

# Alberta Market Price Forecast E3 Core Case

2024 First Edition

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Energy+Environmental Economics

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# Disclaimer

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*E3 created the following forecasts and analyses using the best available public information and our expertise and knowledge of the relevant markets, along with commercially available 3rd party software models and proprietary in-house energy market price forecasting tools. However, the future is uncertain, and these forecasts (along with underlying market expectations) may change due to many factors, including unforeseen events, new technology adoption or inventions, new market structures, regulatory actions, and changes in both state and federal government policies. E3 makes no guarantees related to these forecasts or the information presented herein and should not be held liable for any economic damages associated with independent investment decisions.*

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# **E3 Market Price Forecasting Overview**

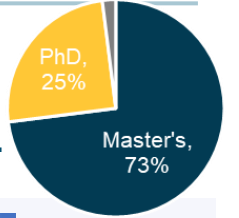


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# Who is E3?

Thought Leadership, Fact Based, Trusted.

130+ full-time consultants | 30 years of deep expertise | Engineering, Economics, Mathematics, Public Policy...



Calgary



San Francisco



New York

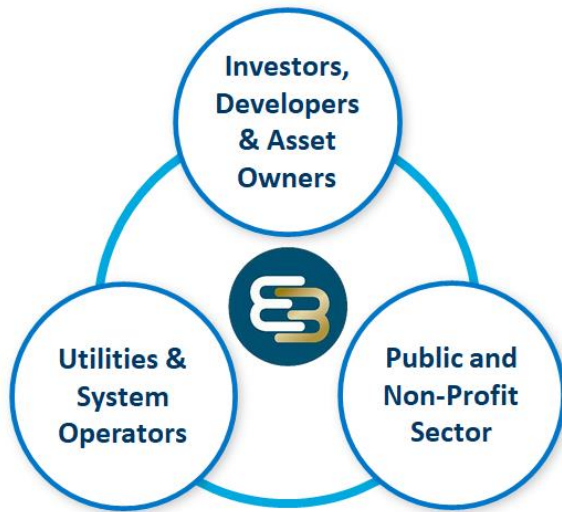


Boston

## E3 Clients

## Recent Examples of Alberta & Canadian Projects

350+ projects per year across our diverse client base



Buy-side diligence support on several successful investments of renewable assets in Alberta, including Alberta's largest inner city solar project, and many other assets across Canada

Providing expert testimony in Alberta rate design including the ISO Tariff, Distribution System Inquiry, distribution rates, and Performance Based Regulation (PBR) proceedings

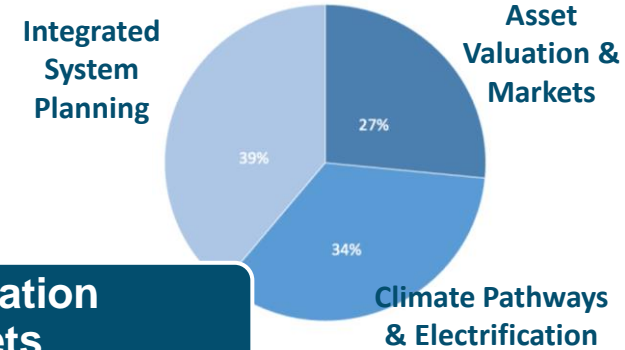
Energy storage and reliability investigated in the dispatchable renewables and storage study for AESO in capacity related design issues

Utility strategy and valuation worked with transmission owners and generators on strategy and valuation

Integrated resource planning and support for multiple Canadian jurisdictions including Nova Scotia, British Columbia, Yukon, Manitoba, New Brunswick, and Ontario

# E3's 3 Practice Areas

**+** E3 has organized itself across three main practice areas to maximize its impact through the diversity of clients, project work, and technical innovation to support the energy transition across North America in a holistic, transparent, and intellectually honest manner



## Climate Pathways & Electrification

- Climate pathways studies
- Future of gas
- Low carbon fuels
- Building electrification
- Transportation electrification
- Load forecasting

## Integrated System Planning

- Integrated system planning for electricity: G, T, & D & non-wires alternatives
- Utility procurement
- Rate design
- Grid modernization
- Avoided costs
- Distributed resource planning

## Asset Valuation & Markets

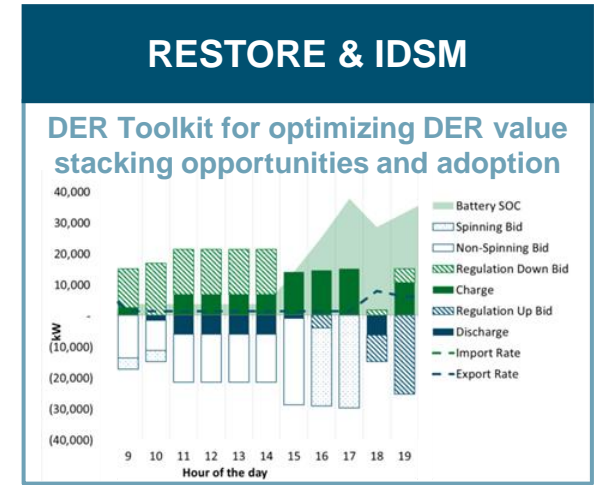
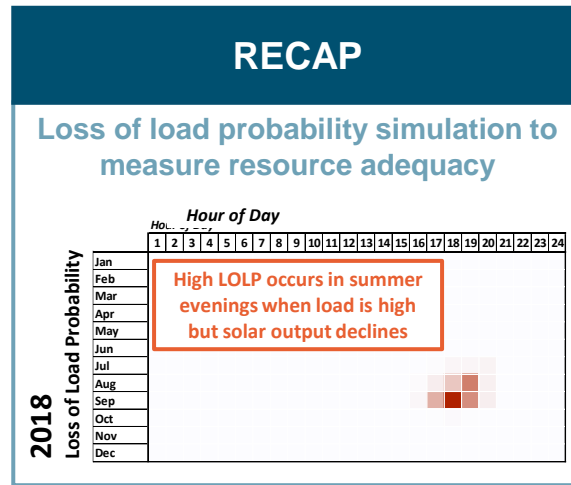
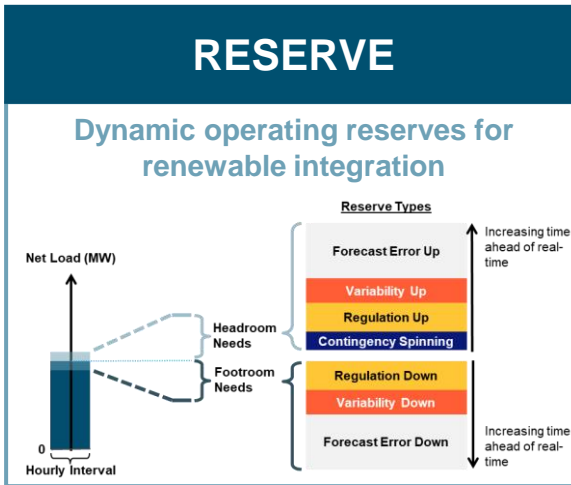
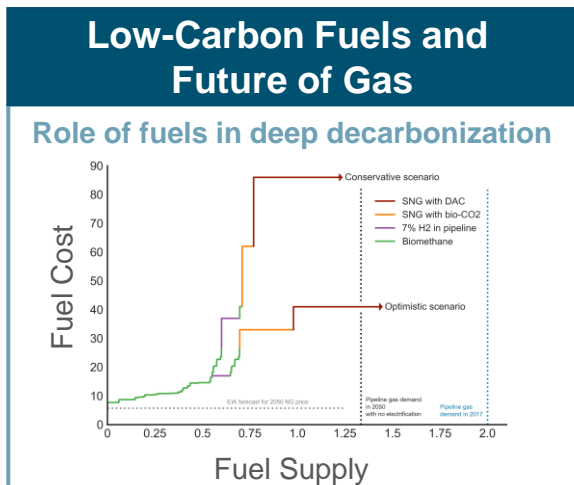
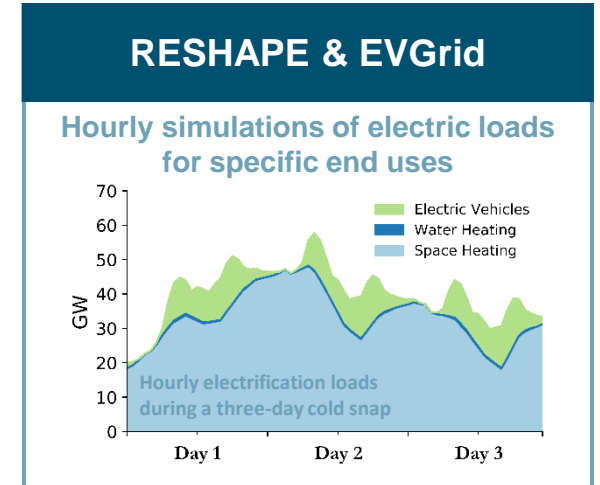
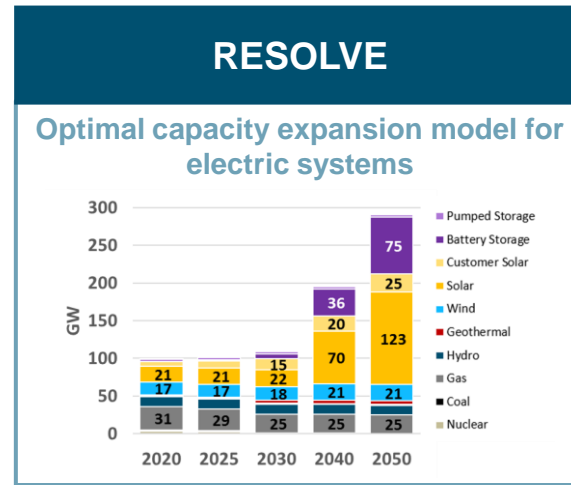
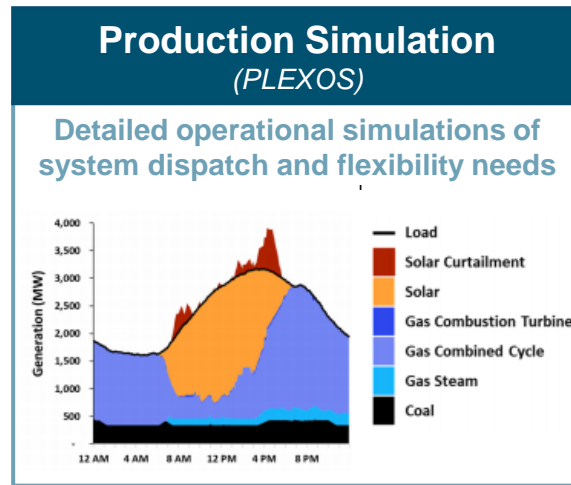
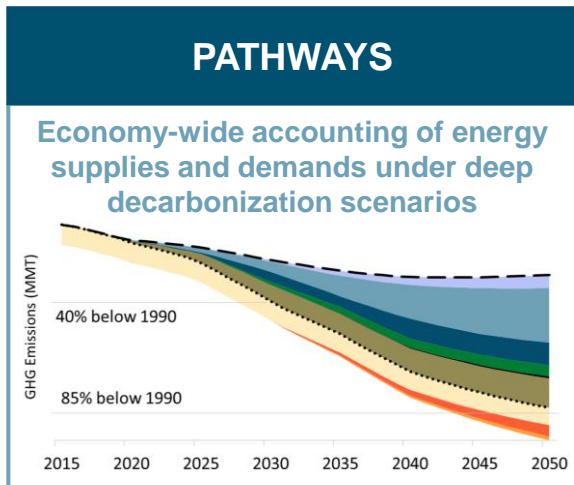
- Asset valuation and due diligence
- Strategic advisory for commercial clients
- Energy market price forecasting
- Market design & analysis
- DER dispatch & asset optimization

Policy

Integrated Energy Planning

Commercial Interests

# E3's comprehensive and best-in-class modeling toolkit positions E3 well to study future energy system dynamics



Economy-wide energy systems

Bulk grid power systems

Grid edge & behind-the-meter

# E3 Model Ecosystem for Market Price Forecasts: Built on Decades of Experience and 360° Analysis

## E3 Model Toolkit

### Input Models

#### E3 PATHWAYS

Least-cost decarbonization pathways across sectors to meet GHG targets

#### E3 RESHAPE

Load simulation for building electrification & EVs

#### E3 Pro Forma Model

Levelized costs of new resources including financing and tax incentives

#### E3 RECAP

Stochastic reliability modeling for ELCCs of renewables and storage

### Output Models

#### E3 RESTORE

Optimized battery operations and revenues

#### E3 Scarcity + RT Price Model

Forecasts scarcity and real-time energy prices with regression analysis

#### E3 Nodal Price Model

Node-zone basis forecast for nodal prices

#### E3 Ancillary Services Model

Forecasts AS prices with regression analysis and market saturation

#### E3 Capacity Market Models

Capacity price formation by market, aligned with unique market dynamics

#### E3 REC Market Models

Renewable Energy Credit prices aligned with unique market dynamics

## Market Price Forecasting Approach

### Key Scenario Variables

**1 Load Forecasts**  
Regional load growth, energy efficiency, building electrification, and EVs

**2 Policies**  
RPS, CES, GHG, other mandates

**3 Regional Coordination**  
Transmission, Trading, and policy alignment

**4 Costs:**

- New resource costs
- Gas prices
- Carbon prices

### PLEXOS Model Outputs

**5 Long-Term Capacity Expansion (Annual)**

**New Resource Additions**

- Economics
- Policies and mandates (RPS, CES, GHGs)
- System reliability needs
- Retirements

**6 Production Cost Simulation (Hourly)**

**Energy Market Forecasts**

- Hourly day-ahead energy prices by zone
- Dispatch, renewable curtailment, and transmission flows

### E3 Forecasts

Market Product	Geographic Granularity	Temporal Granularity
<b>Energy</b> (Day-Ahead and Real-Time)	Zonal	Hourly
<b>Capacity</b> (low, medium, high forecasts)	System / Local	Annual
<b>Ancillary Services</b> (Reg, Spin, Non-Spin)	ISO	Hourly
<b>ELCC Curves</b>	Regional	Annual
<b>RECs</b>	State / ISO	Annual
<b>System Operations</b>	System / Local	Hourly / Monthly

Fundamentals-based market modeling built on day-ahead energy prices



# Asset Valuation and Strategy Practice Area

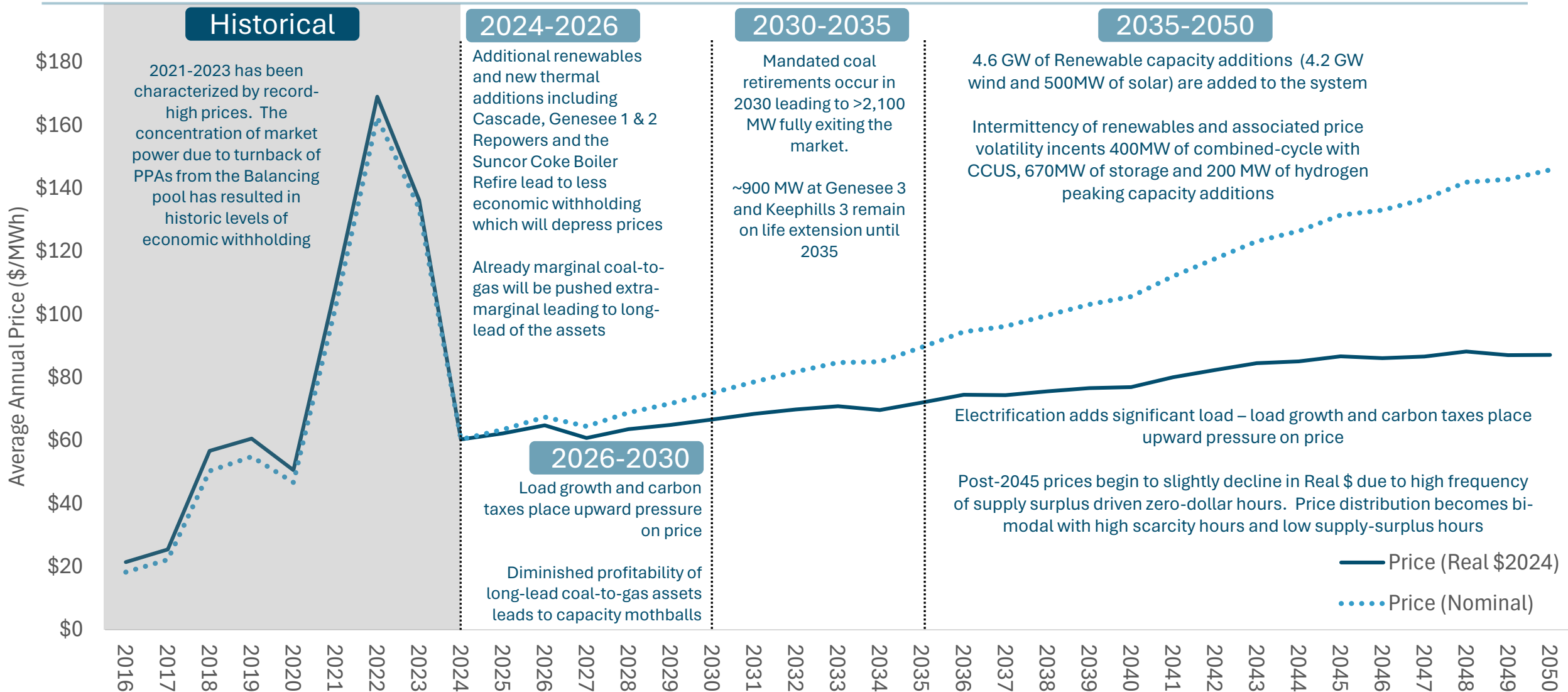
- + The Asset Valuation and Strategy practice area works primarily with project developers, asset owners, and investors
- + Insights informed by work being done across the firm that provides a unique 360-degree perspective of rapidly evolving markets
  - Clean Energy Policy → how will policy change the playing field for different resources?
  - Planning → what resources will power the grid in 2025? 2030? 2050?
  - Market Analysis → how will market prices evolve in the grid of the future?
- + The E3 Asset Valuation and Strategy team provides a variety of analytical support tailored to client needs
- + Typical services include:
  - Transaction support and due diligence on both the buy side and sell side
  - Strategy formulation and market entry
  - Board-level support on market outlook and asset performance
  - Customized forward-market price projections incorporating impacts of policy and technology changes
  - Revenue stream/benefits analysis, either on an individual asset or portfolio basis
  - Production simulation cost modeling using in-house proprietary tools or customized commercial software
  - Project site evaluation
  - Off-taker assessments
  - Basis spread assessment
  - Wholesale market rules and bidding strategies



## Asset Valuation / Strategy

- Analyze asset value from multiple perspectives in vertical, bilateral, and wholesale markets
- Strategic support for project development, acquisition, and operation, including market entry
- Proprietary in-house models and in-depth knowledge of public policy, regulation and markets

# Alberta Market Price Forecast



# Executive Summary



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# Alberta Market Overview



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# Alberta Market

Restructuring



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# E3 Forecasting Approach



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# E3 Modeling Assumptions



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# **E3 Forecast Results: 2025-2050**



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