North Dakota CO_2-EOR Financial Analysis

November 15, 2024

Summary

The following document explores and evaluates various financial considerations related to CO2-EOR in North Dakota, potential synergies across multiple energy-sectors, and the influence policy will have on future CO2-based tertiary efforts in the state.

The U.S. Geological Survey estimates that up to 3.3 billion barrels of undiscovered, technically recoverable oil are in the Bakken formation, with much of that oil in North Dakota. CO2-EOR can play a central role in the recovery of these untapped resources.

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Introduction

Enhanced oil recovery (EOR) development in North Dakota utilizing CO_2, particularly from CO_2 feedstocks sourced from in-state coal conversion facilities, biofuel plants and synfuels production, represents a significant economic opportunity.

Supporting and further enhancing an already favorable economic and regulatory environment to encourage CO_2-EOR versus CO_2 sequestration and permanent, geologic storage, will require evaluating both existing and new policy offerings to mitigate the current $25 differential between two of the three primary 45Q tax credit incentives currently available.

These incentives and economics on the surface favor sequestration over enhanced oil recovery. However, state policy from both a tax and regulatory perspective at least in part, holds the potential to offset the monetary gap and positively influence adoption of CO_2-EOR within our borders, promoting new, long-term capital investment in North Dakota.

From an industry perspective, beyond production-related economics, CO_2-EOR can play a key role in addressing and meeting corporate sustainability objectives, serving as a valuable extension of existing ecocentric practices.

Both internal and external factors will invariably influence CO_2 usage patterns. They include commodity pricing, other investment and capital deployment opportunities, and the regulatory and tax policy environment at the federal, state and local levels.

Further, recognizing the importance of fostering an environment that supports effective public-private partnerships and working collaboratively with tribal interests, is essential.

Arguably, CO_2-EOR in conjunction with existing energy resources in the state signifies the next chapter of oil production in North Dakota. For industry and public sector alike, there exists the potential to further monetize current oil, lignite, and biofuel energy infrastructure.

As North Dakota evaluates a path forward, it is important to recognize other oil and gas producing states including Texas, Oklahoma, New Mexico, and in proximity to North Dakota, Wyoming, are also actively positioning and competing to attract the same CO_2 supplies and capital investment dollars necessary to advance CO_2-EOR projects within their respective geographies.

To counter that reality, new incentive opportunities from a tax policy perspective to complement existing mechanisms and encourage CO_2-EOR and supporting infrastructure development, may be required to attract in-state capital investment for conventional and unconventional oil production alike, where CO_2-EOR is deemed economically viable and applied.

Further, supporting the development of critical CO_2 transportation infrastructure necessary to move feedstock from point-of-capture to application in North Dakota oil fields, will also play an important role in advancing CO_2-EOR efforts in the state.

The ability to establish greater CO_2 supply assurances necessary for industry to justify capital investment within and outside the Bakken, will be an essential element in the level of success experienced. Potential in-state supplies of CO_2 are optimal in the sense they support multiple industrial energy segments including oil, lignite, and agriculture, each playing an important role in the state's economy.

In essence, state regulatory and tax policy as previously mentioned will play a key role in advancing CO_2-EOR in what can best be described as a rapidly developing and highly competitive landscape.

It is important to emphasis that the benefits of CO_2-EOR are not exclusive to the production of oil. North Dakota's fleet of coal-fired plants in proximity to the Bakken and lone synfuels plant, Dakota Gasification, are also strategically positioned to benefit from the application of CO_2-EOR as suppliers and sellers of CO_2. That in turn supports the advancement of carbon capture technology and ultimately, implementation of CO_2-EOR.

North Dakota, with its diverse energy resource portfolio, is arguably more strategically positioned to implement CO_2-EOR in comparison to other oil-producing states, again in large part due to proximity and volume of interrelated energy resources.

While CO_2 transport challenges from an infrastructure placement standpoint currently exist, the ability to move feedstock from point-of-capture to actual use, while not entirely removed, is arguably less pronounced due to the relatively short distance between in-state supplies of CO_2 and oil field application.

North Dakota is in a unique position in that it also has very favorable geology for the sequestration and permanent storage of CO_2. Still, an equally compelling if not stronger argument to support CO_2-EOR can be made, the latter providing a broader and in effect, more favorable long-term economic platform to support incremental production in the Bakken. That in turn provides an attractive return on investment not only in the state, but nation from an energy production and security perspective.

Ultimately, the potential to sustain and increase oil production in North Dakota and subsequently, support and bolster associated revenue collections resulting from carbon capture and EOR, is significant. However, for that to become a reality, it is essential that the economic potential of CO_2-EOR exceeds sequestration.

Conversely, the opportunity cost and loss in potential revenue if sequestration instead displaces CO_2-EOR, particularly in oil-producing states like North Dakota, cannot be overlooked as the following analysis explains.

CO_2 EOR Incentives and Infrastructure by State

As previously noted, effectively competing for investment dollars targeted for carbon capture and transportation, whether from existing industry reserves or venture capital groups, will be paramount in determining the level of success experienced in North Dakota.

In many respects, North Dakota already heavily incentivizes utilizing CO_2 for EOR development. Numerous tax incentives currently exist to support CO_2-EOR, including as specified in NDCC § 57-51.1-02:

- Incremental production from a qualifying tertiary recovery project is exempt for a period of 10 years.
- Incremental production from a qualifying tertiary recovery project located outside the Bakken or Three Forks formations and that injects more than fifty percent carbon dioxide produced from coal, is exempt for twenty years from the date incremental production begins.
- Incremental production from a qualifying tertiary recovery project located within the Bakken or Three Forks formations and that injects more than fifty percent carbon dioxide produced from coal, is exempt for ten years from the date incremental production begins.

Beyond CO_2-EOR incentives, North Dakota exempts low-producing or marginal wells from the oil extraction tax. These wells, often referred to as "stripper wells," can qualify for tax-reduction incentives based on production and location criteria and then be exempt from the state's oil extraction tax for the remaining life of the well, once designated as a stripper well by the North Dakota Industrial Commission. While not necessarily a direct CO_2-EOR incentive, the net effect is still the same through elimination of the extraction tax obligation.

Additionally in North Dakota, the oil extraction tax rate for restimulated wells, identified as previously completed and producing oil and subsequently treated with an application of fluid under pressure for the purpose of creating additional fractures in a targeted geological formation outside the Bakken and Three Forks formations, is reduced from 5% to 2%,

effective for the first 75,000 barrels (bbl) or 18 months, whichever occurs first, after restimulation is complete.

To encourage carbon capture projects and development of infrastructure to support EOR, state policy provides a sales and use tax exemption for materials used in compressing, gathering, collecting, storing, transporting, or injecting carbon dioxide for secure geological storage or use in enhanced recovery of oil or natural gas (NDCC § 57-39.2-04.14) The incentive is broad-based in nature, applying not only to primary pipeline transportation projects but oilfield distribution networks as well.

For projects to be exempt under NDCC § 57-39.2-04.14, tangible personal property must be incorporated into a system used to compress, gather, collect, store, transport, or inject carbon dioxide for secure geologic storage or use in enhanced recovery of oil or natural gas.

Tangible personal property to replace an existing system to compress, gather, collect, store, transport, or inject carbon dioxide for secure geologic storage or use in enhanced recovery of oil or natural gas qualifies as sales tax exempt if the replacement creates an expansion of the original system.

Additionally, a CO_2 pipeline project exemption as specified in NDCC § 57-06-17.1, exempts property, not including land, from taxation during construction and for the first 10 full taxable years following initial operation. Associated equipment necessary for the transportation or storage of CO_2 for secure geological storage or for use in enhanced recovery of oil or natural gas, is also exempt.

Finally, under NDCC § 57-39.2-04.49, Gross receipts from sales of carbon dioxide used for enhanced recovery of oil or natural gas, or secure geologic storage, are exempt from sales tax.

Similarly, other oil-producing states in the U.S. are also aggressively positioning and engaging in policy discussions to incentivize CO_2-EOR within their borders and capture market share.

Virtually all oil producing states in the U.S. currently have mechanisms in place to address low-price cycles for crude oil, similar to previous North Dakota statute which established a low-price trigger and subsequent suspension of the oil extraction tax during market downturns to protect oil producers in the state. While the low-price trigger protection was repealed by North Dakota lawmakers in exchange for a permanent reduction in the extraction tax rate, from 6% to 5%, that same concept is still applicable in other states.

In Texas, the Texas Railroad Commission, the counterpart to North Dakota Public Service Commission, has the authority to incentivize CO_2-EOR projects. Under their current incentive, the producer of oil recovered through a CO_2-EOR project that qualifies, is entitled to an additional 50% reduction in the oil tax rate in Texas if in the recovery of the oil the EOR project uses CO_2 that:

- Is captured from an anthropogenic source in this state;
- Would otherwise be released into the atmosphere as industrial emissions;
- Is measurable at the source of capture; and
- Is sequestered in one or more geological formations as part of the enhanced oil recovery process

Other states, like Wyoming, continue to actively pursue new legislation to support CO_2-EOR development, to effectively compete for regional supplies of CO_2.

In some cases, CO_2 transportation infrastructure designated for CO_2-EOR is already operational, including the Kinder Morgan Cortez Pipeline, delivering approximately 800 million cubic feet or 22,654 metric tonnes of naturally occurring CO_2 daily from the McElmo Dome site in southwest Colorado to oil fields in the Permian Basin in New Mexico and West Texas. Incremental oil production attributed to that project is approximately 50,000 barrels per day (bbl/d).

Active CO_2-EOR projects in North Dakota include the Denbury CO_2 pipeline, stretching 105 miles from Wyoming to Southeast Montana and Southwest North Dakota, targeting the Cedar Creek Anticline.

Additionally, Dakota Gasification Company, a subsidiary of Basin Electric Power Cooperative, has been transporting CO_2 since October 2000 from the Great Plains Synfuels Plant through a 205-mile pipeline operated by Souris Valley Pipeline, Ltd. to the Weyburn-Midale oil fields in Canada, currently shipping up to 155 million cubic feet, or 4,389 tonnes of CO_2 daily for EOR.

In 2022, Red Trail Energy located outside of Richardton began operating North Dakota's first CO_2 storage well in June of 2022. Preceding that effort, test wells were drilled in Mercer and Oliver counties located in North Dakota, in 2018 to study the geologic potential for CO_2 sequestration sourced from North Dakota coal-conversion facilities.

While CO_2-EOR production accounts for only a small fraction of oil currently produced in the U.S. and even globally, new CO_2-EOR policy and projects as previously mentioned continue to be actively explored both in North Dakota and throughout the U.S.

While advancements in carbon capture technology and associated capital investment are rightfully at the forefront of the discussion, the ability to secure, transport and distribute economically viable volumes of CO_2 necessary to support large-scale CO_2-EOR is equally important, particularly from a North Dakota perspective given the opportunity to link multiple energy industry segments to one another.

In summary, North Dakota energy resources and current policy, will serve as a benchmark for future discussions supporting the advancement and application of CO_2-EOR in the state.

Economic Analysis – Current Oil and Gas Collections

Economic estimates are often constructed from a direct or linear, incremental gains' perspective, with limited focus placed on opportunity cost. In evaluating the application and potential economic benefit of CO_2-EOR in North Dakota, it not only has the potential to provide incremental benefits to the state as referenced, but equally important, help preserve existing production levels and associated revenue streams.

That latter aspect or preservation will be particularly evident during periods of oil price declines, whether cyclical or due to unanticipated market conditions, unfavorable supply and demand dynamics, or consequential geopolitical events.

The North Dakota Legislature, recognizing the finite nature of oil resources in the state, has established various reserve funds, most notably the Legacy Fund, intended to benefit future generations by protecting revenue streams should production levels drop below the current range.

Until that time, however, oil production and associated revenue collections in the state can be better optimized through strategic initiatives intended to improve recovery rates in western North Dakota, including CO_2-EOR.

As an energy producing state, North Dakota relies heavily on oil-related revenue to fund state and local government both within and beyond oil producing counties. Oil production and extraction tax collections alone are substantial, most recently exceeding $3 billion in FY2023 and FY2024 respectively, as illustrated in Figure 1. Beyond those collections, associated economic activity plays a vital role in supporting the state's economy, covered later in this document.

As shown on the following graph, oil revenue collections in aggregate over just the past decade, equate to $23 billion.

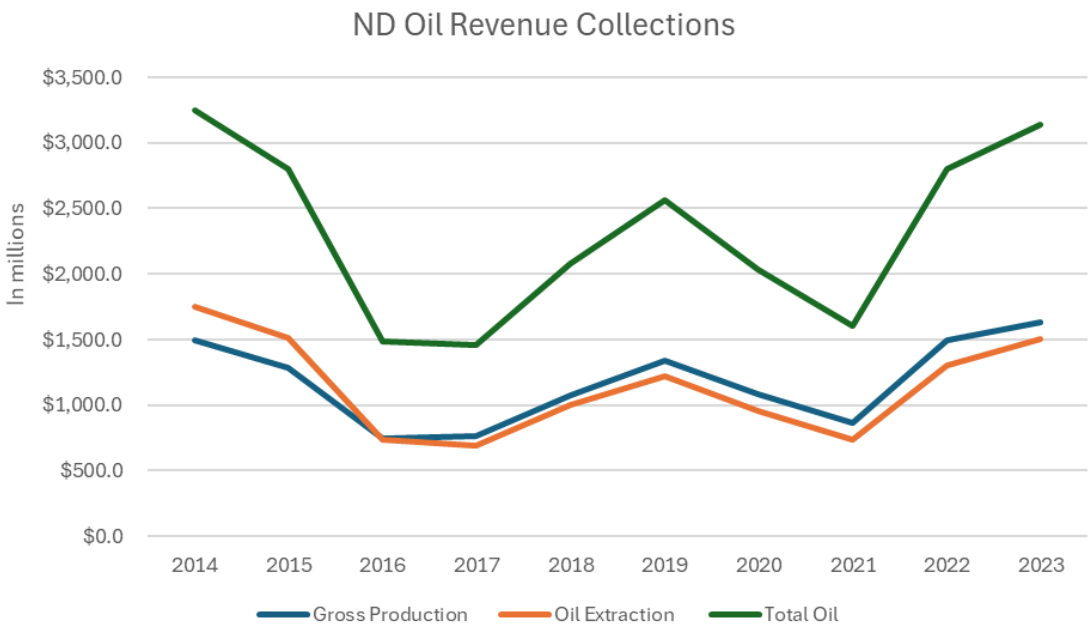

Figure 1

Figure 1 underscores the financial significance associated with oil production in North Dakota and illustrates the impact cyclical pricing, particularly price spikes and declines at various times (Figure 2), predictably has on revenue collections. This is most pronounced during the 2016-2017, 2020 and 2022 timeframes.

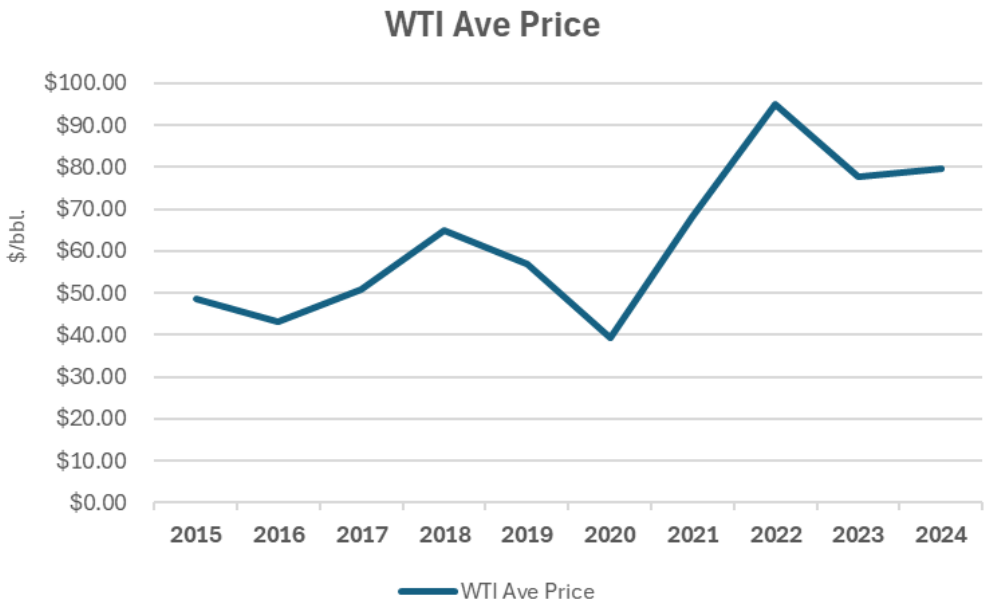

Figure 2

As noted, CO_2-EOR efforts have the potential to increase revenue collections, but equally importantly, preserve existing revenue streams by mitigating market-influenced price declines that inhibit drilling activity and subsequently, negatively impact production.

Historically, the ability to increase or maintain oil production levels in North Dakota has predominately correlated to drilling activity and the introduction of new wells. Absent that, output predictably declines due to high depletion rates experienced by wells drilled in shale plays like the Bakken, often exceeding 50% during the first year of production and falling below 10% of initial production, within 5 to 7 years.

Figure 3 illustrates shifts in economic value or revenue collected from a production and extraction tax standpoint, between 2014 and 2023, for every 100,000 bbl produced. The economic impact shown underscores the importance of maintaining production, particularly when oil prices are depressed over prolonged periods of time.

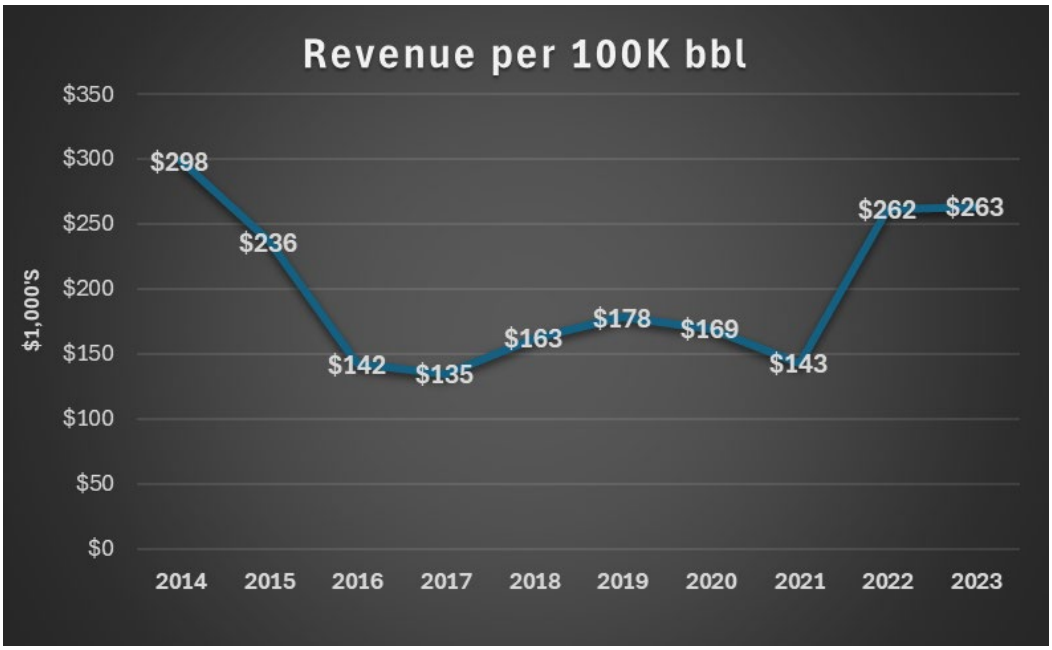

Figure 3

CO_2-EOR Fiscal Impact

Future commodity pricing combined with input costs including the cost of CO_2 itself, will significantly influence the degree of opportunity producers have to pursue CO_2-EOR. Unlocking additional crude oil from existing wells in inventory, reflected in the CO_2-EOR single well revenue models shown in Tables 2-5 to follow, demonstrate the revenue potential to the state, primarily from oil production tax collected on incremental barrels produced, based on different incentive scenarios including:

- 5-year extraction tax exempt models
- 10-year extraction tax exempt models

Models are formulated using the same, single well production estimates over the first 10 years following initiation of CO_2-EOR. Twenty-year and low producing, or stripper well models, are not calculated due to relatively immaterial, residual oil output and respective collections beyond the 10-year mark, resulting from rapid depletion rates associated with and prevalent in shale plays.

The following calculations (Tables 2-5) are based on oil pricing estimates over both 5-year and 10-year timeframes, using the U.S. Energy Information Administration (EIA) price outlook for Brent Crude as of June 2024 (Table 1) for the years 2028-2037 and for comparative purposes, applying an average net price of $80.00/bbl for Bakken crude.

U.S EIA Price Estimates/bbl – June 2024

Year range	Brent crude price projections (ave.)*	WTI after discount to Brent (3%)	Bakken discount to WTI ($3.75-$2.65)	Net price to Bakken producers
2025-2029	$61.00	$59.17	$3.20	$55.97
2030-2034	$73.00	$70.81	$3.20	$67.61
2035-2039	$80.00	$77.60	$3.20	$74.40
2040-2044	$87.00	$84.39	$3.20	$81.19
2045-2049	$91.00	$88.27	$3.20	$85.07
2050	$95.00	$92.15	$3.20	$88.95

Table 1

Net prices reflected in Table 1 and received by Bakken producers are extrapolated from EIA Brent price projections, applying a 3% discount to approximate the price for West Texas Intermediate and assuming an additional average discount rate of $3.20/bbl for Bakken crude, to determine net price.

Single Well CO_2-EOR – 10 yr. extraction tax exempt

Based on EIA 2028-2037 Price Estimates (Table 1)

	Total Annual Production bbl	Legacy Production bbl	Incremental Production bbl	Ave. price Bakken Crude	Incremental Production Tax Revenue	Incremental Extraction Tax Revenue	Total Incremental Revenue
yr 1	71,781	9,211	62,570	$55.97	$175,102	$0	$175,102
yr 2	45,192	7,375	37,817	$55.97	$105,831	$0	$105,831
yr 3	33,222	5,905	27,317	$67.61	$92,345	$0	$92,345
yr 4	20,043	4,728	15,315	$67.61	$51,772	$0	$51,772
yr 5	12,911	3,785	9,126	$67.61	$30,850	$0	$30,850
yr 6	8,719	3,030	5,689	$67.61	$19,232	$0	$19,232
yr 7	6,016	2,426	3,590	$67.61	$12,136	$0	$12,136
yr 8	4,148	1,943	2,205	$74.40	$8,203	$0	$8,203
yr 9	3,010	1,555	1,455	$74.40	$5,413	$0	$5,413
yr 10	1,732	1,392	340	$74.40	$1,265	$0	$1,265
Total	**206,774**	**41,350**	**165,424**		**$502,149**	**$0**	**$502,149**

Table 2

Single Well CO_2-EOR - 10-yr. extraction tax exempt

Based on 10 yr. average price of $80

	Legacy Production bbl	Incremental Production bbl	Total Annual Production bbl	Ave. price Bakken Crude	Incremental Production Tax Revenue	Incremental Extraction Tax Revenue	Total Incremental Revenue
yr 1	9,211	62,570	71,781	$80.00	$250,280	$0	$250,280
yr 2	7,375	37,817	45,192	$80.00	$151,268	$0	$151,268
yr 3	5,905	27,317	33,222	$80.00	$109,268	$0	$109,268
yr 4	4,728	15,315	20,043	$80.00	$61,260	$0	$61,260
yr 5	3,785	9,126	12,911	$80.00	$36,504	$0	$36,504
yr 6	3,030	5,689	8,719	$80.00	$22,756	$0	$22,756
yr 7	2,426	3,590	6,016	$80.00	$14,360	$0	$14,360
yr 8	1,943	2,205	4,148	$80.00	$8,820	$0	$8,820
yr 9	1,555	1,455	3,010	$80.00	$5,820	$0	$5,820
yr 10	1,392	340	1,732	$80.00	$1,360	$0	$1,360
Total	**41,350**	**165,424**	**206,774**		**$661,696**	**$0**	**$661,696**

Table 3

Single Well – CO_2-EOR – 5 yr. extraction tax exempt

Based on EIA 2028-2037 Price Estimates (Table 1)

	Total Annual Production bbl	Legacy Production bbl	Incremental Production bbl	Ave. price Bakken Crude	Incremental Production Tax Revenue	Incremental Extraction Tax Revenue	Total Incremental Revenue
yr 1	71,781	9,211	62,570	$55.97	$175,102	$0	$175,102
yr 2	45,192	7,375	37,817	$55.97	$105,831	$0	$105,831
yr 3	33,222	5,905	27,317	$67.61	$92,345	$0	$92,345
yr 4	20,043	4,728	15,315	$67.61	$51,772	$0	$51,772
yr 5	12,911	3,785	9,126	$67.61	$30,850	$0	$30,850
yr 6	8,719	3,030	5,689	$67.61	$19,232	$19,232	$38,463
yr 7	6,016	2,426	3,590	$67.61	$12,136	$12,136	$24,272
yr 8	4,148	1,943	2,205	$74.40	$8,203	$8,203	$16,405
yr 9	3,010	1,555	1,455	$74.40	$5,413	$5,413	$10,825
yr 10	1,732	1,392	340	$74.40	$1,265	$1,265	$2,530
Total	**206,774**	**41,350**	**165,424**		**$502,149**	**$46,248**	**$548,396**

Table 4

Single Well CO_2-EOR– 5-yr. extraction tax exempt

Based on 10 yr. average price of $80.00

	Total Annual Production bbl	Legacy Production bbl	Incremental Production bbl	Ave. price Bakken Crude	Incremental Production Tax Revenue	Incremental Extraction Tax Revenue	Total Incremental Revenue
yr 1	71,781	9,211	62,570	$80.00	$250,280	$0	$250,280
yr 2	45,192	7,375	37,817	$80.00	$151,268	$0	$151,268
yr 3	33,222	5,905	27,317	$80.00	$109,268	$0	$109,268
yr 4	20,043	4,728	15,315	$80.00	$61,260	$0	$61,260
yr 5	12,911	3,785	9,126	$80.00	$36,504	$0	$36,504
yr 6	8,719	3,030	5,689	$80.00	$22,756	$22,756	$45,512
yr 7	6,016	2,426	3,590	$80.00	$14,360	$14,360	$28,720
yr 8	4,148	1,943	2,205	$80.00	$8,820	$8,820	$17,640
yr 9	3,010	1,555	1,455	$80.00	$5,820	$5,820	$11,640
yr 10	1,732	1,392	340	$80.00	$1,360	$1,360	$2,720
Total	**206,774**	**41,350**	**165,424**		**$661,696**	**$53,116**	**$714,812**

Table 5

Using the single well production model provided by the Energy & Environmental Research Center (EERC) North Dakota 20-year CO_2-EOR Forecast, incremental tax revenues generated on a per well basis range from $502,149 to $714,812 (Table 6) over the initial 10-year period of production following commencement of CO_2-EOR, depending on various pricing scenarios for crude oil.

Single Well CO_2-EOR - Revenue Model Comparisons

Single Well Revenue Model	Incremental Production Tax Revenue	Incremental Extraction Tax Revenue	Total - Single Well
EOR 10-year model - EIA Pricing	$502,149	$0	$502,149
EOR 10-year model - $80.00 WTI	$661,696	$0	$661,696
EOR 5-year model - EIA Pricing	$502,149	$46,248	$548,396
EOR 5-year model - $80.00 WTI	$661,696	$53,116	$714,812

Table 6

Applying the single well model to the estimated 271 grids and 5,744 associated EOR wells targeted in the EERC study, under the high-case scenario and current stripper well count in North Dakota as of July 2024 (12,515), in conjunction with EIA price estimates for Brent crude as illustrated in Tables 2 and 4 and average price of $80/bbl (Tables 3 and 5), generates approximately $2.9 to $9 billion in incremental revenue (Table 7) to the state, alone.

It's worth noting that high-end estimates exceed the available supply of CO_2 required to achieve production estimates, but nonetheless demonstrate the economic potential of CO_2-EOR from an incremental oil production and associated tax revenue perspective.

Overall CO_2-EOR Incremental Revenue Model - North Dakota

Single Well Revenue Model	Total - 5,744 Wells	Total - 12,515 Wells* (*Stripper Well Count - 7-24)
EOR 10-year model - EIA Pricing	$2,884,341,547	$6,284,389,704
EOR 10-year model - $80.00 WTI	$3,800,781,824	$8,281,125,440
EOR 5-year model - EIA Pricing	$3,149,988,103	$6,863,179,163
EOR 5-year model - $80.00 WTI	$4,105,880,128	$8,945,872,180

Table 7

As indicated, if every certified, low-producing or stripper well currently identified in North Dakota is targeted for CO_2-EOR, the economic benefit is significantly higher in comparison to the low estimate, even with low-producing wells in the state being exempted from extraction tax for the life of the well under current statute. Conversely, the opportunity cost or potential revenue loss absent CO_2-EOR as demonstrated, equates to billions of dollars in unrealized collections.

Associated Fiscal Impact – Oil Producing Counties in North Dakota

Beyond direct benefits resulting from incremental oil production, associated economic impacts for CO_2-EOR extend exponentially beyond revenues generated from production and oil extraction tax levied on oil produced in North Dakota.

Target energy sectors including oil and coal, support state and local economies through employment opportunities, sales and use tax collections, property tax or equivalent of, and a plethora of other economic benefits.

Over the most recent five-year period roughly $10 billion in purchases, with associated state sales tax collections totaling approximately $500 million, can be attributed to oil-induced economic activity in the state's four largest oil and gas producing counties comprised of McKenzie, Dunn, Mountrail and Williams.

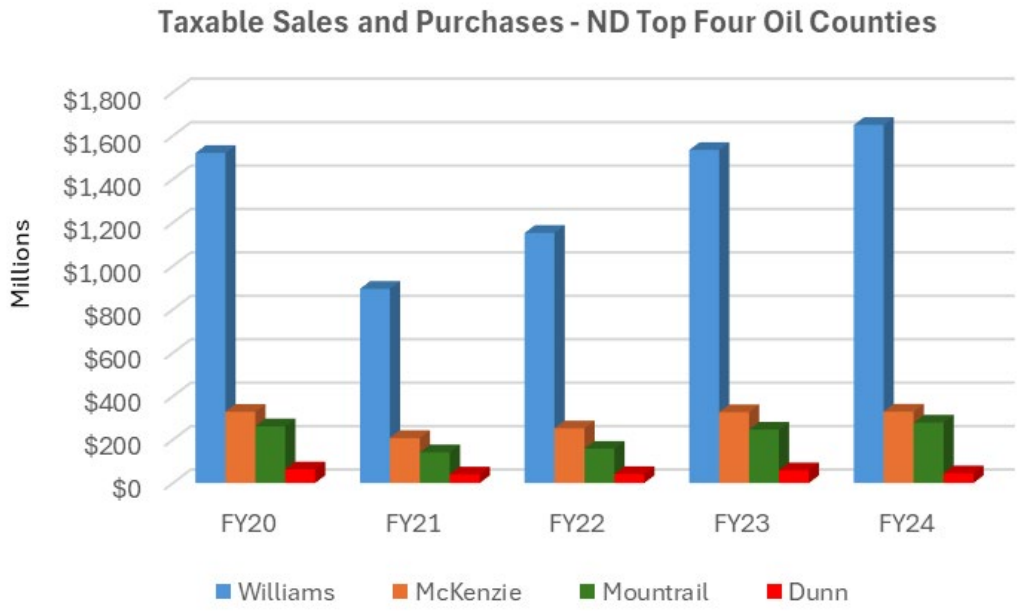

Figure 4

As shown in Figure 4, Williams County, including the city of Williston, continues to be an economic powerhouse in the region with approximately $7 billion in taxable purchases taking place over the past five fiscal years (FY20-FY24). While seemingly overshadowed by their larger economic cousin, the counties of McKenzie, Mountrail and Dunn combined still represent significant economic activity, approaching $3 billion in taxable sales and purchases over the same timeframe.

In addition to the 5% state sales and use tax rate, both cities and counties can levy and collect local sales and use tax in addition to the state requirement, with funds collected channeling directly back to the respective political subdivision.

While rates vary depending on location, the additional local options tax on qualifying purchases yields incremental collections equal to approximately one-third of the amount collected by the state, or $160-$170 million during the same 5-year period.

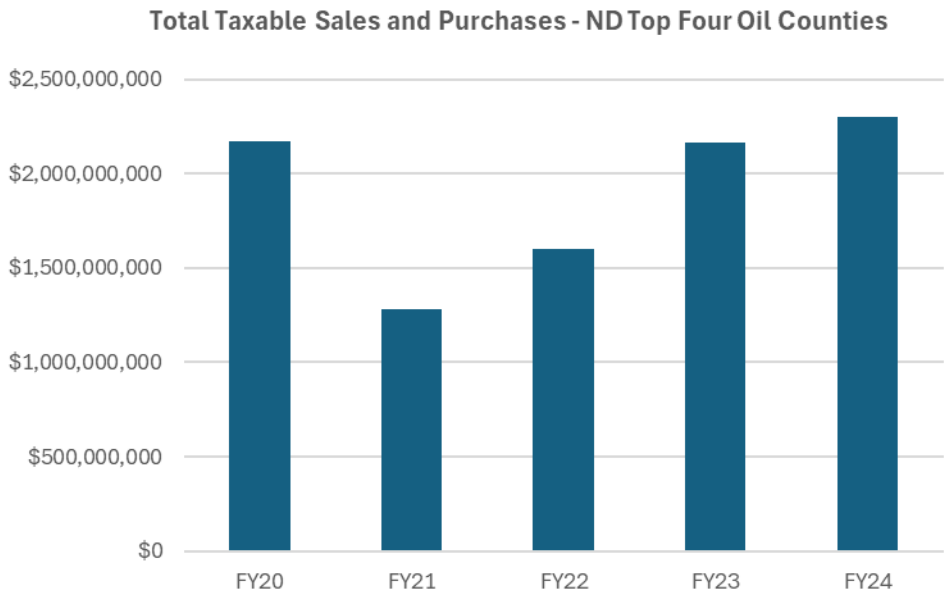

Figure 5

In aggregate, economic activity for North Dakota's four largest oil producing counties (Figures 4 and 5) is significant, despite challenges within the reflected period due to the effects of the pandemic, negatively impacting purchasing activity in FY20, FY21 and FY22.

While the agriculture sector throughout the state including in northwestern North Dakota continues to serve as the foundation of the state's economy, a predominant driver of the forementioned economic activity in the referenced region is energy, or more specifically oil-related, further supporting the case to advance CO_2-EOR in North Dakota.

Addressing the 45Q Incentive Gap

Given the significant economic opportunity related to CO_2-EOR development in North Dakota, ongoing discussions to evaluate and where applicable, improve upon existing policies and incentives to accentuate their influence on pricing models, are warranted.

Gaining a better understanding of the plethora of financial considerations and decisions industry is faced with, including addressing the $25 tax credit incentive differential between CO_2-EOR and permanent sequestration, and how policy-driven incentives and offsets can reduce the 45Q delta, will also be an important part of the conversation.

Production and infrastructure costs associated with CO_2-EOR and incurred by industry should also be recognized as key points of discussion, as prominent expense categories.

Specifically, primary expense centers include CO_2 acquisition cost, associated transportation and distribution costs, and well surface costs to support effective, large-scale implementation of CO_2-EOR, each an equally important factor in determining the financial outlook for tertiary recovery projects utilizing CO_2.

The cost model estimate below (Table 8) is based on the following criteria:

- Well development and surface costs represent approximately two-thirds of total project cost
- CO_2 supply expense equaling approximately one-third of total project cost
- No additional CO_2 compression costs
- Limited cost associated with filtration systems, waste fluid injection and electricity

CO_2-EOR Production Cost Model (Single Well)

Expense/Savings Centers	Cost per bbl	Tax savings/bbl	Tax savings/tonne CO_2	Net Cost/bbl
CO_2 Transportation [1,2]	$5.00	$0	$0	$5.00
CO_2 price/bbl ($30/t = 3 bbl) [2]	$10.00	$0.50	$1.50	$9.50
Royalty payment est. (19% of $80/bbl)	$15.20	$0	$0	$15.20
Well and surface (taxable) [3]	$17.50	$0.88	$2.63	$16.63
Well and surface (non-taxable)[4]	$7.50	$0	$0	$7.50
Extraction tax savings - $80/bbl*5%	$0	$4.00	$12.00	($4.00)
Totals	**$55.20**	**$5.375**	**$16.13**	**$49.83**

Table 8

[1] Primary distribution delivery cost est. = $15/tonne
[2] Per bbl based on $30/tonne CO2 and 3:1 bbl oil/tonne CO_2
[3] Includes well, distribution infrastructure & production costs
[4] Labor cost

Numerous price projection models for CO_2 exist with some in the $10-20 per tonne range. However, like other commodities, CO_2 pricing will vary by region and be influenced by a variety of factors including transportation capacity, available supply, industry demand, and proximity to end use whether geological storage or oil fields targeted for CO_2-EOR. Based on what is anticipated to be a highly competitive landscape for CO_2 acquisition in North Dakota, a $30/tonne estimate is used and reflected in Table 8.

Compression costs as previously noted are determined to be relatively inconsequential based on the assumption that CO_2 transportation projects, i.e. pipelines required to move CO_2 from point-of-origin to oil field distribution networks and ultimately targeted wells, will be accomplished with new infrastructure placement and not through the repurposing of existing facilities, which may be pressure limited.

A high percentage of project cost impacting economic performance is expected to originate from three primary areas including well and surface costs, royalty payments, and CO_2 acquisition costs. While not absent from the equation, filtration system, waste fluid injection, and electricity costs are anticipated to be relatively limited in scope compared to overall project costs and embedded in the "well and surface" cost category.

As demonstrated, tax savings resulting from various state-supported incentives are reflected in the cost model, representing an estimated savings of $5.375 per bbl of incremental oil produced, and based on a bbl of oil produced per tonne CO_2 ratio of 3:1, $16.13 in tax-related incentives per tonne of CO_2 acquired and deployed.

While the $25 credit differential for 45Q as described is not entirely removed through available North Dakota state tax incentives, current exemptions whether direct or indirect are nevertheless material from an economic standpoint, in the sense they offset approximately 64.5%, or almost two-thirds, of the 45Q tax credit differential per tonne of CO_2.

In aggregate, the model (Table 8) equates to $889,000 in tax-related savings, on a per well basis, assuming 165,424 bbl in incremental production over the immediate 10-year period following commencement of CO_2-EOR.

From a state revenue collection perspective using the same production estimates, taxes levied on incremental oil production generate an additional $502,000 to $715,000 (Table 6) in new revenue per well through production and extraction taxes levied, funds that would otherwise not materialize.

Summary

Encouraging industry to pursue CO_2-EOR, sets the stage to further monetize North Dakota energy resources in the Bakken and southwestern portion of the state, well into the future.

From a state perspective, CO_2-EOR certainly provides a considerably greater economic return in comparison to permanent geological storage, with no incremental oil production and associated benefits. Mineral owners, shareholders, and North Dakota citizens benefit as well whether in the form of royalty payments, dividends, or tax-related collections used to fund state priorities.

Similar to the introduction of new wells in unconventional shale plays like the Bakken, CO_2-EOR can serve as a profit center and help mitigate risk for producers, particularly during an oil price downturn, if large volumes of CO_2 can be effectively secured and transported to distribution networks and targeted oil plays.

Producers, in order to justify significant upfront capital investment needed to support CO_2-EOR, will require long-term CO_2 supply contracts structured in a manner that ensures acceptable pricing, whether pricing is fixed or as a percentage of WTI, and the reliable delivery of economic viable quantities of CO_2.

Effectively addressing the 45Q incentive gap between CO_2-EOR and sequestration or permanent storage, will again require adequately incentivizing industry to pursue CO_2-EOR by:

- Funding research to advance technology
- Supporting the development of new energy infrastructure
- Maintaining a reasonable and consistent regulatory environment
- Promoting existing and exploring new CO_2-EOR tax-related policy deemed mutually beneficial to industry and state alike

As emphasized, CO_2-EOR development in states like North Dakota can assist energy producers in addressing increasingly rigid social and environmental standards, challenging federal emissions requirements and aggressive, self-identified sustainability targets.

Even though a federal carbon tax is not currently in place, discussion surrounding that topic will undoubtedly continue but even absent that, a growing number of states have either adopted or are considering cap-and-trade systems and regulations. California has a cap-and-trade program and Washington, a cap-and-invest program.

Eleven northeastern states have organized and participate in a program referred to as the Regional Greenhouse Gas Initiative (RGGI) including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia.

Under RGGI, which was established in 2005 as the first market-based regulatory program in the United States, CO_2 emissions from power plants operating in that region are capped and the regulated power plants, participate in a program to auction or trade emission allowances, with each "allowance" permitting the holder to emit one short ton (2,000 lbs.) of CO_2.

Although these programs are beyond North Dakota's borders, state-driven greenhouse gas reduction initiatives arguably pose a future challenge from a trade standpoint. Subsequently, if not effectively countered, they create long-term risk to both industry and the state's ability to continue as a major exporter of energy and agriculture products, key contributors to the North Dakota economy.

CO_2-EOR as a mechanism to permanently store CO_2 in the reservoir, does not entirely remove those concerns, but holds the potential to certainly lessen the potential impact and reduce CO_2 intensity levels across multiple energy sectors operating in North Dakota.

Despite sequestration appearing to hold an economic advantage over CO_2-EOR due to the $25 dollar tax credit differential, CO_2-EOR nonetheless presents a unique and attractive opportunity for industry to further monetize existing holdings and more effectively distribute previously established costs over new, incremental barrels produced within the same geographic footprint.

While a degree of uncertainty exists regarding the direction federal policy will take long-term and future of the 45Q tax credit program, there remains an exceptional opportunity to pursue CO_2-EOR in North Dakota, given a current construction deadline date of January 1, 2033, and subsequent 12-year timeframe in which tax credits can be received under the program.

In closing, CO_2-EOR presents a significant opportunity to monetize existing resources, create new synergies among critical energy sectors in the state, and act as a catalyst to effectively enhance and extend the life of the Bakken for decades to come.