Innovations in Carbon Crediting for Plugging O&G Assets

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Abstract

Project developers, registries and other stakeholders continue to work to develop methodologies/protocols to use voluntary carbon markets to plug wells in various stages of their lifecycle. Specifically for orphan and abandoned wells there are three active "public" methodologies (along with many private ones); each is better suited for wells with particular characteristics. Continued iteration has raised the integrity of these methodologies; other systems for registries are also evolving to make project data more available/transparent and to provide "financial securities-like" confidence in the projects and participants.

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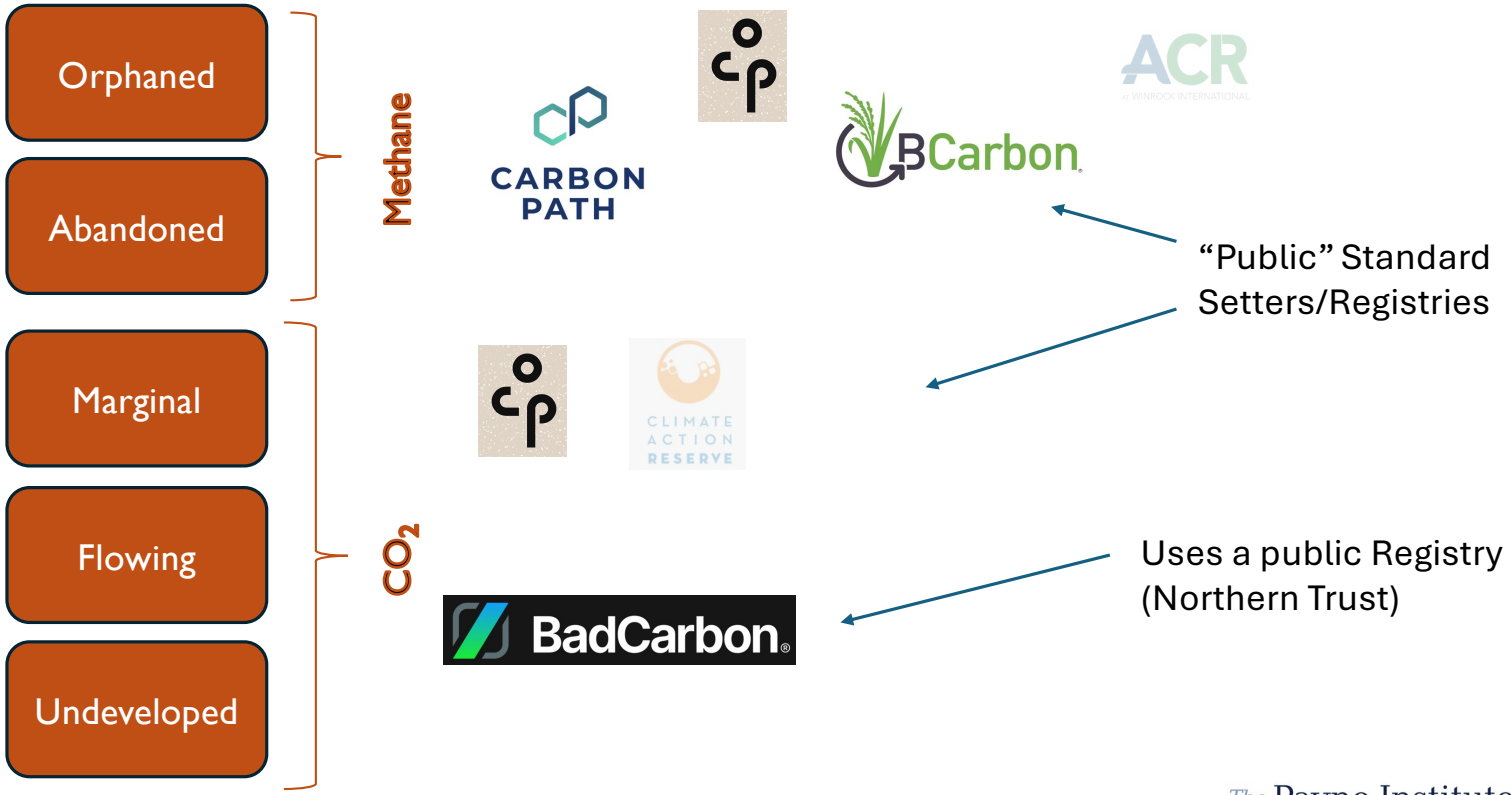
February 25, 2026

Crediting CO_2/Methane Avoidance in Oil & Gas



Orphaned & Abandoned Well Crediting Methodologies

- 3 active methodologies today
  - All from small (unknown) standard setters vs. the "big 4"
- Each better suited to a certain type of abandoned well
  - Not in itself "bad" but adds complexity
- Perception that can bolster integrity measures further
  - To ensure landowners rights, safety, volume determination, other
  - Upfront crediting a hurdle for some

Standard Setter	Methodology Best Suited For
CarbonPath	• More fully produced wells • Minimal methane leakage • No production history available • No or inadequate P&A
BCarbon	• Recently Abandoned • Production history available • "Medium"-sized wells
Open Carbon Protocol	• "Less" produced wells with significant methane leakage potential • Less/no production history

Standards in New/Updated Orphan Methodologies

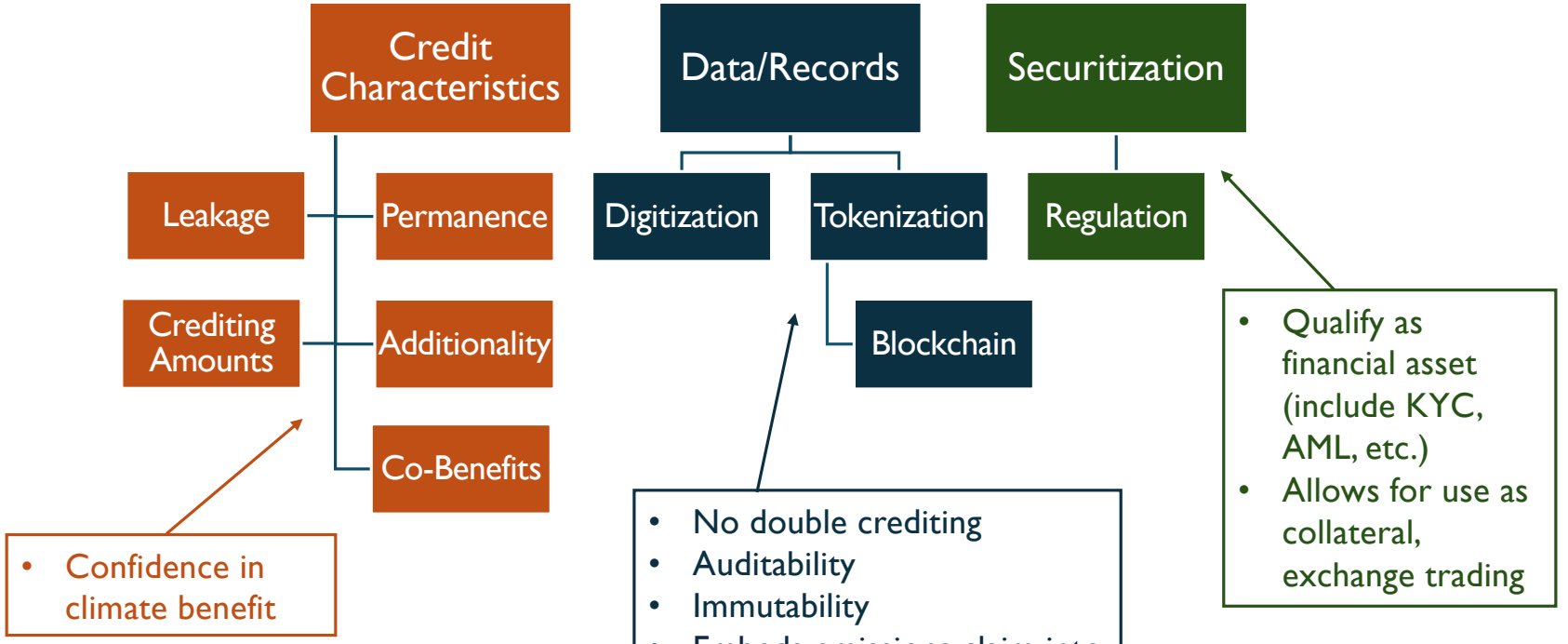
- Eligibility
  - Stability testing (flow and pressure)
- Volume estimation/crediting
  - Decline rates
    - Already in BCarbon (decline curve analysis)
  - Hard ceiling (BCarbon)
- Faulty plugging job
  - Larger holdbacks
    - Alternative is to carry well integrity insurance
- Leakage (to other wells)
  - Buffer (If can't establish other wells are outside required setback distance)

Open Carbon Protocol's "Boilerplate" Terminal Decline Rates

Emissions Rate (Mcf/d)	Annual Decline Rate
<10	4.9%
10-30	5.8%
30-100	6.4%
>100	7.3%

Source: Open Carbon Protocol

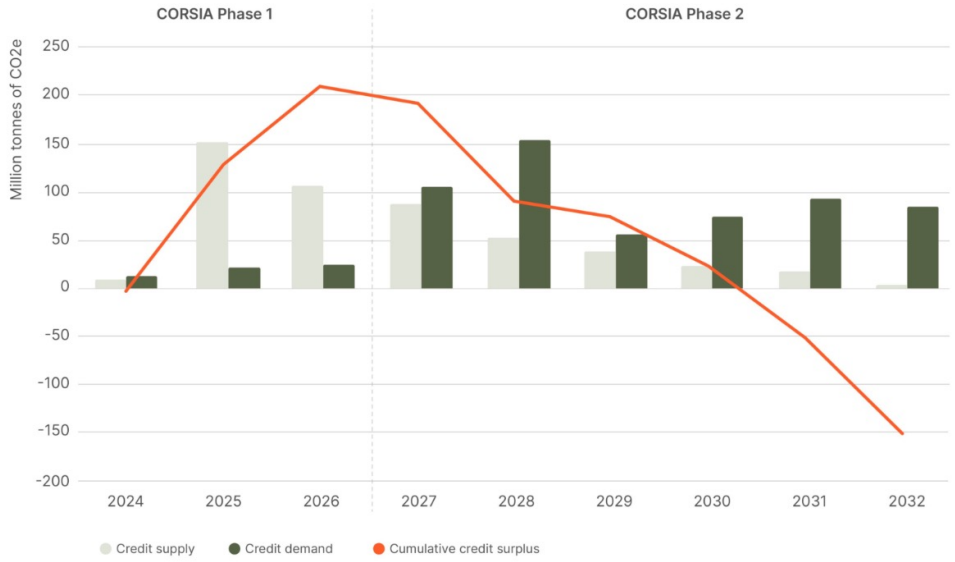
Credit Integrity Must Come In Three Ways



Growing the Buyer Base

International

CORSIA Supply, Demand and Cumulative Inventory, 2024-2035e



Source Abatable

U.S. States

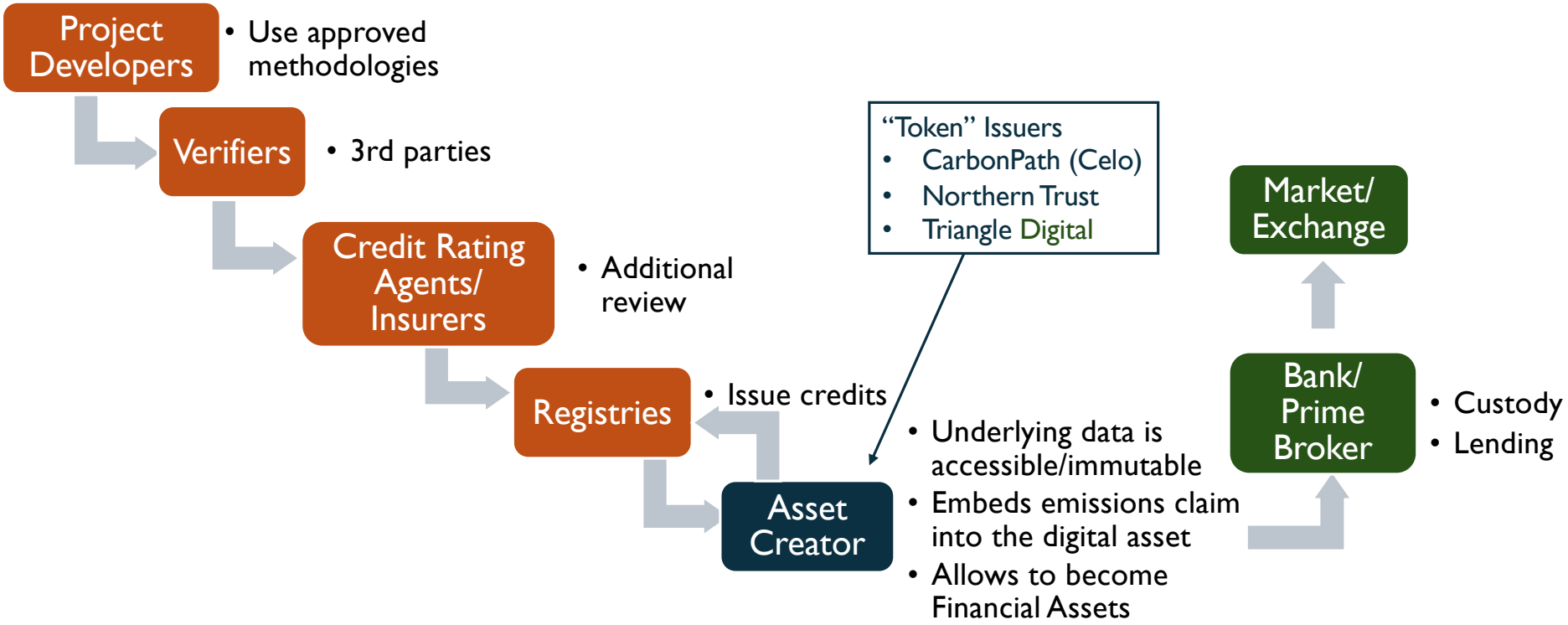
- U.S. DoI removed prohibition on states using carbon credits to offset costs to plug orphans while using Federal (IIJA) funds
- States actively soliciting ideas to lower out-of-pocket expenses of plugging orphans
  - States have different rules in place regarding use of carbon offsets
  - Standard setters will have to sort out additionality

Appendix

Orphaned & Abandoned Public Methodologies

Standard Setter	Well Type	Max Crediting Pd. (yrs.)	Qualifying Conditions	Volume Determination	When Issue	GWP Basis (Yrs.)	Buffer	Deduct Project Emissions?
BCarbon	Orphaned and Abandoned	20	• No prod. for last 3 months • 42 mos. prod. history	• Decline Curve Analysis • Leak Probability • Capped	80% upon P&A; 20% >12 mos. with successful test	20	5% (plug failure)	Y
CarbonPath	Orphaned and Abandoned	50		• Measurement or Default • Volume flat through Crediting Period	100% upon P&A	100	None	N
Open Carbon Protocol	Orphaned	20	• Flow and pressure stability in test (larger requires longer)	• Measurement • Volume declines through Crediting Period	(70% - holdback) upon P&A; balance >12 mos. with successful test	100	5% (leakage)	Y

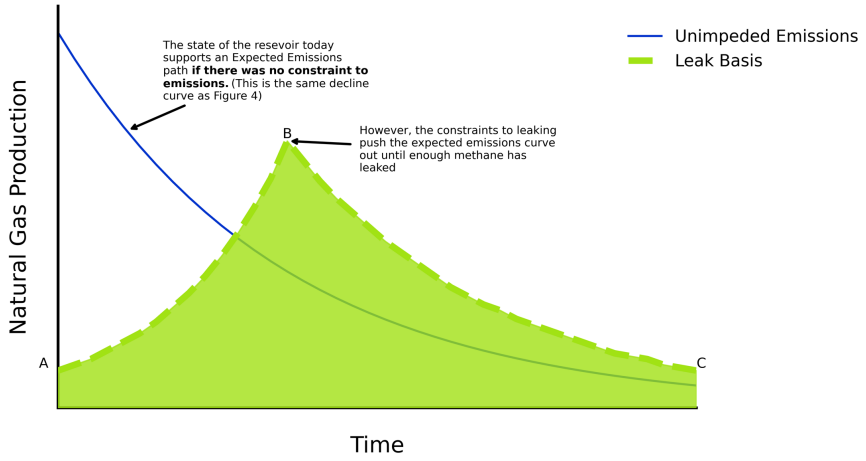
Evolving the Carbon Market Ecosystem



Other Elements to Consider

- Clarifying rights to/ownership of the credits
- Reflecting when the well would (likely) have leaked
  - Assessment of capping hardware condition
  - Capture a "time value"/risked element
- Credits not all issued up front
  - The only "real" value would be to ensure additionality
  - Perception value
- Plugging standards

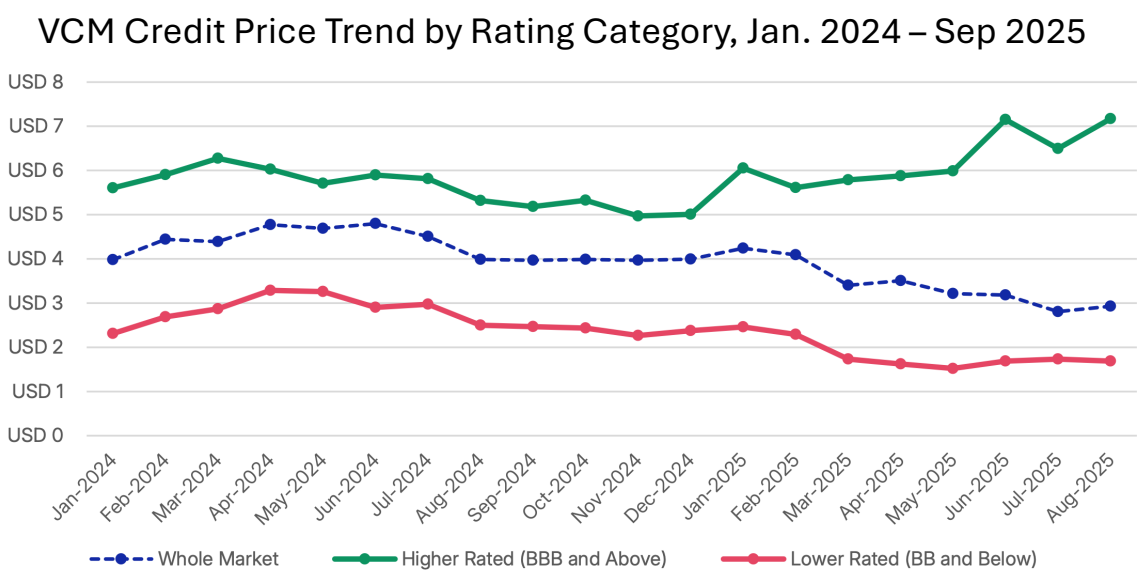
Potential Emissions Profile of Orphan Well



Source: Payne Institute

VCM and O&A Crediting Status

- VCM (retirements):
  - 98MM in 1H25, up 7.5% yoy
  - Ave. price down ~20% to $3.30/ton
  - Quality premium expands
  - Non-CO2 gases ~2x
- O&A Wells:
  - Issued: 28 projects, 7.5MM credits
  - Retired: 880K credits (includes some "self" retirements)



Source for data and chart: MSCI and Payne Institute (from ACR, BCarbon and CarbonPath registry data)

Buyer Feedback

- Business model shouldn't exist
  - The industry should be regulated or oil & gas industry should handle
- Up-front crediting; allows for uncertainty regarding:
  - Volume
  - Permanence
- ACR taking their methodology off-line raised warning flags
  - Only small standard setters active currently
- Manure management and landfill gas credits are ~1/2 the price

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