Understanding the Corporate PPA Landscape Across Canada: A Jurisdictional Review

Business Renewables Centre (BRC) Canada

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Power Advisory LLC

www.poweradvisoryllc.com

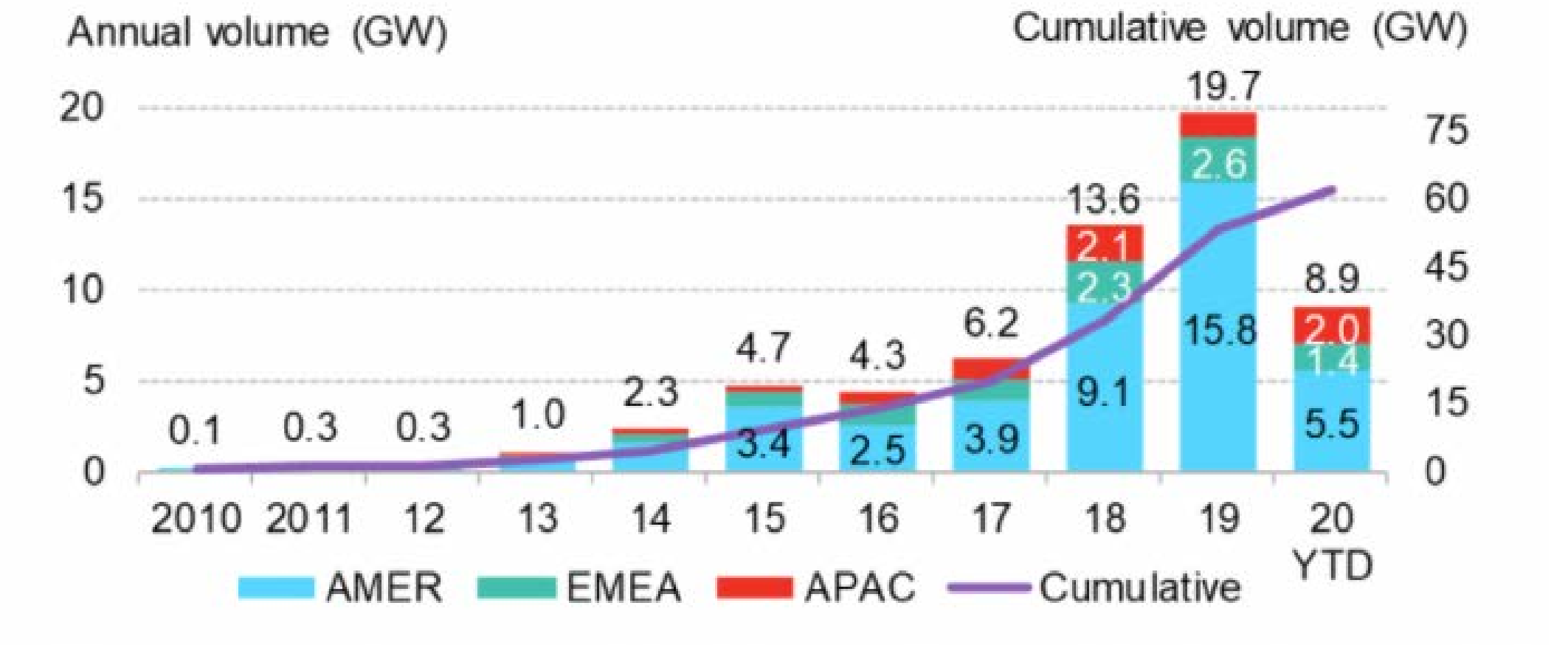
Presentation Overview

- Overview of Corporate Power Purchase Agreement (PPA) Market
- Electricity Reliability Council of Texas (ERCOT) Case Study
- Canadian Electricity Markets and Corporate PPAs

Overview of Corporate PPA Market

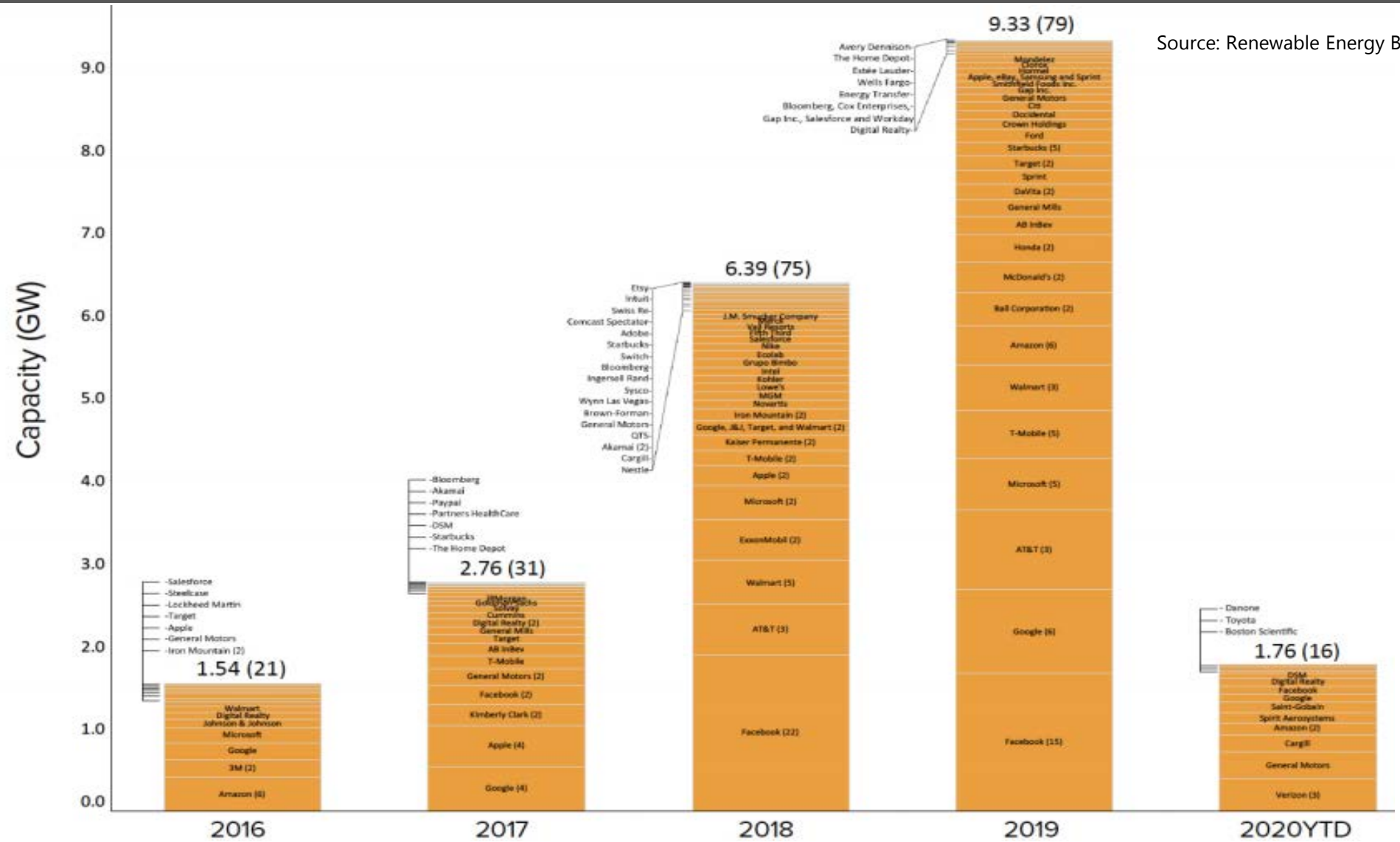
Global transactions and who the buyers are

Renewable Energy Corporate PPA Markets and Growth



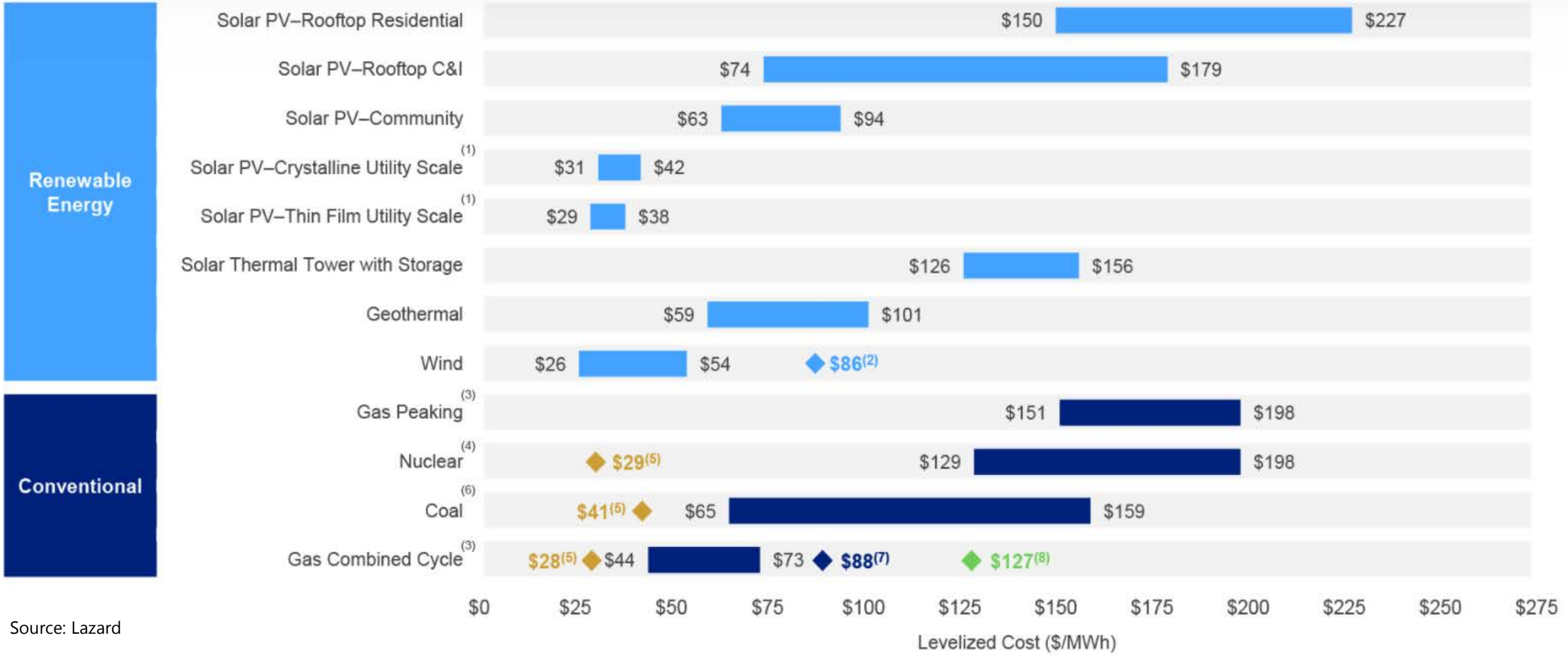
Source: BloombergNEF

Renewable Energy Corporate PPA – U.S. Buyers



Source: Renewable Energy Buyer Alliance

Renewable Energy Costs Continue to Decline



Source: Lazard

ERCOT Case Study

Lessons from Texas for Alberta as primary Canadian corporate PPA market

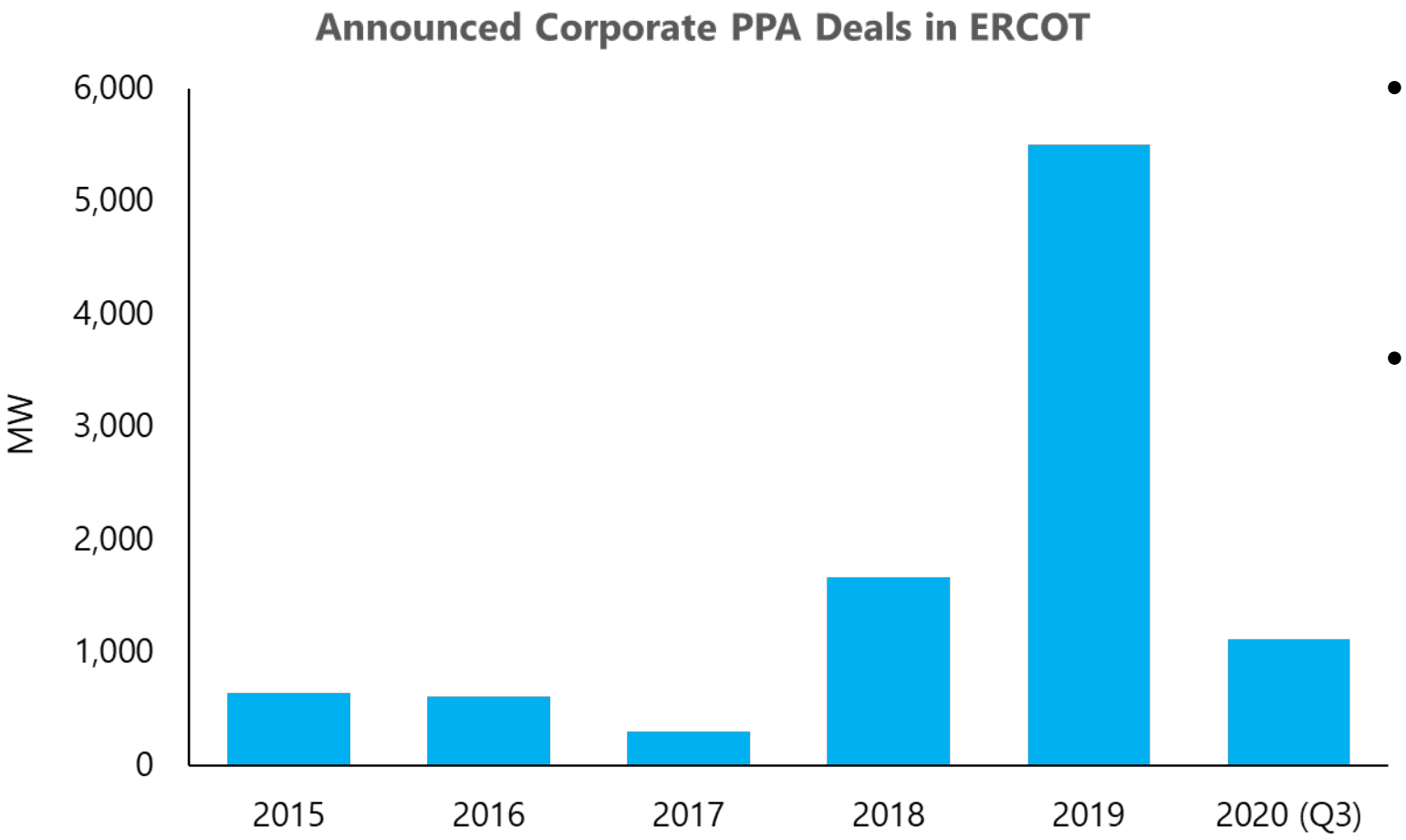
ERCOT Interconnection Queue – July 2020

Source	Power (GW)
Solar	75.3
Wind	25.5
Battery	14.5
Gas	5.4
Coal	0.4
Other	0.4
Nuclear	0.0
Total	**121**

Source: ERCOT

- ERCOT supply mix drastically changing (as other electricity markets)
- Declining production costs, buyer goals/objectives, market structure/design enabling renewable energy project development
- Corporate PPAs key mechanism driving renewable energy investment in Texas

ERCOT Corporate PPA Market Trends

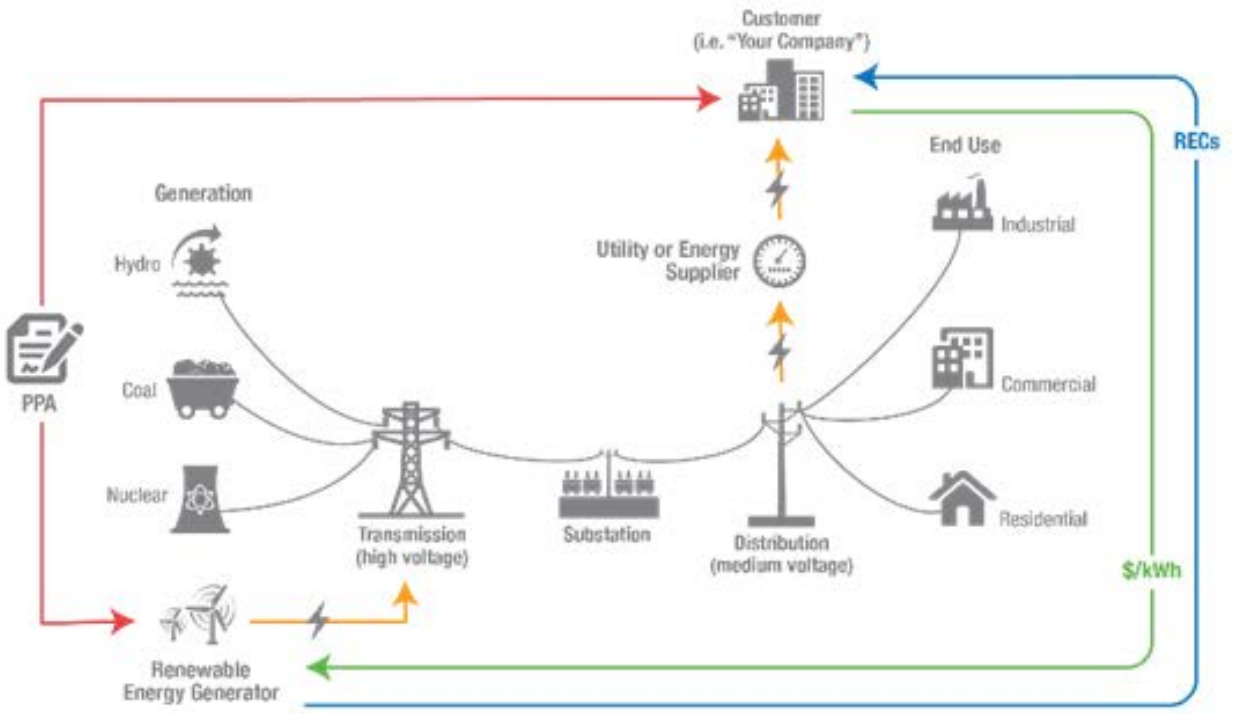


Source: Power Advisory (Information from GTM, BNEF, REBA, deal press releases)

- Texas accounted for >25% of all 2019 corporate PPA deals signed globally
  - o > Asia and Europe combined
- Majority of deals are virtual PPAs (VPPAs) (i.e., financial contracts)

Typical Corporate PPAs

- Long-term contracts
  - Corporate off-taker purchases renewable energy for a fixed price
  - Off-taker generally retains renewable energy certificates (RECs)
  - Typically 10 to 20 year contract term
  - Mainly VPPAs, some physical PPAs
- Corporate PPAs support project financing
- Corporate PPAs enable corporate goals/objectives to be achieved (i.e., lower cost supply, price certainty, Environmental, Social, Governance (ESG))



Source: U.S. EPA

Conditions in ERCOT Supporting Corporate PPAs

Supply Side

- Low costs supported by
  - Favorable renewable energy resources
  - Federal production tax credit (PTC) and investment tax credit (ITC)
- Significant buildout of transmission (under CREZ initiative)

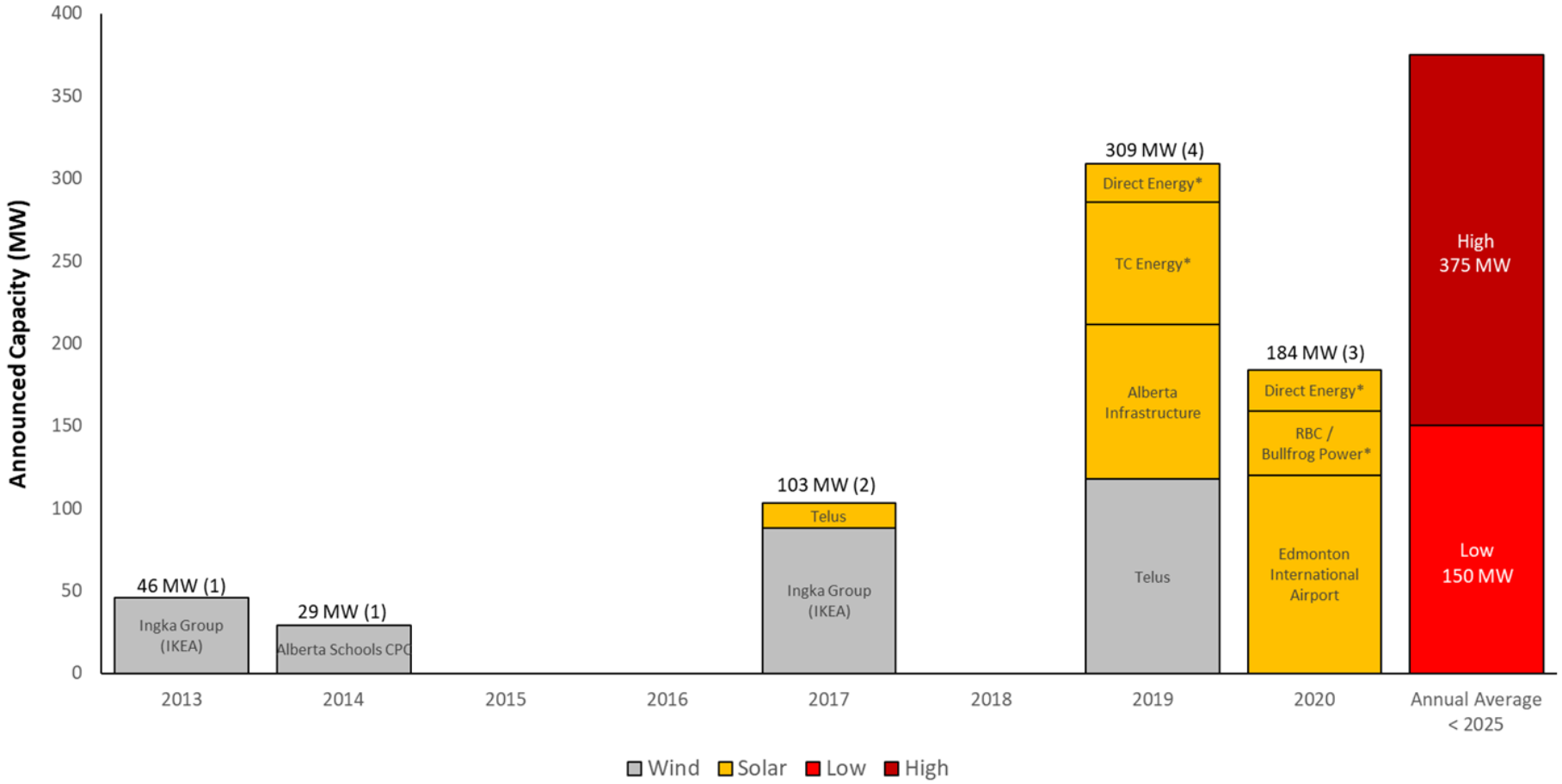
Buyer Side

- Energy-only wholesale market with price volatility
  - Alberta wholesale market structure similar to ERCOT
- More corporations looking to achieve renewable energy and climate goals/objectives – business not necessarily located in Texas

Canadian Electricity Markets and Corporate PPAs

Alberta corporate PPA market opportunities and other Canadian markets

Canadian Corporate PPA Deals and Projected Growth



- Corporate PPAs to date total ~ 800 MW – all located in Alberta
- Driven by open electricity market, voluntary demand, and TIER regulations

Source: Power Advisory
As of October 2020. Publicly announced contracted capacity of corporate PPAs, green tariffs and project ownership in Canada 2013-2020 YTD. Excludes on-site generation and two previous PPAs executed by the City of Calgary.
* Indicates the offtaker is a retailer that serves both corporate and non-corporate customers

Alberta

- Alberta energy-only wholesale market design – open market for energy associated with renewable energy projects at prices reflecting its full value
- Uniform price market design (i.e., no Locational Marginal Prices (LMPs)) reduces risk, though Alberta relatively small market with average load ~ 9,000 MW
  - Value of renewable energy subject to market forces including supply mix, demand, natural gas prices, carbon policy, and penetration of renewable energy supply
- Robust transmission system and zero transmission congestion policy yield opportunities for greenfield renewable energy projects
- Carbon policy supportive of energy prices, carbon prices charged against 'best gas' standard, carbon prices expected to rise to $50/t (2022)
  - Allowance rate (currently 0.37t/MWh) and carbon price post 2022 both uncertain – lower offset rate supports corporate PPAs
  - Renewable energy supply driven by compliance obligation for large emitters have different incentives – maintaining current allowance rate supports renewable energy investment alternative to carbon tax

Alberta

- Alberta supply mix projected to rapidly decarbonize over next decade
  - Coal-fired generators expected to convert to natural gas and/or retire next two/three years
  - Large cogeneration/combined-cycle gas-fired generators potentially come on-line and displace older generation
    - > 2,300 MW new gas-fired generation projects in advanced development stages – if all proceed, up to half current coal-fired generators could retire by 2025 rather than convert to natural gas
  - Load growth swing variable – degree/speed of load growth occurs post COVID-19 impacts amount of retirements expected
  - Solar and wind generation rapidly expanding market share, energy storage still in initial stages
  - Key Power Advisory forecast supply mix changes (2030)
    - ~ 4,200 MW wind generation
    - ~ 1,200 MW solar generation
    - ~ 13,200 MW gas-fired generation (including dual fuel)
    - ~ 200 MW energy storage
  - Wind, solar, gas-fired generation, and storage project developments driven by declining costs, carbon policy, and technology returns in wholesale energy market

Alberta

- Key factors for development of renewable energy projects
  - Continued technology improvement – lower costs provide 'buffer' for market volatility and risk associated with greater renewable penetration (wind 'discount' has not yet impacted solar generation but this will occur with greater penetration)
  - Transmission policy – market access with no/low transmission congestion currently ensured by policy
  - Natural gas prices – Alberta natural gas prices are lower than most North American markets resulting in lower variable cost for gas-fired generation
  - Carbon policy – higher carbon prices generally translate to higher energy prices and/or higher credit value
  - Storage – potentially smooths revenue for renewable energy projects, and 'hybrid' projects offer potential for higher realized prices and better use of transmission connections
  - Diversity of buyers – projects have been driven by falling renewable energy costs, ESG investors, large emitters and parties taking merchant positions in market

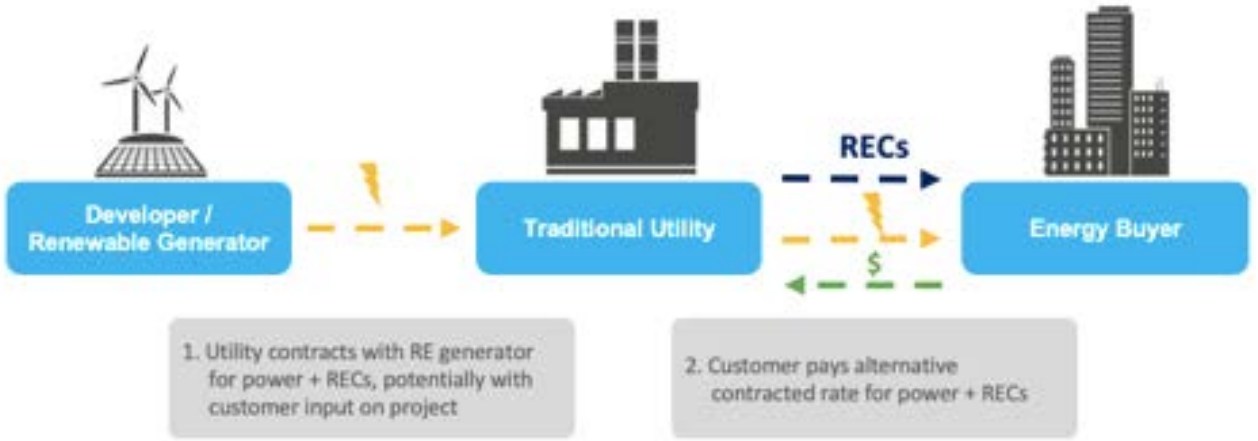
Nova Scotia

- This year, Nova Scotia amended its *Electricity Act* to create a Green Choice Program
  - Form of Green Tariff
  - Distinct from corporate PPAs, but well suited to regulated electricity markets (as in Nova Scotia)
  - Program likely facilitated through Nova Scotia Power as off-taker
    - Reducing risk for project developers
  - Initial procurement estimated to be ~ 150 to 200 GWh
  - Potential for subsequent procurements, more likely with initial success


Saskatchewan and New Brunswick

- Green Tariffs an option for Saskatchewan and New Brunswick
  - Requirements for a viable market
    1. Legislative or regulatory action required to establish Green Tariff – needs support from policymakers, crown corporations, and potentially anchor buyers
    2. Utility and/or agency development of program, which can leverage any federal renewable energy procurement
    3. Competitively priced, with reasonable risk sharing given broad societal objectives
  - Important considerations for Green Tariffs
    - PPA counterparty
    - Contract term
    - Who administers procurement
    - Pricing
    - Risk allocation

Illustrative Green Tariff Program Structure



Source: American Cities Climate Challenge

Ontario

- Like Alberta, Ontario administers wholesale electricity market – key differences not enabling corporate PPAs in Ontario
  - Very high fixed costs through Global Adjustment (GA)
  - GA costs cannot be hedged through market mechanisms/financial products
  - Net metering regime only enables on-site generation off-setting load requirements – not enabling VPPAs for off-site generation

Ontario

- Despite barriers, Ontario represents future opportunity for corporate PPAs
  - Supply needs emerging between mid- to late-2020s through mid-2030s (~ 4,000 MW to 10,000 MW)
  - ~ 8,000 MW of wind and solar generators coming off contract (all with site control) late-2020s through mid-2030s
  - GA declines late-2020s through mid-2030s, potential for policy changes to GA prior to mid- to late-2020s accelerating decline
  - Robust net metering regime enabling off-site generation financial hedges has been recommended
  - IESO Market Renewal Program (MRP) will implement LMPs, providing more accurate wholesale energy prices and greater market exposure from some loads (i.e., prospective renewable energy buyers)

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