Energy Transition, Carbon Markets and Carbon Intensity

October 2021

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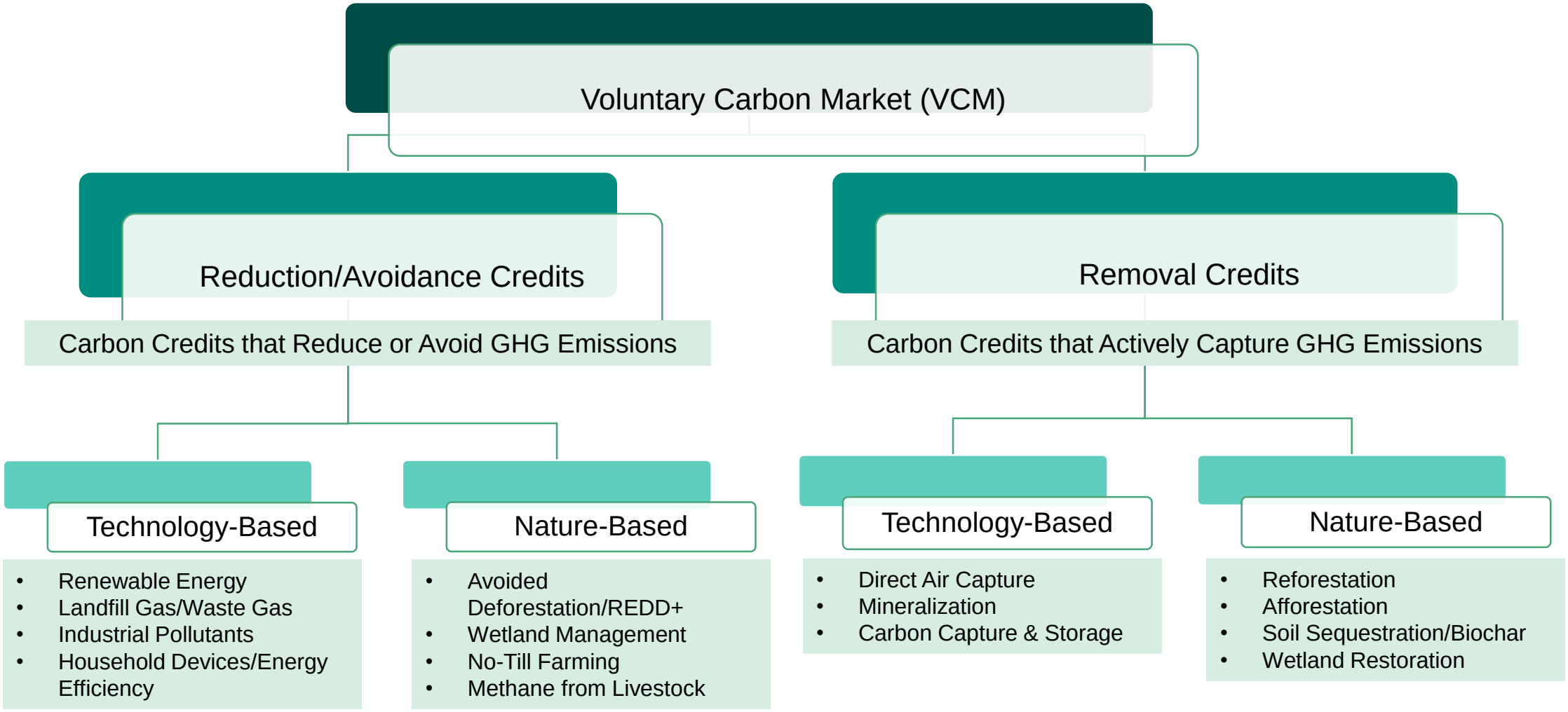
Voluntary Carbon Market is layered and complex



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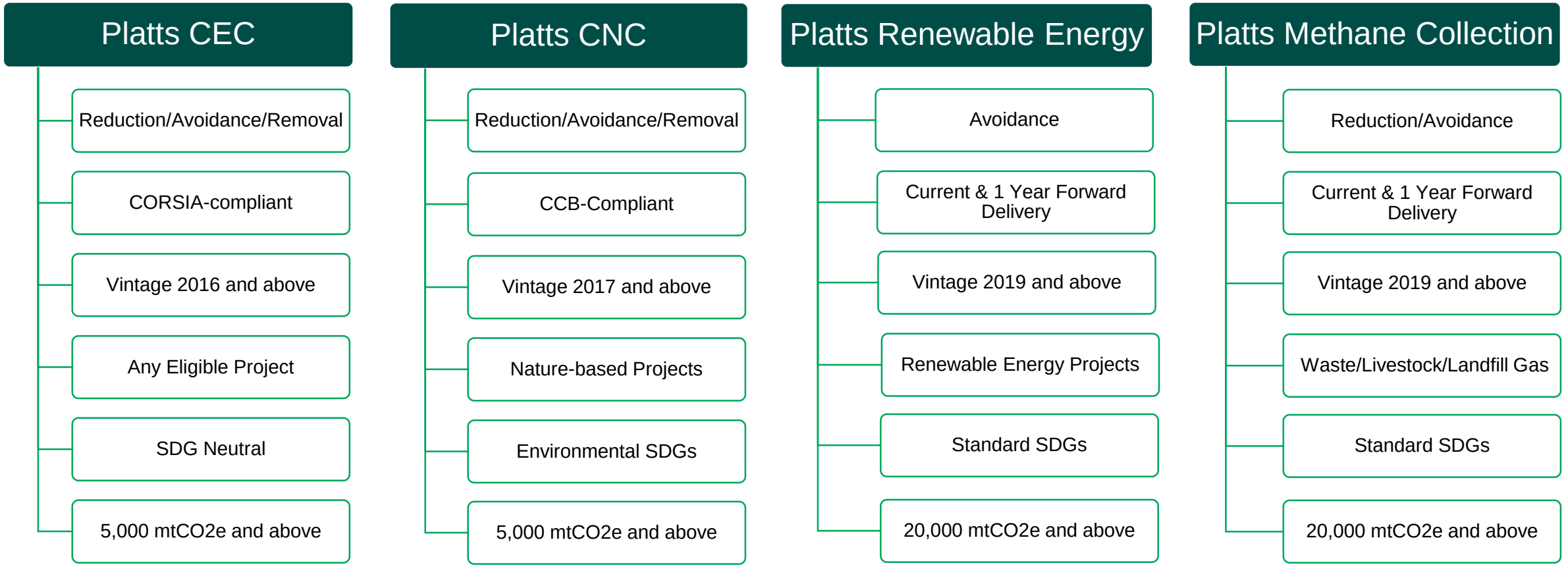
Platts Stand-Alone Carbon Credit Assessments



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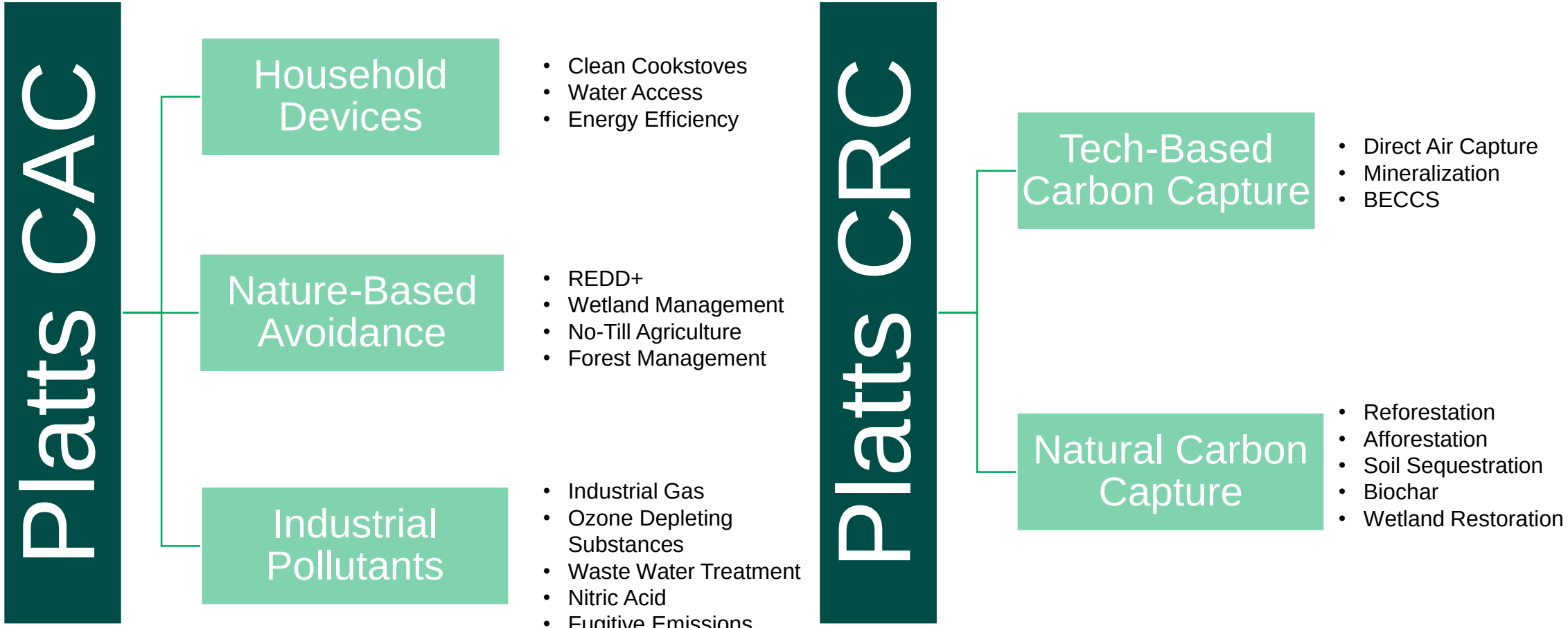
Platts Voluntary Carbon Market Assessments



The routes for integrating emissions into hydrocarbon trades is growing but requires standardization and regulation

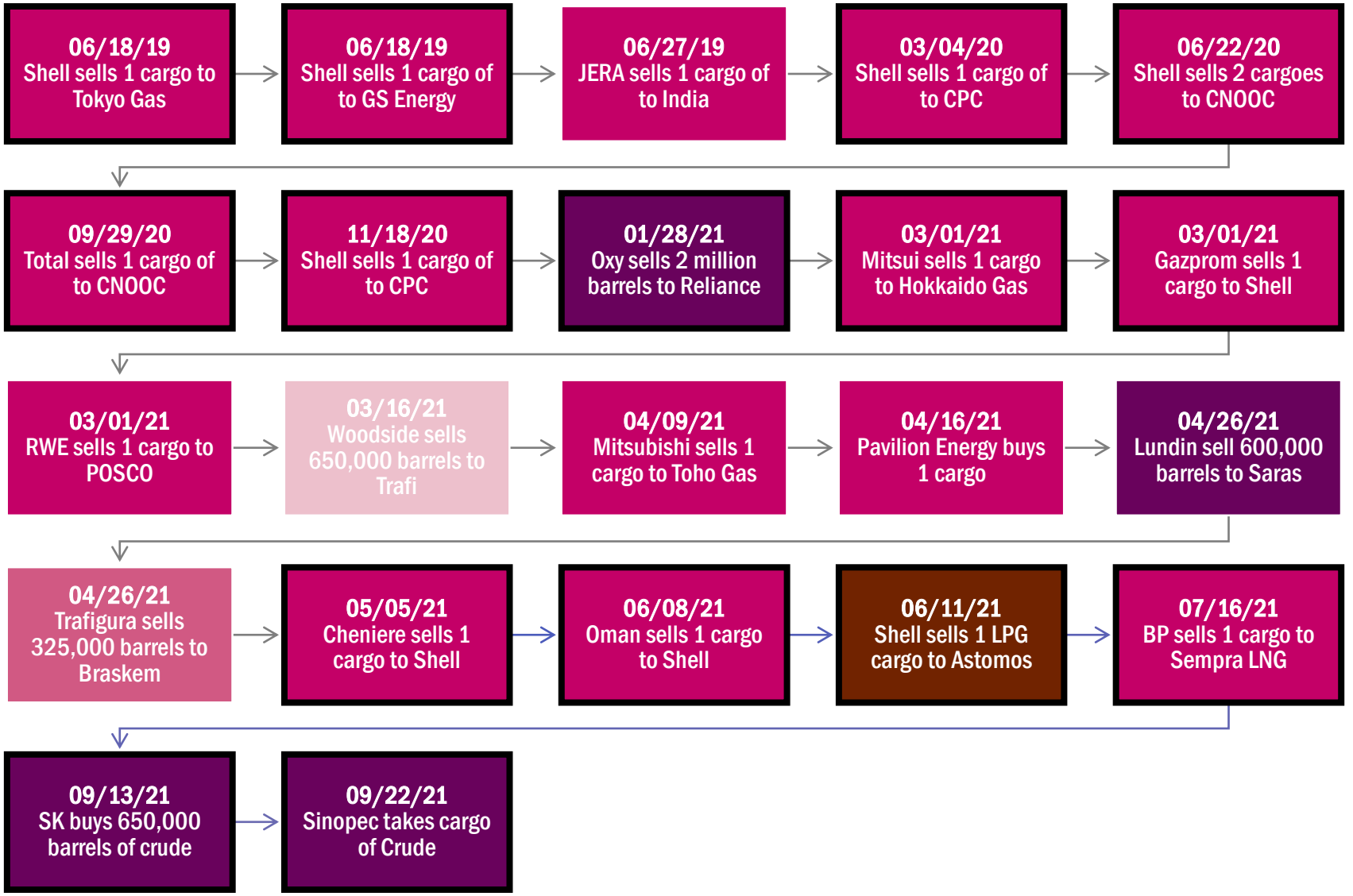
Routes for Integrating Carbon into Hydrocarbon Trade

- **Attribute Approach**
  - Carbon intensity becomes an attribute of the cargo, much like sulphur, allowing differentiation of supplies in the final price of the cargo
  - In this scenario each producer would look to lower the carbon intensity of their own production
- **Offset Approach**
  - Buying carbon credits to offset the emissions from the value stream
  - Key here will be the scope of emissions to be offset
  - Issue is that there is a significant range of credits and a need for strong credibility

Carbon Offset Trades

June 2019- Oct 2021

- LNG
- Crude
- Naphtha
- Condensate
- LPG
- Full Life Cycle emissions



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Platts Carbon-Neutral LNG Offset Differential

LNG Projects' Carbon Intensity **×** Voluntary Carbon Credit Price **=** LNG Emission Offset Cost

Public and official information
&
Market consultation

Platts Nature-Based Carbon Credits

Platts Database code
ACNLB00

$0.xyz/MMBtu

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Source: Platts

Carbon-neutral LNG well to tank OZ-JKTC

Mirrors JKM cargo size and Platts LNG shipping boil-off rates

Cargo size	3.4 Tbtu = 65,384.615 metric ton
Voyage	11 days laden; 8 days unladen
Boil-off	0.12% laden; 0.09% unladen

Australia to JKTC – World's most active trade route globally: About 68 mil ton in 2020

Weighted average carbon intensity: 0.697 tCO2e/ton of LNG

S&P Global Platts

Source: Platts

S&P Global Platts Marginal Carbon Intensity (CI) Definition

S&P Global Platts' carbon intensity (CI) model will estimate different oilfield's upstream emission footprint with respect to its oil production by implementing a bottoms-up approach with the following components: **Production & Extraction, Maintenance, Surface Processing, and Transportation to Storage.**

The model will estimate CO_2eq emissions based on the energy required to accomplish each upstream stage by utilizing approximately 50 primary parameters that cause certain oilfields to emit more CO_2eq than others. Model elements that will be addressed include topics like wellhead flaring and venting practices, associated natural gas processing, produced water handling, and other common critically emitting upstream practices. Complex engineering workflows have been considered to account for different extraction methods (oil sand mines, secondary floods, tertiary CO_2 enhanced oil recovery) which will help more accurately track different region's footprint based on the overall emission intensity from the upstream component. This well-to-refinery workflow has been designed to account for each oilfield's most recent data through proprietary S&P Global Platts' upstream research along with government and public records.

Production & Extraction

Maintenance

Wellhead Flaring

Surface Processing

Transportation

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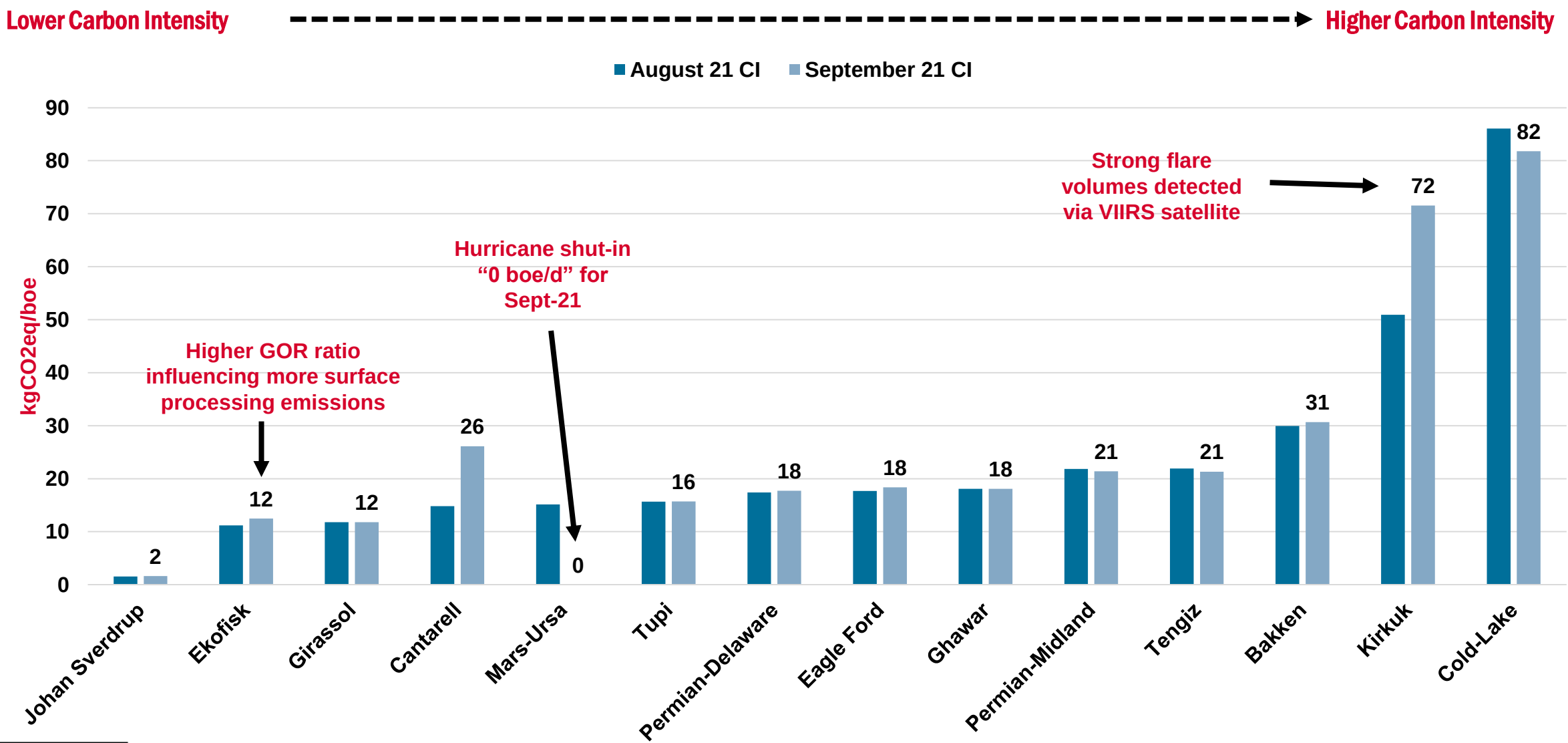
Pilot Fields of Interest, Marginal CI



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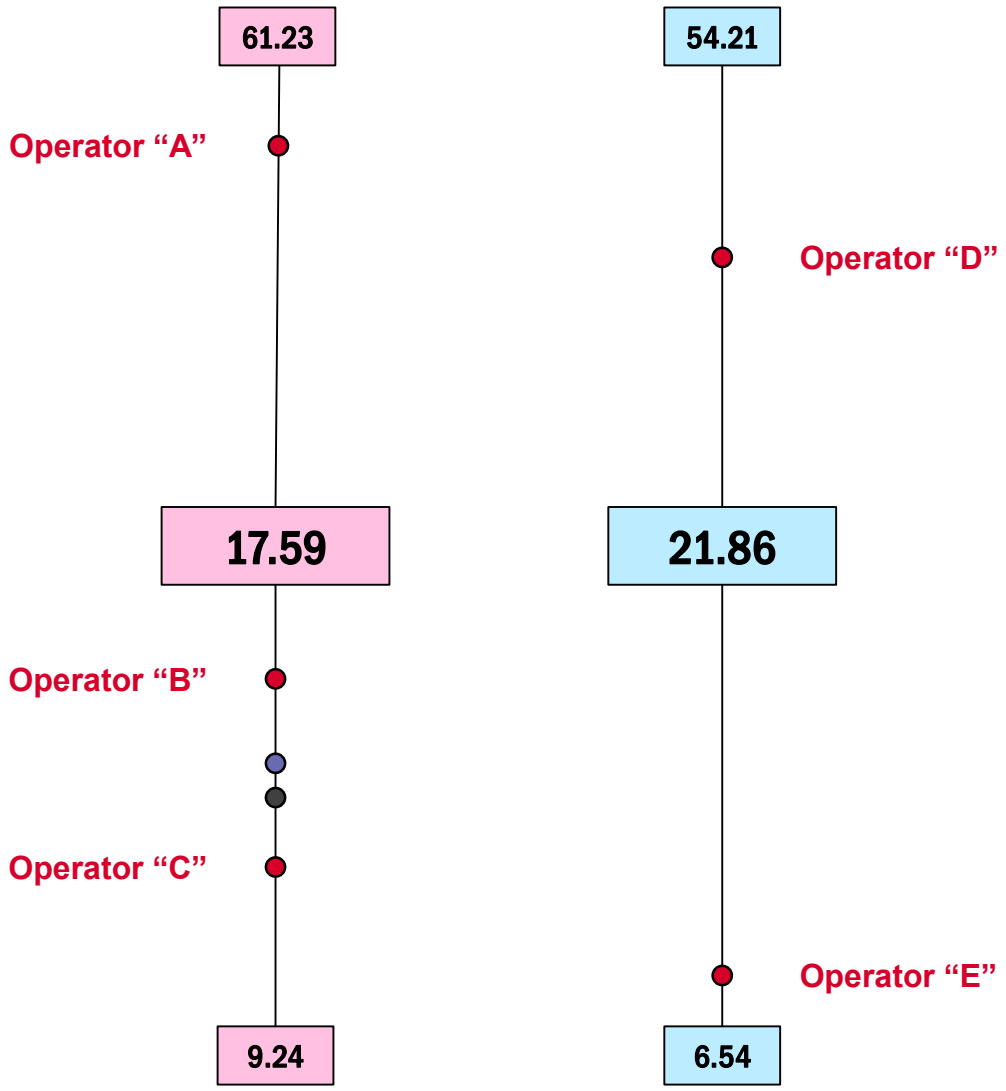
US Shale CI Approach

- Many E&Ps associated with each basin, so we are trying to establish the overall CI as a baseline so then E&Ps can benchmark themselves against the basin average
- Ideally, we can collaborate with different E&Ps to acquire field level upstream info and any collected emission data to compare against the basin level CI
- **Factors to consider that will be difficult to analyze:**
  - Wellhead flare & vent practices, as satellite data struggles with geographic accuracy when pad sites are close to one another
  - Joint venture & operational interest that isn't defined in wellhead databases
  - Varying surface processing practices that are relatively undefined across operator type



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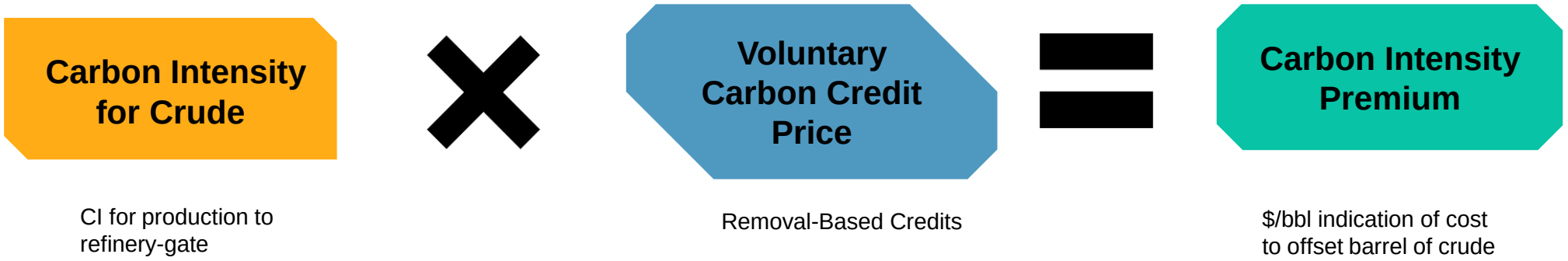
Carbon Intensity Premium: What is it?

- This assessment reflects the price of different streams of crude oil when considering the carbon intensity associated with each stream. Using a baseline carbon intensity of **0 kgCO2eq/boe** each crude stream is adjusted to get to this level.

- Depending on the carbon intensity of each crude, the calculation is a $/barrel indication of how much it would cost to use a carbon credit to get each crude to the baseline level.

- The higher the carbon intensity, the more it would cost to offset emissions from each crude



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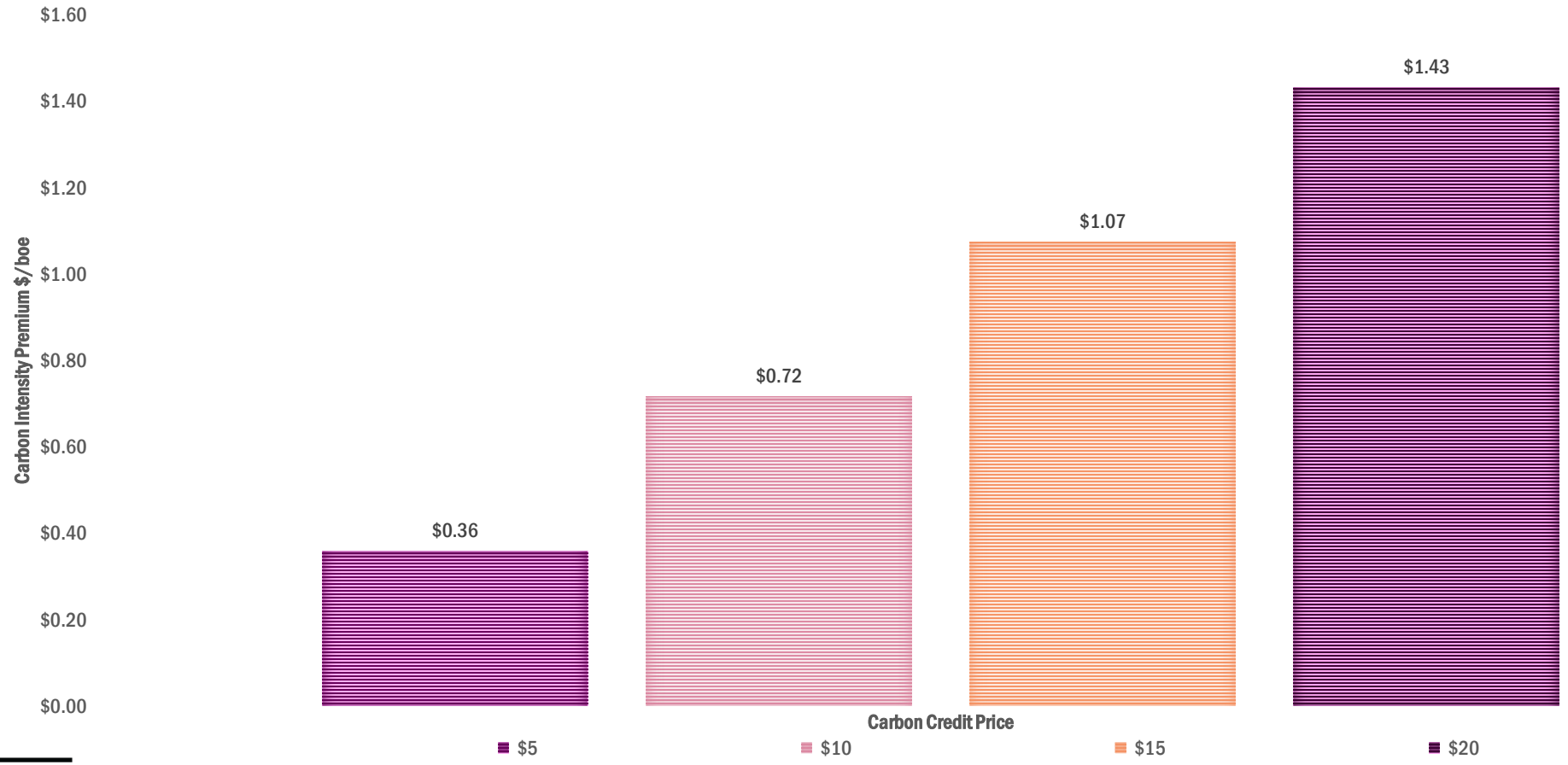
Carbon Intensity Premium: As the Carbon Credit Price changes so does the CI Premium

Crude: Kirkuk

CI : 71.55 KgCO2e/ boe



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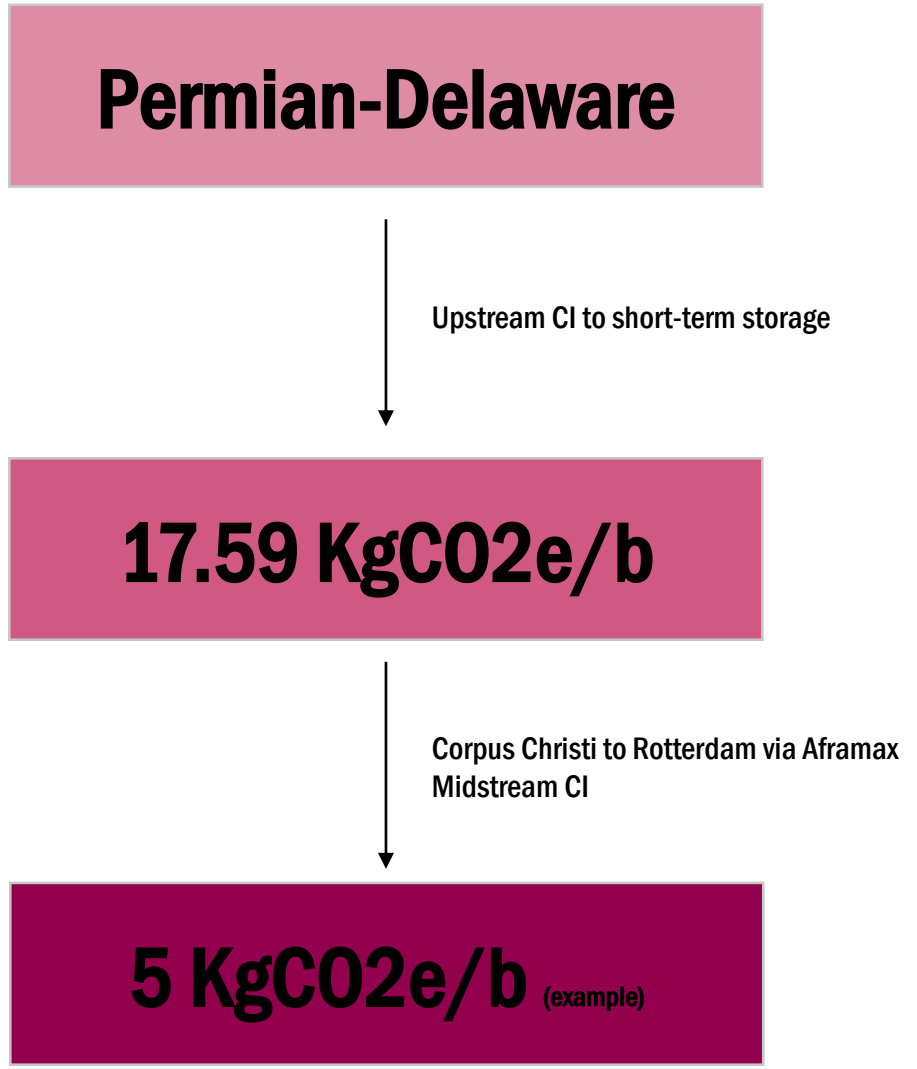
Midstream Carbon Intensity and CI Premium

- Platts has chosen one major route for each specific crude that will take the crude to the refinery-gate.
- Platts has taken into consideration certain assumptions when calculating the midstream carbon intensity for shipping routes as well as for transport through pipeline.
- These assumptions are things like vessel size, load factor, speed, etc.
- Future iterations will include midstream calculator that you can pick your route and it will spit out carbon intensity.



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QUESTIONS AND ANSWERS