

PPAs: A Good Time to Be Buying Renewables

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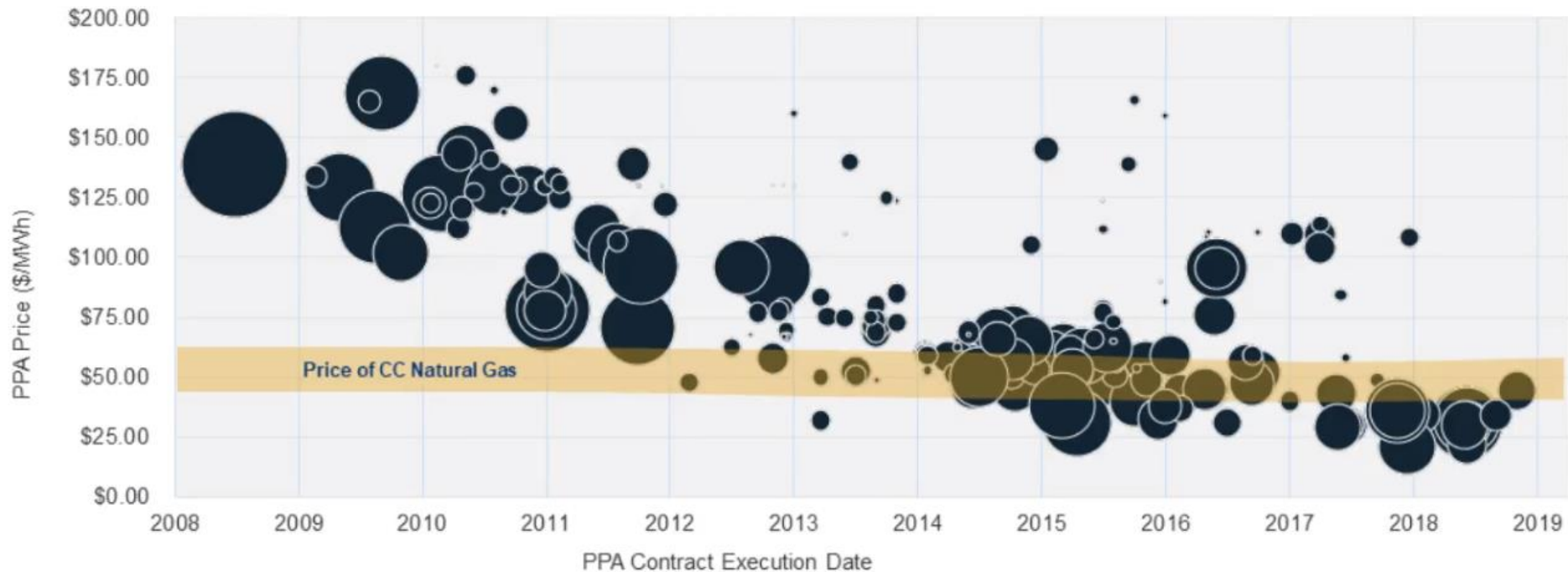


A Consistently Downward Trend for Solar

PPA prices by contract execution date

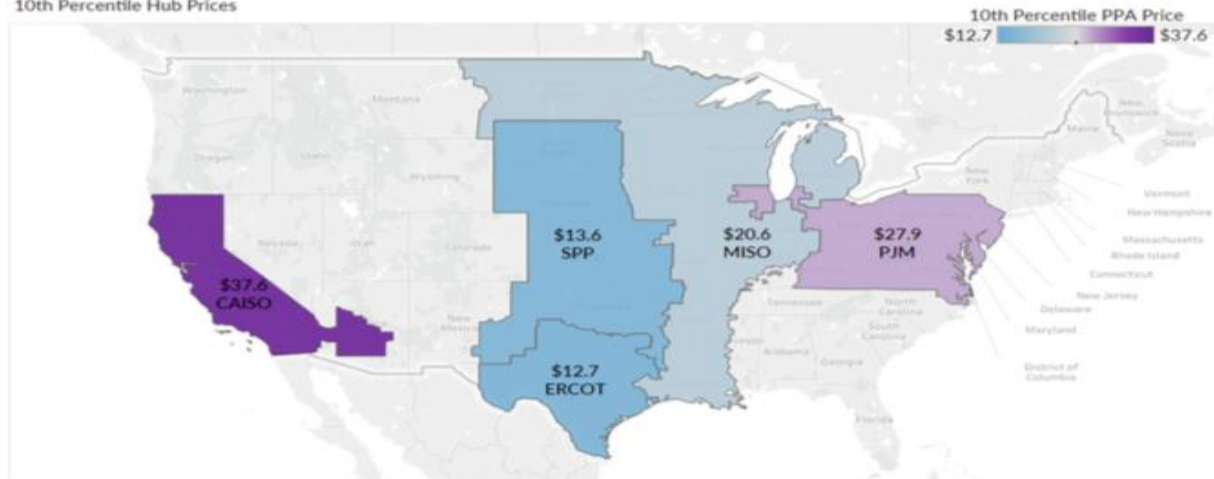
Utility PV PPA price is consistently below the price of new build CC natural gas

Pricing for power purchase agreements has ranged between \$25 and \$45/MWh for contracts signed over the past 18 months
Opening up new origination opportunities beyond procurement to meet Renewable Portfolio Standards



A Very Good Time to Buy Wind or Solar

Wind PPA Price by ISO
10th Percentile Hub Prices



Marketplace Metrics

Total Projects	344.0
Pricing Offers	1,148.0
Total MW Offered	42,721.2
P25 of Levelized PPA Price	\$23.00
P50 of Levelized PPA Price	\$29.50
P75 of Levelized PPA Price	\$35.00

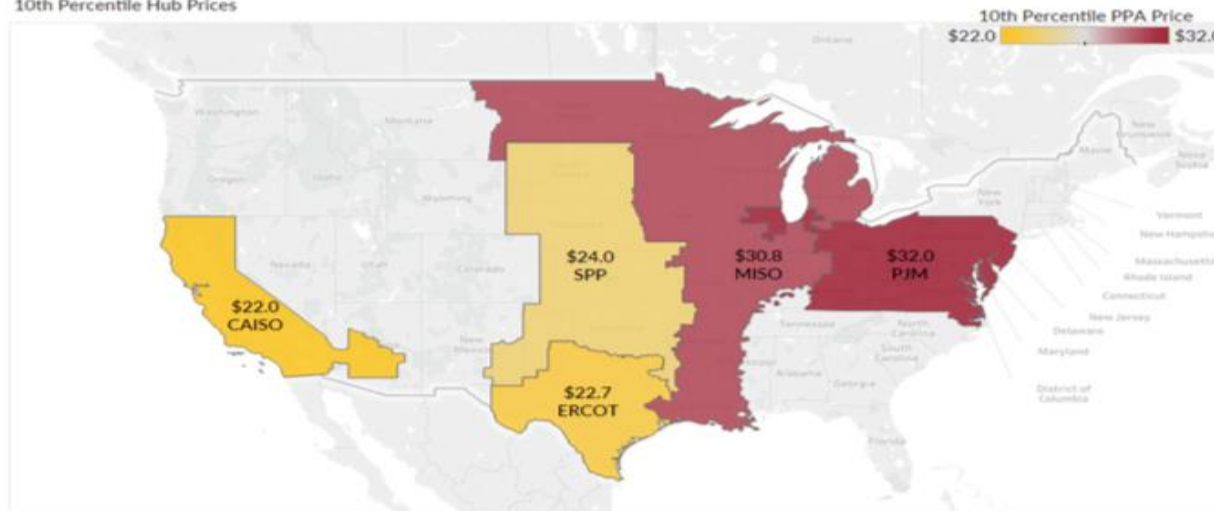
Solar Metrics

Total Projects	252.0
Pricing Offers	798.0
Total MW Offered	26,751.8
P25 of Levelized PPA Price	\$25.50
P50 of Levelized PPA Price	\$31.45
P75 of Levelized PPA Price	\$36.76

Wind Metrics

Total Projects	91.0
Pricing Offers	350.0
Total MW Offered	15,769.4
P25 of Levelized PPA Price	\$15.72
P50 of Levelized PPA Price	\$19.03
P75 of Levelized PPA Price	\$32.85

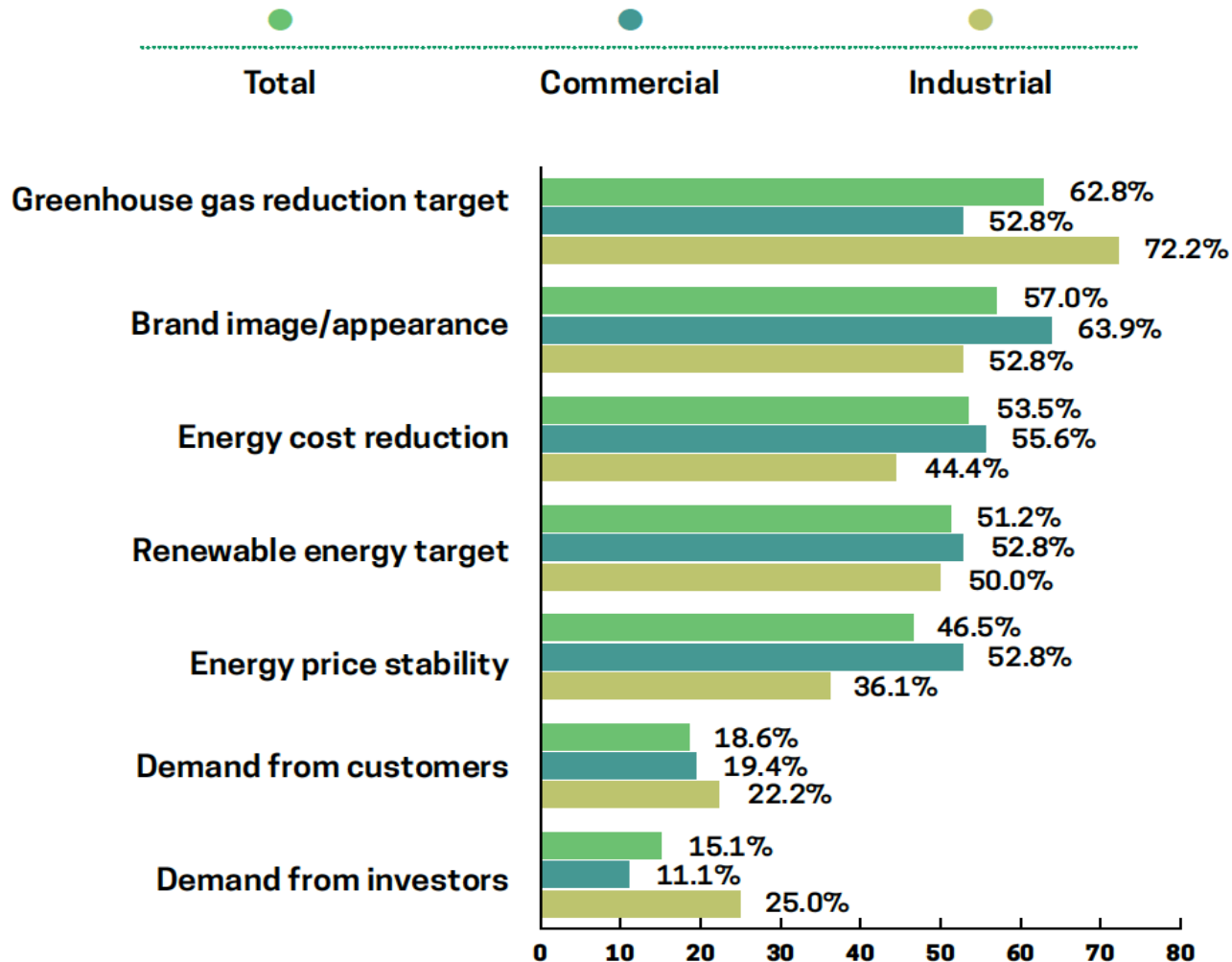
Solar PPA Price by ISO
10th Percentile Hub Prices



10th Percentile PPA Prices by COD



Reasons for Buying

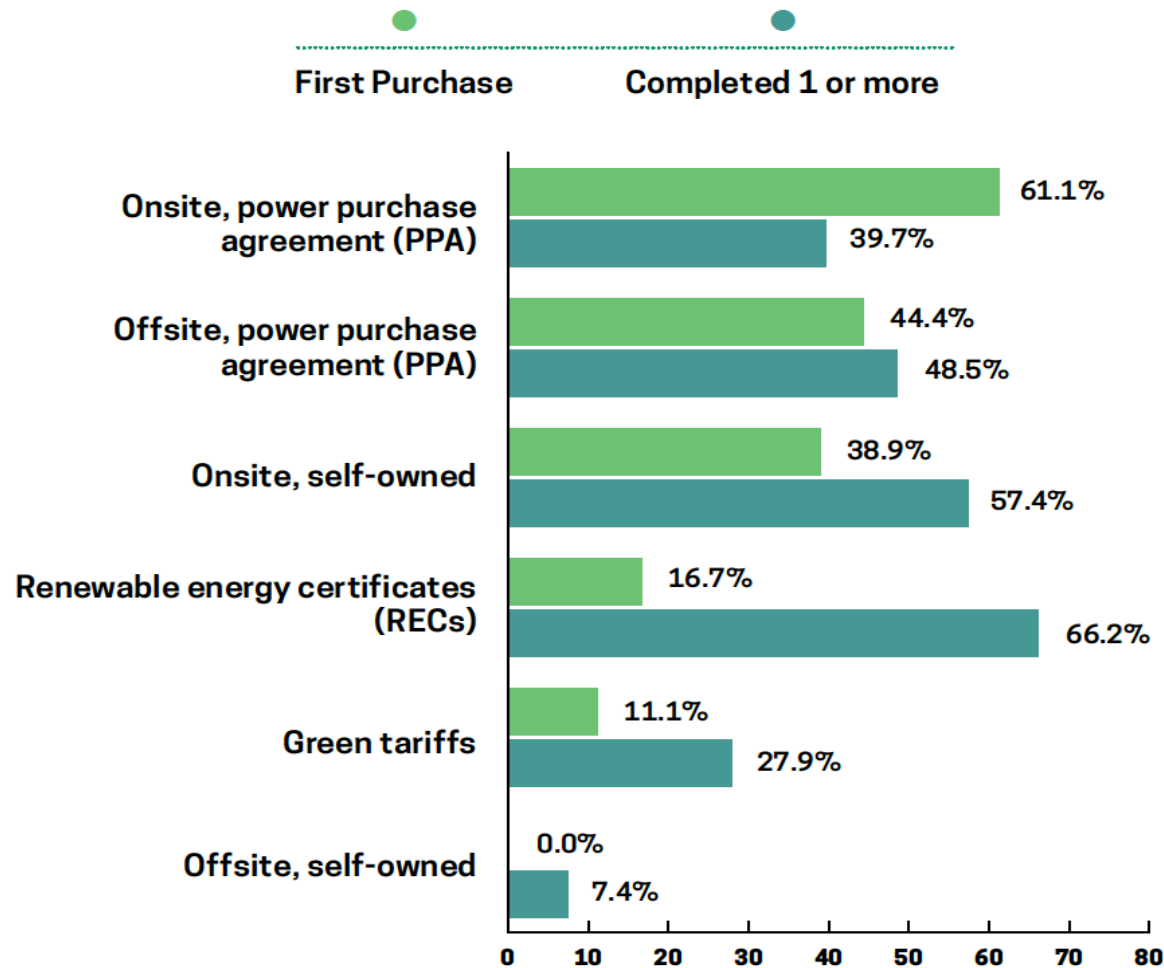


Q. Of the following, what are your company's top three (3) reasons for purchasing renewable energy?

Base: Respondents who are considering or have completed renewable energy purchase

Source: SED Research, 2017

Purchase Options

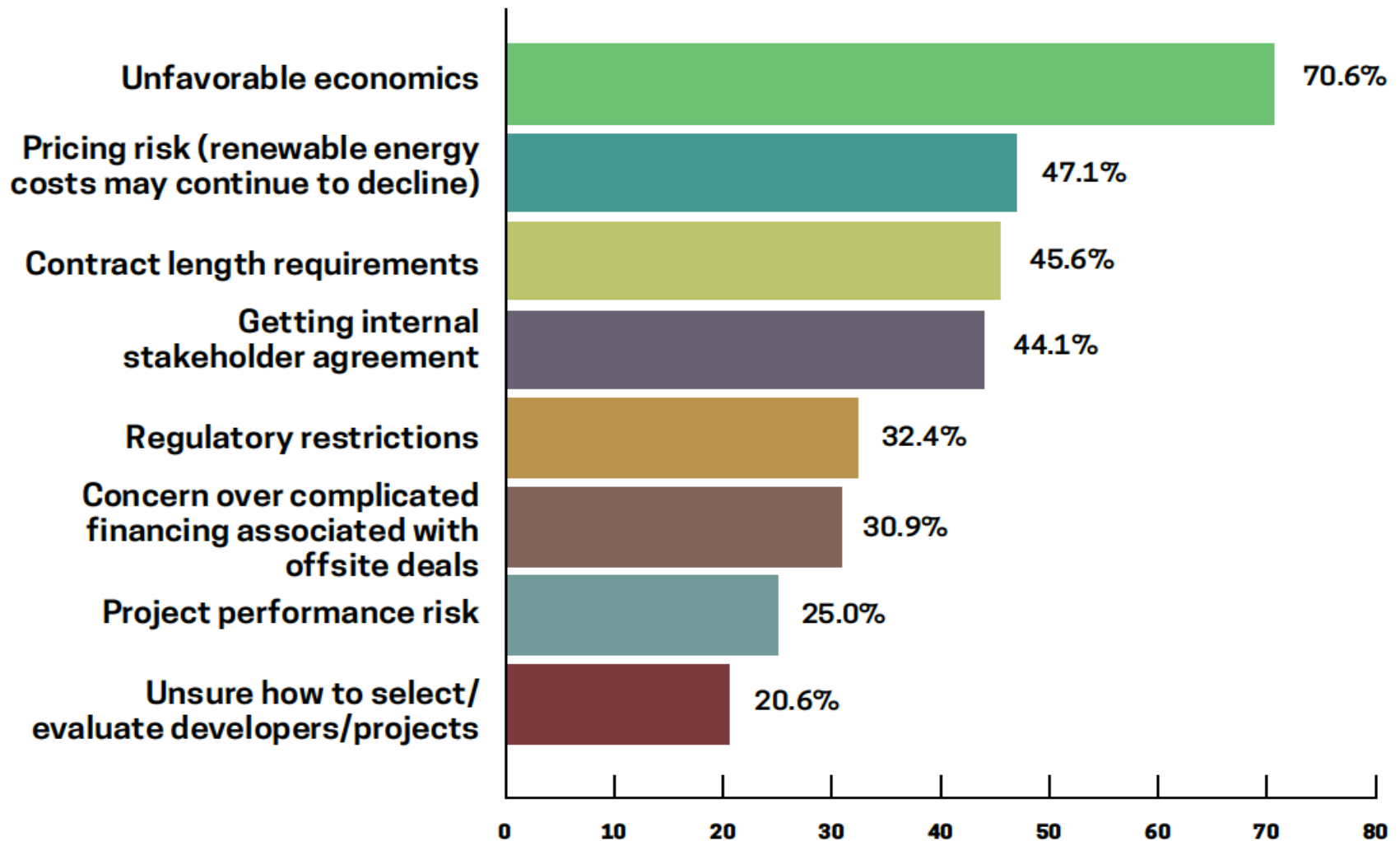


Q. Which of the following method(s) has your company utilized /is your company considering to purchase renewable energy?
(Choose all that apply).

Base: Respondents who are considering or have completed renewable energy purchase

Source: SED Research, 2017

Key Barriers to Deals

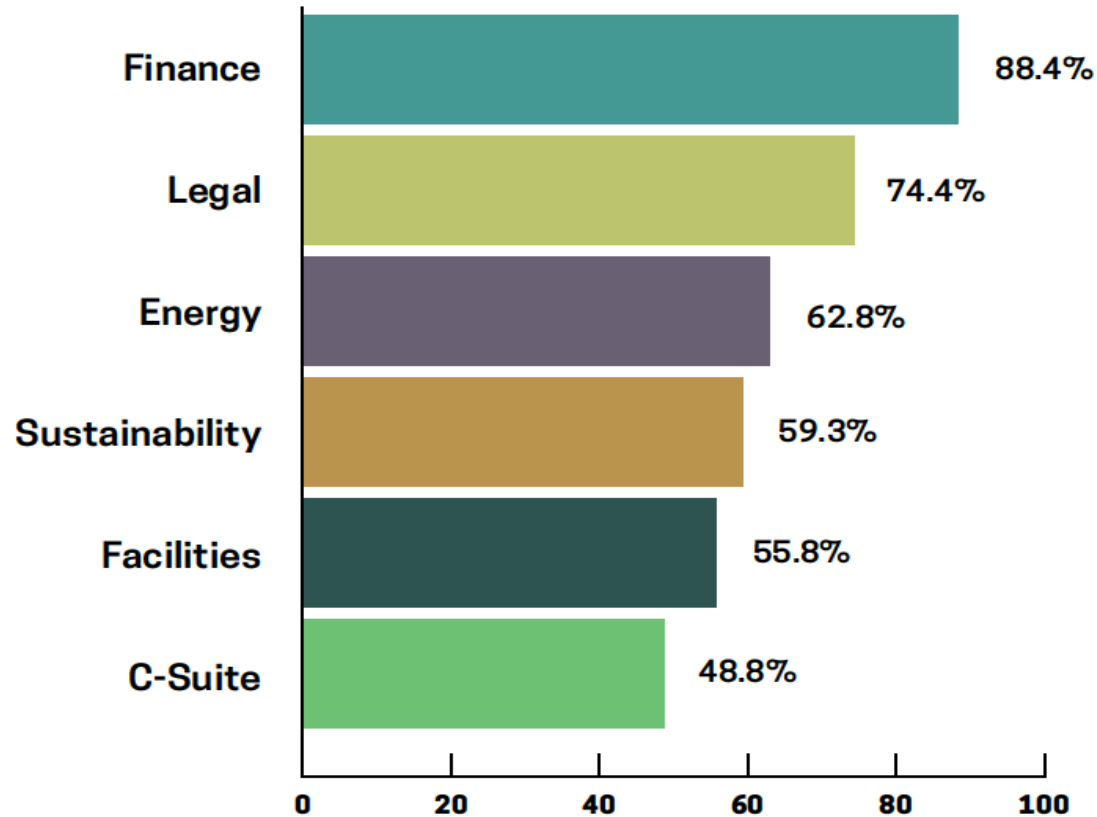


Q. Of the following, which do you see as the top three (3) barriers/obstacles to making future renewable energy purchases?

Base: Respondents who are considering or have completed renewable energy purchase

Source: SED Research, 2017

Who Needs to Sign Off?

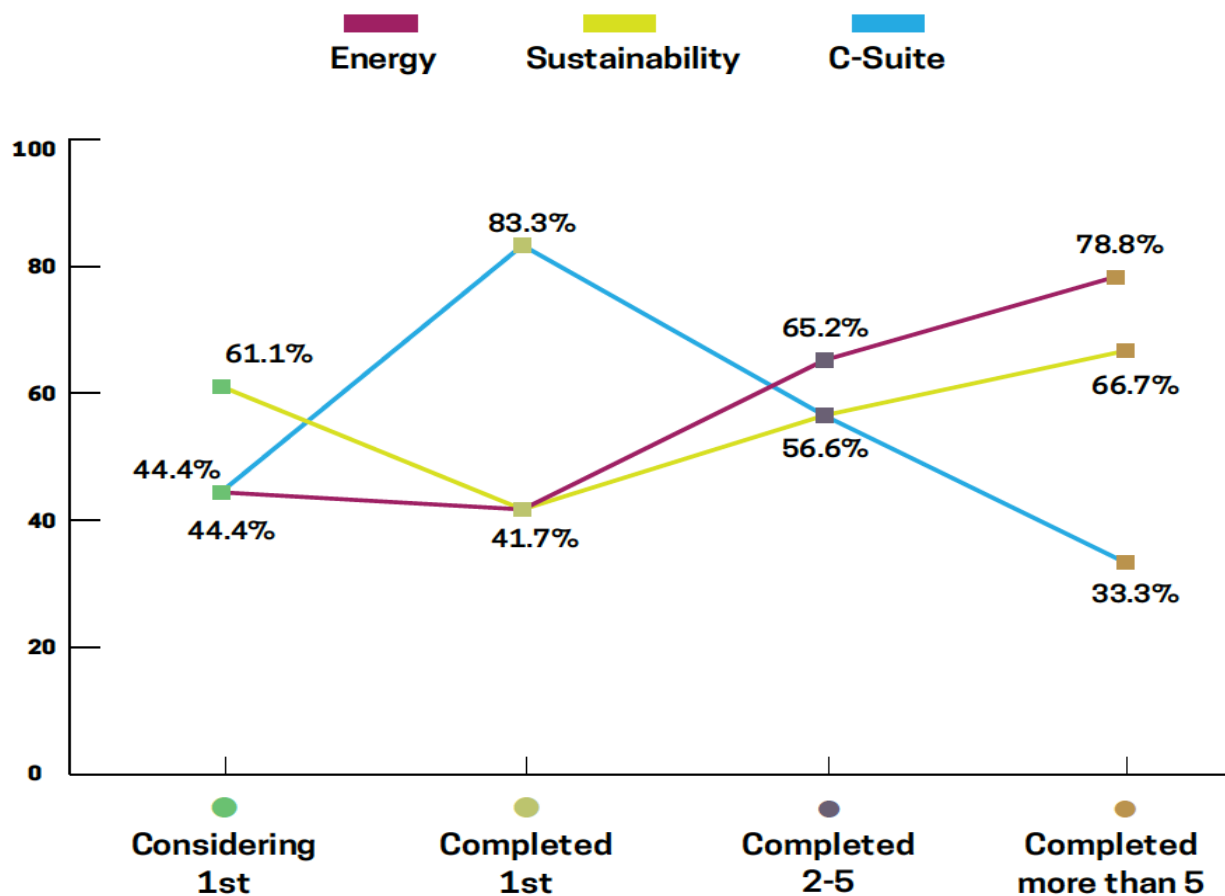


Q. Which of the following departments within your company must sign off on a renewable energy purchase? Check all that apply.

Base: Respondents who are considering or have completed renewable energy purchase

Source: SED Research, 2017

Comfort Levels Increase With Experience



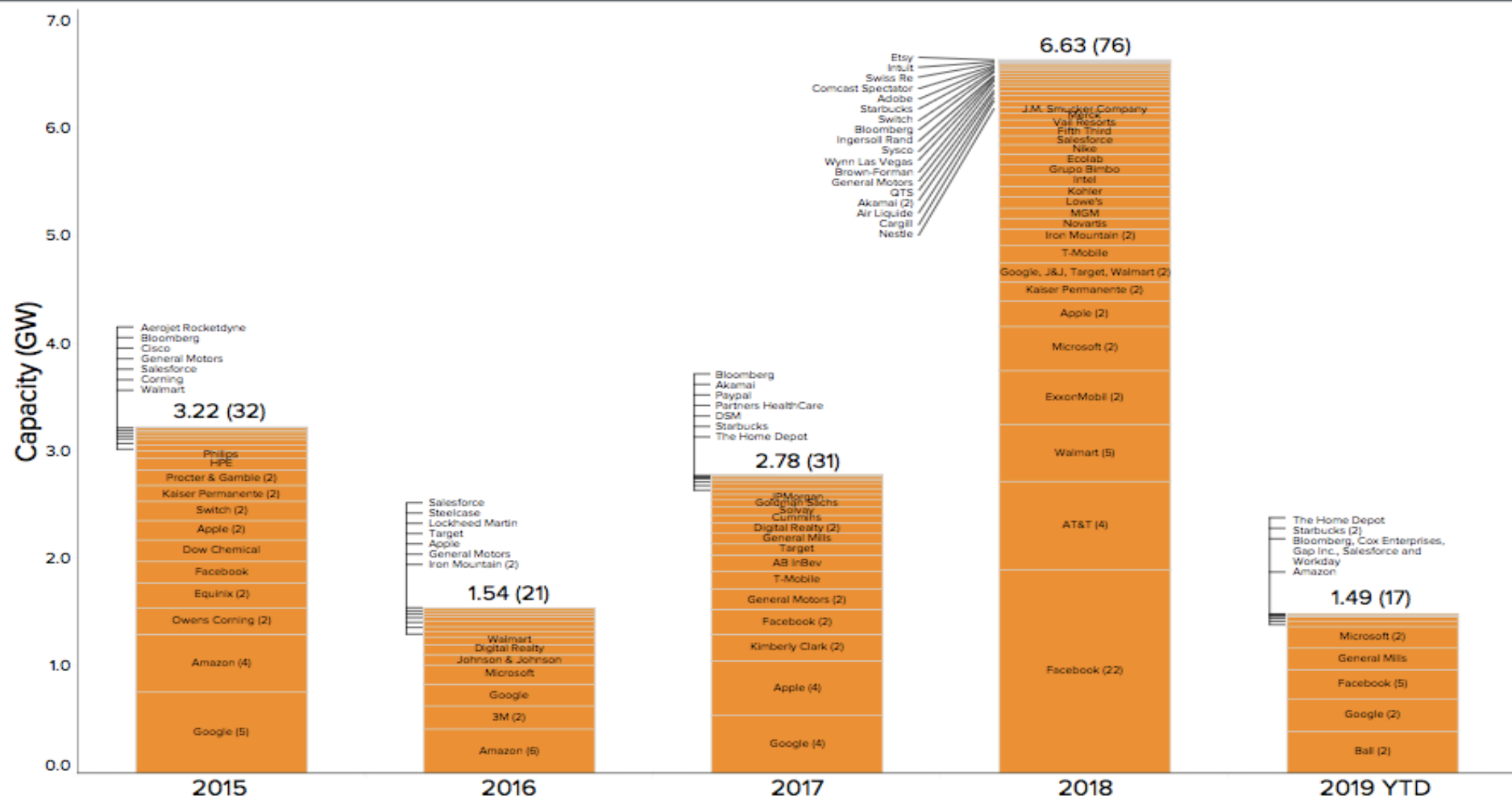
Q. Which of the following departments within your company must sign off on a renewable energy purchase?
Choose all that apply.

Source: SED Research, 2017

Who's Buying, and How Much?



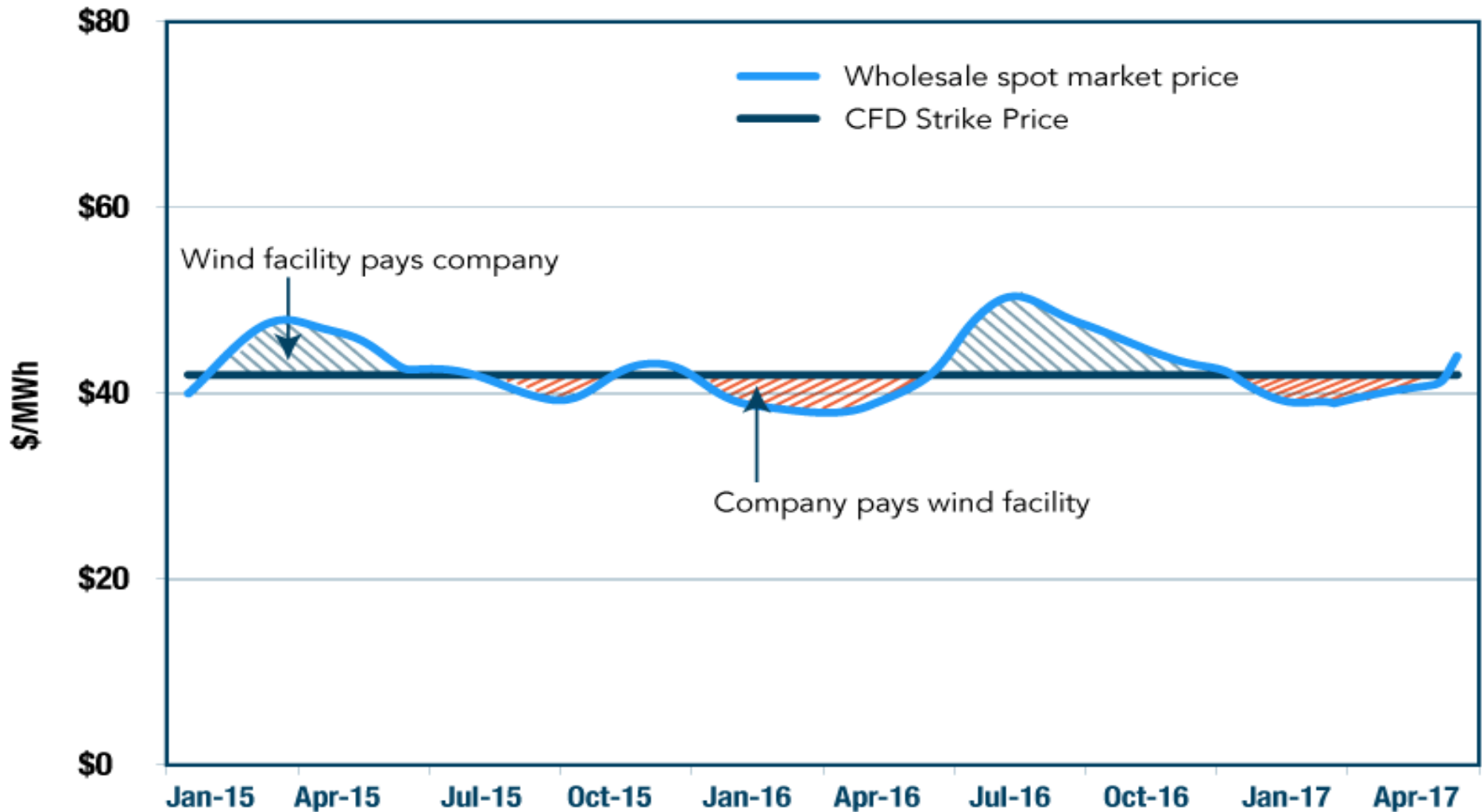
Corporate Renewable Deals 2015 – 2019 YTD



As of December 31, 2018. Publicly announced contracted capacity of corporate Power Purchase Agreements, Green Power Purchases, Green Tariffs, and Outright Project Ownership in the US, 2014 – 2018. Excludes on-site generation (e.g., rooftop solar PV) and deals with operating plants. (#) indicates number of deals each year by individual companies.

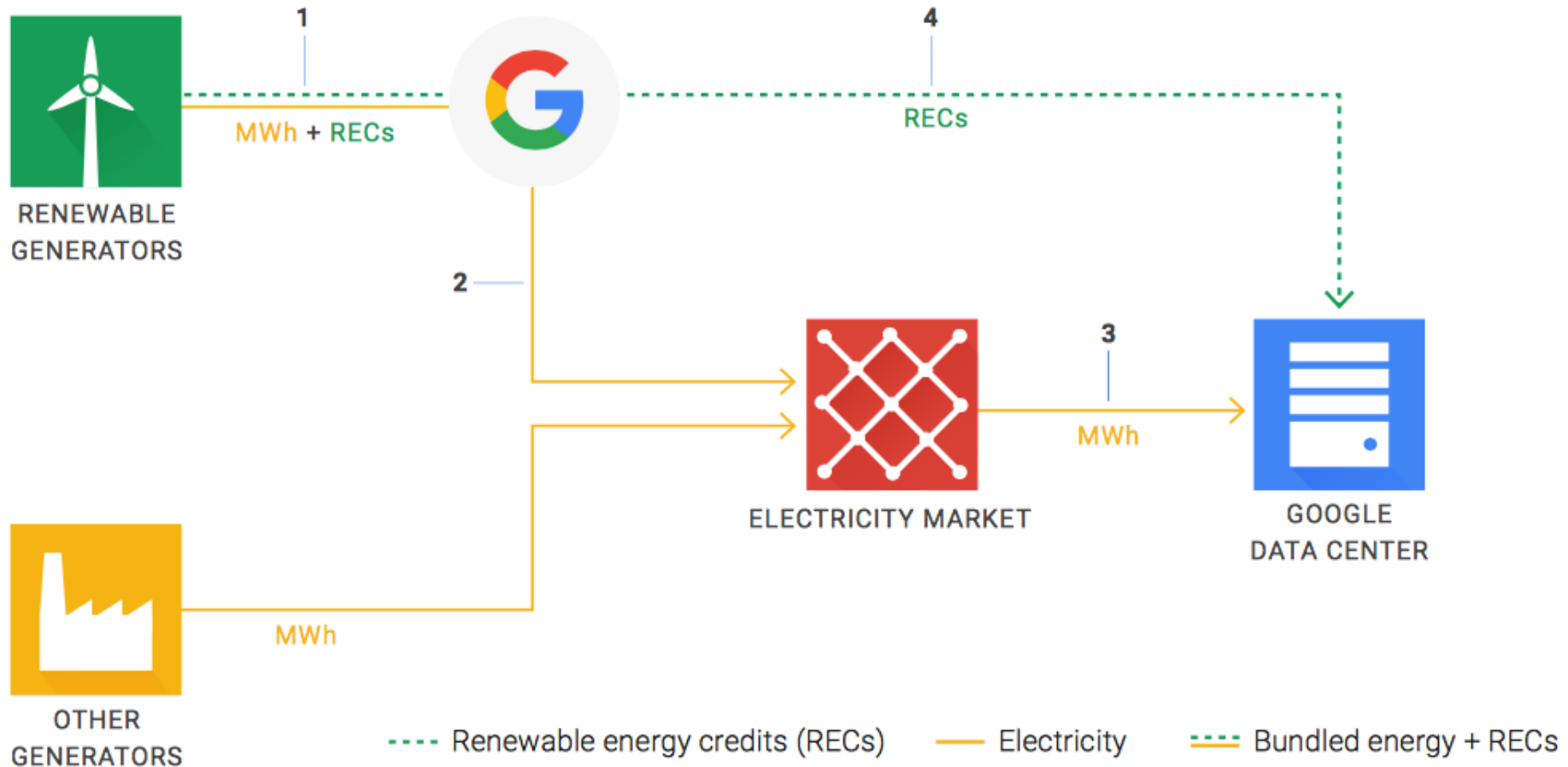
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Virtual PPA: Contract for Differences



Adapted from WRI "Corporate Guide to Green Power Markets -- Installment 6" (Dec. 2004)

Virtual PPA (fixed-floating swap)



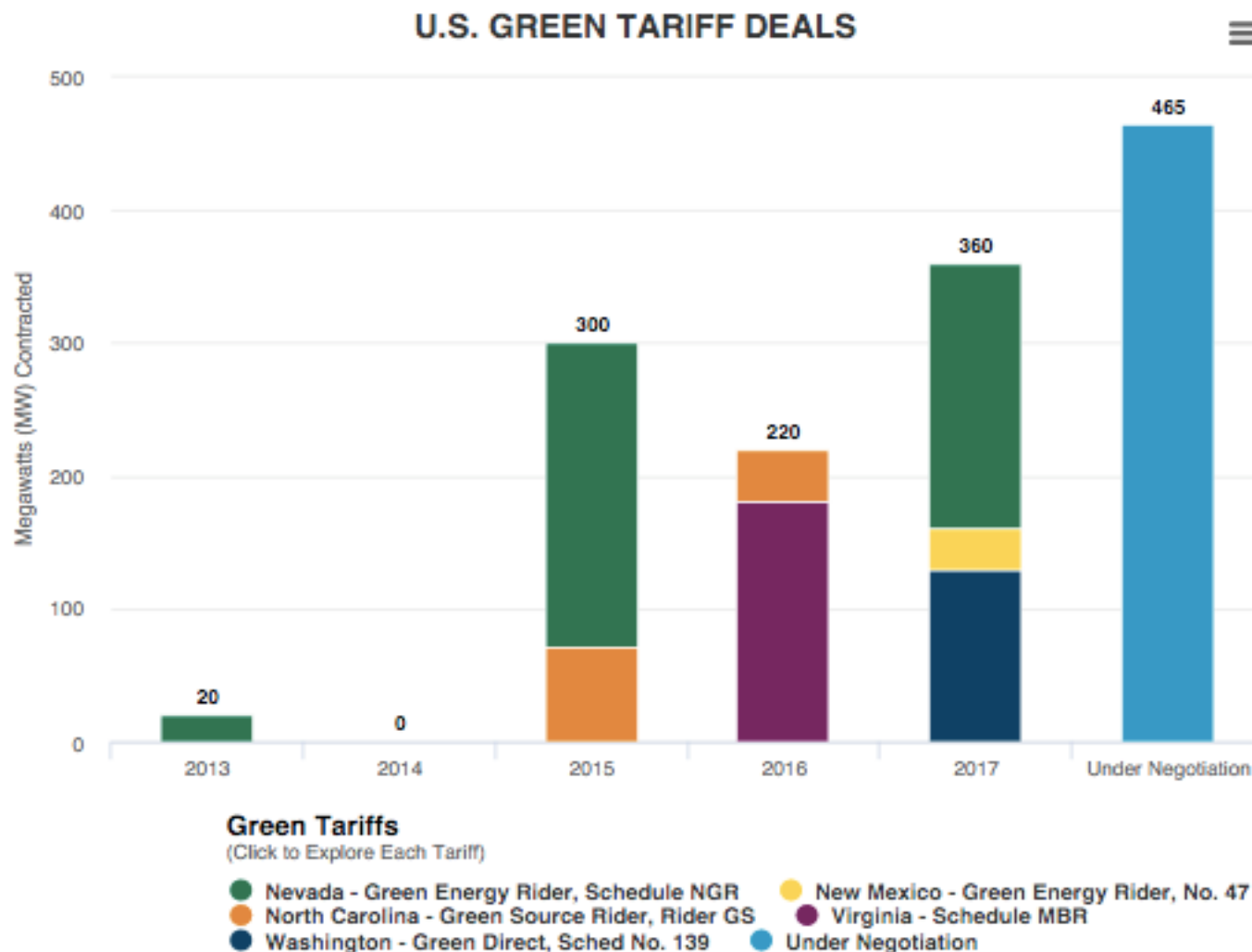
Differences Between Physical & Virtual PPAs

- **Regulatory:** Physical PPAs need power marketing authority from the FERC to buy from the power producer. Time-consuming & complex. Buy can engage authorized 3rd party (e.g., retailer). VPPA, does not involve FERC.
- **Regulatory:** Concern that VPPA contracts are “swap” agreements regulated by Dodd-Frank w/reporting, recordkeeping and registration requirements for swap transactions.

Differences Between Physical & Virtual PPAs

- **Delivery:** Physical PPA buyers must consider delivery location (pay attention to congestion). Usually contract with 3rd parties, but retailers typically offer 5 yr retail contracts
- **Location:** VPPAs can be used to offset electrons in different markets, but hedge is not direct (e.g., buy in ERCOT for Fla)

Green Tariffs (no wholesale market)



bit.ly/1rHLERXs

Source: U.S. Renewable Energy Map: A Guide for Corporate Buyers

 WORLD RESOURCES INSTITUTE

<https://www.wri.org/publication/emerging-green-tariffs-us-regulated-electricity-markets>

 NORTHBRIDGE
ENERGY PARTNERS

Where You Can Buy Renewables Today

U.S. RENEWABLE ENERGY MAP: A GUIDE FOR CORPORATE BUYERS

Where customers can buy large-scale renewable energy through the grid

