

Montana Public Service Commission

**Technical Conference on
Capacity Planning and Resource Adequacy**

*Thursday, June 8th, 2017
Helena, MT*

**Capacity Contributions of Existing of
Existing and Conventional Resources**

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Morgan Stanley West (WECC) Power Capabilities

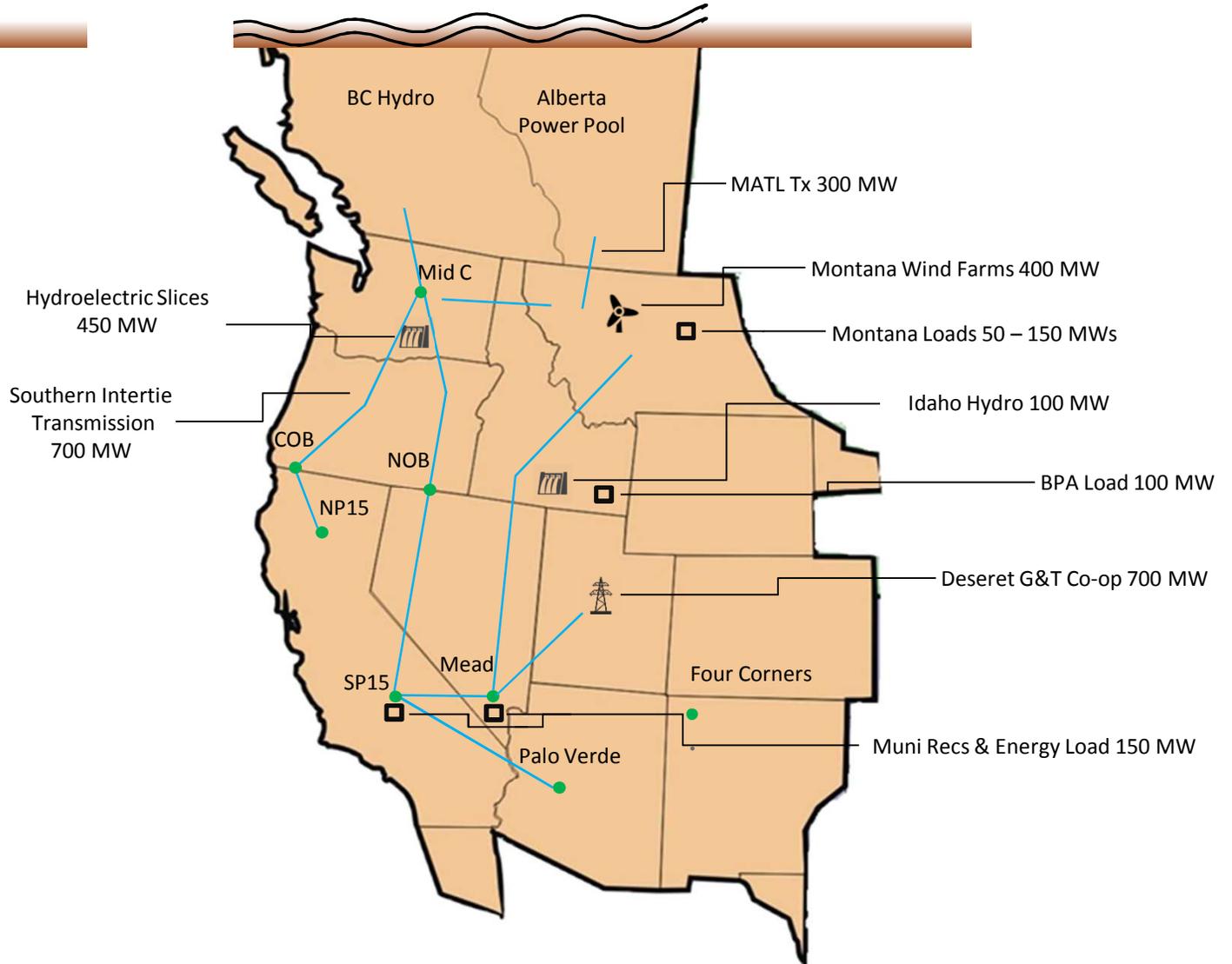
Morgan Stanley is one of the largest physical suppliers of electricity in the WECC region

Overview of West (WECC) Capabilities:

- Supplies a wide range of end-users in the Pacific Northwest, Desert Southwest, and California regions, including utilities, municipalities, electric cooperatives, and commercial/industrial loads with transaction durations up to 15 years
- Provides active market liquidity in most WECC markets, hubs and regions
- Manages and optimizes almost 1,500 MW of generation resources, including the off-take from wind, solar, hydroelectric, and biomass generation facilities, with access to energy, capacity, and ancillary services
- Owns rights to long-term physical transmission and associated interties within and through the Pacific Northwest, California, and the Desert Southwest regions; and congestion revenue rights (CRR's) into California
- Active market participant in the Renewable Energy Credit (REC) and California Carbon Allowance (CCA) markets, amongst others
- Provides a variety of financial and physical risk mitigation solutions for loads and generators alike, including load-following, renewable integration, heat rate and physical call options, off-take agreements, and debt / equity financing



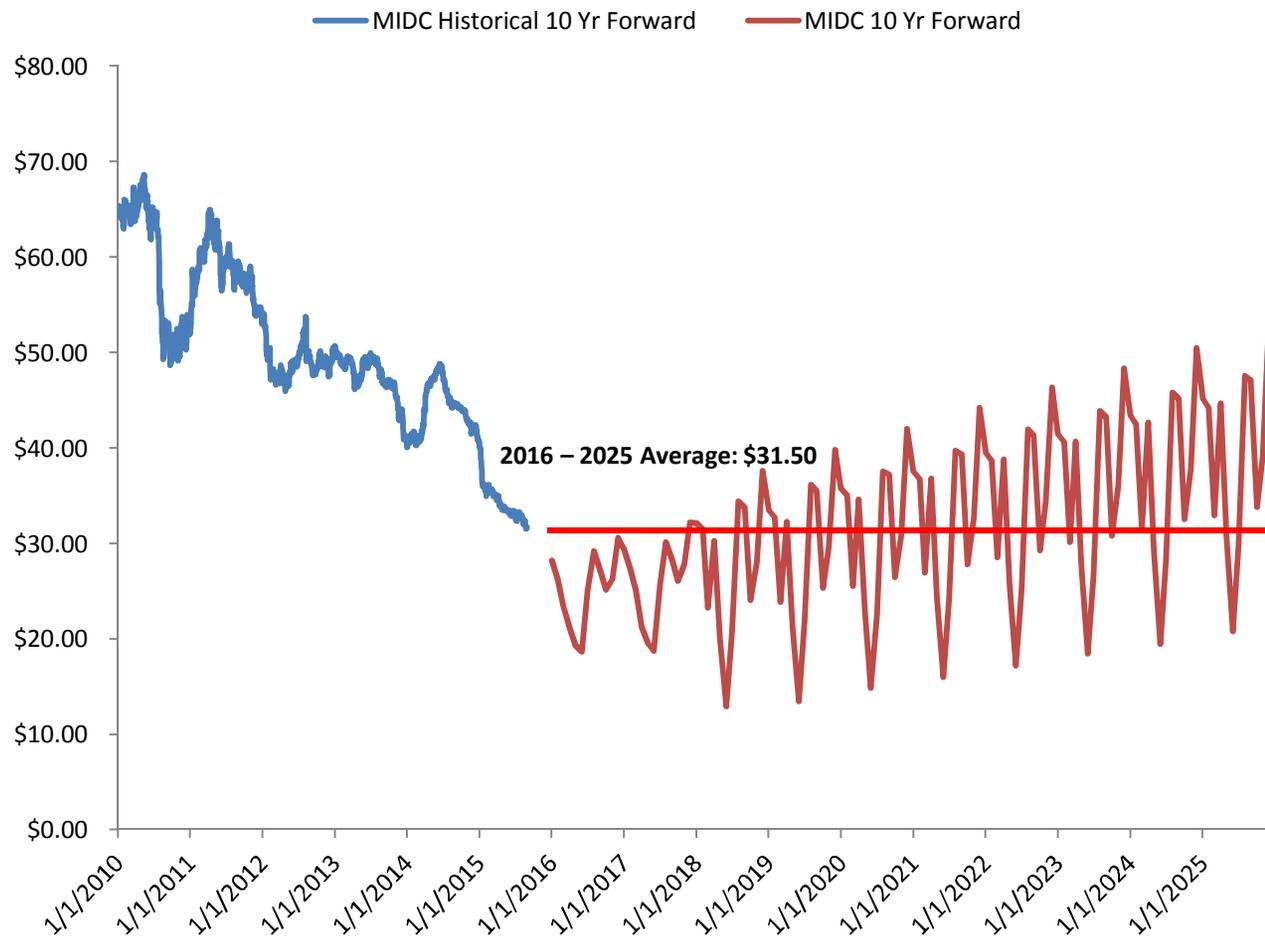
Morgan Stanley – Selection of West Portfolio



Regional and Market Context for Existing and Conventional Capacity Resources

- Lower spot and forward market prices
- EIM and (CA)ISO footprint expansion
- Growth and experience of Balancing Authorities
- Pre-schedule and real-time market developments:
 - Firm, non-firm, unit contingent energy
 - Forecasting and monitoring
- Telemetry and dynamic transmission scheduling
- Market access and liquidity for capacity products, including self-supply
- Transmission inefficiencies and seams

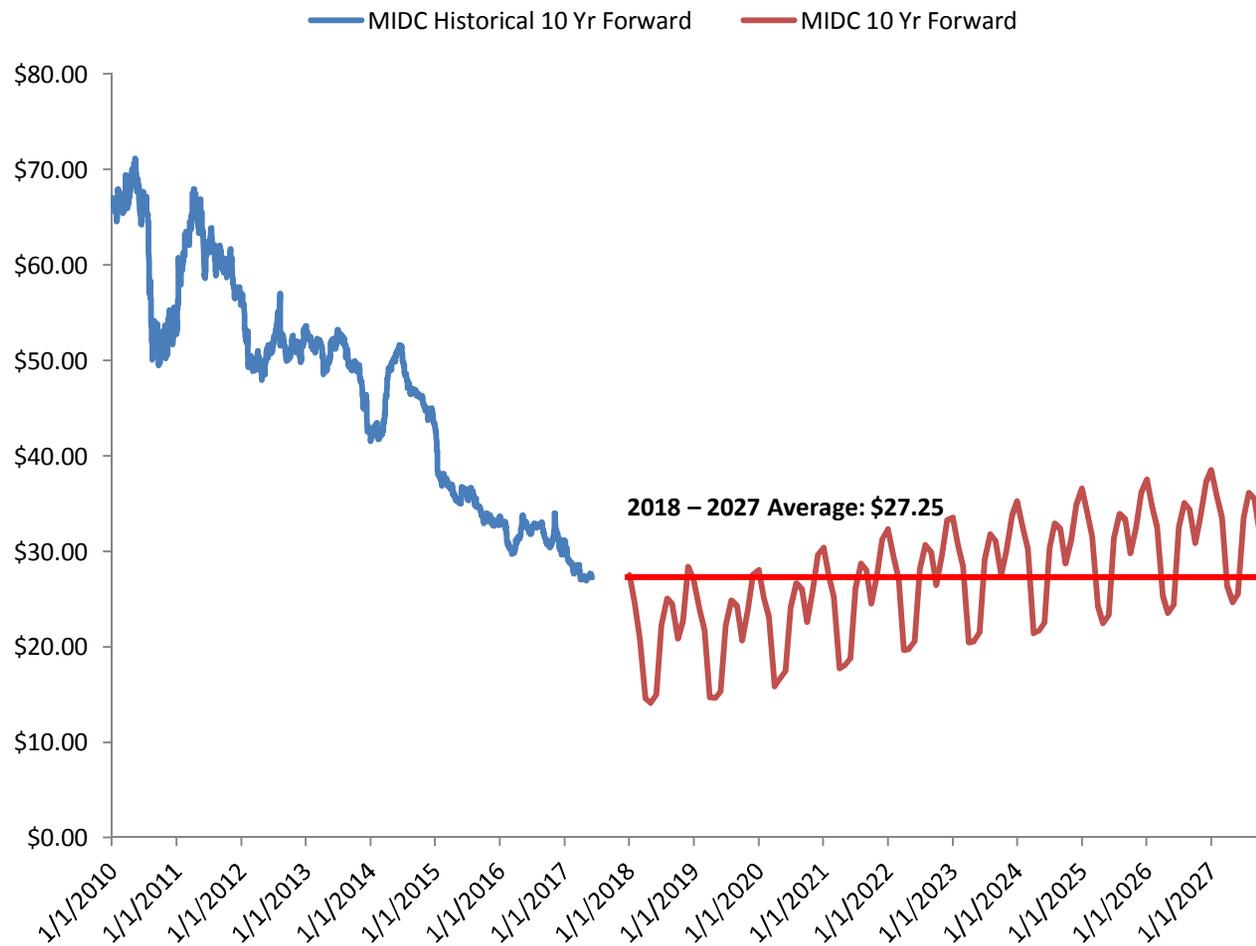
Mid-C 10 Year Historical Forward [2016 – 2025] Summer 2017



2016 – 2025 Average: \$31.50

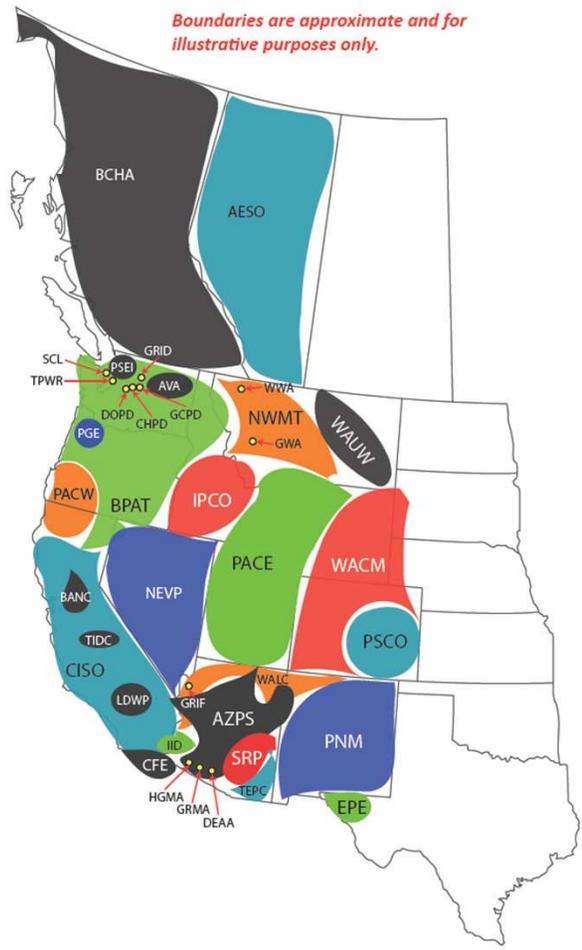
Mid-C 10 Year Historical Forward [2018 – 2027] Today

- The current Mid-C 10-Year forward strip for power near its historical low of approximately \$27.25/MWh
- Approximately \$4.25/MWh lower over the last two years



Source: Morgan Stanley-Commodities

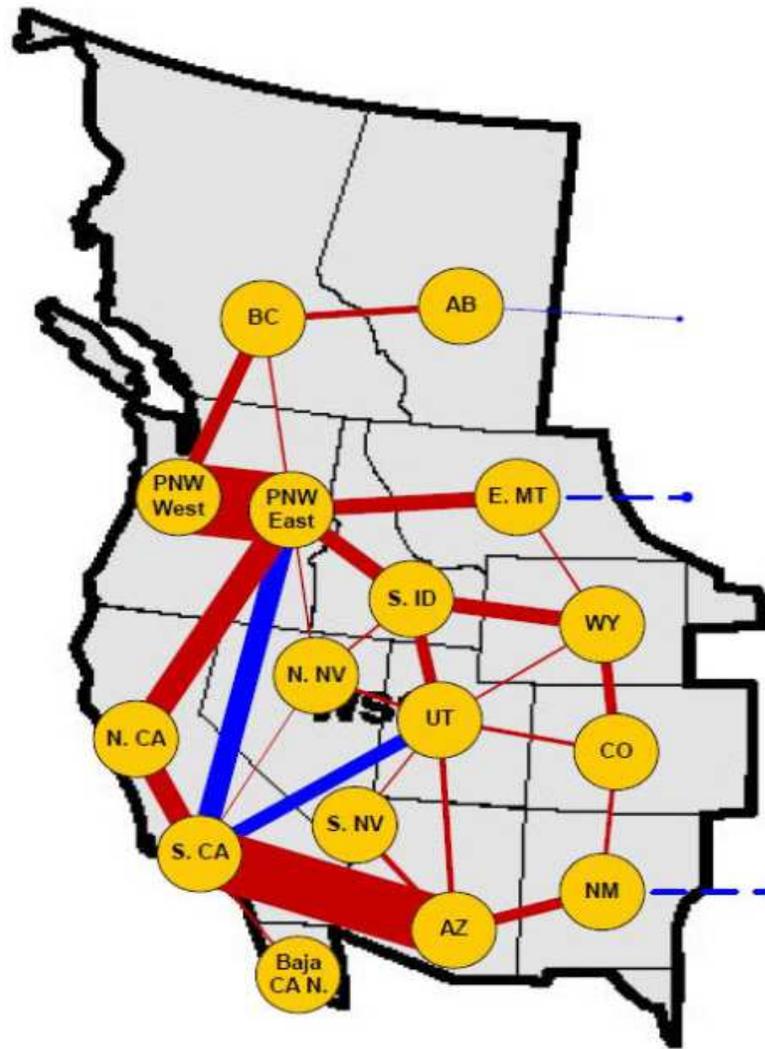
WECC Balancing Authorities



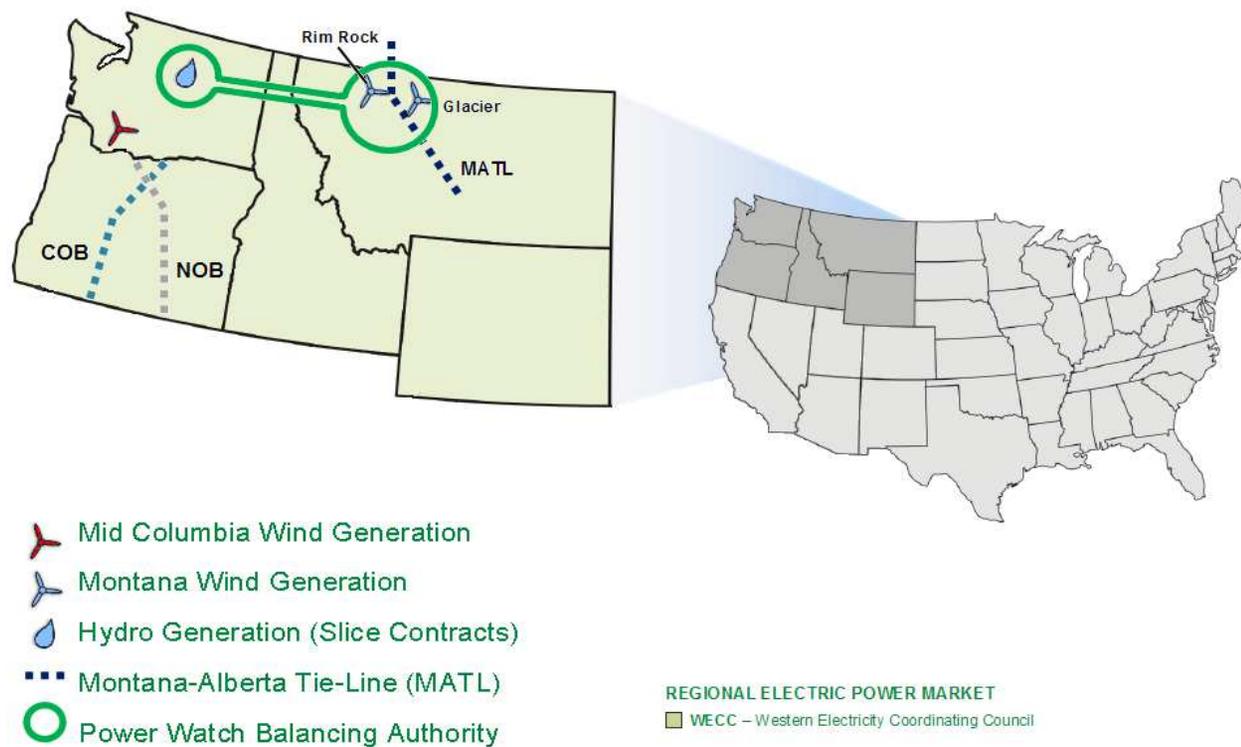
Western Interconnection Balancing Authorities (38)

- AESO - Alberta Electric System Operator
- AVA - Avista Corporation
- AZPS - Arizona Public Service Company
- BANC - Balancing Authority of Northern California
- BCA - British Columbia Hydro Authority
- BPAT - Bonneville Power Administration - Transmission
- CFE - Comision Federal de Electricidad
- CHPD - PUD No. 1 of Chelan County
- CISO - California Independent System Operator
- DEAA - Arlington Valley, LLC
- DOPD - PUD No. 1 of Douglas County
- EPE - El Paso Electric Company
- GCPD - PUD No. 2 of Grant County
- GRID - Gridforce
- GRIF - Griffith Energy, LLC
- GRMA - Sun Devil Power Holdings, LLC
- GWA - NaturEner Power Watch, LLC
- HGMA - New Harquahala Generating Company, LLC
- IID - Imperial Irrigation District
- IPCO - Idaho Power Company
- LDWP - Los Angeles Department of Water and Power
- NEVP - Nevada Power Company
- NWMT - NorthWestern Energy
- PACE - PacifiCorp East
- PACW - PacifiCorp West
- PGE - Portland General Electric Company
- PNM - Public Service Company of New Mexico
- PSCO - Public Service Company of Colorado
- PSEI - Puget Sound Energy
- SCL - Seattle City Light
- SRP - Salt River Project
- TEPC - Tucson Electric Power Company
- TIDC - Turlock Irrigation District
- TPWR - City of Tacoma, Department of Public Utilities
- WACM - Western Area Power Administration, Colorado-Missouri Region
- WALC - Western Area Power Administration, Lower Colorado Region
- WUW - Western Area Power Administration, Upper Great Plains West
- WAW - NaturEner Wind Watch, LLC

Regional Interconnections



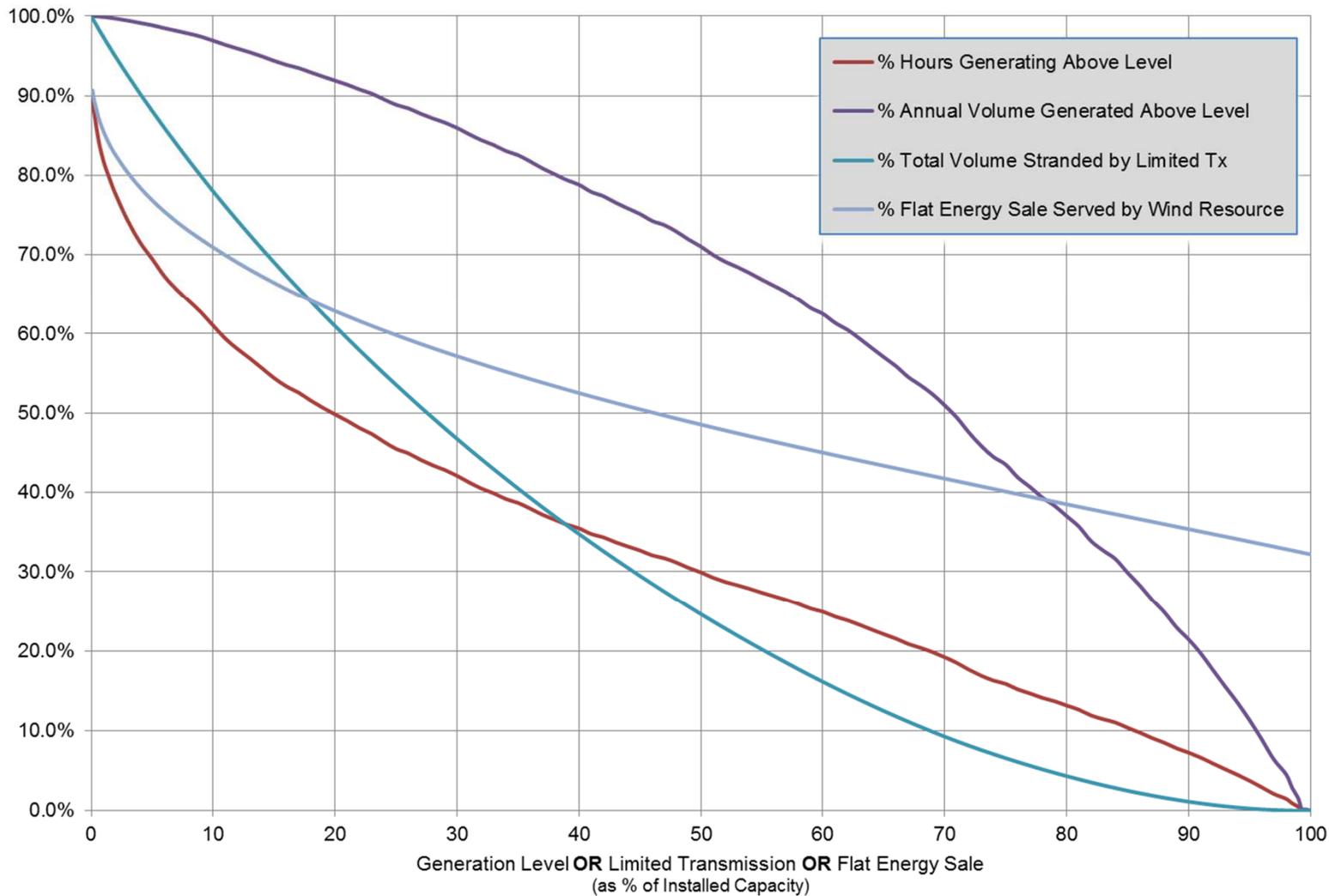
Existing and Conventional Capacity Resources



Source: Morgan Stanley Commodities

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Variable Resource Characteristics



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