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INTRODUCTION

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→ TODAY'S OBJECTIVE:

- **Topic:** On-site renewable generation opportunities in western Canada
- **Purpose:** Education, information sharing and an opportunity for questions and discussion





OPTIONS FOR ON-SITE RENEWABLES

- Wind
- Solar
- Hydro
- Biomass
- Battery Storage
- Hybrid Solutions





WHY CONSIDER RENEWABLES?

1. Cost of Electricity
2. Electricity Related Fees
3. Marketing & Reputation
4. Environmental & Sustainability Goals
5. Technical Constraints



→ COST OF ELECTRICITY

Companies can evaluate opportunities to either:

- 1) Reduce current operating expenses
- 2) Mitigate against future pricing fluctuations / increases

1) Alberta - Deregulated

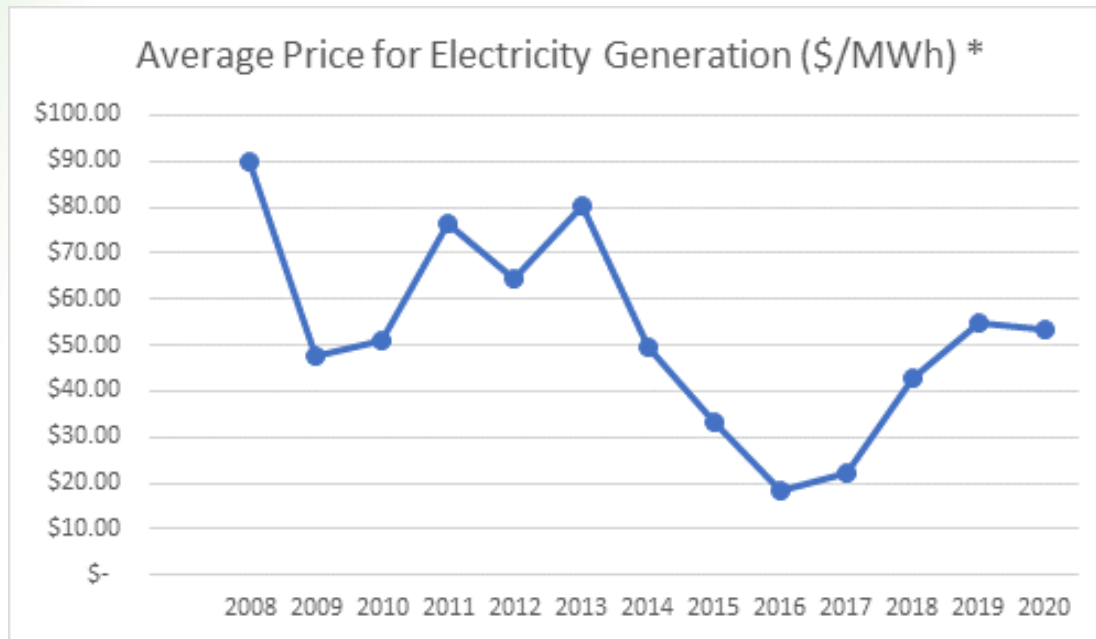


Figure 1: * Data compiled from AESO's 2017 Annual Market Stats, AESO Supplemental 2018 Forecast and TransCanada Power Market Update for June 2018 (Estimating 2019 and 2020 pricing)

2) Saskatchewan - Regulated

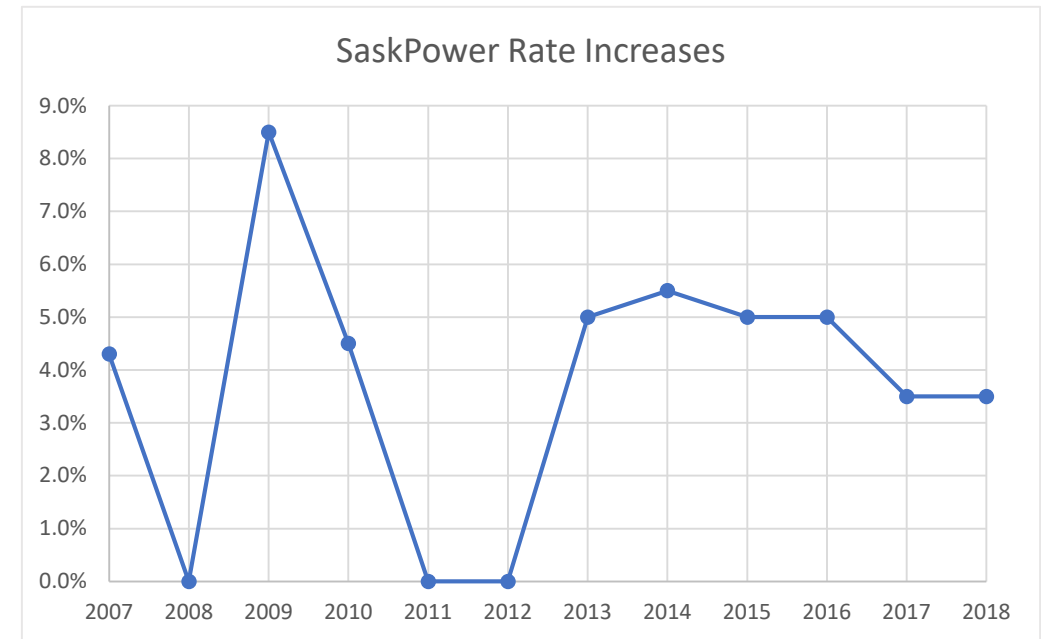
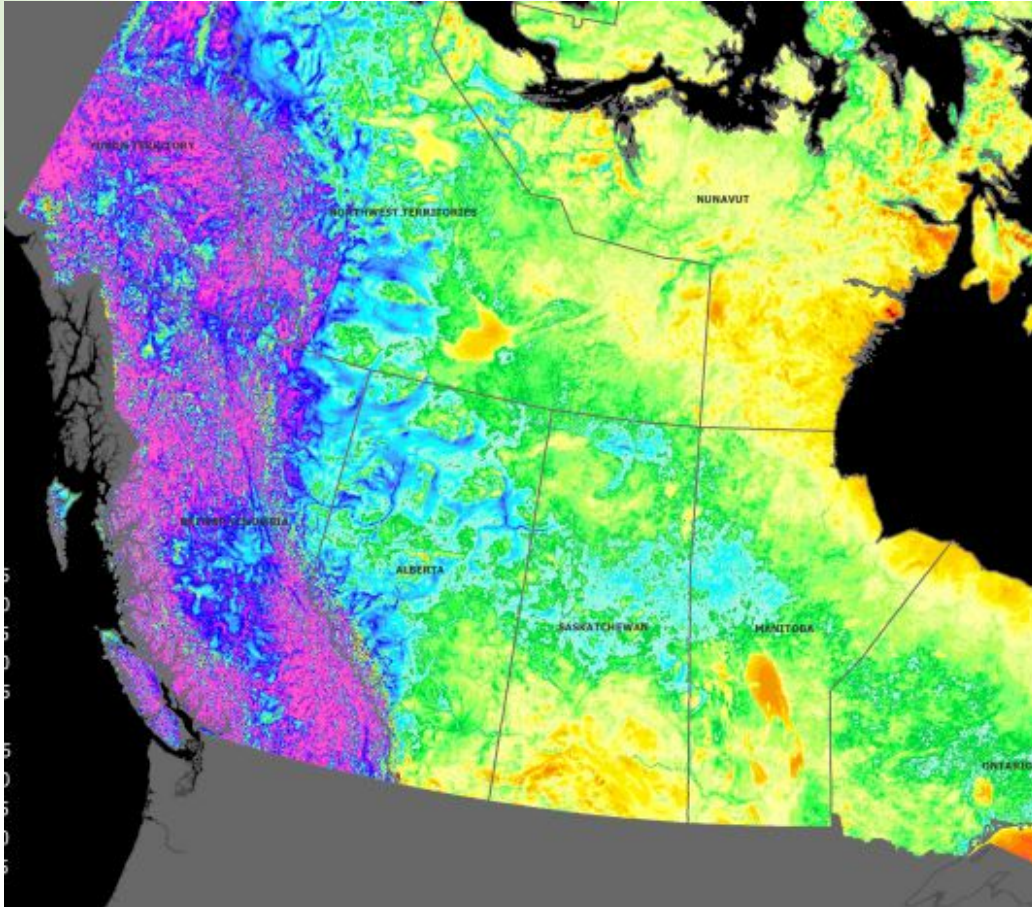


Figure 2: Data compiled from www.saskpower.com, www.saskratereview.ca and Saskatchewan Chamber of Commerce (Backgrounder – October 2016). 2015 rate increase was originally 3% and then another 2% was added (5%)

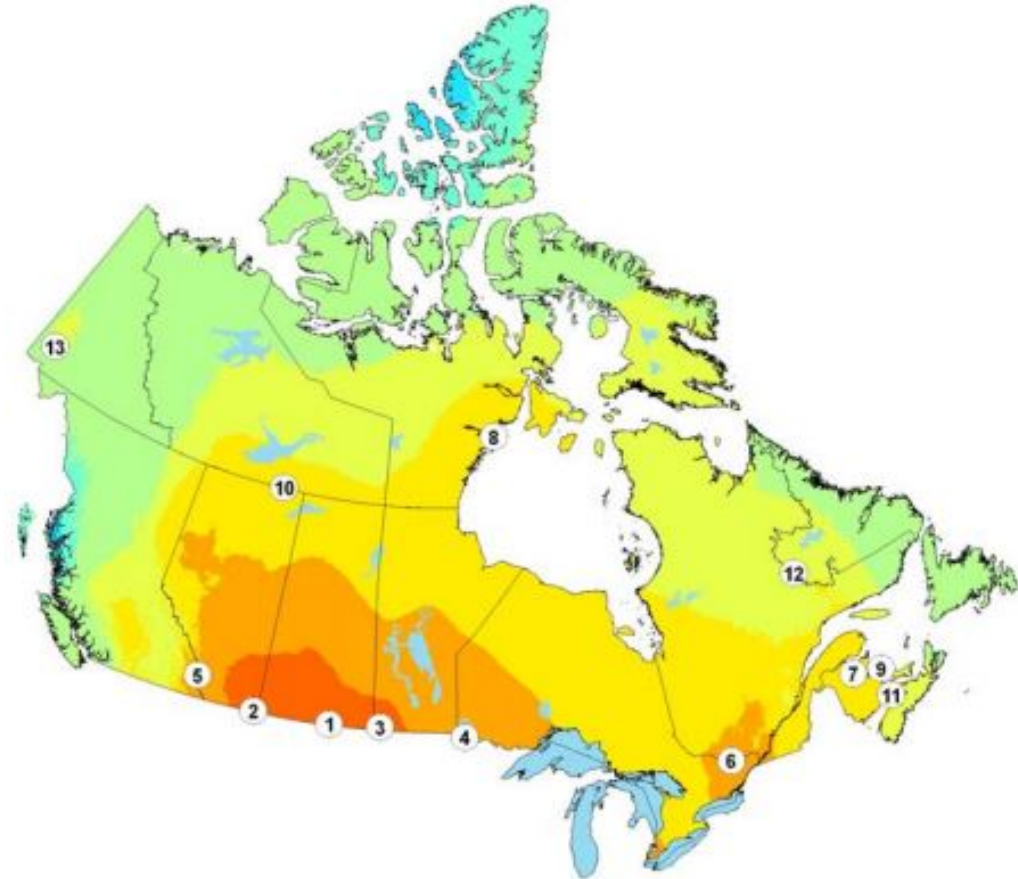
→ ABUNDANT NATURAL RESOURCES

Wind Resource Map



- Figure 1: “Wind Resource of Canada” - AWS Truepower. Graphic retrieved from (www.awstruepower.com)

Solar Resource Map



- Figure 2: “Yearly PV potential map for latitude tilt and the 13 “PV hotspots in each province and territory in Canada.” – NRCAN (The Development of Photovoltaic Resource Maps for Canada” retrieved from (www.nrcan.gc.ca)



ELECTRICITY RELATED FEES

1. Demand Charges
2. Transmission Fees
3. Distribution Fees



Alberta – Transmission Rate Increases

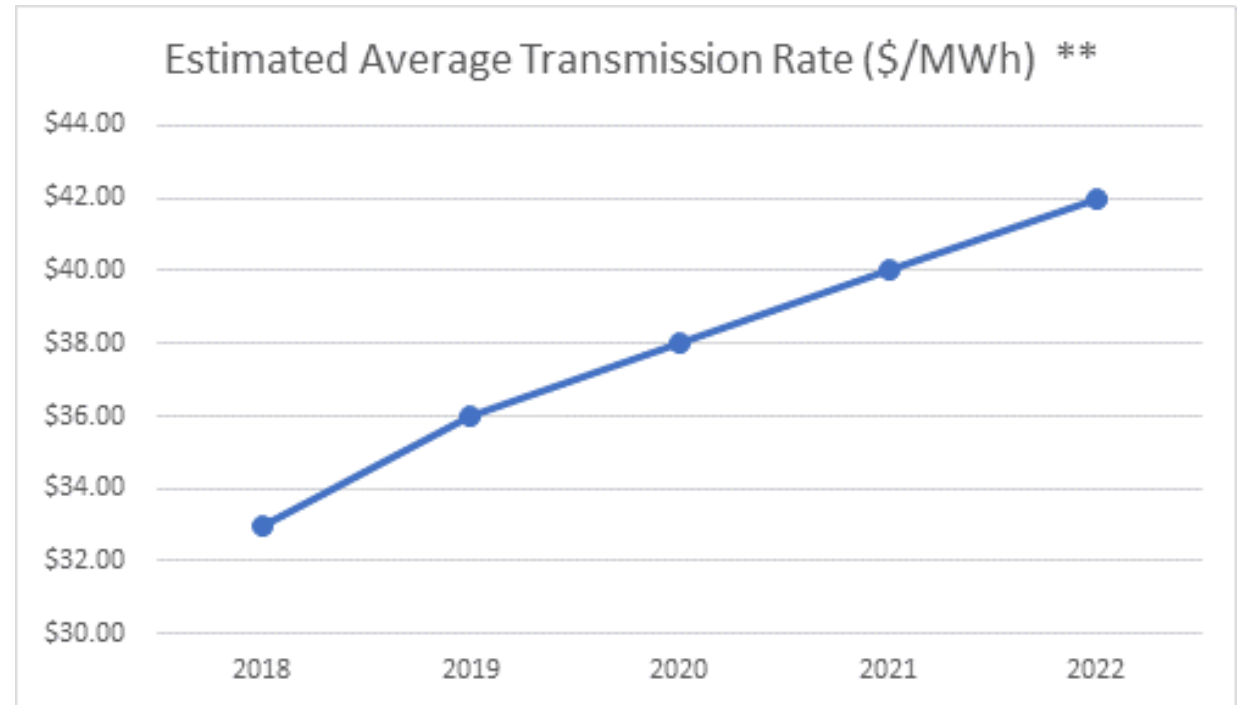


Figure 1: ** Data compiled from AESO's TRP (Transmission Rate Projection) Factsheet



MARKETING & REPUTATION

1. Demonstrate leadership and innovation within the industry
2. Customer Pressure to adopt Renewable Energy
 - RE100 – Kellogg's, Nestle, Clif Bar, Organic Valley
3. Consumer Demands & Trends





ENVIRONMENTAL & SUSTAINABILITY GOALS

1. Reduce emissions of GHGs and other pollutants
2. Achieve corporate sustainability goals & environmental initiatives
3. Recycle and/or using waste by-products (biomass)
4. Reduce compliance costs (taxes/penalties)



TECHNICAL CONSTRAINTS

1. Desire greater reliability at your facility
2. Grid infrastructure will not accommodate future growth
3. Require periodic or supplemental generation at a facility
 - Evaluate baseload vs. intermittent options
 - Consider hybrid solutions





WHAT'S HOLDING INDUSTRY BACK?

1. Investment / Rates of Return
2. Regulations
3. Operations and Integration
4. Technological Maturity
5. Education and Awareness



Above: Heysham South Wind Farm – a Green Cat Renewables project.



DIVING DEEPER

1. Economics
2. Ownership Options
3. Western Canadian Markets
4. Technology Selection & Sizing
5. On-Site Demand





ECONOMICS

1. Electricity Market Hedging
2. Reduced Compliance Costs
3. Revenue Opportunities
4. Falling Costs

Levelized Cost of Energy (USD)	Bloomberg New Energy Outlook	Lazard's LCOE Analysis
Utility Wind	\$55/MWh	\$30-60/MWh
-> Decrease since 2009	38%	67%
Utility Solar	\$70/MWh	\$46-53/MWh
-> Decrease since 2009	77%	86%

Figure 1: * Data compiled from Bloomberg 2018 New Energy Outlook- BNEF (<https://bnef.turtl.co/story/neo2018>) and Lazard's LCOE Analysis Version 11- November 2017 (<https://www.lazard.com/media/450337/lazard-levelized-cost-of-energy-version-110.pdf>)



ECONOMICS CONTINUED

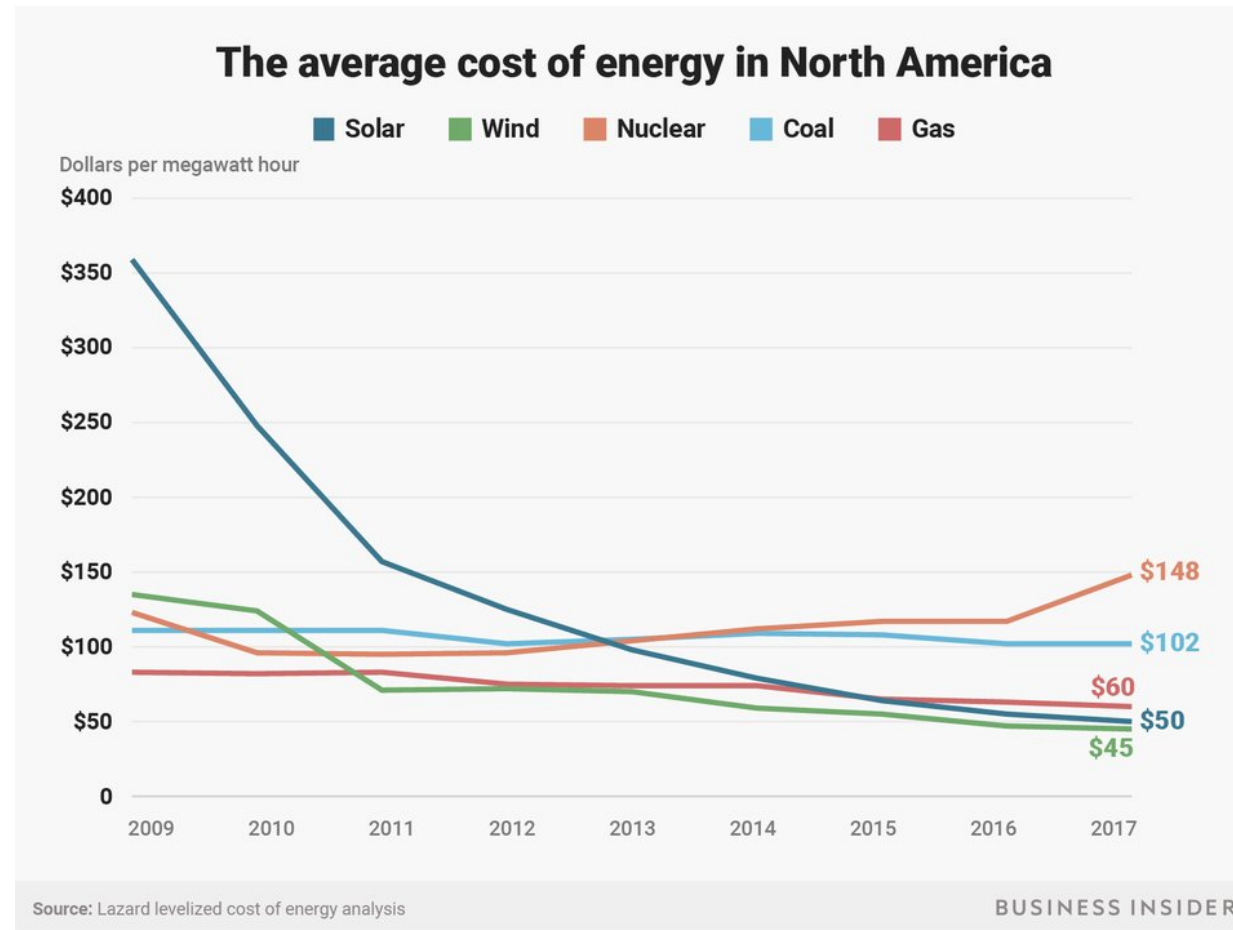


Figure 1: “The average cost of energy in North America” – Lazard’s LCOE Analysis Version 11 (November 2017). Retrieved from: (<https://www.lazard.com/perspective/levelized-cost-of-energy-2017/>)

* Alberta REP auction set a record in December 2017 with a weighted average price of \$37/MWh CAD between 3 winning wind energy projects



OWNERSHIP OPTIONS

1. Full Ownership (100%) by food processing facility
2. No Ownership (0%) – Facility purchases power from 3rd party developer
3. Joint venture opportunities





WESTERN CANADIAN MARKETS & PROGRAMS

1. British Columbia

- I. BC Hydro & Fortis BC
- II. BC Hydro offers Net-Metering up to 100kW

2. Alberta

- I. Deregulated power market
- II. Government programs for micro generation solar (<5MW)





WESTERN CANADIAN MARKETS & PROGRAMS

3. Saskatchewan

- I. SaskPower (Crown Corporation)
- II. Customer Generation Program to be announced in Fall 2018

4. Manitoba

- I. Manitoba Hydro (Crown Corporation)
- II. Net-Metering program of up to 200kW in place





SIZING, RESOURCE AND TECHNOLOGY SELECTION

1. Facility / Company Goals

- Looking for peak demand generation to reduce peak pricing?
- Interested in selling excess power to the grid?
- Building an off-grid facility or supplementing your existing operation?

2. Electricity consumption studies will determine appropriate sizing of facility

3. Resource assessment analysis required to determine economic solutions



MEETING ON-SITE DEMAND

1. Matching demand profile to production windows
 - (ex: solar matches well with peak summer demand for A/C)
2. Matching production to higher priced hours
 - (ex: In AB, prices are highest for power during daytime peaks)
3. Ability to store energy and mitigate outages (increase reliability)



SUMMARY

1. Economic opportunities exist
2. Regulatory hurdles exist
3. Growing public demand
4. Pressure from customers
5. Public awareness needed





GREEN CAT RENEWABLES

- Experience includes **600MW+** of wind, **200MW+** of solar and **25MW+** of hydro projects
- 430+ projects completed since 2005
- We offer technical, engineering, permitting consulting services focused on renewable energy
- Full Lifecycle support - feasibility studies all the way through construction and operations





QUESTIONS



greencat

Renewables

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