Clean Energy Overview: Montana & Western Markets

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Overview
- About Pattern Energy
- Industry Progress
- Montana Wind: Opportunities & Challenges
About Pattern Energy
About Us

- **North America's #1 Independent Renewable Company** (non-utility-owned)
- **Diverse Energy Portfolio**: wind, solar, storage, transmission
- **4,600+ MW** operational assets across five countries
- **$12+ Billion** private capital financed and deployed
- **10,000+ MW** of development projects in pipeline
- **Long Term Business Plan**: Pattern Energy & its affiliates develop, construct, own, & operate

Legend

- In-Service Project
- Late-Stage / Construction
- Development Project
- Corporate Office
- Wind
- Solar
- Storage
- Transmission
Pattern Energy in Montana

Legend
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- Crazy Mountain (80 MW)
- Stillwater (80 MW)

- **Late-Stage Wind Projects:**
  - 2018: Stillwater, 80 MW
  - 2019: Crazy Mountain, 80 MW
  - 2020: ???

- **Stillwater & Crazy Mountain Economic Benefits:**
  - $36 Million in local tax revenue
  - 250+ construction jobs (2 years)
  - 14 operations jobs (20-30 years)
  - Community benefits programs
  - 2\textsuperscript{nd} highest tax payer in Sweet Grass County
Industry Progress
Global new clean energy investment and capacity installations

Source: BNEF 2017

Total values include estimates for undisclosed deals. Includes corporate and government R&D, and spending for digital energy and energy storage projects (not reported in quarterly statistics). Excludes large hydro.
Wind & Solar Price Decline

Unsubsidized Levelized Cost of Energy—Wind/Solar PV (Historical)

LCOE
$/MWh

GW

167 216 278 344 411 496 601 717

0 50 100 150 200 250 300 350 400


LCOE Version

Cumulative Installed Commercial PV
Cumulative Installed Onshore Wind
Wind LCOE Median
Crystalline Utility-Scale Solar LCOE Median (a)
Rooftop C&I Solar LCOE Median (b)

Source: LAZARD 2016
New wind is already cheaper than new CCGT gas.
Within 20 years it will be cheaper to build new wind & solar than to maintain existing fossil-combustion plants. (BNEF, 2017)

Source: Bloomberg New Energy Finance, NEO 2017
Near Term Wind Opportunity: PTC Phase-Out

Wind contracts signed in 2018 will be cheapest available through 2030

Energy Strategies estimates ~$1.9 Billion/GW in ratepayer savings for 2018 contracts vs. 2023

Sources: LAZARD 2017; BNEF 2017; NREL 2016; LBL/IEA 2017; EIA 2017

Source: Energy Strategies, 2017
Near Term Wind Opportunity: PTC Phase-Out

Wind PTC Phase Out: Value of Contracting Early

- $1.64 Billion / GW saved by a wind PPA signed in 2018 vs. 2023

2. The PTC will phase out entirely by 2026, and full value 100% PTC wind projects are projected to be available for contract with load serving entities before 2019, as per “Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2017,” EIA (2017).
3. PTC savings: 100% PTC @ $23/MWh x 1,000 MW x 29 yr PPA x 6,760 hryr x 46% HCF x -9% n RERL assumed cost reductions = $1.62 Billion in nominal taxpayer savings.
4. PPAs for PTC projects will need to be executed by 2018 in order to account for construction time lines necessary to achieve commercial operations by 2026. If necessary, power contracts can be designed to delay power delivery until it is required by a utility, even if that need will also occur after 2026.
5. PTC = Production Tax Credit, PPA = Power Purchase Agreement, LCOE = Levelized Cost of Energy.
Montana Wind
Opportunities & Challenges
Montana Wind Matters to the West

The wind power resource data for this map was produced by TrueWind Solutions using the Mesomap system and historical weather data. It has been validated with available surface data by the National Renewable Energy Laboratory and wind energy meteorological consultants.
Successful Project Checklist

- Wind resource
- Willing land owner
- Responsible permit path
- Market appetite
- Transmission