in Manitoba.

In Manitoba, electricity and natural gas contribute to almost 50% of total energy used. The remaining energy is mainly refined petroleum products, which are generally used to fuel vehicles. Decarbonization is a main driver of the evolving energy landscape. The scale of achieving decarbonization through electrification can be seen by the graft on the left hand side.

Overall, our existing electricity supply and delivery system accounts for only 24% of the energy used in the province. If other fuels for transportation at 44% and the uses of natural gas at 28% are decarbonized through electrification, this would result in a significant increase in electricity use as compared to what we see today. To illustrate this, is a specific example of how our natural gas usage, in the graph on the right.

This data is from last winter when peak electrical demand in Manitoba, the blue column was approximately 4,900 megawatts. During that same winter, the natural gas hourly peak demand in Manitoba, the yellow column, was the electrical equivalent of more than 7,000 megawatts. If we were to serve this gas demand exclusively with electricity, Manitoba Hydro would have to more than double the size of our current electricity system. This is the difference between the green total column and the blue electricity column.

If you have any questions, please do email us at irp@hydro.mb.ca.