International Association of Operative Millers
66th Annual Conference
Western Canadian District Meeting

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Sheraton Cavalier Hotel
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INTRODUCTION

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Green Cat Renewables
- Renewable Energy Consultant (Engineering & Technical Services)
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

2) Saskatchewan - Regulated

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)

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

Solar Resource Map

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

• 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

![Transmission Rate Increases Graph](image)

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
ENVIROMENTAL & 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)
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

<table>
<thead>
<tr>
<th></th>
<th>Levelized Cost of Energy (USD)</th>
<th>Bloomberg New Energy Outlook</th>
<th>Lazard's LCOE Analysis</th>
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<td>Utility Wind</td>
<td>$55/MWh</td>
<td>$30-60/MWh</td>
<td>67%</td>
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<tr>
<td>-&gt; Decrease since 2009</td>
<td>38%</td>
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<td>Utility Solar</td>
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* 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
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

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