CONTRACTING FOR SUCCESS

Development Perspectives in Risk Management
February 2020

The 2.16 MW John Day Run-of-River Hydroelectric Dam near Goldendale, WA
• Scale Development
  o 25 Projects
  o Over $3.7 Billion
• Tailored to Geographic Priorities
  o Closed Loop Variable Speed Pumped Storage in Renewable-Heavy Western States
  o Summer Peaking Conventional Hydro in MS & LA
  o Baseload Renewable Infrastructure in Rust Belt
• Clustered Projects to Create Economies of Scale
  o Focus on Lowering Costs Throughout Development and Construction
• Political Strategy coordinated with Offtake
  o Integrated with Political Outreach
PROJECT LOCATIONS

Pumped Storage Hydro Project Locations

Run-of-River Hydro Project Locations

Transmission Lines
- ±500 kV DC
- 500 kV
- 345 kV - 360 kV
- 230 kV - 287 kV
# NEW HYDROPOWER DEVELOPMENT: RISKS VS ADVANTAGES

## Competitive Advantages of New Hydropower

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>RAMPING DURATION</th>
<th>MATURE TECHNOLOGY</th>
<th>LIFECYCLE</th>
<th>COST-COMPETITIVE</th>
<th>FLEXIBILITY</th>
<th>SCALE</th>
<th>CLEAN</th>
<th>CAPACITY RESOURCE</th>
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<tbody>
<tr>
<td>Pumped Hydro Storage</td>
<td>✔</td>
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<td>✔</td>
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<td>✔</td>
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<tr>
<td>Run-of-River Hydro</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Batteries</td>
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<td>✗</td>
<td>✗</td>
<td>✔</td>
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<tr>
<td>Wind (PJM &amp; MISO)</td>
<td>✗</td>
<td>✔</td>
<td>✔</td>
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<td>✗</td>
<td>✔</td>
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<tr>
<td>Solar (PJM &amp; MISO)</td>
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CONTRACTING FOR SUCCESS:
A DEVELOPERS PERSPECTIVE IN RISK MANAGEMENT

Private Equity

Wind & Solar Challenges in PJM and MISO:
22 Strategically Located Run-of-River Hydro Projects

PNW Critical Capacity Shortage (CLPS):
Projected Deficit of 5-15 GW by 2030

Fixed Price Development Team:
Ability to Secure all Pre-Construction Permits, Land Acquisition, Traditional or Non-Traditional PPA

Project Construction
EPC vs DBB & Bank Finance

Project Commissioning and Transitioning to Operation

New Hydropower

Market Demand
RISK: ABILITY TO ATTRACT CAPITAL FOR NEW HYDROPOWER

Mississippi law makes solar power unfeasible for many
By Adam Northam - The Daily Reader

A surge, then a fade for Pennsylvania’s wind industry
By Amy Sisk - StatelImpact Pennsylvania

• Challenges for wind and solar in PJM and MISO
  o Opportunity for New Hydro at Existing Dams

• Tailored to Geographic Priorities
  o Closed Loop Variable Speed Pumped Storage in Renewable-Heavy Western States
  o Summer Peaking Conventional Hydro in MS & LA
  o Baseload Renewable Infrastructure in Rust Belt

• Clustered Projects to Create Economies of Scale
  o Focus on Lowering Costs Throughout Development and Construction

• Political Strategy coordinated with Offtake
  o Integrated with Political Outreach
• Projects tailored to address popular demand, policy, and utility priorities
  - Two closed loop pumped storage projects in western states with a focus on carbon-free grids
    - Existing technology with proven costs
    - Markets where coal generation is retiring and there are limits for new thermal generation

### Western Electricity Coordinating Council Coal Retirement Scenarios (cumulative)

![Western Electricity Coordinating Council Coal Retirement Scenarios](image)

**NOTE:** In 2019, ~35 GW coal in WECC (11 GW in Greater NW)

### Solar Oversupply in California in 2030†

<table>
<thead>
<tr>
<th></th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
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<tr>
<td>Avg Hours / Day</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Avg Oversupply GWh / Day</td>
<td>104</td>
<td>70</td>
<td>152</td>
<td>133</td>
<td>181</td>
<td>100</td>
<td>80</td>
<td>66</td>
<td>66</td>
<td>49</td>
<td>62</td>
<td>28</td>
<td>91</td>
</tr>
<tr>
<td>Total GWh / Month</td>
<td>3,237</td>
<td>1,982</td>
<td>4,715</td>
<td>3,977</td>
<td>5,612</td>
<td>3,014</td>
<td>2,485</td>
<td>2,042</td>
<td>1,968</td>
<td>1,513</td>
<td>1,854</td>
<td>864</td>
<td>33,243</td>
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† Table sourced from “National Grid Pacific Northwest and California Capacity Needs” report delivered by Energy+Environmental Economics.
• **Narrow focus**
  - Owned by Institutional Investors
  - Lean platform focused only on water infrastructure development

• **Ability to guide regulatory reform and policy**
  - Development integrated with political outreach and policy formation

• **Ability to negotiate and execute non-traditional PPA’s**
  - Corporate Physical PPA
  - Corporate Virtual PPA

**BENEFITS TO THE PROJECT**

- De-risking pre-construction development timeline and cost
- Right sized—right geography
- Stakeholder supported projects--delivering the right products in the right amounts
- Bid efficiency for offtakers
**RISK: CONSTRUCTION**

- **EPC Approach**
  - Ability to leverage multiple projects as a single contract
    - Early Contractor Involvement
      - Experience/Qualifications
        - Complex construction
        - Project Finance
    - Ability to select and sign equipment contracts early and separately
      - Cost control for Engineering/Design

**BENEFITS TO THE PROJECT**

- De-risking cost estimate
  - Early identification of constructability issues
- De-risking COD
- Bid efficiency for offtakers
- Early QA/QC implementation

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**Optimize Capacity, Storage, Energy Production**

**Contract for Major Equipment**

**Major Equipment Design**

**Engineering Contract Phase 1 EPC**

**Engineering and Design**

**Design Review**

**Construction Contract Phase 2 EPC**

**Build**
DE-RISKED NEW HYDRO: BEST SOLUTION FOR THE REGION

EXPERIENCED DEVELOPMENT TEAM

- Site Control
- Permit
- Water Rights
- Complex Construction Experience
- Top Engineering Firm Review
- Extensive Field Work
- Swan Lake and Goldendale Design and Location

BENEFITS TO PROJECTS

- De-Risk COD
- De-Risk Cost Estimate
- Closed Loop
- Right Sized
- Key Interconnect Point

OFFTAKE AND STAKEHOLDER APPEAL

- Efficient Bid to Major Offtakers
- Stakeholder-Supported Projects Delivering Products Where Needed in Right Amounts

BEST SOLUTION FOR REGION