



Burlington Enterprises Corp: Sustainability Plan

Public Webinar

April 25, 2024

Disclaimer

Please note that the Sustainability Plan discussed today is still under development and the information shared is for discussion purposes only.

The content of this webinar is not binding on BEC and includes assumptions about the energy transition and the future state of the distribution system which are subject to change.

Additionally, please be aware that this webinar is being recorded, and any information collected as part of this stakeholder engagement process belongs to BEC and can be used for any business-related purpose.

Today's Context

- The energy industry and the City of Burlington are on the verge of significant change due to the energy transition (decarbonization and electrification), climate change, and population growth
- In response to the City of Burlington's Climate Action Plan and its commitment to be a net carbon-neutral community by 2050, Burlington Enterprises Corporation ("BEC")*, through Burlington Hydro is committed to supporting the City of Burlington's climate goals and ensuring its distribution system is prepared for these changes
- BEC is conducting a **Sustainability Plan** to develop strategies to continue to evolve its distribution system to meet electrification needs and ensure continued resiliency in the face of more frequent extreme weather events.
- BEC has retained [Power Advisory](#) to support the development of the Sustainability Plan, including:
 - Modelling and translating the changes to electricity demand resulting from key initiatives from the City of Burlington's Climate Action Plan onto the electricity system
 - Identifying the impacts on the distribution system that need to be accounted for in BEC's planning processes
 - Conducting community and stakeholder engagement to inform the Sustainability Plan
- The Sustainability Plan will highlight potential changes to consider including investment decisions to expand the system as well as energy efficiency programming

*During the remainder of this presentation BEC will refer to BEC and Burlington Hydro

Purpose of Today's Public Webinar

- BEC and Power Advisory recognize that collaboration with and informing stakeholders is critical for the development of the Sustainability Plan
 - This is why we are conducting today's webinar: to receive your feedback and foster mutual learning
- The purpose of today's session is to:
 - Inform the residents and businesses of the City of Burlington about BEC's Sustainability Plan
 - Review how climate change and the energy transition are impacting the distribution system
 - Explore what actions BEC may undertake to support climate action within the City of Burlington, and describe the importance of climate resiliency
 - Hear from attendees about their priorities and areas of interest that may inform recommendations in BEC's Sustainability Plan
- Immediately following today's webinar, a brief survey will be sent to participants and posted on the website for two weeks to collect feedback to be reflected in the final Sustainability Plan
- Once completed the Sustainability Plan will be posted on BEC's website

Our Team

Our experienced team has a detailed understanding of market fundamentals, yields the strategic insights that provide clients with the market advice that enhances project value and mitigates project risk.



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Manager, Planning and Analytics



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Manager, Regulatory



Nadiha Khan

Consultant

Q&A Will Follow Our Presentation

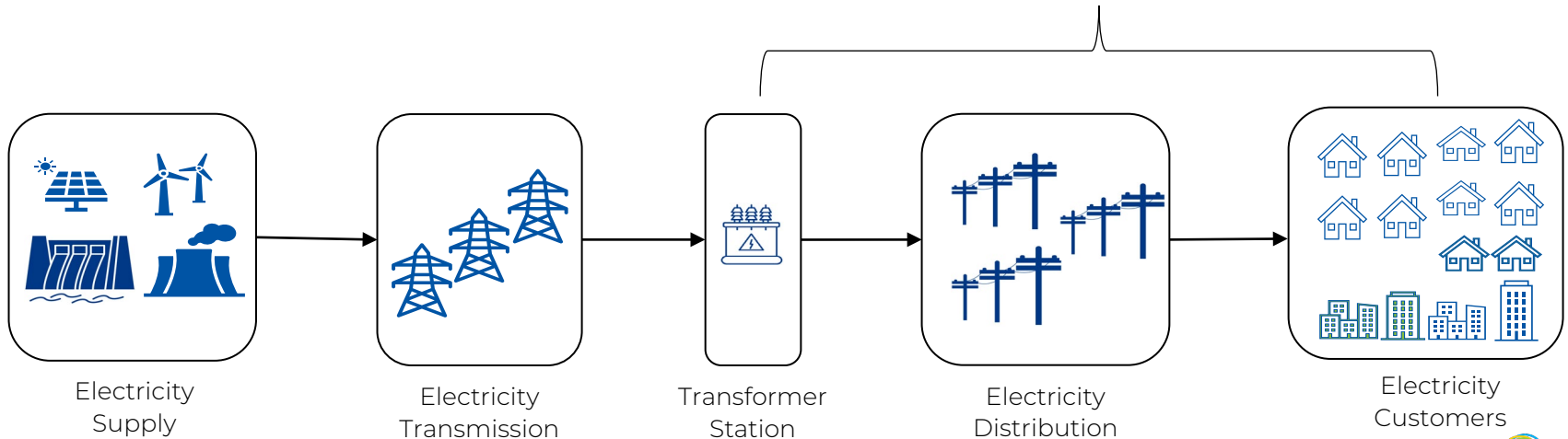
- Use the “**Q&A Box**” to submit your questions
- Feel free to submit questions throughout the presentation
- We will review and respond to questions at the end of this presentation



Background on Distribution Systems

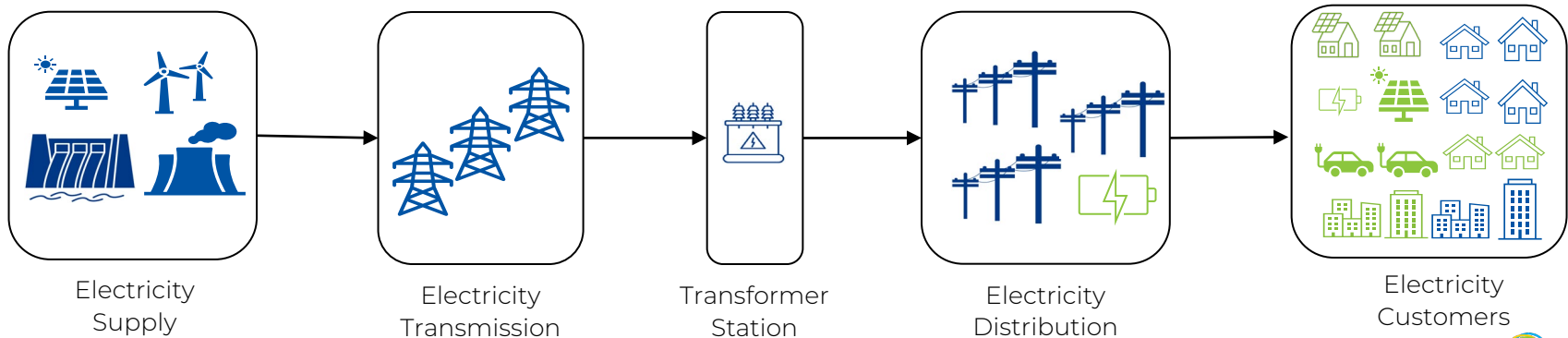
- Electricity is generated across the province and transmitted across the bulk system to local distribution systems
- Each community has a local distribution company (Burlington Hydro) that delivers electricity from the bulk system through the distribution system to homes and businesses

Distribution System (Burlington Hydro)



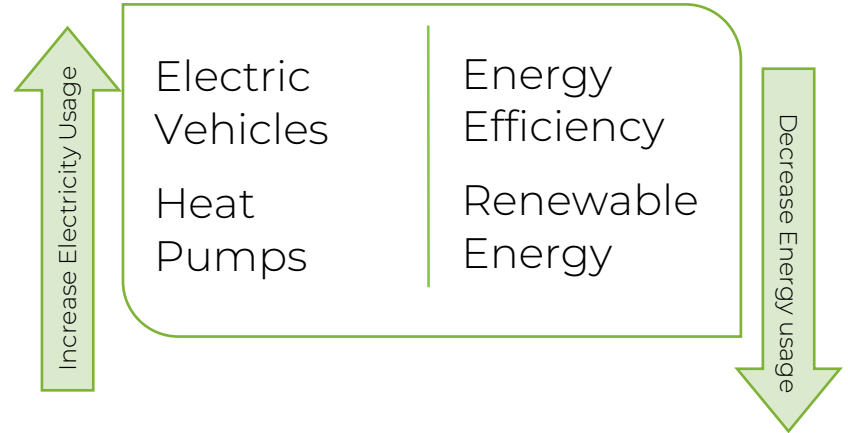
Impact of Climate Action on Distribution Systems

- Customers increase their electricity usage with electric vehicles and heat pumps
- Customers offset their electricity usage with solar energy, and using energy more efficiently
- Energy storage is a new resource in Ontario (currently only 0.05% of grid-connected capacity in Ontario)
- Battery storage offers many benefits including the ability to store electricity for use during peak periods and can support reliability and resilience of electricity supply; however, as they are a new technology their deployment on the distribution system needs to be thoughtfully integrated



Why is BEC Preparing a Sustainability Plan?

- Local distribution companies are responsible for planning the distribution system to ensure there is sufficient and reliable grid capacity to deliver electricity to customers year-round
 - As electricity usage increases, BEC must make sure that grid infrastructure is scaled to meet customer demands
 - Potential changes that would *increase* electricity demand include population growth, electric vehicles, heat pumps and climate change impacts on weather
 - Potential changes that could *reduce* electricity demand include battery storage, solar and energy efficiency
 - Climate change is leading to increases in extreme weather events which makes the distribution system more vulnerable to damage and customers prone to outage events
- The complexity of all these changes will require an evolution in the day-to-day operations of the distribution system.



Changing Electricity Usage

- The adoption of new technologies has an impact on the distribution system; some technologies will reduce demand while others will increase demand



Electric Vehicles

Vehicles powered by electricity stored in batteries, eliminating the need for traditional gasoline or diesel fuel



Heat Pumps

Heating and cooling systems that transfers heat from one location to another, alternative to natural gas furnaces and air conditioning units



Solar Energy

Renewable energy sources that produce electricity that can be integrated into rooftops and buildings



Energy Storage

Technologies, like batteries, that store energy for future use



Energy Efficiency

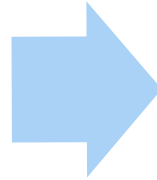
Measures that can be implemented to reduce the amount of energy consumed while maintaining the same level of service



What is a Sustainability Plan?

Identifying changes in electricity usage due to climate action initiatives and key drivers

- Electric vehicles and heat pumps
- Solar energy and energy storage
- Energy efficiency measures
- Population growth
- Extreme weather events
- Evolving climate



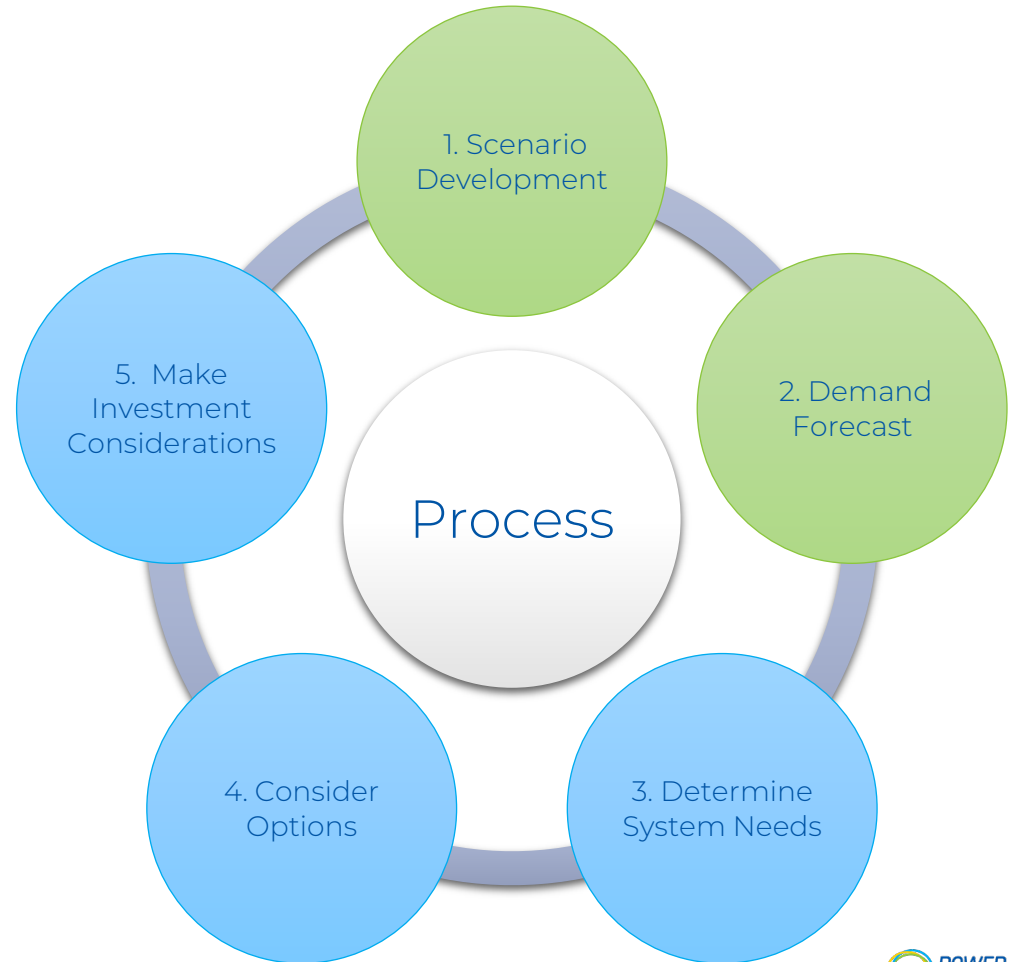
Preparing the distribution system for the future

- Identifying new electricity infrastructure
- Adopting and investigating climate resilient measure
- Supporting climate action

Studying Impacts on Distribution System

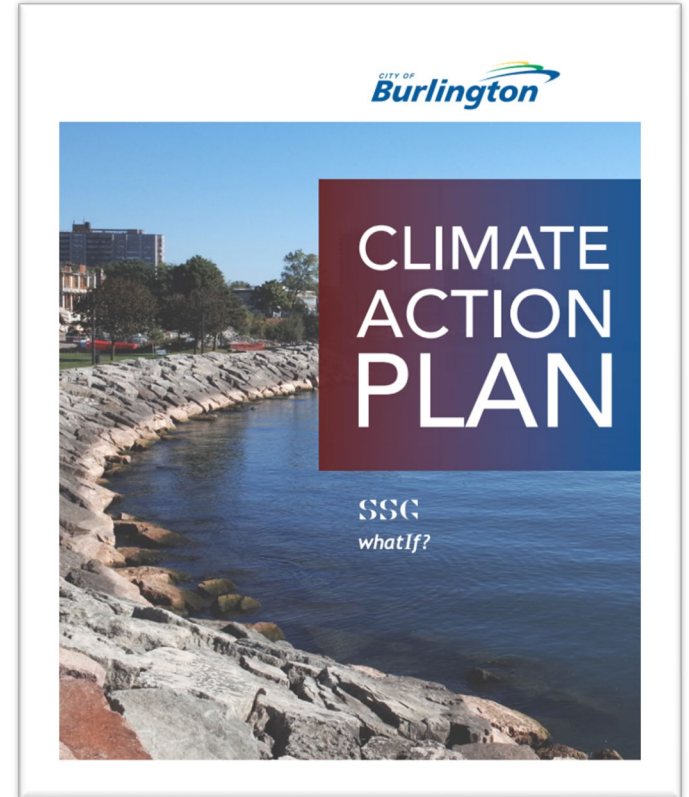
Studying The Needs of the Distribution System

- The process consists of five (5) critical steps, allowing for an agile approach to distribution system modeling across various scenarios and sensitivities.



Scenario Development

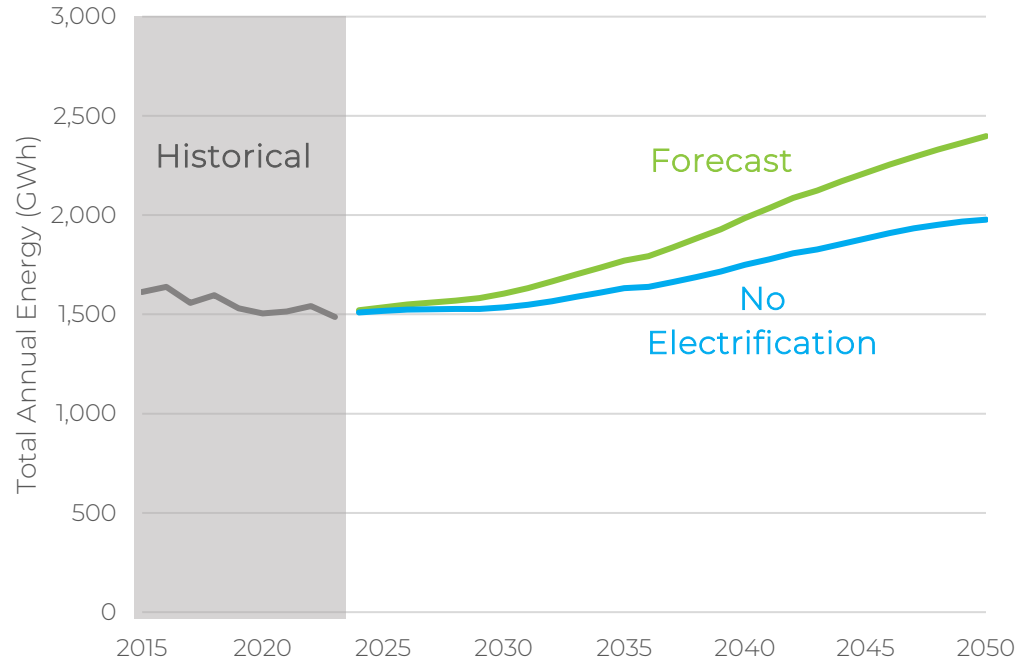
- The City of Burlington produced their Climate Action Plan in April 2020
- The Climate Action Plan identifies a low-carbon energy pathway
 - It includes community member interests and stakeholder engagement; it builds on the City's Climate Emergency Declaration to set direction for the City to mitigate GHG emissions and reduce energy consumption
- The three priority areas as identified:
 - Deep Energy Retrofit of Existing Buildings
 - Renewable Energy
 - Electric Mobility & Equipment (Integrated Mobility Plan)
- Achieving the goals identified in the Climate Action Plan will have an impact on the distribution system
- These three priority areas, in addition to other growth drivers (i.e., population growth), are going to be considered in BEC's Sustainability Plan



Draft Demand Forecast

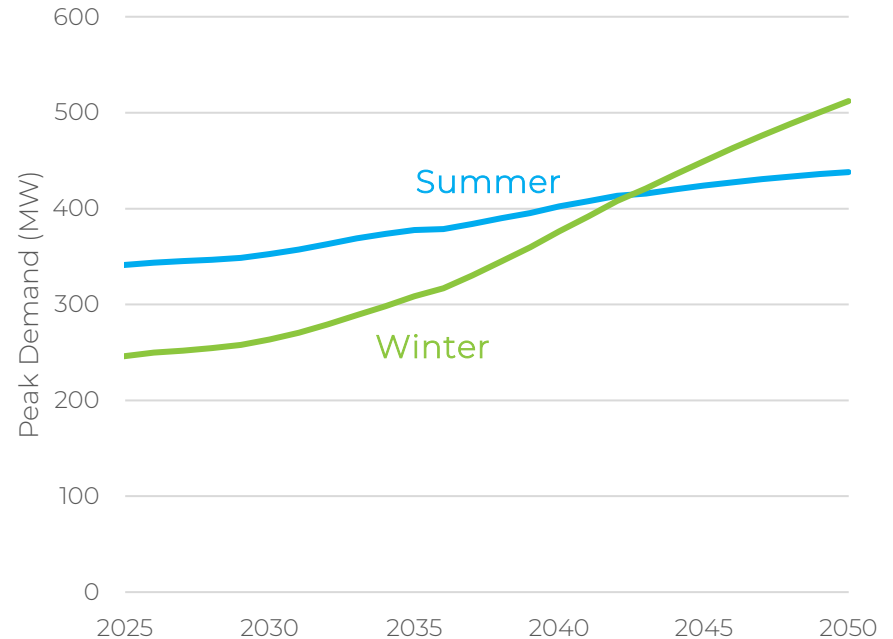
BEC's Annual Energy (GWh) Forecast

- Power Advisory forecasted annual energy usage based on the City of Burlington's Climate Action Plan, and other regional plans for housing and economic development
- Annual energy consumption in the City of Burlington reaches nearly 2,500 GWh by 2050, approximately **60%** higher than current usage
- Long-term growth is mostly due to electrification assumptions (i.e., EV and heat pump adoption)
- Energy efficiency and higher-density housing offsets much of the growth driven by population and employment



BEC's Forecasted Summer and Winter Peak Demand

- Customers' electricity consumption varies throughout the day (i.e., usage of lighting, appliances, etc.) and varies seasonally (i.e., usage of air conditioning in summer)
- The maximum amount of electricity consumed by customers at any given time in an area is referred to as the peak demand, that is the power rating of the distribution system, which is typically measured in megawatts (MW)
- Distribution systems are built to meet the annual peak demand forecast (historically, occurs in the summer)
- In the Climate Action Plan scenario, Power Advisory forecasts that in the 2040's the overall system peak will shift from the summer to winter due to the adoption of new technology like EVs and heat pumps



Key Demand Drivers

Electric Vehicles

- Forecast reflects meeting federal sales targets for 2026 and 2030, with EVs making up 100% of sales after 2035
- Medium- and heavy-duty vehicles are assumed to consume 5% as much energy as light-duty passenger vehicles, consistent with the IESO's 2022 Annual Planning Outlook
- The forecast also considered the transportation mode consistent with the City of Burlington's Integrated Mobility Plan, September 2023

Figure ES-1: Existing Mode Shares Graph

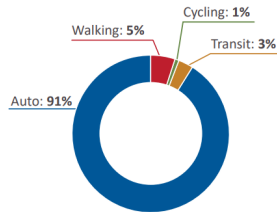
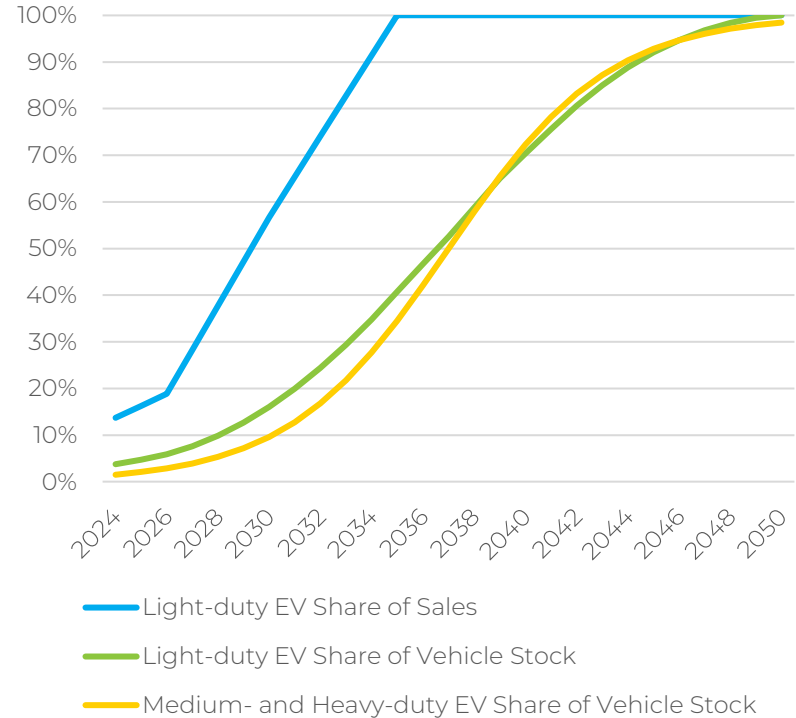
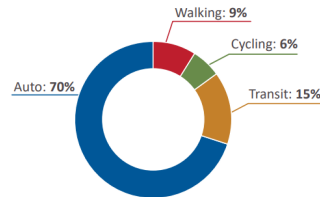


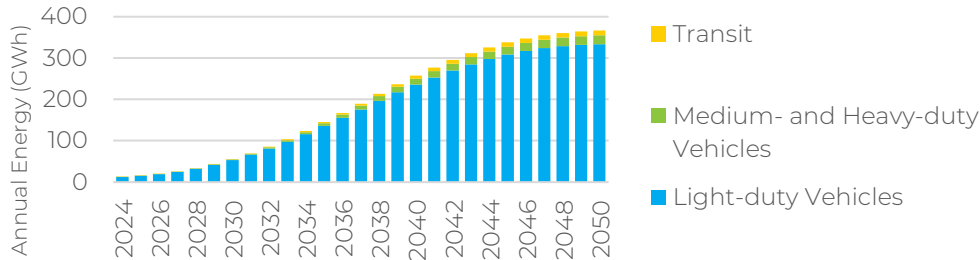
Figure ES-2: IMP Proposed 2051 Mode Shares Graph



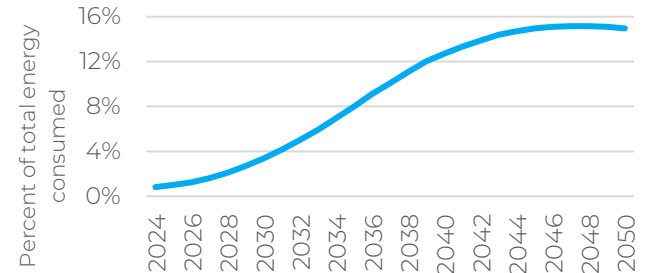
Electric Vehicle Energy Consumption

- Light-duty vehicles for personal and commercial use electrify faster than other vehicles and represent over 90% of total consumption
 - Light-duty vehicle consumption was estimated based on vehicle population data from Statistics Canada, vehicle kilometers travelled data from the Transportation Tomorrow Survey, and a vehicle efficiency assumption consistent with Independent Electricity System Operator (IESO) forecasts
 - Data on medium- and heavy-duty vehicles, including transit buses, was more limited than data on light-duty vehicles
- Electric vehicle share of total energy sales rises from less than 1% today to a plateau of around 15% by the mid-2040s

EV Load Growth in Burlington

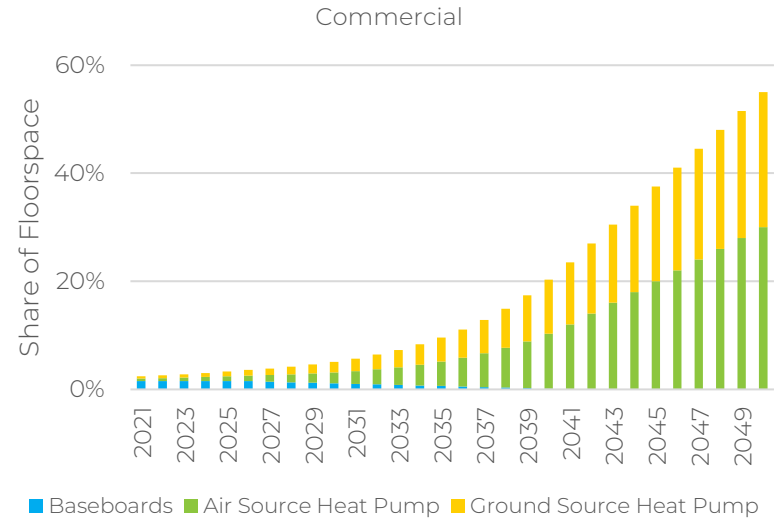
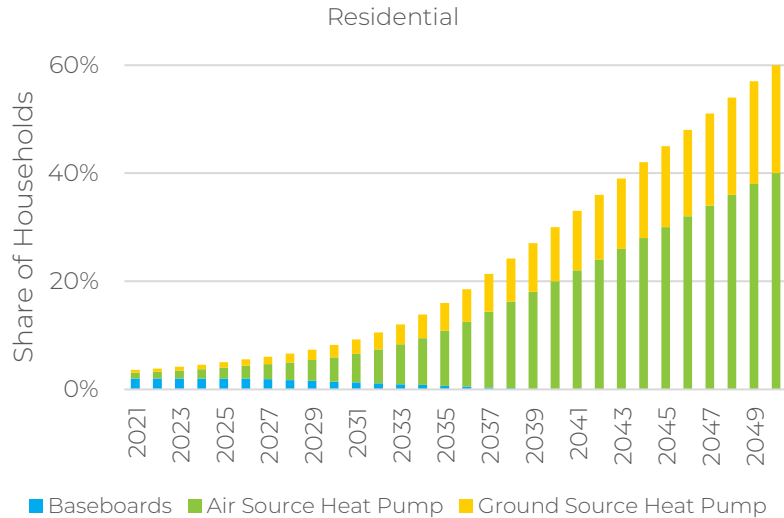


EV Share of Total Load in Burlington



Heat Pump Adoption

- Assumptions with respect to heat pump adoption are consistent with Burlington Hydro's Climate Action Plan



Climate Resilience

Distribution System Climate Risk

- Climate projections are extremely uncertain
 - Future emissions are dependent on numerous assumptions including population growth and the effectiveness of climate mitigation activities
 - The effect of climate change on weather outcomes is not fully understood; models are particularly uncertain on the risk of low-probability events like extreme high winds
- Common findings for electricity distributors:
 - Increased risk of extreme heat impacting outdoor workers, customer electricity consumption, transformer/cable ratings, utility-owned facilities, sensor accuracy, and battery lifespan
 - Increased risk of extreme rainfall and flooding impacting underground infrastructure and backup generators
 - Minimal change in the frequency and risk associated with high-wind events and ice accumulation events are expected in the future; however, these risks are significant today

“Relative to the body of literature for variables such as temperature and precipitation, much less attention has been paid to wind extremes and hence, overall uncertainty about historical trends and future changes is also higher”

- Environment and Climate Change Canada, Climate-Resilient Buildings and Core Public Infrastructure

Weather vs. Climate

- Both weather and climate can have significant impacts on distribution systems
 - **Weather:** Refers to short-term atmospheric conditions (e.g., daily changes in temperature, precipitation, and wind) at a specific location and time.
 - **Climate:** Represents long-term averages and patterns of weather conditions (e.g., temperature, precipitation) over an extended period (typically 30 years or more) for a specific region. It provides a broader view of typical conditions.
- To address these impacts, local distribution companies need to focus on climate resilience measures, such as enhancing infrastructure robustness, implementing smart grid technologies, and incorporating climate data into long-term planning



Weather Impact



Extreme Events: Severe weather events, such as storms, heavy rainfall, or ice storms, can damage power lines, substations, and other infrastructure, leading to outages. Strong winds can cause trees and branches to fall on power lines, disrupting electricity supply.



Temperature Extremes: Extreme temperatures, whether extremely hot or cold, can affect the efficiency and reliability of distribution systems. For example, heatwaves can lead to increased electricity usage for cooling, potentially straining the system, while extreme cold can affect the performance of equipment.



Precipitation: Heavy rainfall and flooding can damage infrastructure and substations, leading to outages. Snow and ice accumulation can also weigh down power lines and equipment, affecting their functionality.

A Climate Resilient Distribution System

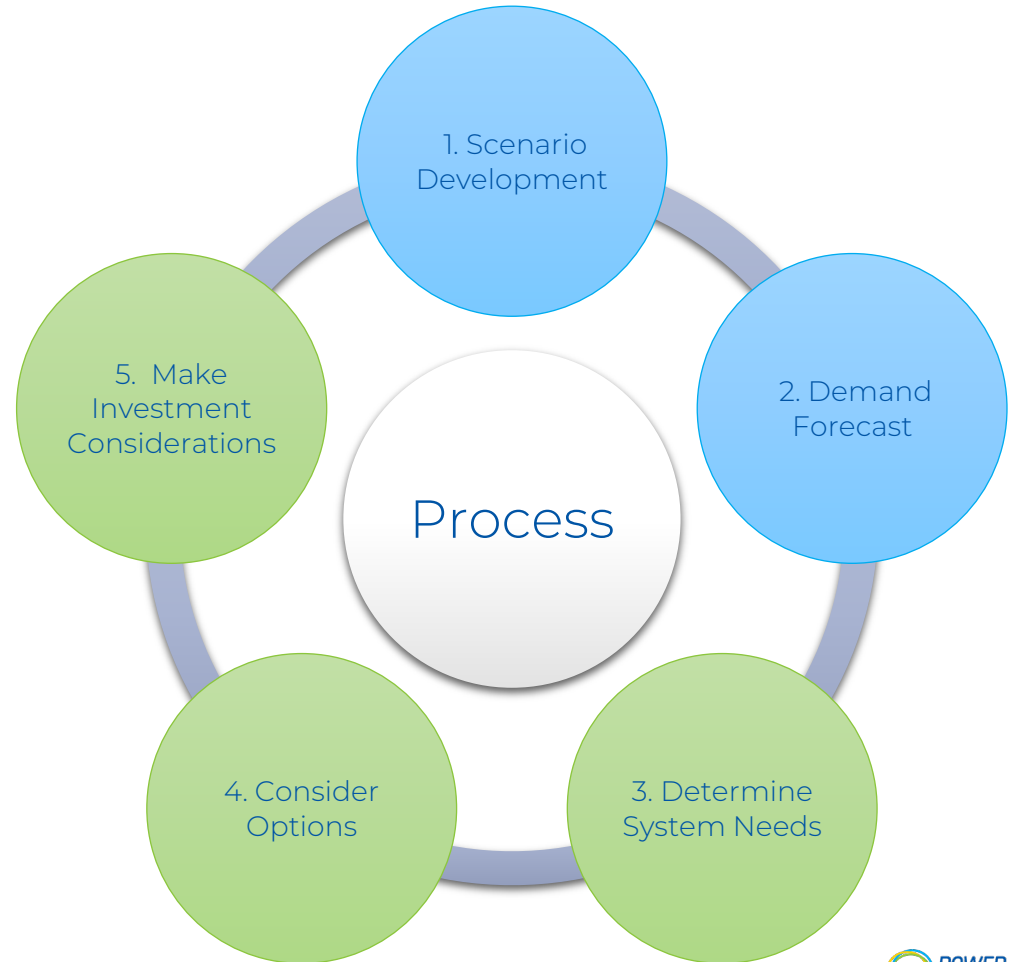
- Climate resilience for local distribution companies refers to the ability to adapt and withstand the impacts of climate change on their infrastructure, operations, and services
- Key aspects of climate resilience for local distribution companies:
 - Grid Hardening
 - Redundancy and backup systems
 - Climate-informed planning
 - Emergency response and recovery plans
 - Community engagement and communications
 - Regulatory/standards compliance
 - Investment in technology and innovation
 - Training and capacity building



Sustainability Plan Considerations

Potential Changes to the Distribution System

- As part of the Sustainability Plan, Power Advisory will identify distribution system needs resulting from the Climate Action Plan
- This assessment will specify when the needs will arise and propose different options to address them, including traditional solutions like poles and wires, as well as emerging non-wire technologies
- Cost-effective options will undergo further analysis based on the study's findings
- The following slides illustrate strategies adopted by local distribution companies to meet increasing demands, while specific options for this study will be explored post-need determination



Both Wires and Non-Wires Solutions



- The Sustainability Plan will consider the infrastructure required to meet emerging electricity needs as customer usage increases
- In addition to traditional investments (i.e., stations, poles and wires), the Sustainability Plan will identify which investments could be deferred or avoided with non-wires solutions
 - These solutions include energy storage, demand response programs, energy efficiency programs, etc.
 - BEC may consider pilot programs in early years, and prepare to scale over time as needs arise
- The use of non-wires solutions will be considered in conjunction with other grid modernization investment and new technologies

Climate Resilience



- The Sustainability Plan will identify strategies to improve climate resilience, such as:
 - Policies and procedure review
 - Updating Emergency Response Plans
 - Vegetation management plan
 - Physical climate risk and vulnerability assessment
 - Cost-effectiveness of grid modernization, grid hardening, and other solutions

Enabling Customers in the Energy Transition



- The Sustainability Plan will outline initiatives BEC may take to support climate action within the community
- This may include support for:
 - New connection requests to the distribution system (i.e., EV charging infrastructure, solar installations, etc.)
 - Customer education with respect to solar, storage, EVs, heat pumps, energy efficiency, etc.
 - Industry partnerships and programs

Feedback from the Community

We Invite Your Input with Respect to the Sustainability Plan

- Based on what you've heard today, what are your top priorities or concerns that you would like to see addressed in BEC's Sustainability Plan?

- Following today's session, we invite your input via our Survey (**scan the QR code**)
 - A link to the survey will be shared with registered webinar participants

- For inquiries directed to Burlington Hydro not related to today's Sustainability Plan webinar:
 - Corporate Relations: bhi_corporate_relations@burlingtonhydro.com, phone 905-332-1851



We Invite Your Input: Q&A

- Use the “**Q&A Box**” to submit your questions





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