

# Petra Nova Successful Demo

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First of a Kind CCUS Scale-up

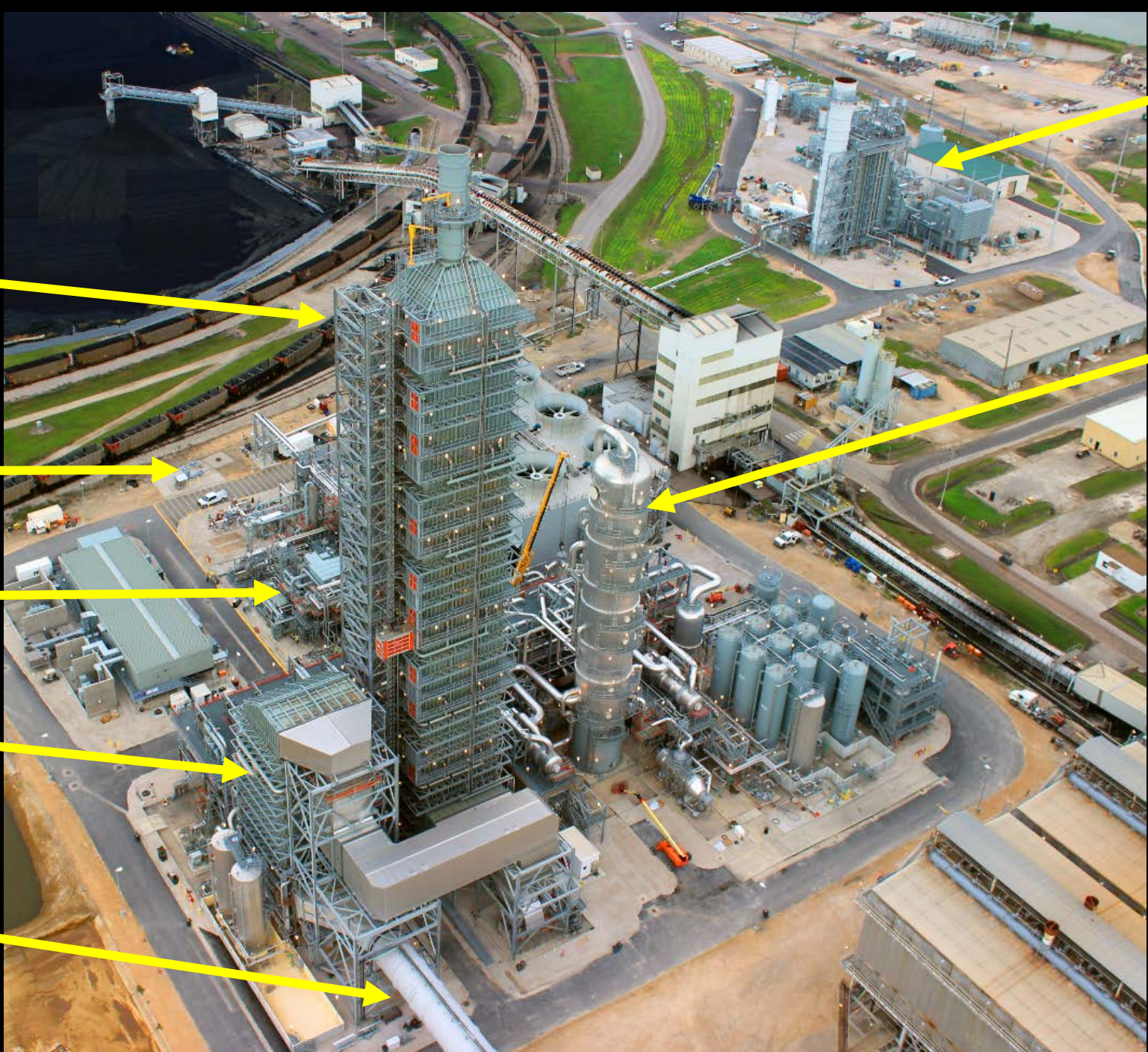
# An Ambitious Mandate

- Demonstrate Carbon Capture at scale
- On an operating coal plant without destroying capacity
- Without reliance on carbon credits
- Without a developed sequestration regime

## An Innovation of Relationships

Partner	Role
NRG	Sponsor/ Host – W.A. Parish Plant
DOE	\$190 MM cost share
JX Nippon	JV Partner
Hilcorp Energy	E&P Partner/West Ranch EOR/Pipeline
Mitsubishi Heavy Industries	CO2 Capture Technology
Bureau of Economic Geology (UT)	Sequestration Verification
The Industrial Group (Kiewit)	Construction

# Petra Nova site photo



Absorber

CO<sub>2</sub> Pipeline

Compressor

Quencher

Flue Duct

Cogeneration  
(steam & power)

Regenerator



# Petra Nova Operating Record

Outage by Component (Total Phase 3)									
	2017			2018			2019		
	Total	Full (Days)	Partial (FDEs)	Total	Full (Days)	Partial (FDEs)	Total	Full (Days)	Partial (FDEs)
CC Facility	41	23	18	34	19	15	29	17	12
Cogen Facility	67	57	10	1	1	0	20	14	6
WAP Unit 8	13	8	5	30	28	2	17	12	5
CO <sub>2</sub> Pipeline	0	0	0	0	0	0	0	0	0
West Ranch	6	0	6	30	13	17	6	4	2
Weather	14	13	1	5	2	3	2	2	0
Planned Outage	0	0	0	52	52	0	0	0	0
<b>Totals</b>	<b>141</b>	<b>101</b>	<b>40</b>	<b>152</b>	<b>115</b>	<b>37</b>	<b>74</b>	<b>49</b>	<b>25</b>

By the 3<sup>rd</sup> year  
Carbon Capture achieved  
**90+% online factor**

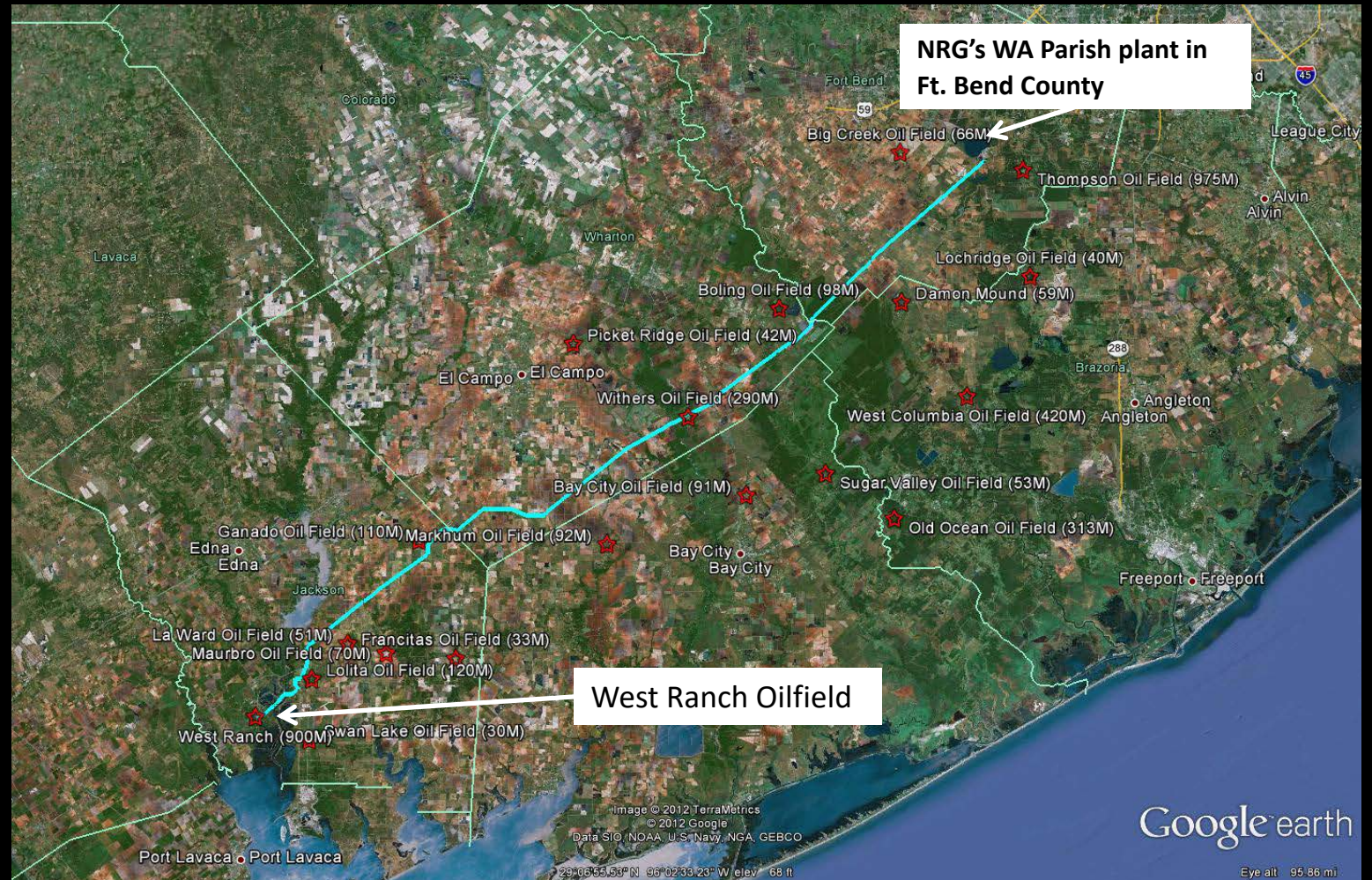
Notes:

1. Except for the Cogen Facility, issues with BOP equipment is included in the CC Facility values.
2. Totals are shown for total day outages plus partial day outages (in full day equivalents, FDE). To calculate full day equivalents, daily de-rates were converted to hours (using a daily target of 5,265 tons per day), summed for the year, and divided by 24. For example, if CO<sub>2</sub> capture rate on a given day was 4,739 tons (or 90% of 5,265 tons) it would equate to 2.4 hours of outage time. If this occurred for 10 days, it would equal 24 hours or 1 full day equivalent.

Source:  
W.A. Parish Post-Combustion CO<sub>2</sub> Capture and Sequestration Demonstration Project  
DOE Award Number DE-FE0003311  
Final Scientific/Technical Report  
March 31, 2020

# Petra Nova CO<sub>2</sub> Pipeline to West Ranch EOR Project

- More than 1,000,000 tons of CO<sub>2</sub> captured and delivered during the first ten months of operation
- Oil production boosted 1,300 %
- 3,831,818 short tons of CO<sub>2</sub> captured during Phase 3 at 100% operating capacity, meeting design value of 5,200 short tons per day
- 99.8 percent of captured CO<sub>2</sub> sequestered as determined by BEG, meeting the DOE target of 99 percent





# Tundra – Petra Nova Commercial Comparison

	Tundra	Petra Nova
Size	455 MWe	240 MWe
Flue gas fuel	Lignite	Powder River Basin coal
Steam source	Nat Gas Boilers	Stand-alone CCGT
Host plant owner	Coop – long-term view	IPP – short term view
CO2 disposition	On-site storage	Project-owned oilfield
<b>Exposure to oil price</b>	<b>None</b>	<b>Yes – high</b>
<b>Revenue sources</b>	<b>45Q Tax Credits</b>	<b>Crude oil sales</b>
Host unit dispatch	To serve long-term contracts	Day-to-day decision
Capture technology	Fluor	Mitsubishi

Petra Nova  
is an  
Oil Company  
not a  
CCUS project