Large, growing corporate demand

Corporate Renewable Deals

2014 – 2018 YTD

As of December 14, 2018. Publicly announced contracted capacity of corporate Power Purchase Agreements, Green Power Purchases, Green Tariffs, and Outright Project Ownership in the US, 2014 – 2018 YTD. Excludes on-site generation (e.g. rooftop solar PV) and deals with operating plants. (F) indicates number of deals each year by individual companies. Copyright 2018 by Rocky Mountain Institute.
Large tech kicked off the market...but demand is broadening and deepening.

**FIGURE: U.S. corporate & industrial (C&I) renewables market activity through 2018**

<table>
<thead>
<tr>
<th>Offtaker</th>
<th>GW under contract</th>
<th># of PPAs</th>
<th>% of market share (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>2.2</td>
<td>24</td>
<td>14.1%</td>
</tr>
<tr>
<td>Google</td>
<td>2.1</td>
<td>15</td>
<td>13.7%</td>
</tr>
<tr>
<td>Amazon</td>
<td>1.1</td>
<td>14</td>
<td>7.3%</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.8</td>
<td>4</td>
<td>5.2%</td>
</tr>
<tr>
<td>Walmart</td>
<td>0.8</td>
<td>10</td>
<td>5.1%</td>
</tr>
<tr>
<td>Apple</td>
<td>0.8</td>
<td>7</td>
<td>5.0%</td>
</tr>
<tr>
<td>Microsoft</td>
<td>0.6</td>
<td>5</td>
<td>4.1%</td>
</tr>
<tr>
<td>Exxon Mobil</td>
<td>0.5</td>
<td>2</td>
<td>3.2%</td>
</tr>
<tr>
<td>Equinix</td>
<td>0.4</td>
<td>3</td>
<td>2.4%</td>
</tr>
<tr>
<td>Zotos International</td>
<td>0.3</td>
<td>3</td>
<td>2.2%</td>
</tr>
<tr>
<td>Other</td>
<td>5.9</td>
<td>138.0</td>
<td>37.7%</td>
</tr>
</tbody>
</table>

Source: Wood Mackenzie

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Natel Energy
What do customers want?

- Cost effective power
- Sustainability / Additionality
- Product Quality

Increasingly, a focus on procurement that more closely matches actual consumption, as opposed to aggregate net annual demand.

204 RE100 companies have made a commitment to go '100% renewable'.

COPRORATE RENEWABLE ENERGY BUYERS' PRINCIPLES

About Us
A group of large energy buyers developed the Buyers’ Principles to spur progress on renewable energy and to add their perspective to the future of the U.S. energy and electricity system. WWF and WRI facilitated these efforts from 2014 to 2019. Today, the Buyers’ Principles are facilitated by the Renewable Energy Buyers’ Alliance.

ReBA
a community of energy buyers accelerating the zero-carbon energy future—greening the grid for all
How are we tackling those issues?

Quantify the benefits beyond generation that hydropower provides to the grid

Drive down cost of hydro upgrades and build

Better data to optimize operations while delivering on requirements for environmental metrics such as in-stream flow, dissolved oxygen, etc

Sustainability improvements

- Fish safe turbines
- Incorporate watershed restoration into project design
Grid value of distributed hydro

- NREL paper: 25 x 1 MW plants → up to 200 MWh/day dispatchable storage; aligns well with CA evening demand peak

- When controlled as a system, significant control over daily generation timing, to match demand, far in excess of any individual plant’s storage

Fish safe turbine design

- Performance tests by Rennasonic, Inc. June 2019
- 85 kW, $\varnothing$ 0.55 m, $H_{\text{net}}$ 10 m
- $\eta_{\text{hydraulic}}$ ~ 90.5% (met expectation)
- Total experimental uncertainty < 0.5%
- Exceeded expectation at some off-design conditions
Restoration Hydro: a vision for nature-based distributed hydro

- Turbine-generator Module
- Foundation Module and Passage Module: dolo-timber
- Foundation Module for turbine generator
- Water, Sediment, Fish, and Recreation Passage Module: natural rock arch passage
Better data to manage water

A suite of digital solutions for the three areas of freshwater related to hydropower: utility operations, agriculture, and land management.

**HydroForecast™**
A new way to accurately forecast short-term and seasonal water quantity and quality anywhere on Earth.

**Lens™**
An efficient and scalable way to comprehensively oversee the landscapes that matter to you, no matter how large or remote.

**AgTrends™**
Optimize water conservation investments with field-level data, targeted recommendations, and measurable water quality and quantity impacts.
Thank you!