

Renewable Energy Law Institute ERCOT Panel

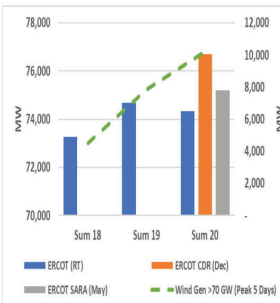
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January 25, 2021



Quick Review: ERCOT Summer 2020

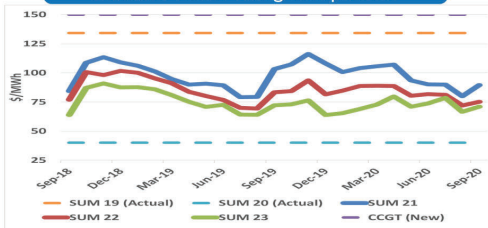
Summer 20 Recap – power@abpoweradvisors.com

Summer '20 Highlights



- ERCOT experienced strong loads despite reduced COVID conditions, realizing ~300 MW below 2019 levels
- 2020 Peak Loads: 45 hours >72 GW vs. 8 hours in 2019
- Weather: Above average temperatures with CDDs increasing 20 YoY to 1349 compared to historical average (1215)
- Renewable generation largely outperformed ERCOT projections during peak demand periods

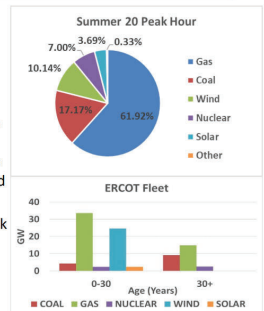
Summer Peak Pricing Comparison



- ERCOT DA pricing reduced ~65% YoY due to abundant wind production on peak demand periods, reduced outages and normal load conditions
- Scarcity Pricing: Hours >\$1000/MWh reduced by 23, 25 to 2
- Forward Pricing: Bearish long-term outlook on large scale renewable expansion with major risks to upside on project slowdowns and delays

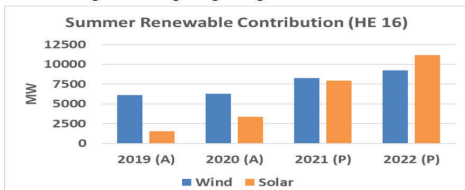
Generation Contribution Summary

- NG assets continue to dominate the fuel mix accounting for ~2/3 of required generation for late day peak demand
- Renewables and Batteries will continue to gain market share as older less efficient units are replaced in the stack
- Commercialization and risk strategies will drive life extension decisions on units approaching large CAPEX needs

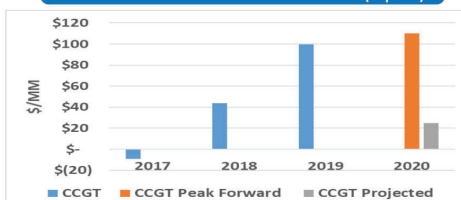


Renewable Generation Update

- 25 GW of new renewables expected by 2025 (12.6 Wind/12.7 Solar GW)
- COD Delay Potential: Increasing project qualification, locational diligence, financing, and credit challenges, suggest 12-24 months delays
- Solar + Storage solutions gaining strong investor interest



CCGT EBITDA Review – 725 MW (Open)



- Large distribution of outcomes likely to continue given high risk/reward Summer season and reliance on Energy Only revenue structure
- Best in class CCGTs are well positioned to capitalize assuming prudent commercialization strategies and operational performance

AB Power - Views

- Despite modest 2020s liquidations, AB expects continued volatility and heightened risk/return opportunities on ERCOTs reliance on renewables to support long term resource adequacy
- AB looks for delays in projected renewable supply as tightening economics and heightened qualifications require more thorough risk assessment and capital diligence
- Commercial/Risk Strategies – Capturing short term robust cash flows will be paramount for positive economics to extend useful life of older/less efficient assets
- AB expects an increase in short term forwards as fundamentals drive a post COVID risk premium, however, believe anticipated renewable/storage solutions will cap long term growth
- ESG governance/mandates likely to expedite clean initiatives

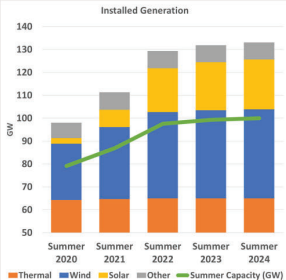
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ERCOT CDR – AB Views (Dec Update)

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Generation - ERCOT (Current vs. 2024)

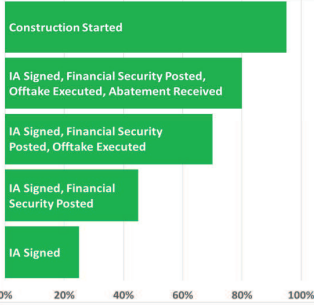


- ERCOT projects installed generation to surpass 130 GW
- Renewables projected to exceed 60 GW – ERCOT CDR
- Installed wind to account for ~28% of all generation and ~7.5% of Summer capacity
- Utility scale solar to grow from 2.5% to 15% (21 GW)
- Thermal generation expected to decrease to ~50% installed capacity
- Coal is projected to decrease to 10% or 13.5 GW of generation

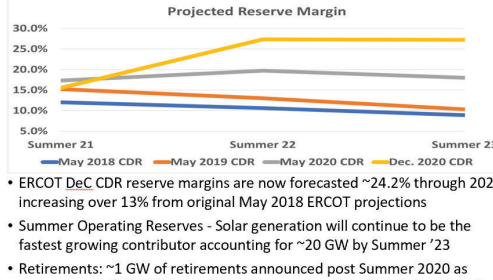
*ERCOT CDR

AB – Qualification Logic

- AB's qualification process is derived from achieved milestones with probabilities assigned per development stage, financial security, owner type, offtake agreements and capital support

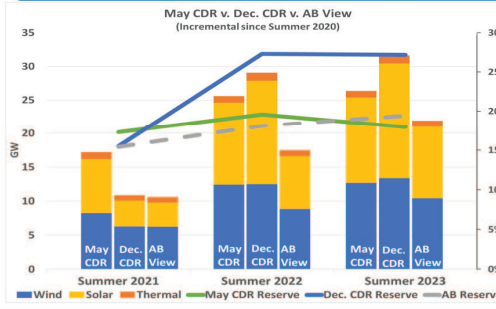


Reserve Margin – ERCOT Updated



*ERCOT CDR

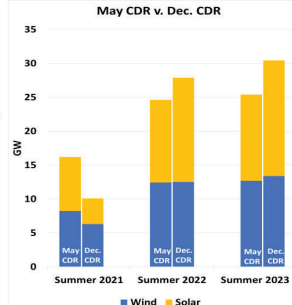
AB – Projected CDR / Reserve Margin



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Renewable Update - ERCOT

- ERCOT Dec CDR suggests ~6 GW of 2021 projects have been extended to 22/23
- Low commodity pricing environment continues to produce plentiful buyer interest for long term PPA/offtake agreements
- Strong investor interest and large renewable presence will support storage solutions in energy only market structure (1.6 GW -2023)



*ERCOT CDR

AB – Forward Outlook

- AB expects reserve margins to realize ~17.5% compared to ERCOT projections over the short term due to continued renewable delays and negative economic outlook for thermal generation
- AB projects an additional ~5 GW of delayed projects over the 22/23 period due to heightened project qualification, increased investor diligence, and tax/sponsor financing challenges
- Large corporate behind the meter solutions continue to gain momentum given decreasing EPC costs, ESG mandates, and savings associated with TDSP, congestion, ancillary and retail charges
- Recent market pricing decline likely to challenge offtake execution for higher risk development projects and accelerate retirement review of less efficient/older generation requiring material end of life CAPEX investment



Relevant Source Material

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- ERCOT West Texas Export Study
- The Use of GTCs in ERCOT
- ERCOT Report on Existing and Potential Electric System Constraints and Needs (December 2020)
- ERCOT Transmission Constraints for Generators Workshop presentation
- SB 1941 on storage ownership – last version, not passed
- AEP PUCT case on storage ownership – application
- AEP PUCT case on storage ownership – final order
- Brattle study for Oncor on value of storage to grid
- Military siting wind bill SB 277, as enrolled
- “The Transition Away From Fossil Fuels” - paper on renewable impacts to Native American communities

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Net Metering in ERCOT

- Three bodies of law covering Net Metering:
 - PURA
 - PUCT Rules
 - ERCOT Protocols
- ERCOT protocols allow for net metering proposals with:
 - Single point of interconnection
 - Multiple points of interconnection where load and generation connect to a common switchyard (points of interconnection within 400 yards)
 - Qualifying Facility – load netted with a thermal host (cogeneration facility)
 - Generation and load on a private, contiguous transmission system (not included in a TSP's or DSP's rate base)

Netting Requirements

- PURA and PUCT do not require common ownership, however:
 - PURA prohibits anyone besides an electric utility for charging for wires/delivery
 - PURA prohibits REP transactions in a NOIE territory
 - PUCT case law is case fact specific for common ownership requirements when facilities are in multiple service areas
- ERCOT protocols on Common Ownership:
 - Past protocols used term "Associated Load" for allowance of netting
- ERCOT definition of "Associated Load":
 - Not defined in PURA or PUCT Rules
 - ERCOT has been interpreting this to mean common ownership of load and generation
- NPRR 945 new Net Metering Requirements:
 - "Associated Load" will be struck from ERCOT protocols
 - Clarifies when All-Inclusive Generation Resources may be netted against Load for Settlement purposes

Cause for Change

Previous Rules

- Interconnect Process for Generators under 10 MW much easier, No FIS Study
- Zonal Pricing for Resources under 10 MW
- ERCOT had little transparency into DG assets

ERCOT Moratorium

- September 26, 2019, ERCOT issued a market notice prohibiting DGRs from interconnection until appropriate rules developed
- The market notice did allow for the continued operation of existing DGRs and for entities that could demonstrate substantial investment to continue development if DGR met certain criteria and an affidavit was submitted by October 28, 2019

Going Forward

- Expect Revision Requests there to be continuing revisions to protocols and planning guides involving DGRs as the number grows in ERCOT.
- Expect ERCOTs desire to gain clarity on the existing and new DGRs to affect reliability planning
- Expect reporting for DGRs in CDR and GIS

Revision Requests Passed or in Process

- NPRR917 -Nodal Pricing for SODGs and SOTGs
 - Implemented nodal energy pricing, instead of load zone energy pricing for SODGs and SOTGs and defines energy pricing for each. Allows for existing SOGs to continue with Zonal pricing until the sooner of opting into nodal or January 1, 2030
- PGRR082 - Revise Section 5 and Establish Small Generation Interconnection Process
 - Creates definition of "Large" and "Small" generators, Creates new interconnection process for generators and generator modifications that are less than 10 MW in size, Extends generator interconnection process to apply to distribution-connected Generation resources and SOG
- NPRR995 – RTF-6 Create Definition and Terms for Settlement Only Energy Storage
 - Provides definitions for Settlement Only Energy Storage, distribution and transmission connected, clarifies Nodal pricing for SODGs and SOTGs

Acronyms

- | | | |
|---|---|---|
| • ESR – Energy Storage Resource | • NPRR – Nodal Protocol Revision Request | • PRS – Protocol Revision Subcommittee |
| • DG – Distributed Generation | • PGRR – Planning Guide Revision Request | • ROS – Reliability and Operations Subcommittee |
| • DGR – Distributed Generation Resource | • SO(D)(T)G – Settlement Only (Distribution) (Transmission) Generator | • SCED – Security Constrained Economic Dispatch |
| • ERCOT – Electric Reliability Council of Texas | • POI – Point of Interconnection | |
| • MW – Megawatt | | |

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First appeared as part of the conference materials for the
16th Annual Renewable Energy Law Institute session
"ERCOT Panel"