




*Success of Renewable Energy in ERCOT & City of Houston's 50 MW Solar Power Deal*



**James P. Cargas**  
Senior Assistant City Attorney, City of Houston  
**Houston Public Works Department**  
**Green Building Resource Center**  
August 22, 2018

1



*Disclaimers*

- NOT speaking on behalf of the City, Mayor, or any elected officials.
- Opinions and views expressed are the opinion and views of the individual only.
- NOT warranting the information, and NOT providing legal advice.
- Please verify all statements before relying on.

2



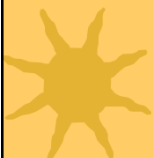
## *City of Houston* *Renewable Energy Leadership*



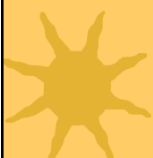
EPA's annual national top 100 green power users:



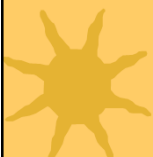
- # 8 purchaser of renewable energy in America
- # 1 local government purchaser of renewable energy in America



3



Status of TEXAS (ERCOT) Renewable Energy Market



- Impact on pricing: Time of day & reducing prices
- Prices are not spiking out of control!
- Renewables still catching up to fossil energy
- Wind will continue to dominate ERCOT
- Location of generation & importance of CREZ lines

4

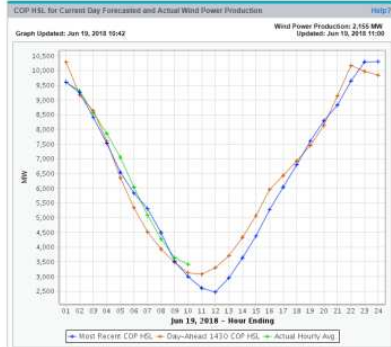


# Impact on Pricing: Time of Day



## WHY THE LOW PRICES IN ERCOT?

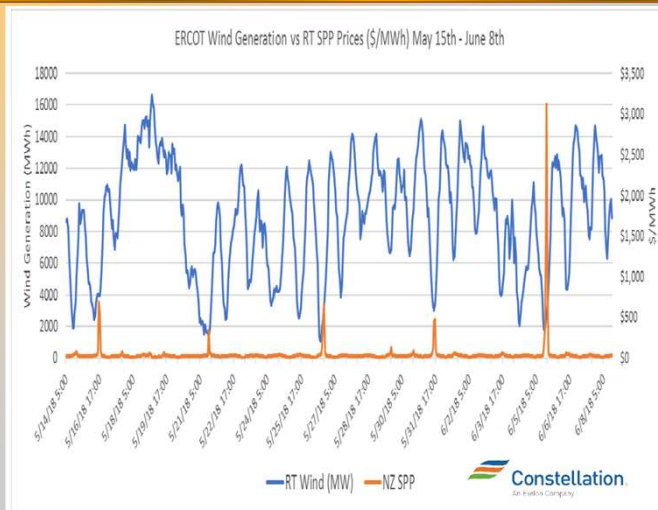
- More wind spinning at much higher capacity factors
- Wind spinning at greater output during peak hours
- Continuance of low gas costs
- ERCOT very willing to add transmission capacity
- New capacity still being added
- Capacity factors on new installations at 52% to 54% vs. 38% just 3 years ago



ERCOT Reserve Margin @ 11% / Avg. LMP for June \$36.86

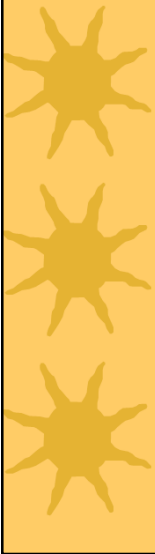


# Impact on Pricing: Wind is Reducing Prices

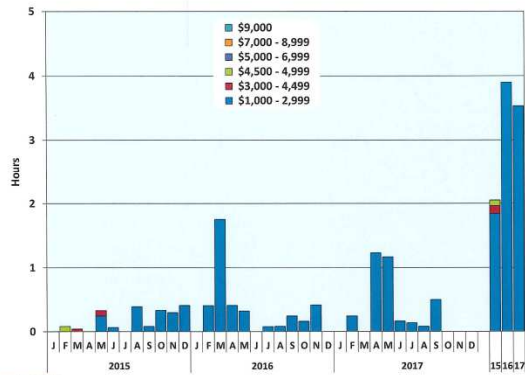




# Don't Believe the Hype



### Durations of High Real-Time Prices

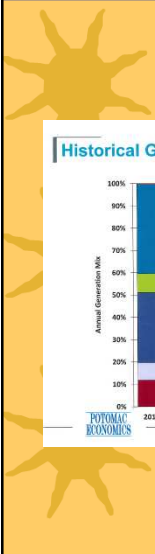


POTOMAC ECONOMICS

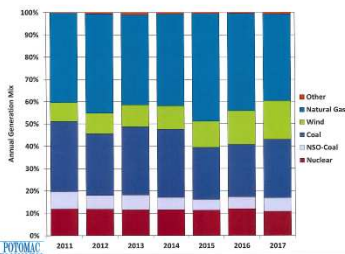
7



# Renewables Still Catching Up to Fossil Energy

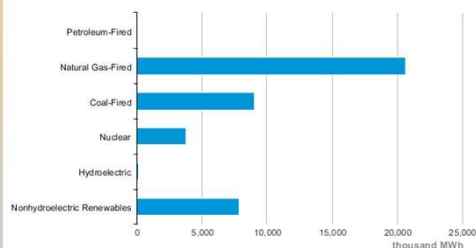


### Historical Generation by Fuel Type



POTOMAC ECONOMICS

### Texas Net Electricity Generation by Source, May. 2018

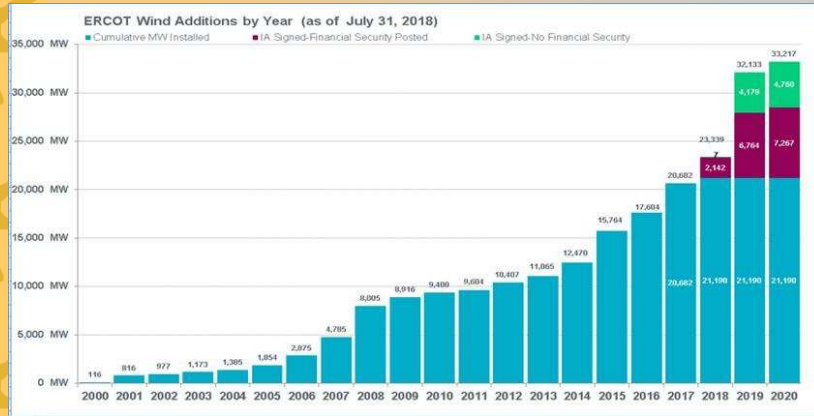


Source: Energy Information Administration, Electric Power Monthly

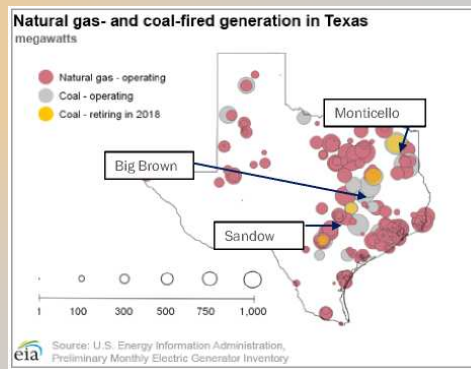
8



# Wind Will Continue to Dominate ERCOT

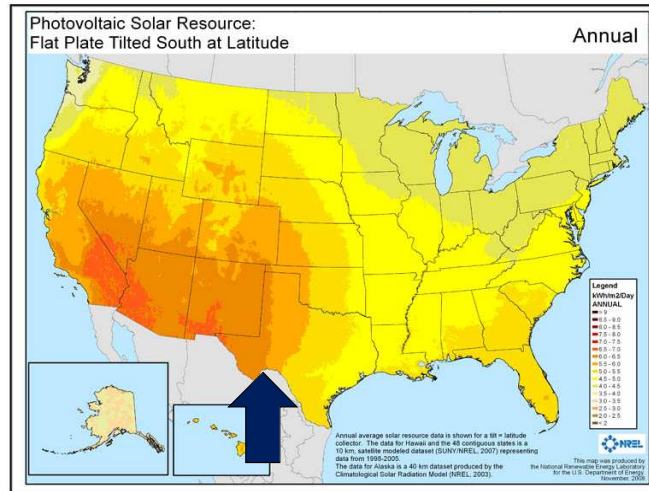


# Location of Renewable vs. Fossil Generation





## Solar Facility Location: Alpine, TX



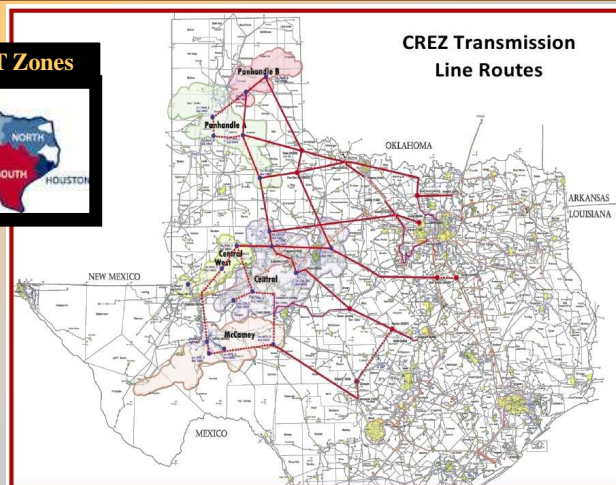
11



## Vital Importance of CREZ Lines



### ERCOT Zones

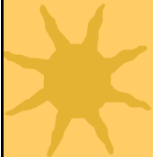


Source: Texas State Energy Conservation Office

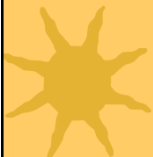
12



## *City of Houston* *Options for Renewable Power*



1) Purchase Renewable Energy Credits (RECs)



2) Build solar or wind facilities on-site (“behind the meter”)

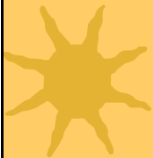


3) Power Purchase Agreement (PPA)

13



## *Renewable Energy Credits (RECs)*

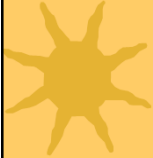


### **Pros:**

- Purchased separate from electrons
- Older vintage more affordable
- Texas and national markets for trading
- Provide extra income to renewable generators

### **Cons:**

- Not sure which facility they come from
- Futures market limited to 3 years
- May not be supporting Texas renewable industry
- Potential for illegal double sales

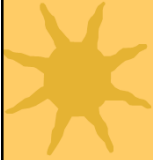
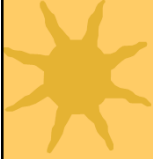


14





## *Building On-Site Renewables (Behind the Meter)*



### **Pros:**

- Long-term protection from volatility of electric market (budget certainty)
- Avoid transportation and distribution (T&D) costs
- Improves resilience and reliability
- Know exactly where green power comes from

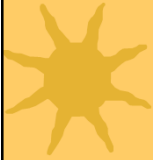
### **Cons:**

- Very limited on size since tied to specific load
- Requires open land next to, or on top of, operation being powered
- Complicated regulations for selling excess power to the grid
- Storage (batteries) not cost effective yet
- Maintenance costs

15



## *Power Purchase Agreement*



### **Pros:**

- Long-term protection from volatility of electric market (budget certainty)
- Federal construction tax credits (expiring 2019)
- Know exactly where green power comes from

### **Cons:**

- Complex arrangement involving three parties
  - Generator / Developer
  - Retail Electric Provider
  - End-User
- Additional transportation costs above T&D
  - Congestion risk

16





## *Construction of Solar Farm*



17



## *Construction of Solar Farm*



18




## *Finished Solar Farm*

### *Commercial Operation on April 17, 2017*

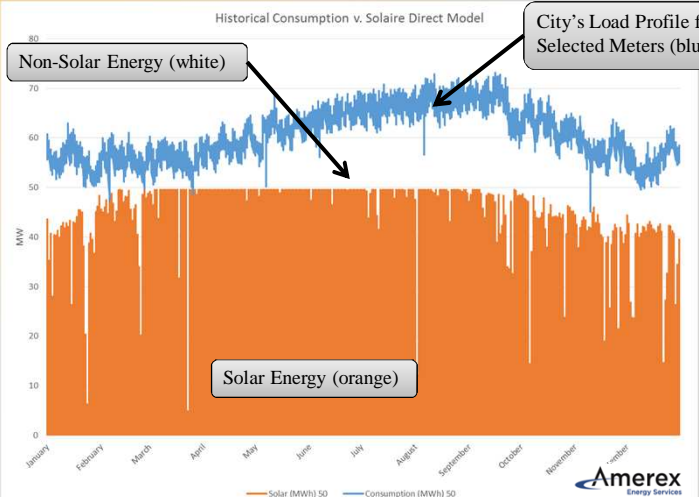



**19**



## *Reliant Energy:*

### *Providing Non-Solar Energy*



Historical Consumption v. Solaire Direct Model

City's Load Profile for Selected Meters (blue)


Non-Solar Energy (white)

Solar Energy (orange)

MW

January February March April May June July August September October November December

— Solar (MWh) 50 — Consumption (MWh) 50



**20**

