

Overview of the market for CO₂ in the Williston Basin for EOR

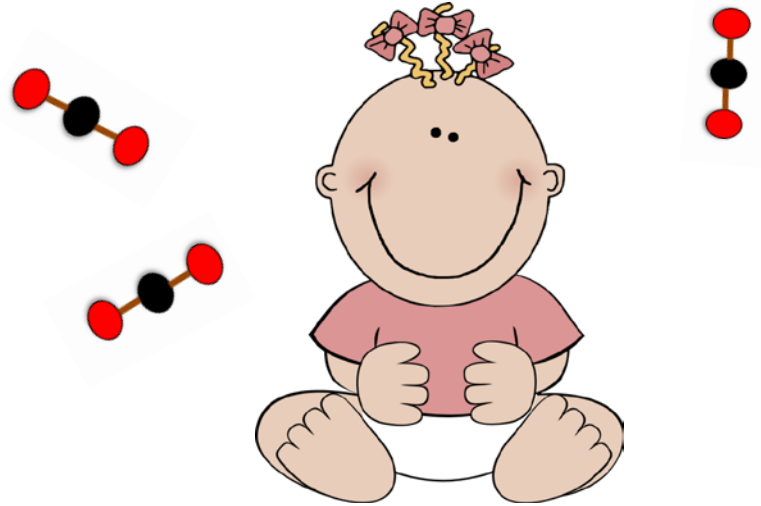
2017 Williston Basin Petroleum Conference
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Jim Linnell, Manager, Fuel Business & Commercial Products

David Hanly, Consultant, Strategic Corporate Development



Little Billion Dollar Baby



40+ million tonnes of CO₂ → 240 Millions of barrels of oil → Billions of \$ in oil revenue

Williston Basin

Cenovus at Weyburn field, SK

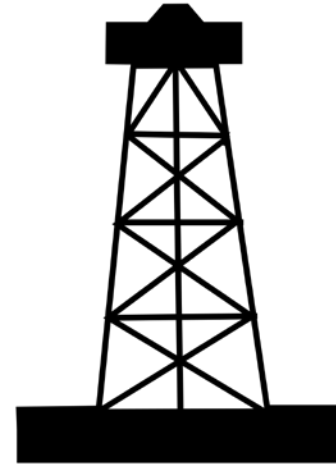
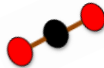
Started in late 2000

In 2010, 2.4 Mt of new CO₂ and 2.4 Mt of recycled CO₂ → 6.6 million barrels of oil

Apache at Midale field, SK

Started in 2005

In 2010, 0.5 Mt of new CO₂ and 0.1 Mt of recycled CO₂ → 1 million barrels of oil



Expected to produce for over 30 years!

CO₂ supply



Dakota Gasification, Beulah, ND

- in 2010, captured nearly 3 Mt/yr
- capable of capturing 5 Mt/yr
- pipeline to Canada can deliver 3 Mt/yr, pipeline in North Dakota to Tioga has capacity of 5 Mt/yr

SaskPower's Boundary Dam Unit 3, Estevan, SK

- captured 0.8 Mt/yr in 2016



Capture tower at
Unit 3



Opportunity to Grow

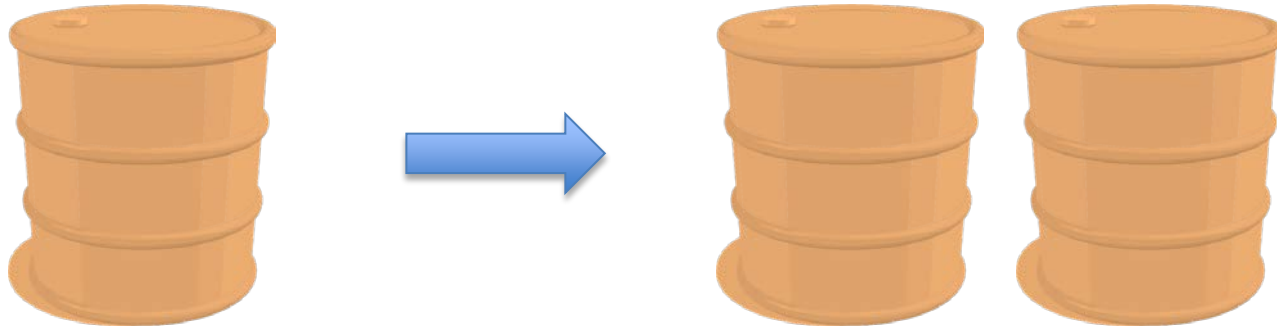
Conventional Oil

Canada – up to 5 Mt/yr of CO₂ →
15.5 million barrels of oil/yr.

USA – up to 3 Mt/yr of CO₂ →
9.5 million barrels of oil/yr.



Bakken Needs EOR



U.S. Williston – 6.5 Mt/yr of CO₂ → 22 million barrels of oil/yr.

Canadian Williston – 2.4 Mt/yr of CO₂ → 7.2 million barrels of oil/yr.



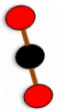
Residual Oil Zone (ROZ)



- Nature's waterflood – below main production zone
- CO₂ used for ROZ production in other basins

Speculative technical potential in Williston Basin

Up to 43 Mt/yr of CO₂ → 110 million barrels of oil/yr.



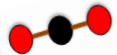
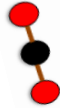
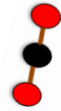
Many sources of CO₂

Saskatchewan: Coal units – 11 Mt/yr.

North Dakota: Coal units – 25 Mt/yr and
Dakota Gasification – 5 Mt/yr

Montana: Colstrip coal station – 14 Mt/yr
Pipeline expansion from Wyoming – 8+ Mt/yr

Total potential supply - 63 Mt/yr.



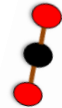
What's next?

Research and test CO₂ EOR

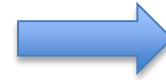
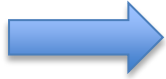
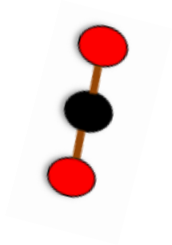
- Bakken - models show promise, limited field trials (need knowledge)
- ROZ - define pools, pilot studies

Partnership

- negotiation with CO₂ suppliers such as SaskPower
- co-operation among oil producers, bigger is better



The Prize



40 million
tonnes/yr

110 million
barrels/yr

\$7.5 billion/yr