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<td>8:00 – 8:30 a.m.</td>
<td>Registration and Continental Breakfast</td>
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<td>8:30 – 8:35 a.m.</td>
<td>Welcoming Remarks</td>
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| 8:35 – 9:15 a.m. | Executive Panel and Strategic Overview          | Ian Robertson, Chief Executive Officer  
                        | Chris Jarratt, Vice Chair  
                        | David Bronicheski, Chief Financial Officer               |
| 9:15 – 10:00 a.m. | North American Renewable Generation           | Jeff Norman, Chief Development Officer  
                        | Joanne Atalay, Director, Wind Asset Management  
                        | Elizabeth Dumm, Senior Director, Governmental Affairs  
                        | Rahi Nathwani, Vice President, Finance                 |
| 10:00 – 10:15 a.m. | Break                                        |                                                                          |
| 10:15 – 11:00 a.m. | Regulated Utilities                           | David Pasieka, Chief Operating Officer  
                        | Peter Eichler, Vice President, Centralized Operations  
                        | Gerald Tremblay, Senior Vice President, Operations  
                        | Elizabeth Dumm, Senior Director, Governmental Affairs   |
| 11:00 – 11:40 a.m. | International Expansion                       | Ian Robertson, Chief Executive Officer  
                        | Chris Jarratt, Vice Chair  
                        | Armando Zuluaga, Chief Executive Officer, AAGES         |
| 11:40 – 11:50 a.m. | Closing Remarks                               | Ian Robertson, Chief Executive Officer                                  |
| 12:00 – 12:30 p.m. | Lunch and Learn: The Role of Storage to Achieve 100% Renewable Energy | Charles Ashman, Vice President, Technology                           |
Caution Concerning Forward-Looking Statements and Non-GAAP Measures

FORWARD-LOOKING STATEMENTS

Certain statements included herein contain forward-looking information within the meaning of applicable securities laws. These statements reflect the views of APUC with respect to future events, based upon assumptions relating to, among others, the performance of APUC’s assets as well as the business, interest and exchange rates, commodity market prices, and the financial and regulatory climate in which it operates. These forward looking statements include, among others, statements with respect to the expected performance of APUC, its future plans and its dividends to shareholders. Statements containing expressions such as “anticipates”, “believes”, “continues”, “could”, “expect”, “estimates”, “intends”, “may”, “outlook”, “plans”, “project”, “strives”, “will”, and similar expressions generally constitute forward-looking statements.

Since forward-looking statements relate to future events and conditions, by their very nature they require APUC to make assumptions and involve inherent risks and uncertainties. APUC cautions that although it believes its assumptions are reasonable in the circumstances, these risks and uncertainties give rise to the possibility that actual results may differ materially from the expectations set out in the forward-looking statements. Material risk factors include the impact of movements in exchange rates and interest rates; the effects of changes in environmental and other laws and regulatory policy applicable to the energy and utilities sectors; decisions taken by regulators on monetary policy; and the state of the Canadian and the United States (“U.S.”) economies and accompanying business climate. APUC cautions that this list is not exhaustive, and other factors could adversely affect results. Given these risks, undue reliance should not be placed on these forward-looking statements. In addition, such statements are made based on information available and expectations as of the date of this document and such expectations may change after this date. APUC reviews material forward-looking information it has presented, not less frequently than on a quarterly basis. APUC is not obligated to nor does it intend to update or revise any forward-looking statements, whether as a result of new information, future developments or otherwise, except as required by law.

NON-GAAP FINANCIAL MEASURES

The terms “Adjusted Net Earnings”, “Adjusted Earnings Before Interest, Taxes, Depreciation and Amortization” ("Adjusted EBITDA"), “Adjusted Funds from Operations” (or “Adjusted FFO"), “per share cash provided by Adjusted Funds from Operations”, “per share cash provided by operating activities”, “Net Energy Sales”, and “Net Utility Sales”, may be used throughout this document. The terms “Adjusted Net Earnings”, “per share cash provided by operating activities”, “Adjusted Funds from Operations” (or “Adjusted FFO”), “per share cash provided by Adjusted Funds from Operations”, “Adjusted EBITDA”, "Net Energy Sales" and "Net Utility Sales" are not recognized measures under GAAP. There is no standardized measure of "Adjusted Net Earnings", "Adjusted EBITDA", “Adjusted Funds from Operations” (or “Adjusted FFO”) “per share cash provided by Adjusted Funds from Operations”, “per share cash provided by operating activities”, "Net Energy Sales", and "Net Utility Sales" consequently, APUC’s method of calculating these measures may differ from methods used by other companies and therefore may not be comparable to similar measures presented by other companies. A calculation and analysis of “Adjusted Net Earnings”, "Adjusted EBITDA", “Adjusted Funds from Operations”, “per share cash provided by Adjusted Funds from Operations”, “per share cash provided by operating activities”, "Net Energy Sales", and "Net Utility Sales" can be found in APUC’s Management Discussion & Analysis for the year ended December 31, 2016 (the “Annual MD&A”) and for the period ended September 30, 2017 (the "Interim MD&A"). Per share cash provided by operating activities is not a substitute measure of performance for earnings per share. Amounts represented by per share cash provided by operating activities do not
represent amounts available for distribution to shareholders and should be considered in light of various charges and claims against APUC.

USE OF NON-GAAP FINANCIAL MEASURES

Adjusted EBITDA

Adjusted EBITDA is a non-GAAP measure used by many investors to compare companies on the basis of ability to generate cash from operations. APUC uses these calculations to monitor the amount of cash generated by APUC as compared to the amount of dividends paid by APUC. APUC uses Adjusted EBITDA to assess the operating performance of APUC without the effects of (as applicable): depreciation and amortization expense, income tax expense or recoveries, acquisition costs, litigation expenses, interest expense, gain or loss on derivative financial instruments, write down of intangibles and property, plant and equipment, earnings attributable to non-controlling interests and gain or loss on foreign exchange, earnings or loss from discontinued operations and other typically non-recurring items. APUC adjusts for these factors as they may be non-cash, unusual in nature and are not factors used by management for evaluating the operating performance of the company. Where APUC manages the day to day operations of a facility and receives the majority of its economic benefits, the full operating profit of such facility is included in calculating the measure. APUC believes that presentation of this measure will enhance an investor’s understanding of APUC’s operating performance. Adjusted EBITDA is not intended to be representative of cash provided by operating activities or results of operations determined in accordance with GAAP. A reconciliation of Adjusted EBITDA to net earnings can be found for the three and nine months ended September 30, 2017 at page 26 of the Interim MD&A and for the year ended December 31, 2016 at page 32 of the Annual MD&A.

Adjusted Net Earnings

Adjusted Net Earnings is a non-GAAP measure used by many investors to compare net earnings from operations without the effects of certain volatile primarily non-cash items that generally have no current economic impact or items such as acquisition expenses or litigation expenses and are viewed as not directly related to a company’s operating performance. Net earnings of APUC can be impacted positively or negatively by gains and losses on derivative financial instruments, including foreign exchange forward contracts, interest rate swaps and energy forward purchase contracts as well as to movements in foreign exchange rates on foreign currency denominated debt and working capital balances. Adjusted weighted average shares outstanding represents weighted average shares outstanding adjusted to remove the dilution effect related to shares issued in advance of funding requirements. APUC uses Adjusted Net Earnings to assess its performance without the effects of (as applicable): gains or losses on foreign exchange, foreign exchange forward contracts, interest rate swaps, acquisition costs, litigation expenses and write down of intangibles and property, plant and equipment, earnings or loss from discontinued operations and other typically non-recurring items as these are not reflective of the performance of the underlying business of APUC. APUC believes that analysis and presentation of net earnings or loss on this basis will enhance an investor’s understanding of the operating performance of its businesses. It is not intended to be representative of net earnings or loss determined in accordance with GAAP. A reconciliation of Adjusted Net Earnings to net earnings can be found for the three and nine months ended September 30, 2017 at page 27 of the Interim MD&A and for the year ended December 31, 2016 at page 33 of the Annual MD&A.

Adjusted Funds from Operations

Adjusted Funds from Operations is a non-GAAP measure used by investors to compare cash flows from operating activities without the effects of certain volatile items that generally have no current economic impact or items such as acquisition expenses and are viewed as not directly related to a company’s operating performance. Cash flows from operating activities of APUC can be impacted positively or negatively by changes in working capital balances, acquisition expenses, litigation expenses, and cash provided or used in discontinued operations. Adjusted weighted average shares
outstanding represents weighted average shares outstanding adjusted to remove the dilution effect related to shares issued in advance of funding requirements. APUC uses Adjusted Funds from Operations to assess its performance without the effects of (as applicable) changes in working capital balances, acquisition expenses, litigation expenses, cash provided or used in discontinued operations and other typically non-recurring items affecting cash from operations as these are not reflective of the long-term performance of the underlying businesses of APUC. Where APUC manages the day to day operations of a facility and receives the majority of its economic benefits, the Adjusted Funds from Operations of the entire facility is included in calculating the measure. APUC believes that analysis and presentation of funds from operations on this basis will enhance an investor’s understanding of the operating performance of its businesses. It is not intended to be representative of cash flows from operating activities as determined in accordance with GAAP. A reconciliation of Adjusted Funds from Operations to cash flow from operating activities can be found for the three and nine months ended September 30, 2017 at page 28 of the Interim MD&A and for the year ended December 31, 2016 at page 34 of the Annual MD&A.

Net Energy Sales

Net Energy Sales are a non-GAAP measure used by investors to identify revenue after commodity costs used to generate revenue where revenue generally is increased or decreased in response to increases or decreases in the cost of the commodity to produce that revenue. APUC uses Net Energy Sales to assess its revenues without the effects of fluctuating commodity costs as such costs are predominantly passed through either directly or indirectly in the revenue that is charged. APUC believes that analysis and presentation of Net Energy Sales on this basis will enhance an investor’s understanding of the revenue generation of its businesses. It is not intended to be representative of revenue as determined in accordance with GAAP.

Net Utility Sales

Net Utility Sales is a non-GAAP measure used by investors to identify utility revenue after commodity costs, either natural gas or electricity, where these commodity costs are generally included as a pass through in rates to its utility customers. APUC uses Net Utility Sales to assess its utility revenues without the effects of fluctuating commodity costs as such costs are predominantly passed through and paid for by the utility customer. APUC believes that analysis and presentation of Net Utility Sales on this basis will enhance an investor’s understanding of the revenue generation of its utility businesses. It is not intended to be representative of revenue as determined in accordance with GAAP.

Divisional Operating Profit

Divisional Operating Profit is a non-GAAP measure. APUC uses Divisional Operating Profit to assess the operating performance of its business groups without the effects of (as applicable): depreciation and amortization expense, corporate administrative expenses, income tax expense or recoveries, acquisition costs, litigation expenses, interest expense, gain or loss on derivative financial instruments, write down of intangibles and property, plant and equipment, and gain or loss on foreign exchange, earnings or loss from discontinued operations and other typically non-recurring items. APUC adjusts for these factors as they may be non-cash, unusual in nature and are not factors used by management for evaluating the operating performance of the divisional units. Divisional Operating Profit is calculated inclusive of Hypothetical Liquidation at Book Value (“HLBV”) income, which represents the value of net tax attributes earned in the period from electricity generated by certain of its U.S. wind power and U.S. solar generation facilities. Where the Company manages the day to day operations of a facility and receives the majority of its economic benefits, the full operating profit of such facility is included in calculating the measure. APUC believes that presentation of this measure will enhance an investor’s understanding of APUC’s divisional operating performance. Divisional Operating Profit is not intended to be representative of cash provided by operating activities or results of operations determined in accordance with GAAP.
### Key Selected Financial Information

All dollar amounts in C$ M except per share information

<table>
<thead>
<tr>
<th></th>
<th>NINE MONTHS ENDED</th>
<th>TWELVE MONTHS ENDED</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>SEPTEMBER 30</td>
<td>DECEMBER 31</td>
</tr>
<tr>
<td></td>
<td>2017</td>
<td>2016</td>
</tr>
<tr>
<td>Revenue</td>
<td>$1,454.5</td>
<td>$785.8</td>
</tr>
<tr>
<td>Adjusted EBITDA ¹</td>
<td>650.0</td>
<td>338.6</td>
</tr>
<tr>
<td>Cash provided by operating activities</td>
<td>288.0</td>
<td>166.0</td>
</tr>
<tr>
<td>Adjusted funds from operations ¹</td>
<td>455.4</td>
<td>260.0</td>
</tr>
<tr>
<td>Net earnings attributable to shareholders</td>
<td>133.1</td>
<td>84.6</td>
</tr>
<tr>
<td>Adjusted net earnings ¹</td>
<td>206.2</td>
<td>114.0</td>
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<tr>
<td>Dividends declared to common shareholders</td>
<td>178.5</td>
<td>109.9</td>
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**Per share**

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<thead>
<tr>
<th></th>
<th>2017</th>
<th>2016</th>
<th>2016</th>
<th>2015</th>
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</thead>
<tbody>
<tr>
<td>Basic net earnings</td>
<td>$0.34</td>
<td>$0.28</td>
<td>$0.44</td>
<td>$0.42</td>
</tr>
<tr>
<td>Adjusted net earnings ¹²</td>
<td>0.53</td>
<td>0.40</td>
<td>0.57</td>
<td>0.46</td>
</tr>
<tr>
<td>Diluted net earnings</td>
<td>0.33</td>
<td>0.28</td>
<td>0.44</td>
<td>0.42</td>
</tr>
<tr>
<td>Dividends declared to shareholders</td>
<td>0.46</td>
<td>0.40</td>
<td>0.55</td>
<td>0.49</td>
</tr>
</tbody>
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<table>
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<tr>
<th></th>
<th>2017</th>
<th>2016</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total assets</td>
<td>$10,306.7</td>
<td>$8,249.5</td>
<td>$8,249.5</td>
</tr>
<tr>
<td>Long term debt ³</td>
<td>4,435.1</td>
<td>4,272.0</td>
<td>4,272.0</td>
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</table>

2. APUC uses per share adjusted net earnings, cash provided by operating activities and adjusted funds from operations to enhance assessment and understanding of the performance of APUC.
3. Includes current and long-term portion of debt and convertible debentures per the financial statements.
Biographies

Ian Robertson | Chief Executive Officer

Ian serves as Chief Executive Officer of Algonquin Power & Utilities Corp. (APUC). He is a founder and principal of Algonquin Power Corporation Inc., an independent power developer which was formed in 1988 and is the predecessor organization to APUC.

Ian has over 29 years of experience in the development, financing, acquisition and operation of electric power generating projects both in North America and internationally. He is an electrical engineer and holds a Professional Engineering designation through his Bachelor of Applied Science awarded by the University of Waterloo and a Master of Business Administration from York University’s Schulich School of Business. In addition, Ian was awarded a Chartered Financial Analyst designation in 2001. Ian received a Chartered Director designation from McMaster University in 2008. Consistent with his commitment to continuing education, Ian recently completed a Master of Laws at the University of Toronto, Law School.

In addition to his principal occupation as Chief Executive Officer of Algonquin Power & Utilities Corp., Ian has served as a director on a number of Boards of Directors for public companies in the electrical generation and oil and gas sectors, and is a member of the Board of Directors of the American Gas Association and the Edison Electric Institute.

Chris Jarratt | Vice Chair

Chris has been a director and Vice Chair of Algonquin Power & Utilities Corp. since 2009. Prior to that, he was a founder and principal of Algonquin Power Corporation Inc., a private independent power developer formed in 1988 which is the predecessor organization to Algonquin Power & Utilities. Chris has over 30 years of experience in the independent electric power and utility sectors and holds an Honours Bachelor of Science in Engineering from the University of Guelph and holds an Ontario Professional Engineering designation. He also holds the certification of C. Dir. (Chartered Director) from McMaster University in 2009. In addition, Chris was co-recipient of the 2007 Ernst & Young Entrepreneur of the Year finalist award.
David Bronicheski | Chief Financial Officer

David joined Algonquin Power & Utilities Corp. in 2007 and is responsible for all aspects of planning, directing, implementing, evaluating, and reporting on the company’s financial performance. David has over 30 years of senior management experience including 14 years in the cable television & telecommunications industries. He has held various senior management and finance positions within the telecommunications industry including Executive Vice President and Chief Financial Officer of a publicly traded telephone, cable television and internet service provider. David holds a Bachelor of Arts in economics (cum laude), a Bachelor of Commerce degree, and an MBA. He is also a Chartered Professional Accountant (CPA, CA).

Jeff Norman | Chief Development Officer

Jeff co-founded the Algonquin Power Venture Fund in 2003 and served as President until it was acquired by Algonquin Power Co., APUC’s Generation Business Group, in 2008. Jeff joined Liberty Power in 2008 to form the business development team and was appointed to the Algonquin Power & Utilities Corp. executive team in 2015. Since 2008, the business development team has developed and constructed over 1 GW of wind facilities and secured in excess of 150 MWs of solar facilities. Jeff has over 24 years of experience and has reviewed the economic merits of hundreds of renewable energy projects located throughout North America. Jeff holds an Honours Bachelor of Arts degree from the University of Waterloo, a Masters of Accounting degree from the University of Waterloo, and is a Certified Professional Accountant/Chartered Accountant.

David Pasieka | Chief Operating Officer, Liberty Utilities

David joined Algonquin Power & Utilities Corp. in 2010 and serves as Chief Operating Officer of APUC’s Liberty Utilities Group. As Chief Operating Officer, David is focused on acquiring and managing a portfolio of regulated Water, Natural Gas, and Electrical distribution companies throughout the United States. David has global experience in sales, marketing, integration, P&L, operations and customer service. He has led many organizations while integrating people, policies, and processes to encourage the steady growth of the organization. David holds a Bachelor of Science Degree from the University of Waterloo, Masters of Business Administration from the Schulich School of Business – York University, and a Chartered Director designation from McMaster University.
**Gerald Tremblay**  |  Senior Vice President, Operations, Liberty Utilities

Gerald joined Algonquin Power & Utilities Corp. in 2000. He has overall accountability for field operations of the Distribution Business Group, including customer care, operations, and engineering departments. Gerald has over 25 years of experience in increasingly senior positions within the retail, energy, and utilities industries. He earned a Bachelor’s degree in Social Science with honours in Economics and is a Chartered Professional Accountant (Certified General Accountant).

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**Peter Eichler**  |  Vice President, Centralized Operations, Liberty Utilities

Peter joined APUC’s Distribution Business Group in 2009. His roles have focused on the development of rate case strategy and identifying and executing on growth opportunities throughout the United States. In his current role, Peter focuses on the development of regulatory strategy, business and community development, and oversees the centralized operations group. Prior to joining the Company, Peter developed significant financial, operational, and regulatory expertise in the utility industry working for some of the largest electric distribution companies in Ontario. Peter holds a Bachelor of Commerce Degree, a Masters of Business Administration, and is a Chartered Professional Accountant (Certified Management Accountant).

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**Rahi Nathwani**  |  Vice President, Finance

Rahi joined Algonquin Power & Utilities Corp. in 2010, leading the Financial Reporting team for Algonquin Power and Utilities Corp. For the past six months he has had organization-wide accountability for Financial Planning & Analysis and Production Reporting. Rahi previously spent 11 years in public accounting with PricewaterhouseCoopers (8 years) and MNP (3 years) specializing in growth-stage companies. Rahi is a Chartered Professional Accountant (CA, CPA) and a Certified Public Accountant (CPA, Colorado).
Charles Ashman | Vice President, Technology

Charlie re-joined Algonquin Power Co. in 2012 as Vice President of Technology; a key leadership position providing advisory and oversight support to the senior executive team. Prior to rejoining the company, Charlie provided strategic consulting and technical advisory services to a portfolio of alternative energy clients and was instrumental in the successful repowering of the Windsor Locks cogeneration facility. Charlie graduated from the United States Merchant Marine Academy in 1977 with a degree in Marine Engineering. He also holds an MBA from the University of Connecticut, and a Six Sigma Black Belt Certificate from Villanova University. He formerly served as a Lieutenant in the United States Navy Reserve.

Ian Tharp | Vice President, Investor Relations

Ian joined Algonquin in January, 2016 and is responsible for the development and execution of the company’s investor relations strategy. He brings over 20 years of progressive experience in the electricity and investment industries to the role, with a specific focus on Renewable Energy, Electric Utilities, and Cleantech. Having worked on the buy-side as a Venture Capital / Project Equity portfolio manager on early-stage Cleantech companies and renewable power developers, and through his work with many of Canada’s largest Canadian-listed companies as a Sell-side equity research analyst, he has a depth of experience in articulating high-growth opportunities to the investment community. Ian has an Economics degree from the University of Western Ontario and is a CFA Charter Holder.

Elizabeth Dumm | Senior Director, Governmental Affairs

Elizabeth joined Algonquin Power and Utilities Corp. from Empire District Electric, where she directed federal and state government affairs since 2010. As Senior Director of Governmental Affairs, Elizabeth leads the development of provincial, state and federal governmental policy and strategy for Algonquin and its subsidiaries. Elizabeth graduated from the University of Missouri with her Bachelor’s Degree in Journalism. Early in her career, Elizabeth worked as a consultant in Boston for Brodeur Worldwide providing strategic communications counsel to Fortune 500 companies. Following her time in Boston, Elizabeth returned to Joplin, Missouri and worked at the St. John’s Regional Medical Center before joining Empire.
**Joanne Atalay | Director, Wind Asset Management, Liberty Power**

Joanne joined Liberty Power in 2015 and is Director of Wind in the Asset Management group. She is responsible for all aspects of commercial asset management including warranty management and Tax Equity partner engagement. Currently managing APUC’s wind portfolio with over 1 GW of generation capacity, Joanne brings over 20 years of experience in wind power asset development and management of both on and offshore applications. She is the former Global Asset Manager for Shell Wind Energy, and was responsible for the performance of the company’s global operational portfolio of 740 MW. In this role she held company managing director positions and was responsible for the governance of the joint ventures in Europe and the US. Joanne took part in the raising and placement of large non-recourse project financing and associated acquisition financing of renewable energy assets. Previously, she has held wind asset management positions with Cinergy Corp (now Duke Energy) and PowerGen plc (now Eon UK) and a development manager role with Renewable Energy Systems of UK (RES). She holds a BSc Hons in Urban Land Economics and is a former member of the Royal Institution of Chartered Surveyors.

**Armando Zuluaga | Chief Executive Officer, AAGES**

Armando is the Deputy Chief Executive Officer of Abengoa, S.A. (MCE: ABG/P:SM), the international company that applies innovative technology solutions for sustainability in the infrastructures, energy and water sectors. With more than 20 years of experience, prior to becoming the Deputy CEO of Abengoa, Armando was the Chief Executive Officer of Abengoa Solar, the solar business unit of Abengoa. With a global reach, Abengoa solar has been a worldwide leader in the development of solar projects having developed and projects in Spain, US, Algeria, EUA, Chile, Israel, China, Australia and South Africa with a total installed capacity of over 2GW and a total capex of over $7B.

Before becoming the CEO of Abengoa Solar, Armando was the CEO of Abengoa Solar LLC, head of the North American business of Abengoa. With base in Denver (Colorado), Armando managed the financing, construction and commissioning of two of the largest Concentrating SP plants in operation in the world (Solana and Mojave Solar Project) with a total capex of $3.8B and 560 MW of capacity installed.

Armando has a law degree from the University of Granada (Spain) and earned a LLM in European Law from the Carlos III University in Madrid (Spain) and an Executive Master in Business Administration from the IIST in Seville (Spain).
Introduction

Ian Robertson
Chief Executive Officer
Algonquin Power & Utilities

Chris Jarratt
Vice Chair
Algonquin Power & Utilities

David Bronicheski
Chief Financial Officer
Algonquin Power & Utilities
Welcome
## Agenda

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<tr>
<td>8:30-8:35 a.m.</td>
<td>Welcoming Remarks</td>
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<tr>
<td>8:35-9:15 a.m.</td>
<td>Executive Panel and Strategic Overview</td>
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<tr>
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<td>11:00-11:40 a.m.</td>
<td>International Expansion</td>
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<tr>
<td>11:40-11:50 a.m.</td>
<td>Closing Remarks</td>
</tr>
<tr>
<td>12:00-12:30 p.m.</td>
<td>Lunch and Learn: The Role of Storage to Achieve 100% Renewable Energy</td>
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Introduction
Safety Moment
Messages for the Day

- Continued stability and predictability of results
- Robust and resilient business model
- Industry leading growth profile
- New investment channel through measured international expansion strategy

*Strategically aligned for a changing future through core competencies*
Macro Environmental Considerations
Changing Character of our Customers

- Safe, reliable, and affordable electric, gas and water services remain essential to modern society

- Utility customers demanding more choice, control, and transparency

- Growing environmental stewardship
  - Direct corporate procurement of energy (RE100)
  - Carbon regulation in effect in Canada, California, and Northeast

- Regulatory environment moving slowly in comparison to technology and market advances
Technology Disruptors

Continuing cost declines in renewable generation
- Lowest cost form of generation
- Changing electrical grid topology

Growing proliferation of energy storage
- Source of customer independence
- Value of distributed storage maximized through grid connection

Information technology reducing transactional barriers
- Leading to customer disintermediation
- AMI, “Smart Cities”, “Internet of Things”

Source: Utility impact model central scenario EUROPE - EY Analysis
Lower corporate tax rate generally constructive

- Liberty Power to enjoy lower tax rate, Liberty Utilities indifferent
- Cash flow impact on Liberty Utilities likely spread over a number of years
- Lower tax rate will drive faster rate base growth in Liberty Utilities

ITC feasible alternative tax attribute monetization strategy

- In lower wind regimes, ITC value close to PTC (~US$2/MW-hr)
- Empire “Greening the Fleet” remains on track with US$300 M of customer savings under ITC structure (US$170 M more rate base)

Tax provisions could make self sheltering most practical alternative

- Junior developers likely to be most impacted
- Changing provisions could advance Liberty Utilities cash tax horizon by 1-2 years
Opportunities in the Industry

- Disruption and change drive opportunities for Algonquin

- Continued opportunity for increased renewables penetration supporting investment in flexible distribution utility infrastructure

- Critical factors for success:
  - Be customer centric
  - Embrace new business models
  - Focus on cost-competitiveness

Source: BNEF.
Macro Environmental Considerations

Start with “Why”

Level of abstraction
(The level of difficulty in using words to adequately describe)

Emotional Engagement

Rational Engagement

Capacity to inspire, motivate and touch customers, employees and investors

WHAT

WHY

HOW
WE BELIEVE: The services we provide, which are fundamental to the fabric of society, are contributing to a sustainable energy and water future…

As we strive to build the safest, cleanest, and most reliable utility company, we are creating something special that can make a real difference…
We will be the utility company most admired by our customers, communities and investors for our people, our passion and our performance.
We aspire to perform as a top quartile North American integrated utility as measured by:

- Our safety record
- Our customer experience
- Our employee engagement
- Our financial performance and growth
- Our commitment to renewable energy
Overview – Milestones and Achievements in 2017

Empire Acquisition
Transaction close - 218,000 customers

Luming Solar
Commissioned - 50 MW

Tuck-In Acquisitions
St. Lawrence Gas - 16,000 customers
City of Perris Water - 4,100 customers

“Greening the Fleet”
IRP submitted
800 MW investment potential

Winter

New Capacity
Deerfield Wind - 150 MW
Bakersfield II - 10 MW

Spring

Successful Rebranding
Algonquin Power Co. to Liberty Power

Summer

Progress on Construction
Great Bay Solar - 75 MW
Amherst Wind - 75 MW

Fall

Entry into International
Atlantica Investment
AAGES Joint Venture

✓ Delivered material growth in Operating Profit:\n  • Liberty Utilities = 139%
  • Liberty Power = 16%

✓ C$7.7 B in investment potential over the next five years:
  • Liberty Utilities = C$4.5 B
  • Liberty Power = C$3.1 B

Note: Results for the nine months ending Sept 30, 2017 as compared to the same period on 2016.
Numbers may not add up due to rounding.

Macro Environmental Considerations 16
Financial Positioning and Business Expectations
Algonquin has a proven track record of accretive growth

Growth is visible on a per share basis

Financing growth efficiently is a critical element of our success
### AQN Equity Brand is Strong

- Solid investment-grade balance sheet
- Access to equity capital markets never stronger
- TSX & NYSE listed
- Investor base is growing globally

#### Financial Positioning

**Senior Debt to Total Capitalization**

<table>
<thead>
<tr>
<th>Year</th>
<th>Target Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>40.0%</td>
</tr>
<tr>
<td>2014</td>
<td>45.0%</td>
</tr>
<tr>
<td>2015</td>
<td>50.0%</td>
</tr>
<tr>
<td>2016</td>
<td>45.0%</td>
</tr>
<tr>
<td>2017</td>
<td>40.0%</td>
</tr>
<tr>
<td>2018</td>
<td>35.0%</td>
</tr>
<tr>
<td>2019</td>
<td>30.0%</td>
</tr>
<tr>
<td>2020</td>
<td>25.0%</td>
</tr>
<tr>
<td>2021</td>
<td>20.0%</td>
</tr>
<tr>
<td>2022</td>
<td>15.0%</td>
</tr>
</tbody>
</table>

**C$ millions**

<table>
<thead>
<tr>
<th>Category</th>
<th>Forecast December 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term debt</td>
<td>3,883 48%</td>
</tr>
<tr>
<td>Preferred shares</td>
<td>214 3%</td>
</tr>
<tr>
<td>Equity</td>
<td>3,953 49%</td>
</tr>
<tr>
<td>Total capitalization</td>
<td>8,050 100%</td>
</tr>
</tbody>
</table>

- Tax equity brings meaningful equity for U.S. renewable projects
- > C$1 B of tax equity placed with 6 providers across 9 projects
<table>
<thead>
<tr>
<th><strong>Seasoned Debt Platforms Provide Low Cost Capital</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Investment grade platforms provide ready access to debt capital markets in Canada and the U.S.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
AQN has 93% of adj. EBITDA and assets in USD

AQN is now listed on both the NYSE and TSX

AQN dividend is paid in U.S. dollars
AQN maintains an appropriate mix of U.S. debt to U.S. assets as its primary hedging strategy.

Capital is sourced in appropriate denomination to achieve a balanced book.

Dividend declared in USD.

Increasing interest from U.S. investors for financial reporting in USD.
- Five year capital of C$7.7 B

- Multiple sources of capital provides financing flexibility
Sources and Uses of Capital

- Tax equity market may be constrained due to U.S. tax reform
- Algonquin has the ability to self-shelter more than half of the tax equity financing
U.S. Tax Reform – Implications for APUC

- Regulated utility business expected to be largely unaffected
  - Expected grandfathering of existing debt arrangements
  - Interest expense deduction retained
  - MACRS remains as tax depreciation method
  - State and Local tax deduction retained

- Non-regulated power business expected to have a net benefit from tax reform
  - Interest expense limitations are more than offset by lower corporate tax rate and accelerated tax depreciation

*Tax reform not expected to materially affect APUC earnings*
Forecast Expectations
**Robust investment program delivering ~20% CAGR in assets through 2022**

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019-2022</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liberty Power</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>330</td>
<td>1,250</td>
<td>1,580</td>
</tr>
<tr>
<td>International</td>
<td>770</td>
<td>780</td>
<td>1,550</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,100</td>
<td>2,030</td>
<td>3,130</td>
</tr>
<tr>
<td><strong>Liberty Utilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution</td>
<td>470</td>
<td>1,370</td>
<td>1,840</td>
</tr>
<tr>
<td>Generation</td>
<td>50</td>
<td>1,940</td>
<td>1,990</td>
</tr>
<tr>
<td>Transmission</td>
<td>60</td>
<td>640</td>
<td>700</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>570</td>
<td>3,950</td>
<td>4,520</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,670</td>
<td>5,980</td>
<td>7,650</td>
</tr>
</tbody>
</table>
Creating Value Through Growth

- Adjusted EBITDA growth consistent with asset growth
- Adjusted EPS growth in excess of DPS growth will improve payout ratio
- Per share accretion includes impact of execution on de-leveraging program

Robust & transparent Adj. EBITDA, EPS, and FFOPS growth will support 10% DPS growth

Note: FX C$1.25/US$, EBITDA in $C millions and share amounts in $C/share
Post 2022 Outlook

- Focus on long-term cash flows

- 2022-2027 Scenario
  - No further growth in Liberty Power assets
  - Inflationary increases in IPP PPAs as appropriate
  - Continued organic investment in utilities

- AFFOPS CAGR Outlook
  - No further investment: ~4-6%
  - Continued investment: ~10%

- Conclusions
  - Current growth initiatives are accretive to long-term cash flows
  - Continued opportunity for organic growth in Liberty Utilities

*Characteristics of current and future assets will deliver growing cash flows*
Dividend History and Expected Growth

- Seven years of steady dividend growth, average growth rate of 15%
- Member of S&P Canadian Dividend Aristocrats Index
- Dividend paid in US$ (or C$ at investor’s choice)
- Improving payout ratio secures dividend

Long-Term Growth Supports Sustainable Dividend

Forecast Expectations
Messages for the Day

Continued Stability and predictability of results
- Demonstrated diversification benefits from a solid foundation of high-quality, long-lived utility assets

Robust and resilient business model
- Well positioned for changing business, political, and social environment

Industry leading growth profile intact
- C$7.7 B investment pipeline will deliver earnings and cash flows growth to support targeted 10% dividend growth

New investment channel through measured international expansion strategy
- Greater organizational efficacy and investment opportunity without undue execution risk

Well positioned for a changing future through core competencies
North American Renewable Energy

Jeff Norman
Chief Development Officer
Algonquin Power & Utilities

Joanne Atalay
Director, Wind Asset Management
Liberty Power

Elizabeth Dumm
Senior Director, Governmental Affairs
Algonquin Power & Utilities

Rahi Nathwani
Vice President, Finance
Algonquin Power & Utilities
Key Messages

- Diversified high quality generation platform
- Predictable returns
- Long-term growth potential
- Supportive industry trends
- Entrepreneurial deal makers

*Liberty Power’s growth profile supports APUC’s goals*
Macro Economic Factors
## Growing Our North American Clean Energy Platform

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Operational</th>
<th>Construction</th>
<th>Facilities</th>
<th>Provinces &amp; States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>1,050 MW</td>
<td>99 MW</td>
<td>13 Facilities</td>
<td>4 Provinces &amp; 5 States</td>
</tr>
<tr>
<td>Solar</td>
<td>40 MW</td>
<td>75 MW</td>
<td>4 Facilities</td>
<td>1 Province &amp; 2 States</td>
</tr>
<tr>
<td>Hydro</td>
<td>124 MW</td>
<td></td>
<td>19 Facilities</td>
<td>4 Provinces &amp; 1 State</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>127 MW</td>
<td></td>
<td>2 Facilities</td>
<td>2 States</td>
</tr>
</tbody>
</table>

1,515 MW Total

*Strong set of diversified operating assets with average PPA length of 16 years*
Renewables’ Continued Cost Reductions

- Today utility scale wind is the lowest cost generation
- Cost of solar is falling rapidly
- Low cost renewables are and will continue to disrupt markets

Renewables’ attractive economics reshaping electricity markets

Source: Lazard and Greentech Media

Modern Turbines Provide More Swept Area and Increased Capacity Factor

Unsubsidized Average LCOE (US$/MWh)

- Coal CCGT 2017: $74
- Utility Solar 2017 - 2022: $48
- Wind 2017 - 2022: $40

2005 Technology
Vestas V-82 – 1.65 MW

2017 Technology
Vestas V-136 – 3.45 MW

North American Renewable Energy
Rapid near-term wind and solar buildout

Solar competitiveness continues to drive significant growth beyond 2021

Economic and market forces see renewable share increase to 2040

Post-PTC Wind: 45 GW
Post-ITC Solar: 130 GW

Renewables growth forecast to continue after PTC/ITC expiration

Sources: BNEF
In SPP, wind represents 18% of capacity
  - Plans in place to support up to 75%

In ERCOT, wind represents 15% of capacity
  - Exceeding 50% of generation on some days

NREL modelled 30% wind and solar penetration in Eastern interconnect
  - Up to 400 GW of wind and solar with modest transmission and storage additions
  - 65 GW currently installed

Grid can accommodate growing renewables penetration

Source: NREL, AWEA, CANWEA, SEIA, CANSIA
### Key Disruptors

<table>
<thead>
<tr>
<th>Key Disruptors</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind &amp; Solar Grid Cost Parity</td>
<td>Now</td>
</tr>
<tr>
<td>Retail Cost Parity (Distributed Rooftop Solar &amp; Storage)</td>
<td>~10 Years</td>
</tr>
<tr>
<td>Electric Vehicles Parity (EV Performance = Combustion Vehicle Performance)</td>
<td>~10 Years</td>
</tr>
</tbody>
</table>

**Disruption underway – tipping points inevitable**

**Two Parity Points are Forecast**

- **Retail Cost Parity**
- **EV Parity**
- **Current Solar LCOE**
- **Current Wind LCOE**
- **Non Utility Solar & Battery LCOE**

*Source: Ernst & Young, BNEF*
Retail Cost Parity

- Retail cost parity: ~10 years
  - Cost of locally generated and stored electricity equals the retail price of grid-delivered electricity
  - Distributed Energy Resources (DER) growing 2-3 times faster than centralized generation
- Widespread deployment of distributed storage will enable greater penetration of intermittent renewables

**Annual Installed DER Power Capacity Additions by Technology, United States**

**DER growth accelerating in North America and Canada**

Source: BNEF
EV Parity

- EV Parity: ~10 years
  - Battery EVs reach parity with combustion engine vehicles

- Creating a grid related value stream
  - Real time energy balancing
  - Peak shaving load shift
  - Distribution peak capacity support
  - Time of Use energy management

- Increasing deployment of distributed storage

*EVs projected to add global demand of 200 TWh annually*

Source: Ernst & Young
Development Perspective
Development Trends

Superior economics are the primary driver of growth

Market Drivers

United States:
- Corporate off-takers
- Community Choice Aggregators
- Renewable Portfolio Standards
- Production Tax Credit/Investment Tax Credit
- Solar Panel Import Tariff

Canada:
- Alberta and Saskatchewan RFPs

Economic Drivers

- Continuing low gas prices
- Declining wind and solar costs
Many major companies looking to source 100% renewable energy

Source: RE100, AWEA
Implications of More Corporate Offtakers

- Shorter term offtake
- Increased challenge of project financing
- Balance sheet financing
- More counterparties than just utilities

A whole new market of energy purchasers

Source: AWEA

North American Renewable Energy
Increased Prominence of Community Choice Aggregators

- Locally owned, non-profit pseudo-utilities
- Growth driven by low-cost renewables
- Large potential growth market

Legally Enacted:
- Massachusetts (1997)
- Ohio (1999)
- California (2002)
- Rhode Island (2002)
- New Jersey (2003)
- Illinois (2009)
- New York (2014)

Under Consideration:
- Utah
- Delaware
- Minnesota

Potential for CCAs to serve 60% of California load
Renewable Portfolio Standards Remain Relevant

RPS Targets

- 60% of new renewables since 2000 due to RPS
- 95% of RPS requirements met in recent years
- At least 60 GW of RPS capacity required by 2030

RPS Adoption

- 29 states have adopted RPS standards
- 50% of states have increased their RPS targets

Along with falling LCOEs, RPS to drive growth in post-PTC/ITC market
Development Timeline

- Strong portfolio of late-stage projects representing C$3.1 B
- Well positioned to take advantage of PTC/ITC phase-out

### North American Renewable Energy

**Liberty Power**
- Val Éo Wind
- Amherst Wind
- Sustaining Capital

**C$1.5 B**

**Blue Hill Wind**
- 150 MW Safe Harbor 1
- 150 MW Safe Harbor 2
- Blue Hill Wind

**Cumulative New Capacity**
- 2018: 99 MW
- 2019: 249 MW
- 2020: 711 MW

**Atlantica Investment**
- Atlantica
  - C$0.8 B

**International Growth**
- International
  - C$0.8 B

Robust portfolio of quality projects ensures continued accretive growth
Great Bay Solar

- On-site construction nearing completion
- Targeting year-end placed in service
- COD Q4 2017

- APUC’s 5th operational solar project development; 165 MW ac total

#### Great Bay Solar

- Installed Capacity: 75 MW
- Location: Maryland
- Capital Cost: C$168-187 M
- Offtake: 10 Year PPA
- Production: 146 GWh

Another solar project successfully added to the portfolio
Amherst Island Wind

- On-site construction proceeding
- Major permits complete
- COD Q2 2018

*Construction underway; operational in 2018*
Late-Stage Developments

Val Éo Wind
- 24 MW wind facility in Quebec
- 20 year PPA with Hydro Quebec
- Q1 2018 start of construction; 2018 COD

Blue Hill Wind
- 177 MW wind facility in Saskatchewan
- 25 year PPA with SaskPower
- 2019 start of construction; 2019/2020 COD

Walker Ridge Wind
- 135 MW wind facility in California
- Negotiating offtake (CCAs / hedges / corp.)
- 2019/2020 COD

Strong late-stage development projects reinforce growth trajectory
Safe Harbor Projects

Safe Harbor Components:
- Vestas
- Gamesa/Siemens

Projects:
- Large inventory of sites that require Safe Harbor components to secure access to tax attributes

Repowerings:
- Vestas Safe Harbor components ideal for repowering

Safe Harbor components secure future growth
Early-Stage Developments

Canada

- Current Focus:
  - Alberta
  - Saskatchewan

- Longer Term:
  - Ontario
  - Quebec
  - Nova Scotia
  - New Brunswick

United States

- Current Focus:
  - Colorado
  - Maryland

- Longer Term:
  - California
  - Georgia
  - Minnesota

Focus on high-potential development markets

Source: AWEA
Wind and Solar Policy
U.S. Tax Reform – Implications for Renewable Energy

- Immediate and meaningful response from industry associations
- Committee report suggests IRS “Safe Harbor” is protected; Senate bill preserves the PTC / ITC
- Work continues to exempt PTC from Base Erosion Anti-Abuse Tax (BEAT)

<table>
<thead>
<tr>
<th>Proposed Change</th>
<th>Senate Approach</th>
<th>House Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTC Rate and Phase-out</td>
<td>• No change – existing phase out maintained</td>
<td>• Value of credit reduced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PTC value drops from US$24 to US$15 per MWh</td>
</tr>
<tr>
<td>ITC Rate</td>
<td>• No change - Option for ITC in lieu of PTC maintained</td>
<td></td>
</tr>
<tr>
<td>Safe Harboring / Construction</td>
<td>• Developer must pay or incur 5% of eligible project costs for safe harbor maintained</td>
<td>• Retroactively removes 5% safe harbor option</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Report language suggests safe harbor protected</td>
</tr>
<tr>
<td>Annual Inflation Adjustment</td>
<td>• Maintained</td>
<td>• Terminates the PTC inflation adjustment</td>
</tr>
<tr>
<td>Base Erosion Anti-Abuse Tax (BEAT)</td>
<td>• Applies a minimum corporate tax of 10%</td>
<td>• No similar provision in House Bill</td>
</tr>
<tr>
<td></td>
<td>• Potentially limits benefit from Tax Equity investment</td>
<td></td>
</tr>
</tbody>
</table>

Advocacy efforts continue to preserve the long-term value of the PTC
U.S. Solar Panel Import Tariff

- A group of U.S. manufacturers of PV panels have petitioned the U.S. International Trade Commission
- Seeking remedies claiming damages due to unfair trade practices
- The U.S. International Trade Commission has agreed that the domestic manufacturers have been harmed
  - Recommending remedies: tariffs and/or import quotas
  - Final decision from the President
- Impacts:
  - Panel availability has slowed project growth
  - International negotiations may reverse the ruling
  - Efficiencies will continue to bring the cost of panels down
  - Globally there is increased availability of low cost panels

Uncertainty for PV growth in the U.S. is short-term
Financial Summary
US$700 B of expected investment in the U.S. and Canada renewable generation markets through 2040

An average annual investment of US$30 B

Source: BNEF

Significant near-term renewable energy opportunity
Liberty Power CapEx Pipeline

- Solid growth pipeline of renewable projects
- Continued investment drives earnings growth

Investment in accretive generation projects supports APUC’s dividend growth target
Liberty Power Operating Profit Growth

- LPCo operating profit almost doubles by 2022
- Solid operating profit growth at a CAGR of 17%

100% increase in profit over five years
Summary

- Profitable renewables portfolio
- Core competencies
- Strong positioning
- Deep development pipeline
Regulated Utilities

David Pasieka  
Chief Operating Officer  
Liberty Utilities

Peter Eichler  
VP, Centralized Operations  
Liberty Utilities

Gerald Tremblay  
SVP, Operations  
Liberty Utilities

Elizabeth Dumm  
Sr. Director, Governmental Affairs  
Algonquin Power & Utilities
Key Messages

- Diversified utility platform
- Predictable returns
- “Greening the Fleet” investments
- Focus on customer centricity
- Demonstrated ability to execute with entrepreneurial spirit

*Liberty Utilities’ growth profile supports APUC’s goals*
## Predictable Earnings and Growth

<table>
<thead>
<tr>
<th>Customers</th>
<th>Core Competence</th>
</tr>
</thead>
</table>
| 775,000 customers | - Increase of ~250,000 customers  
|                  | - Core customer care competence |

<table>
<thead>
<tr>
<th>Employees</th>
<th>Employee Competence</th>
</tr>
</thead>
</table>
| Over 2,000 employees | - Skilled at managing complex projects  
|                  | - Capital investment competency |

<table>
<thead>
<tr>
<th>States</th>
<th>Regulatory Competence</th>
</tr>
</thead>
</table>
| 13 operating states | - Provides regulatory diversification  
|                  | - Regulatory relationship management |

<table>
<thead>
<tr>
<th>Assets</th>
<th>Portfolio and Return</th>
</tr>
</thead>
</table>
| US$7.2 B in regulated utility assets | - Diversified portfolio of utilities  
|                  | - Stable earnings and return protection |
Environmental Scan
Utility Earnings Growth Influencers

- **Changing customer trends** – more control and more renewables

- **Reliability and safety** are still the most important factors to customer satisfaction

- **Transition to agile, competitive structure** – new technologies and renewables are disruptors

**Utility industry trends enable Liberty Utilities’ growth**
Liberty Utilities is investing in water, gas, and electric utility modernization

Source: Navigant
Liberty Utilities’ ROEs have stabilized between 9-10% with improved regulatory lag.
### Rate Regulation

<table>
<thead>
<tr>
<th>Mechanism Type</th>
<th>AZ</th>
<th>CA</th>
<th>GA</th>
<th>MA</th>
<th>MO</th>
<th>NH</th>
<th>NY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue assurance</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Accelerated recovery mechanisms</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Post test year recovery</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Authorized ROE</td>
<td>9.0%</td>
<td>10.0%</td>
<td>10.5%</td>
<td>9.5%</td>
<td>9.5%</td>
<td>9.5%</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

- Electric ☺ - Water ☺ - Gas ☺ - Under Consideration ☀

**Mechanisms enhance Liberty Utilities’ ability to earn its authorized ROEs**
M&A Transactions

- M&A market remains area of focus
- Given our increased size, we have expanded our opportunity set
- Continued trend in utility privatization and “Plant the Flag” opportunities
- Consolidation creates opportunity for additional ‘orphan’ assets

**M&A approach creates competitive advantage**

---

**Number of North American Utilities by Market Capitalization (US$)**

- 16 Up to $5 B
- 10 $5B - $10B
- 14 $10B - $20B
- 32 $20B+

---

**Regulated Utilities**
U.S. Tax Reform
Where are we in the process?
- Industry associations have been very active
- Industry priorities favorably addressed
- Work continues to influence final outcome

### U.S. Tax Reform – Update on Current Proposals

<table>
<thead>
<tr>
<th>Proposed Change</th>
<th>Senate Approach</th>
<th>House Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax rate moves to 20%</td>
<td>2019</td>
<td>2018</td>
</tr>
<tr>
<td>Interest expense limitation to 30% of EBIT</td>
<td>Utilities exempted</td>
<td></td>
</tr>
<tr>
<td>Full expensing of capex</td>
<td>MACRS retained for utilities</td>
<td></td>
</tr>
<tr>
<td>Non-deduction of State and Local Sales Tax</td>
<td>Deduction retained</td>
<td></td>
</tr>
<tr>
<td>Dividend and capital gains tax rate</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>Normalization and excess deferred tax</td>
<td>Included</td>
<td></td>
</tr>
</tbody>
</table>

**Industry priorities are favorably addressed**
Opportunities remain to influence the implementation
Tax reform in 1986 saw varied approaches taken by state regulators.

Liberty Utilities’ state regulators have not declared how they intend to engage with utilities.

<table>
<thead>
<tr>
<th>Generic proceeding applied to all in-state utilities</th>
<th>Regular rate case or other utility-specific proceeding</th>
<th>Deferral account</th>
<th>Rate reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>State utility commissions could hold a special proceeding to address lower corporate tax rates, the result of which would apply to all utilities in the state</td>
<td>The effect of lower tax rates could be handled in the normal course of a regular rate case proceeding along with all other utility expenses and rate base investments</td>
<td>Utilities could be asked to set up a deferral account to track the tax expense difference until the next formal proceeding or rate case</td>
<td>State utility commissions could simply order a rate reduction equal to the reduction in taxes in isolation from any other proceeding</td>
</tr>
</tbody>
</table>

Lower tax rates are expected to be phased in over time.
Growth Strategies
Investment Opportunity – US$3.6 B

Distribution
- Safety and reliability
- Customer growth
- “Plant the Flag”

Transmission
- Gas infrastructure
- Electric transmission upgrades

Generation
- “Greening the Fleet”
  - Midwest wind
  - California solar

Robust investment plan to drive rate base growth
Achieving Authorized Returns

Minimum customer rate impact
- 83% of CapEx does not affect rates
- OpEx to CapEx strategy minimizes impacts

Achieving authorized ROEs
- Capital optimization
- Taking advantage of mechanisms
- Managing operating costs

Liberty Utilities achieves authorized returns while minimizing customer rate impacts
Organic Growth Opportunities – US$1.5 B

- Replace aged infrastructure
- Improve existing infrastructure
- Pursue customer growth

Increasing reliability creates investment opportunity of US$1.5 B
"Greening the Fleet"

- Strategy driven by customer demand and economics:
  - California – Utility-scale solar (Luning and Turquoise)
  - Midwest – Community Solar, 800 MW of wind

- Investment opportunity of US$1.6 B

Customer demand and economics create investment opportunities of US$1.6 B
“Greening the Fleet” – Coal to Wind in the Midwest

- Retirement of coal and build out of 800 MW of wind
- Estimated customer savings US$60/year
- Investment net of tax equity into rate base of US$900 M
- Extensive stakeholder outreach conducted

Midwest 2016 Energy Supply Mix (GWh)
- 44% coal
- 43% wind
- 13% gas

Midwest 2021 Energy Supply Mix (GWh)
- 28% coal
- 52% wind
- 20% gas

Up to US$300 M in customer savings

Economics creates customer savings of up to US$300 M
“Greening the Fleet” – Midwest Wind Timeline

- Dockets filed before 4 commissions
- Positive feedback from stakeholders
- New rates implemented Q1 2021

"Sierra Club, on behalf of its ratepayer members, is interested... appears to be a positive step for its members and the environment. Sierra Club supports the retirement of coal-fired power plants and their replacement with renewable energy and energy efficiency programs."

-Sierra Club, Petition to Intervene, Missouri PSC

Midwest wind expected to be in rates in Q1 2021
Changing customer expectations enables US$300 M in incremental investment
New Technologies Create Investment Opportunities

- California leading technology adoption
  - 2 Microgrid pilot projects within utility
  - Transportation electrification plan
  - Pursuit of 100% renewables

- Distributed storage in New Hampshire

- Community Solar in Missouri
  - LOI with anchor tenant

*Entrepreneurs – think big, start small, scale quickly*

Source: Berkeley Lab
Infrastructure constraints originally addressed by pipeline projects

LNG as a peaking solution now growing in importance with increased renewables

Three key initiatives:
- Northeast Energy Centre US$55 M
- Fall River LNG upgrade US$18 M
- Granite Bridge US$312 M

Northeast constraints create investment opportunities of US$385 M
Granite Bridge – US$312 M Investment

Three core components:
- 27 mile lateral
- “Plant the Flag” opportunity
- Liquefaction, gasification, and storage facility

Attractive infrastructure investment:
- Significant customer savings
- Leverages existing Right of Way
- Diversifies supply pipelines
- Increases tax revenue

Made in New Hampshire for the benefit of New Hampshire
Investment Growth of US$3.6 B

- Significant investment potential
  - New technologies
  - Infrastructure supply
  - Organic growth
  - “Greening the fleet”

- Rate base CAGR of 24%
  - Post-Empire CAGR of 8%

Investment in accretive distribution projects supports APUC’s earnings growth
Operating Profit Growth at a CAGR of 23%

- Capital investment drives rate base and earnings growth
- Operating profit CAGR of 23%
  - Post-Empire CAGR of 9%

Optimally timed investment and rate cases drive returns and support APUC’s dividend growth target
Summary

- Diversified utility platform
- Predictable returns
- “Greening the Fleet”
- Focus on customer centricity
- Demonstrated ability to execute with entrepreneurial spirit
International Expansion

Ian Robertson
Chief Executive Officer
Algonquin Power & Utilities

Chris Jarratt
Vice Chair
Algonquin Power & Utilities

Armando Zuluaga
Chief Executive Officer
Abengoa-Algonquin
Global Energy Solutions
Powerful drivers of global electric demand – Electrification in developing markets, load growth, cost reduction, and environmental concerns are driving investment in all types of generation.

Renewables are winning on cost and environmental impact.
Demand Growth, Focus on Carbon Intensity

- **Carbon reduction** – Europe and Latin America actively decarbonizing electricity sectors
- **Regulatory drivers** – European regulations in place
- **Clear path forward** – Low cost coupled with low emissions
- **New solutions needed** – Options for management of intermittency will be required – storage, fast-start natural gas, distributed energy resources, transmission, etc.

### Annual Change in Power Demand

![Annual Change in Power Demand Graph]

### Carbon Intensity of Generation is Declining

![Carbon Intensity of Generation Graph]

Source: BNEF
### Expansion Consistent with APUC’s Growth Strategy

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>Company formation as an independent Canadian hydroelectric generation developer</td>
</tr>
<tr>
<td>1996</td>
<td>First U.S. hydro facility</td>
</tr>
<tr>
<td>2006</td>
<td>First wind energy development – 120 MW St. Leon</td>
</tr>
<tr>
<td>2009</td>
<td>First U.S. wind development – 400 MW Sandy Ridge, Minonk, Senate projects</td>
</tr>
<tr>
<td>2014</td>
<td>First solar energy development – 10 MW Cornwall</td>
</tr>
<tr>
<td>2017</td>
<td>International expansion through announced AAGES venture and Atlantica investment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Installed Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>33 MW</td>
</tr>
<tr>
<td>2006</td>
<td>602 MW</td>
</tr>
<tr>
<td>2014</td>
<td>1,150 MW</td>
</tr>
</tbody>
</table>

1. Capacity decline due to asset sales. Projects listed achieved COD in 2012.

---

*International is the next logical step in APUC’s proven track record of sustainable growth*
Strategic investment in Atlantica Yield

- **To acquire** 25% interest in Atlantica from Abengoa for a total of US$608 M
- **Attractively-priced** portfolio of high-quality, international operating assets
- **Material dividend growth** expected with clearing of sponsor uncertainty
- **Near-term investment** in growth opportunities – use of corporate cash
- **Future with Abengoa drop down** of AAGES projects through new ROFO

AAGES venture

- **Global development platform** for clean energy, transmission, and water infrastructure
- **Strategic, measured approach** to international development for APUC
- **Access to new modalities** such as energy storage, desalination, and concentrating solar
- **Strongly aligned** with APUC’s criteria for viable global investment
- **Near-term construction opportunities** – A3T (co-gen) and ATN3 (transmission)

**Complementary initiatives represent measured first steps into key global markets**
A Win-Win-Win Strategic Partnership

- Measured approach for international development
- Access to Abengoa’s global presence and project pipeline
- Immediate accretion of Atlantica investment

**ABENGOA**
- Key to Abengoa’s back-to-basics strategy - EPC and O&M services
- Long-standing global expertise and presence
- Maximization of proceeds on sale of Atlantica Yield

**Atlantica Yield**
- Strengthens growth profile by accelerating Abengoa drop-downs
- New ROFO agreement with AAGES
- Strong new sponsor supports future growth and capital access

**Abengoa - Algonquin Global Energy Solutions**

AAGES is a key first step in APUC’s strategic expansion into global infrastructure development
Atlantica – Strong, Diversified Global Operating Fleet

Strength of assets

- Peer-leading weighted average contract life of 21 years\(^1\)
- Benefits of diversity by both geography and modality

Strength of financing structure

- 100% of assets have long-term non-recourse project financing which amortizes prior to end of contract life
- \(~90\%\) of project debt has fixed or hedged interest rates

Strength and quality of cash flows

- Revenues 100% contracted\(^2\) for full output
- Over 95% is generated from investment grade off-takers
- Over 90% is denominated or hedged in USD or Euros

---

1. As of December 31, 2016
2. Regulated in the case of the Spanish solar assets
Focus on total returns consisting of share price appreciation and dividends

Portfolio built with stable, diverse, long-term cash flow generating assets

An attractive opportunity to invest in a high-quality, growing global infrastructure portfolio

Atlantica’s Highly-Diversified Portfolio is a Material Benefit

Objectives Well-Aligned with APUC Strategy

Key Figures

- **1,442 MW** Renewable generation (83% MW Solar)
- **300 MW** Conventional power generation
- **1,770 KM** electric transmission
- **10.5 Mlf³/ day** of water capacity

By Modality

- Renewable Energy: 73%
- Clean Energy: 17%
- Electric Transmission: 7%
- Water: 3%

By Geography

- North America: 41%
- Europe: 40%
- South America: 12%
- RoW: 7%

Source: Atlantica filings
Abengoa is a Strong Global Partner

Overview

Depth of International Expertise

- Abengoa is a global company that applies innovative technology solutions for sustainability in the infrastructure, energy and water sectors
- Established presence in key global markets

Two Primary Operating Segments

Engineering and Construction

- Sector foci – Clean energy and Water
- Turn-key project execution – Solar-thermal, solar-gas, conventional generation, transmission

Operations and Maintenance

- Long-standing provider of O&M services to global client base

Key Figures

- €3,700M enterprise value
- 13,776 employees
- 91% of revenues from outside of Spain
- 50 countries Global presence

Share Sale Supports Restructuring

Renewed Strength

- Abengoa’s plan to re-affirm its leading market position in EPC and O&M is supported by its anticipated sale of the 25% interest in Atlantica
- Initial funding of AAGES will be netted from sale proceeds

Abengoa is well positioned to support AAGES in securing international development opportunities

Source: Abengoa filings
Abengoa’s Strong Track Record

- Over 6,000 MW of Power projects
- Over 2.4 MLD capacity of desalination projects
- Over 27,000 km of T&D projects

Abengoa projects

- Transmission Line
- IP Water Abengoa: 11 projects
- IP Water Third Party: 2 projects
- Solar
- Combined Cycle or W2E
- Wind Farm

International Expansion

Note: “BOT” = Build-Operate-Transfer
Source: Abengoa
AAGES – Setting our International Strategy into Motion
Strategic Benefits

Highly capable development vehicle for international growth

- Experienced international team – AAGES utilizes a risk-managed approach to global markets
- Capitalized for early-stage developments
- Immediate access to early-stage pipeline

Sustainable competitive advantages

- Top talent – Dedicated and experienced management team
- Proven track record – Successful development of more than 3 GW in international markets in the last 7 years
- Local expertise – Critical direct knowledge of key markets and BD capabilities
- Leveraging on:
  - Global EPC and O&M skillset – Abengoa has 75-year track record
  - Strong capital access – APUC as investment-grade partner
## Transaction Structure

<table>
<thead>
<tr>
<th>Overview</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Equal ownership by APUC and Abengoa</td>
<td></td>
</tr>
<tr>
<td>▪ Mission - Pursue global clean energy, transmission, and water infrastructure development projects</td>
<td></td>
</tr>
<tr>
<td>▪ Near-term construction pipeline presents immediate value creation opportunity</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Financing Plan</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ AAGES to be initially funded by Abengoa and APUC</td>
<td></td>
</tr>
<tr>
<td>▪ Initial Abengoa capital contribution funded from proceeds of Atlantica interest sale</td>
<td></td>
</tr>
<tr>
<td>▪ Access to low-cost capital enabled through APUC’s investment grade credit rating</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Governance Structure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Affiliated transactions approved by non-conflicted directors</td>
<td></td>
</tr>
<tr>
<td>▪ Construction services provided by Abengoa negotiated at arms-length based on commercial market terms</td>
<td></td>
</tr>
</tbody>
</table>
Robust Compliance Program

Compliance

- **Strong corporate culture** – Internal Code of Conduct
- Governance, Risk and Compliance (GRC) Model
- **Tools** – Whistleblower channel, audits

Six Pillars

- **Leadership** – Top down, highest ethical standards
- **Risk assessment** and protection of financial and reputational assets
- **Adherence to standards** – Relevant applicable Laws, FCPA, UN Conventions
- **Training and communication**
- **Sanctioning** system
- **Oversight** – Continuous audits, random checks of delegated authorizations
Highly Experienced Global Leadership Team

**Staffing**
- **Experienced** – > 20 years of global experience in the relevant industry sectors and target geographies
- **Core capabilities throughout AAGES’ value chain** – Development, financing, and construction supervision
- **Outsourcing** – Non-core functions to be outsourced to shareholders or third parties
- **Efficient** – Focused and flexible structure
- **Integrated** – Final selection underway for APUC personnel to join the AAGES team

**Location**
- **Local footprint** in all targeted geographies
- **Market knowledge** leveraging existing Abengoa Business Development capabilities and market presence

---

**AAGES Chief Development Officer**

**Michael Geyer**

Ph.D. - Power Plant Engineering, M.A. - Physics
Successful ten-year project management track record (US$2.2 B) spanning from project inception through to financial close

**AAGES Director, Global Energy & Water Concessions**

**Javier Monfort**

Industrial Engineer, MBA, Energy Sector
Business development focused on Energy & Water projects with secured off-takers

**AAGES Chief Financial Officer**

**Kevin Melnyk**

Chartered Accountant, CFA Charter Holder
Over 25 years of finance & investment management experience. Global project finance and M&A expertise

---

International Expansion 106
Project Focus

**Generation**
- Renewables (Solar/Wind/Hydro)
- Clean (Natural Gas)
- Hybrid plants (Solar/Gas)

**Water**
- Desalination (Solar Desal)
- Water transportation
- Water recycling

**Transmission & Distribution**
- TL concessions

**Storage (Thermal & Electric)**
- Stand alone
- Storage + renewables (Solar/Wind)
Key Investment Parameters

- High quality off-takers
- Stable geographies
- Strong Rule of Law, low sovereign risk
- Predictable regulatory environments
- Stable currencies, with EURO & USD focus
- Hedge agreements
- Repatriation of capital
- Long-term offtake agreements
- Suitable for drop-down to Atlantica
Financing Strategies for AAGES Development Initiatives

Decision to Advance Project
“ProjectCo” formed
Funding from APUC / Abengoa

Construction Financing
“ProjectCo” financing through to COD
Funding sources –
APUC
External debt and equity

Early-Stage Development
Initial development work
funded by AAGES

Development Financing Toolkit
Working capital and bonding lines to be established

Atlantica ROFO
Funding options –
Atlantica cash on hand
APUC investment
Project-level debt
Equity issuance

AAGES to maintain flexibility in financing structures to maximize financial returns
Strong Global Reach

Source: Abengoa
## Market Opportunity

<table>
<thead>
<tr>
<th></th>
<th>Latin America</th>
<th></th>
<th>Europe</th>
<th></th>
<th>Africa</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mexico</td>
<td>Central America</td>
<td>North</td>
<td>East</td>
<td>South</td>
<td>Mexico</td>
</tr>
<tr>
<td><strong>Wind</strong></td>
<td>5.5</td>
<td>0.4</td>
<td>9.5</td>
<td>24</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td><strong>Gas</strong></td>
<td>6.0</td>
<td>0.8</td>
<td>3.0</td>
<td>7.5</td>
<td>8.6</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Solar</strong></td>
<td>2.0</td>
<td>1.2</td>
<td>6.8</td>
<td>12.3</td>
<td>2.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

|                | 13.5 GW | 2.5 GW | 19.3 GW | 43.8 GW | 18.6 GW | 28.9 GW | 6.9 GW | 6.8 GW | 3.4 GW |

- **Significant global power project potential**, with a focus on wind, solar, and natural gas
- **Further international opportunities** in transmission and water infrastructure

Source: Abengoa
Near-Term Investment Opportunities

A3T
Natural Gas Co-Gen
220 MW
Mexico

- **Capital Cost:** Approx. US$450 M
- **Timing:** Investment and COD expected to occur in 2018
- **Counter-party:** Multiple bi-lateral PPAs
- **Term:** Perpetual

ATN3
Transmission
220 kV
Peru

- **Capital Cost:** Approx. US$220 M
- **Timing:** Investment in 2018 and COD expected early 2020
- **Counter-party:** Government of Peru
- **Concession Term:** 30-year

*Near-term investment opportunities of over US$650 M*
Near-Term Development Opportunities

**Chile**
- Mataquito-Hualqui
  - Transmission: 220 kV / 260 km
  - Cost: US$200 M
- Pan de Azucar-Los Pelambres
  - Transmission: 220 kV / 292 km
  - Cost: US$125 M
- Puerto Montt-Alcud
  - Transmission: 500 kV / 130 km
  - Cost: US$100 M

**Morocco**
- Water desalination: 275,000 m³/day
  - Cost: US$320 M
- Marrakesh-Safi
  - Wind: 210 MW
  - Cost: US$295 M

**Uruguay**
- UTE P51165
  - Transmission: 500 kV / 120 km
  - Cost: US$60 M
Key Messages

- **AAGES** – The power of reality
- **Funding** – Hitting the ground running
- **Team** – Making things happening
Financial Aspects of International Expansion and Concluding Remarks
Atlantica – Strong Ability to Grow

- **Atlantica’s continued investment in assets** expected to be accretive to cash available for distribution per share.
- **Initial growth funded** through US$125 M of corporate cash within Atlantica.
- **Atlantica expected to fund growth** through combination of existing cash, corporate level debt and new equity issuances.
- **Growth in Atlantica CAFD per share** – CAGR in mid-high single digits possible.

1. All values are in USD. Algonquin estimates.
**Atlantica – Immediate ROFO Dropdown Opportunities**

**Xina**
- **CSP parabolic trough 100 MW South Africa**
- **Solar CSP parabolic trough with 5.5 hours of storage**
- **Potential Atlantica investment:** ~US$125 M
- **Timing:** Asset expected to be offered in 2018
- **Counter-party:** DoE / Eskom
- **Term:** 20-year take-or-pay

**Tenes**
- **Desalination Plant 200,000 m3/day Algeria**
- **Reverse osmosis desalination plant**
- **Potential Atlantica investment:** ~US$35 M
- **Timing:** Asset expected to be offered in 2018
- **Counter-party:** Sonatrach and L’Algerienne Des Eaux
- **Term:** 25-year take-or-pay
AAGES – Value Proposition

APUC to benefit from its involvement along the value chain:

- As 50:50 partner in AAGES – AAGES will receive an interest in the value from its early development support
- As funder of “ProjectCo” – More advanced projects will be funded by APUC, and potentially other funders

Drop-down of completed projects to Atlantica will release value to APUC. Options available:

- Additional equity in Atlantica provided for its interest in the project
- APUC can also elect to receive cash proceeds for the sale
- Participation as an equity investor in Atlantica

Profits from sale of a developed project from AAGES to be divided between APUC and Abengoa:

- Pro-rata according to equity investment
- Contemplated that APUC will provide ~95% of project equity
- Development profit typically in the range of 5 - 10% of project capital costs
Near-Term Accretion

- **Dividends received from Atlantica** included in APUC adj. EBITDA and Net Income
- **Immediate accretion** - Investment in Atlantica forecast to deliver mid-single digit percentage accretion to APUC Adj. EPS over coming 3-4 years

Accretive to Growth Profile

- **Opportunities to drive growth in APUC cash flows include:**
  - Growth in Atlantica CAFD per share through acquisitions by Atlantica
  - Increase in APUC ownership interest in Atlantica through option on remaining 16.5% and APUC pre-emptive right to fund Atlantica growth

*Investment in Atlantica will reinforce APUC’s ability to deliver forecasted growth in Dividends Per Share*

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**Note:** Based on CAD/USD exchange rate of $1.25.
Concluding Remarks – International Development Strategy

- Measured entry into International

- **Atlantica** – Strong investment, growth vehicle

- **AAGES** – Top Talent, immediate growth potential

- Project opportunities support APUC growth objectives
Closing Remarks
A Proven Business Proposition Brings

- A conservative business model which is sufficiently robust to accommodate today’s social, political and market conditions
- A portfolio of long-lived, high-quality assets delivering predictable earnings and cash flows
- A line-of-sight opportunity set now including global investments representing ~$C7.7 B of investment potential across modalities
- The organizational commitment, human capacity, and financial capability to execute on its growth plan

Highly transparent growth outlook through 2022

- 18-20% CAGR in adjusted Adj. EBITDA
- 10-14% CAGR in adjusted Adj. EPS
- All metrics supportive of 10% DPS CAGR

Commitment to consistent strategy has delivered results

Closing Remarks
The Role of Storage to Achieve 100% Renewable Energy

Charles Ashman
Vice President, Technology
Algonquin Power & Utilities Corp.
Topics – Storage Lunch and Learn

- Case for Storage in a 100% Renewable Energy World
- Review of Storage Technology
- Concentrating Solar Power with Storage
- A California Case Study
A Short Personal Story a 100% Renewable Goal

- 100% renewable at home
- Conservation
- Demand reduction
- Retail choice
- Home energy monitoring
- Community solar
- Customer service
- Battery for reliability

With community solar we had a $178 credit!

Our total load decreased, but the profile changed from Summer AC to Winter Heat Pumps.

Retail supply is $105/MWh in summer and increases in winter due to gas. Solar lease is $111 fixed for 20 years.
Innovation happens when someone challenges the status quo
How can we achieve 100% renewable generation?
Cost-effectively balancing the intermittency of renewable energy supply versus demand
Low cost renewables + low cost storage
The Real Challenge: Renewables Supply-Demand Balancing

I. Planning for Extremes

II. Continuous Balancing

III. Continuous Frequency

Source: BNEF
### Bulk Energy Management Technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Maturity Bulk Energy Management</th>
<th>Power (MW) Grid Support Behind Meter</th>
<th>Energy (MWh) Bulk Energy Management</th>
<th>LCOS (US$/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumped Hydro</td>
<td>95% of all storage, Scale, low cost</td>
<td>Special site, long development</td>
<td>High – 95%</td>
<td>1979</td>
<td></td>
<td>$152-$198*</td>
</tr>
<tr>
<td>Compressed Air</td>
<td>Scale, low cost</td>
<td>Special site, may depend on gas</td>
<td>Low</td>
<td>Demonstration</td>
<td></td>
<td>$115-$140*</td>
</tr>
<tr>
<td>Thermal Salt</td>
<td>Lowest cost integrated with CSP</td>
<td>Need CSP for lowest cost</td>
<td>Low</td>
<td></td>
<td></td>
<td>$50–$100**</td>
</tr>
<tr>
<td>Flow Batteries</td>
<td>High capacity</td>
<td>Demonstration, energy density</td>
<td>None</td>
<td>Demonstration</td>
<td></td>
<td>$209-$413*</td>
</tr>
<tr>
<td>Sodium Sulfur</td>
<td>High power and energy density, high efficiency</td>
<td>Production cost, safety concerns</td>
<td>Medium</td>
<td>1993</td>
<td></td>
<td>$301-$784*</td>
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<tr>
<td>Lithium-ion</td>
<td>High power and energy density, high efficiency</td>
<td>Rare material, recycling</td>
<td>Low</td>
<td>1979</td>
<td></td>
<td>$282-$347*</td>
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<tr>
<td>Lead Acid</td>
<td>Maturity and cost recycle infrastructure</td>
<td>Limited cycles</td>
<td>None</td>
<td>1859</td>
<td></td>
<td>$425-$933*</td>
</tr>
</tbody>
</table>

Source: *Lazard, **U.S. Department of Energy NREL  
Note: “LCOS” = Levelized Cost of Storage
Concentrating Solar Power (CSP) vs Photovoltaic (PV)

**Concentrating Solar Power**
- Solar energy to steam turbine
- Thermal storage ~US$50/MWh
- Dispatched up to baseload
- Output does not degrade
- Efficiency ~40% (net of lifetime)
- Large scale >100 MW

**Photovoltaic**
- Solar energy to DC converted to AC
- Lowest cost solar generation
- Store electricity US$150-300/MWh
- Daytime vary with clouds
- Output degrades with time
- Efficiency 18-28% (net new)

*Concentrating Solar Power with large thermal storage capacity is competitive*
CSP Parabolic Trough Technology with Storage

Proven, low cost, flexible, and reliable renewable energy

Source: Helioscsp
Abengoa Concentrating Solar Power Experience

- Worldwide leader in CSP
  - 1,592 MW in operation, >33% world installed capacity
  - 1,441 owned by Atlantica
  - 360 MW under construction
  - 167 solar patents

- Solucar Complex
  - R&D and commercial facilities on 2,471 acres
  - Thermal storage pilot facility
  - Worlds first tower projects are Atlantica’s

- First thermal storage in U.S. at Solana, the largest CSP trough project in the world

- CSP 110 MW, with 17.5 hours storage in Atacama Desert

Abengoa is a world leader in thermal storage

Source: Abengoa
The Thermal Energy Storage and Conversion System

- Solana - 240 MW with 6 hours of storage
- Mature, standard materials of construction

Proven technology built with standard materials, dispatchable, and competitive
A dedicated crew works every night to clean the parabolic troughs.
Thermal Energy Storage

2-Tank Molten Salt Tanks

- Each pair, one hot 400°C and one cold 290°C
- Each tank ~90ft wide x 30ft high
- Occupying ~8 acres

125,000 MT molten salt

- 6 hours storage or 1,440 MWh

Potential applications

- New CSP with storage
- Retrofit existing CSP
- Standalone grid-scale energy storage
- Retrofit thermal power generation facilities

*Proven, cost effective, grid scale energy storage technology*
Thermal Storage Roadmap to Reduce Costs

- Eliminate intermediate fluid
- Higher temperature salt or other
- Tank design
- Turbine generator technology
- Alphabet (Google) Project Malta
  - The Brayton Battery

Considering the benefits of economical thermal storage, CSP is cost competitive

Source: U.S. DOE
The California Customer

- Geographically part of California
- Connected to Nevada electrically
- Tucked away, mountain terrain, pristine
- Winter peak – driven by ski industry
- Sensitive geography
- Environmentally conscious consumers
Challenges

- Virtually all electricity imported from Nevada
- Intermittency of solar PV and wind
- Limited distributed energy resource (DER) potential
- Scale and location

**Seasonality** - Load profiles driven by ski business

- Winter: 80-120 MW
- Last week: 95-135 MW peak
- Summer: 45-85 MW
- 585 GWh annual demand

- Solutions must be competitive

*Some of the challenges can be solved today*

Source: Cal ISO
The 100% Renewables Solution

**Optimum Mix of Renewables**
- Days: Solar – Luning, Turquoise
- Nights: Wind – Future projects
- Maximize DERs and other renewables

**Energy Storage**
- Distributed storage for grid support
- Behind meter storage to reduce demand
- Low-cost utility-scale storage

**Smartest Grid**
- Orchestrate DERs including EVs
- Real time balancing of load and supply
- Enable demand response

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**Hypothetical Winter Daily Profile MW**
Solar $45 - Wind $48 - CSP $100 = Average $71
2017 Unsubsidized $US/MWh

**Hypothetical Summer Daily Profile MW**
Solar $45 - Wind $45 - CSP $100 = Average $62
2017 $US/MWh Unsubsidized

Source: NREL SAM, internal analysis.
“A dream doesn't become reality through magic; it takes sweat, determination and hard work.”

- Colin Powell