S&P Global
Market Intelligence

North Dakota Revenue Outlook

Presentation to North Dakota Legislative Council by S&P Global Market Intelligence

Wednesday, March 15th, 2023

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Market Intelligence

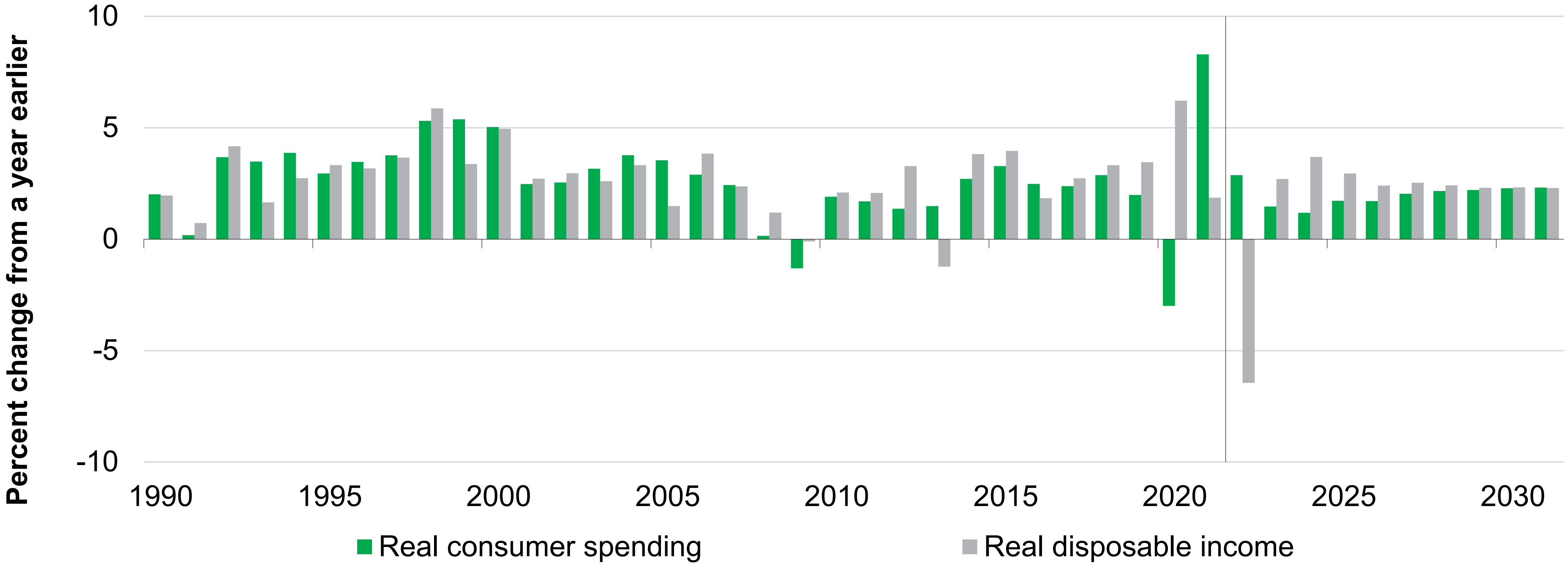
U.S. and North Dakota Macroeconomic Outlook

2022 ended on a strong note; and early data in 2023, especially re jobs and consumer spending, has reduced the risk of recession. But the FED will continue to fight inflation and growth will be muted.

- We project real GDP growth was 2.0% in 2022 to 2.0%, and in 2023 will be 1.0%.
- The forecast includes a growth pause in Q2 and Q3 (-0.1%)
- Unemployment will reach 3.9% in Q4,and reach a peak of 4.5% in mid 2025.
- We project GDP to grow 1.8% in 2024.
- Inflation for 2023 will be 4.4%, slowing to 2.9% in 2024.
- Why is a recession possible?
  – Labor markets are unsustainably tight.
  – Inflation is intolerably above the Fed’s long-run 2% objective.
- This slow growth reflects an economy bumping up against capacity rather than one sliding into recession.

Spending growth continues but at a slower rate

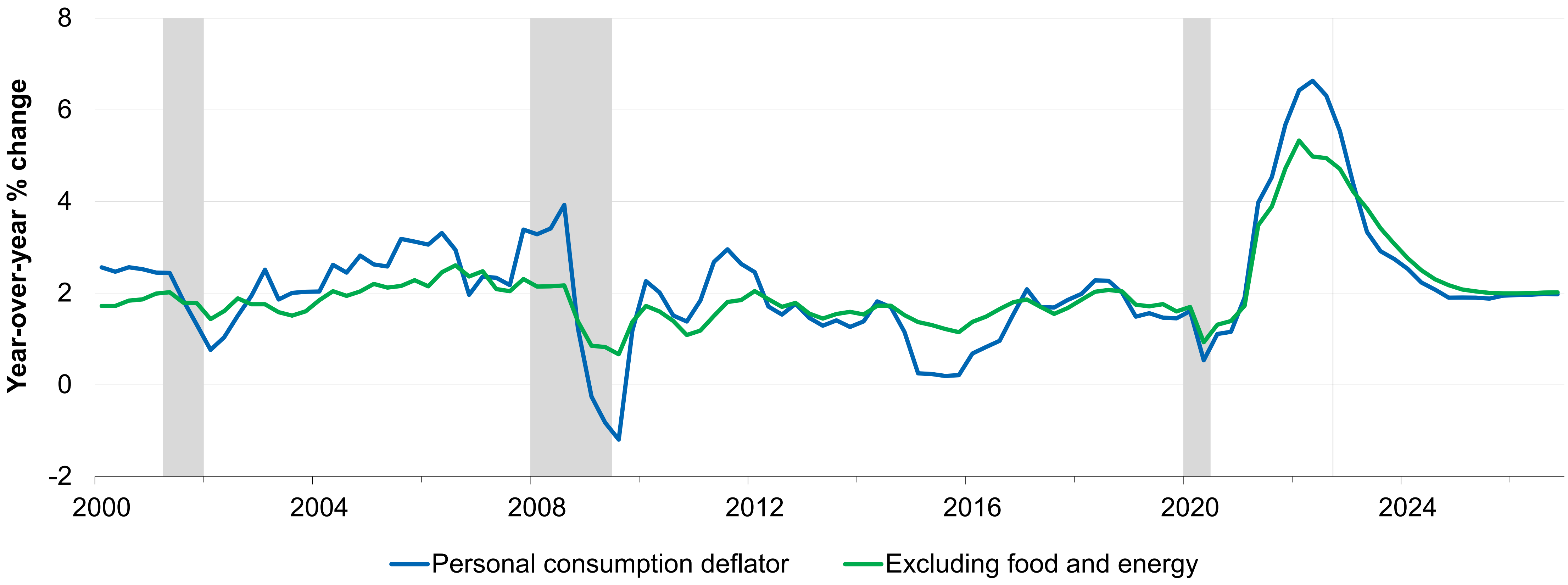
Real consumer spending and disposable income



Source: S&P Global

After a bulge in 2022, core inflation is expected to return to about 2% in late-2024

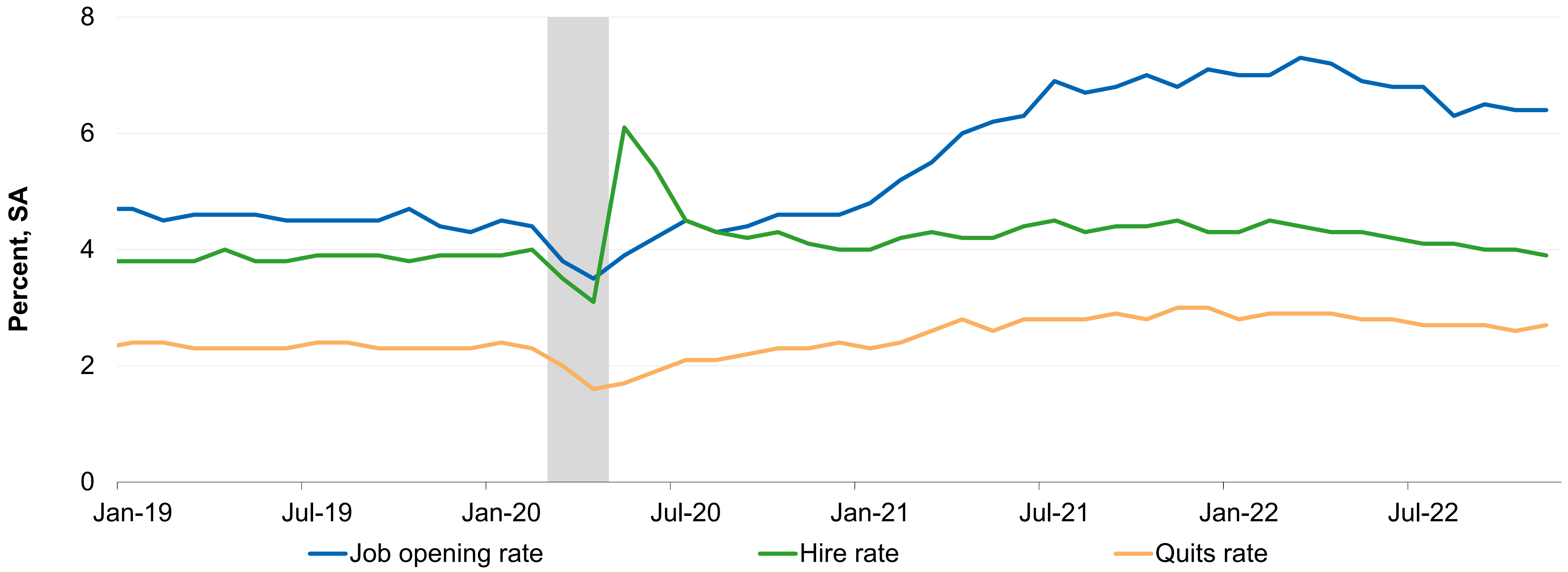
Personal consumption deflators



Source: S&P Global

US job openings are slowly moving down

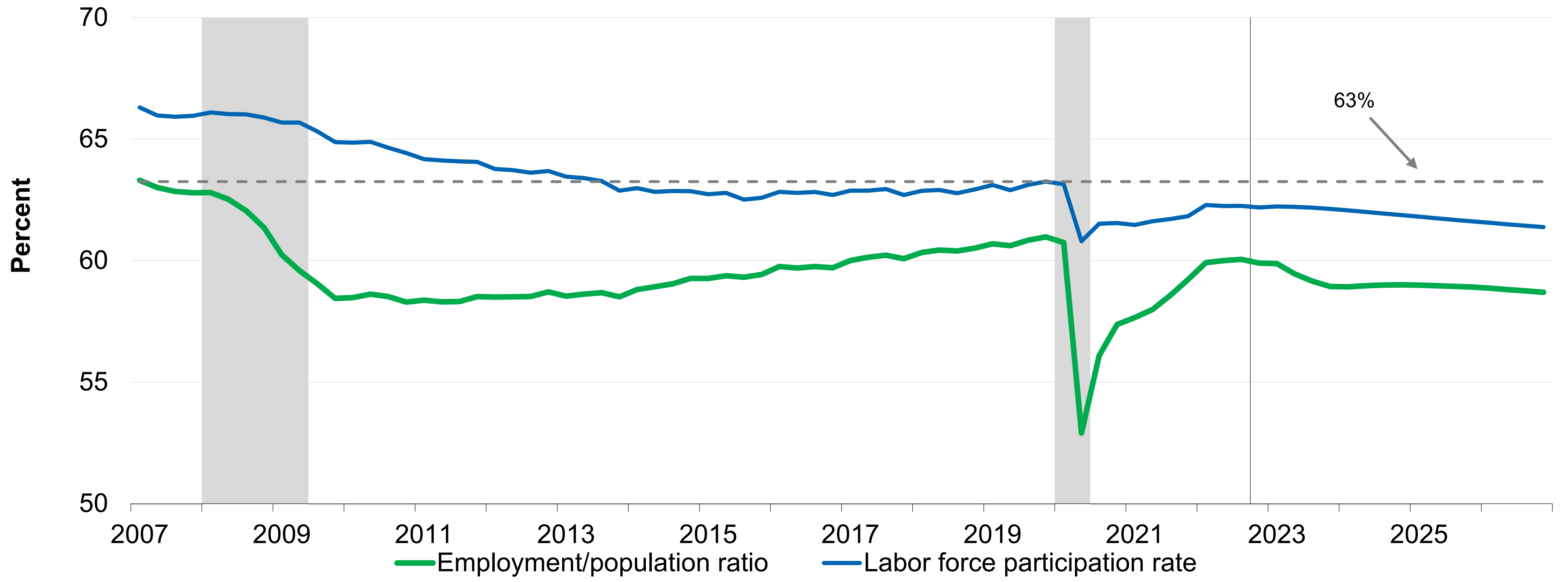
Job Openings and Labor Turnover Survey



Source: BLS

Gains in the labor force participation rate will be limited by demographic trends

Labor force participation

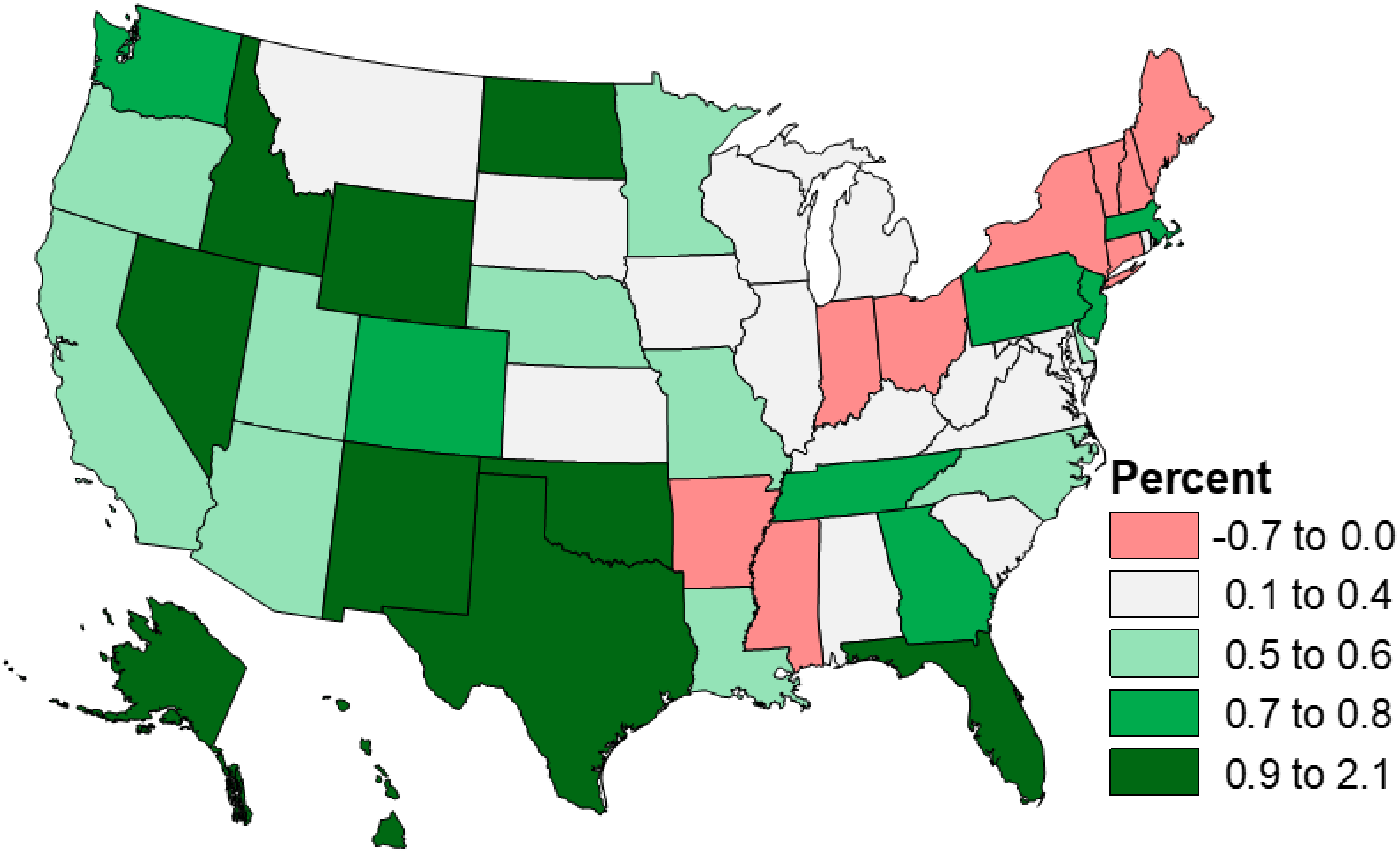


Source: S&P Global

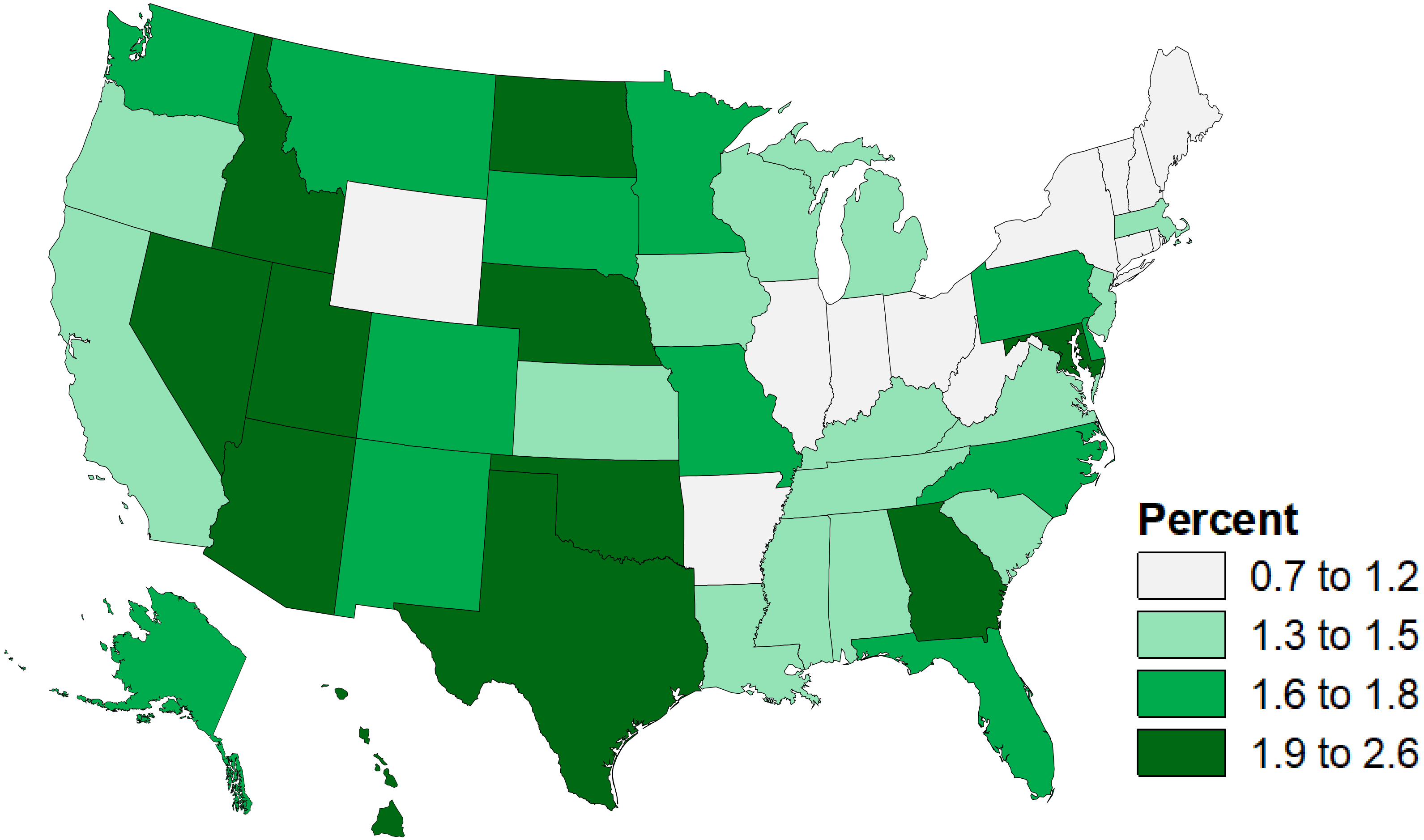
Risks to the US forecast

	Baseline (55%)	Pessimistic (25%)	Optimistic (20%)
GDP Growth	Real GDP rises 2.0% in 2022 as the aggressive recovery following the pandemic-induced downturn begins to chill. Growth slows to 1.0% in 2023 before rising to 1.5% in 2024.	Real GDP rises 2.0% in 2022 and 0.5% in 2023 in response to sustained weakness through the end of 2022 leading into 2023. Growth resumes at 0.8% in 2024.	Real GDP rises 2.1% in 2022 as the relative strength in consumer spending supports growth. Growth persists at 1.5% in 2023 and 1.7% in 2024.

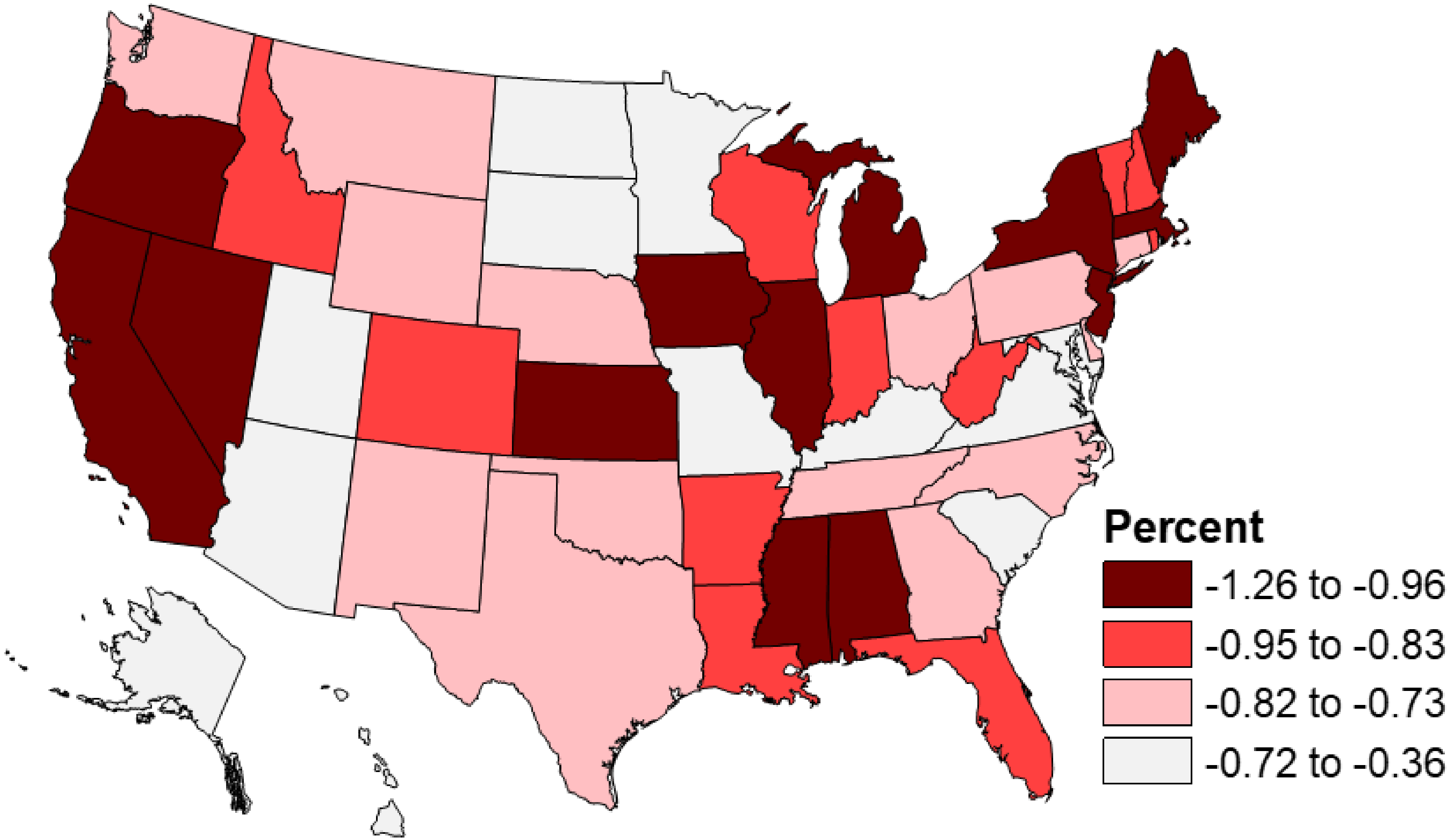
Real Gross State Product Growth, 2023, Percent Change Year Ago



Real Gross State Product Growth, 2024, Percent Change Year Ago



Employment Growth, 2024Q1, Percent Change Year Ago



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North Dakota Tax Revenue Outlook

Biennium forecast

Revenue Source	2019-21 Biennium Actual	2021-23 Biennium Forecast (January 2023)	2021-23 Biennium Forecast	2023-25 Biennium Forecast
Sales and use tax	**1,823,991,775**	**2,078,519,988** ***14.0%***	**2,086,625,595** ***14.4%***	**2,166,986,725** ***3.9%***
Motor vehicle excise tax	**259,690,121**	**293,777,345** ***13.1%***	**300,472,293** ***15.7%***	**354,198,262** ***17.9%***
Individual income tax				
Total individual income tax collections	1,025,353,869	1,366,749,441 *33.3%*	1,421,580,006 *38.6%*	1,732,350,615 *21.9%*
Transfer to refund reserve accounts	(207,800,000)	(451,400,000)	(463,400,000)	(367,000,000)
Net individual income tax collections	**817,553,869**	**915,349,441** ***12.0%***	**958,180,006** ***17.2%***	**1,365,350,615** ***42.5%***
Corporate income tax				
Total corporate income tax collections	294,644,398	451,931,830 *53.4%*	485,611,447 *64.8%*	371,905,502 *-23.4%*
Transfer to refund reserve accounts	(56,234,413)	(62,351,687)	(68,351,687)	(63,000,000)
Net corporate income tax collections	**238,409,985**	**389,580,143** ***63.4%***	**417,259,760** ***75.0%***	**308,905,502** ***-26.0%***

* The percentages reflect the change from the prior biennium.

Fiscal year forecast

Revenue Source	2019-21 Biennium		2021-23 Biennium		2023-25 Biennium	
	Fiscal Year 2020 Actual	Fiscal Year 2021 Actual	Fiscal Year 2022 Actual	Fiscal Year 2023 Forecast	Fiscal Year 2024 Forecast	Fiscal Year 2025 Forecast
Sales and use tax	**970,559,564** ***1.4%***	**853,432,211** ***-12.1%***	**976,113,737** ***14.4%***	**1,110,511,858** ***13.8%***	**1,067,726,267** ***-3.9%***	**1,099,260,458** ***3.0%***
Motor vehicle excise tax	**119,506,814** ***-4.2%***	**140,183,307** ***17.3%***	**137,876,349** ***-1.6%***	**162,595,944** ***17.9%***	**171,595,138** ***5.5%***	**182,603,124** ***6.4%***
Individual income tax						
Total individual income tax collections	467,896,604 *-6.8%*	557,457,265 *19.1%*	649,390,175 *16.5%*	772,189,831 *18.9%*	843,683,859 *9.3%*	888,666,756 *5.3%*
Transfer to refund reserve accounts	(115,800,000)	(92,000,000)	(193,400,000)	(270,000,000)	(179,000,000)	(188,000,000)
Net individual income tax collections	**352,096,604** ***-14.9%***	**465,457,265** ***32.2%***	**455,990,174** ***-2.0%***	**502,189,831** ***10.1%***	**664,683,859** ***32.4%***	**700,666,756** ***5.4%***
Corporate income tax						
Total corporate income tax collections	112,654,676 *-33.6%*	181,989,722 *61.5%*	239,786,314 *31.8%*	245,825,133 *2.5%*	196,277,996 *-20.2%*	175,627,506 *-10.5%*
Transfer to refund reserve accounts	(21,090,643)	(35,143,770)	(26,351,687)	(42,000,000)	(33,000,000)	(30,000,000)
Net corporate income tax collections	**91,564,033** ***-38.0%***	**146,845,952** ***60.4%***	**213,434,627** ***45.3%***	**203,825,133** ***-4.5%***	**163,277,996** ***-19.9%***	**145,627,506** ***-10.8%***

- The percentages reflect the change from the prior fiscal year.
- The big volatility in gross individual income tax collections in FY20, FY21 and FY22 reflects the filing and payment extension from April 2021 to July 2021.

It is estimated that the annual changes of gross income tax collection would be 3.2%, -0.3%, 1.7% in FY20, FY21 and FY22 respectively barring the impacts of the extension.

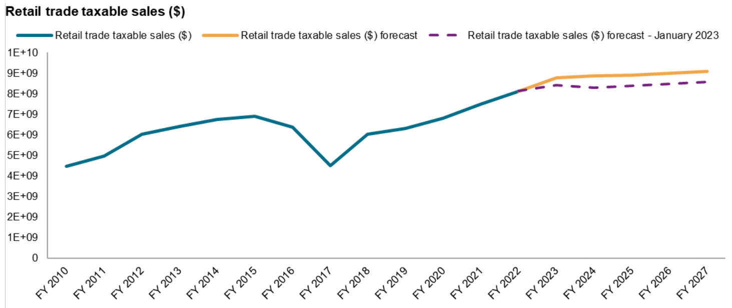
* Increase in net individual income tax collections in FY 2024 is primarily related to the expiration of a tax credit.

Economic indicators used in the tax model

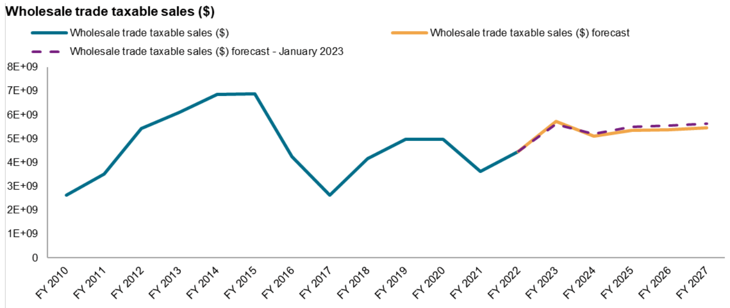
REVENUE SOURCE	ECONOMIC DRIVER	DESCRIPTION
Sales and Use tax	•Bakken new producing wells •CPI inflation •Gross state product by sector	Taxable sales are divided into 15 different sectors and the sectors are individually modeled. The main drivers of these models are the new producing wells in the Bakken play, inflation and gross state product by sector. The forecast of the sectors are summed to total taxable sales then the sales and use tax revenue forecast is calculated.
Motor vehicle excise tax	•New passenger and light truck registrations (ND state)	The motor vehicle excise tax base is best captured by the state's new vehicle registrations (including new passenger car and light truck).
Individual income tax	•Total wage disbursements (ND state) •Personal income, dividends interest and rent (ND state)	The tax base of individual income tax submitted as withholdings is relatively stable and largely driven by total wage income in the state. The tax base of individual income tax submitted as estimated payments, on the other hand, is more volatile due to the nature of capital gains realization. That being said, a reasonable amount of variations in the tax base of individual income estimated payments is captured by the state's property income, i.e., rental income of persons, personal dividend income, and personal interest income.
Corporate income tax	•Bakken new producing wells	The tax base of corporate income tax is mainly driven by by the Bakken new producing wells, as it affects oil company's profits.

Taxable sales by sector

- There are fifteen taxable sales sectors that are modeled. The five largest sectors are retail trade, wholesale trade, mining and oil, accommodation and food services, and manufacturing.



As of Mar. 2023.
Source: S&P Global



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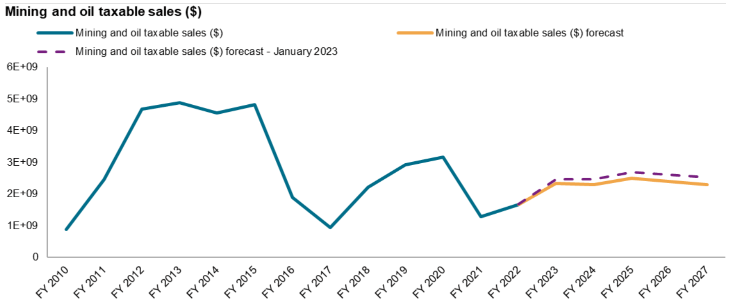

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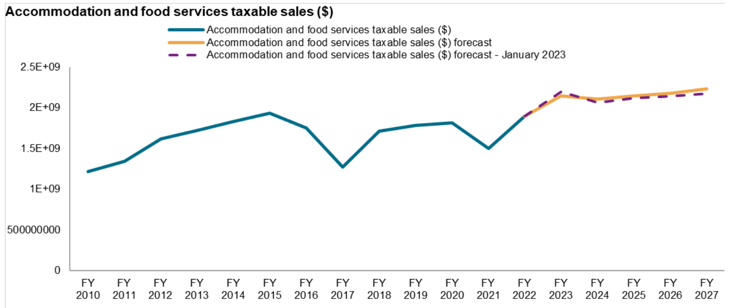

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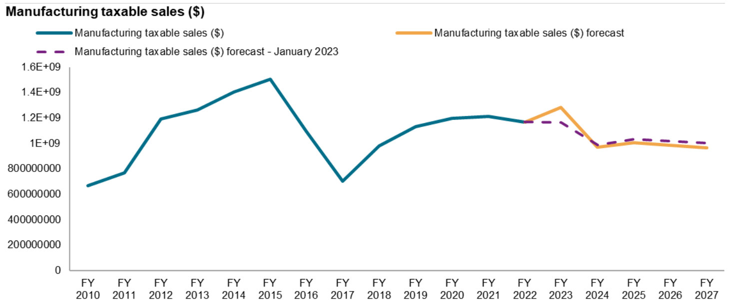
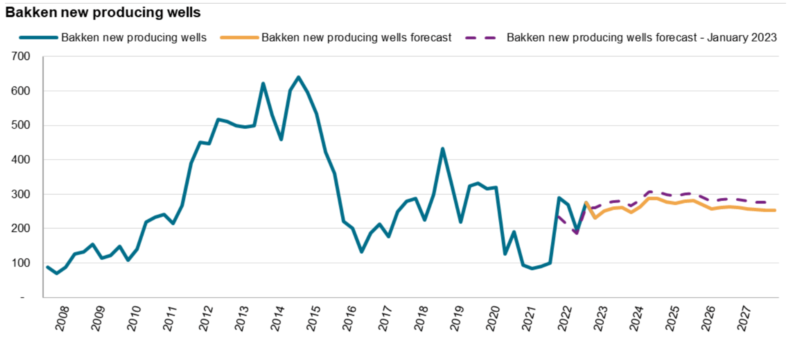


As of Mar. 2023.
Source: S&P Global

Drivers of taxable sales sectors

- The number of new producing wells in the Bakken play is the main driver in four of the five largest taxable sales sectors; these sectors are wholesale trade, mining and oil, accommodation and food services, and manufacturing
- Of the fifteen taxable sales models, nine include Bakken new producing wells as a driver.
- Sector-specific gross state product numbers for North Dakota are also used as drivers for some sector models like wholesale trade, and accommodation and food services.
- In the equation for retail trade taxable sales, inflation and population are included as drivers.



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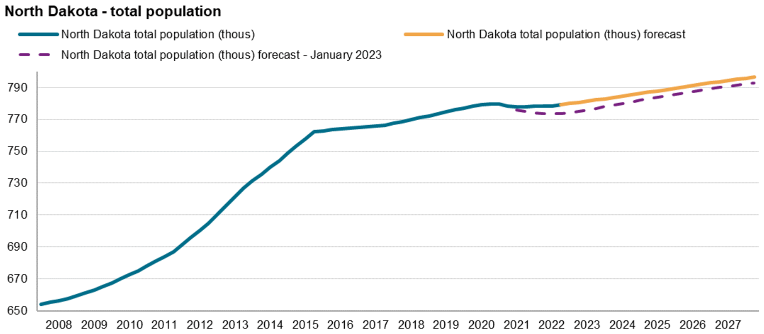

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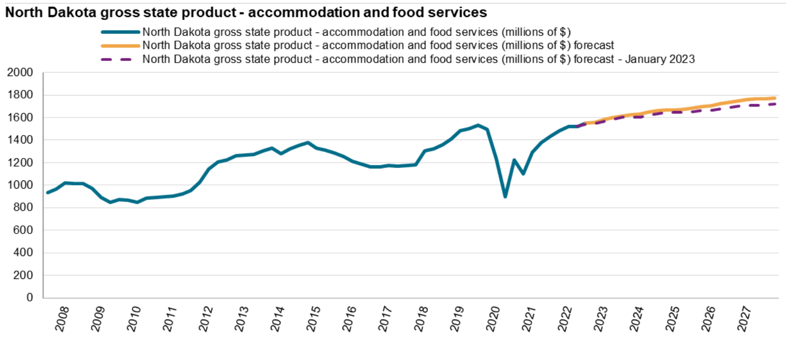
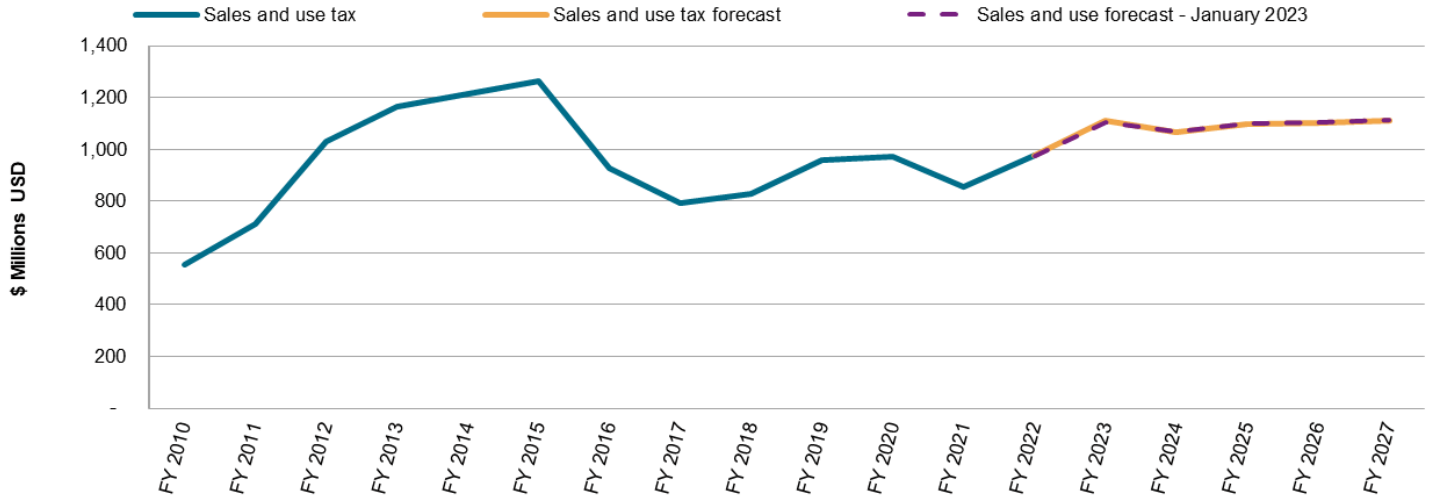


As of Mar. 2023.
Source: S&P Global Market Intelligence.

Sales and use tax revenue

Sales and tax use forecast



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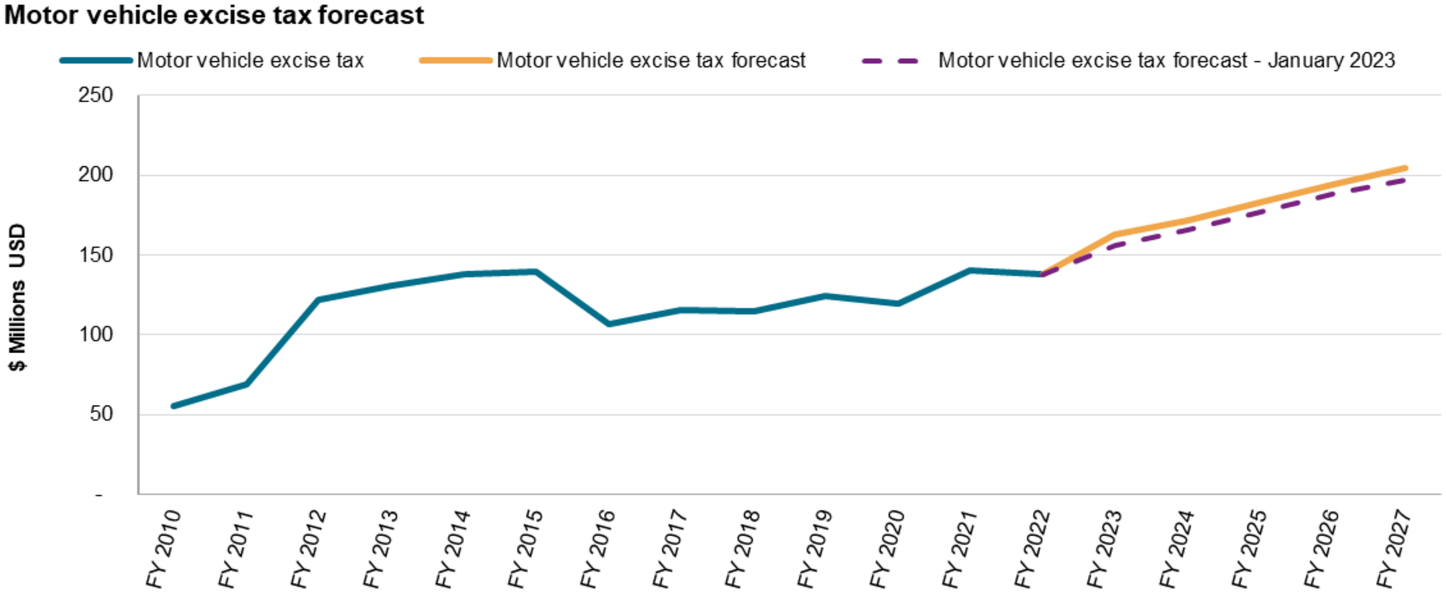
Motor vehicle excise tax revenue



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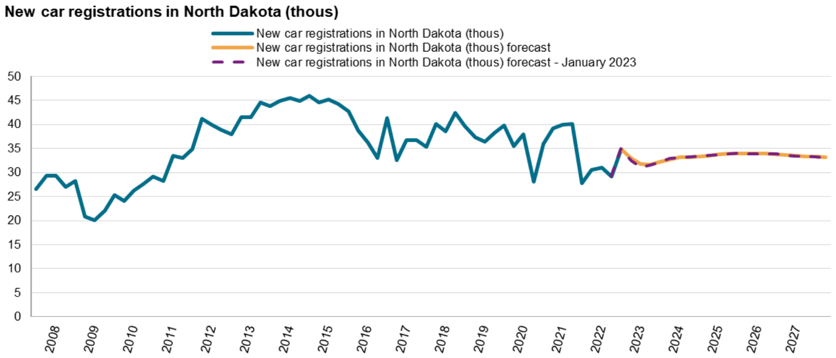

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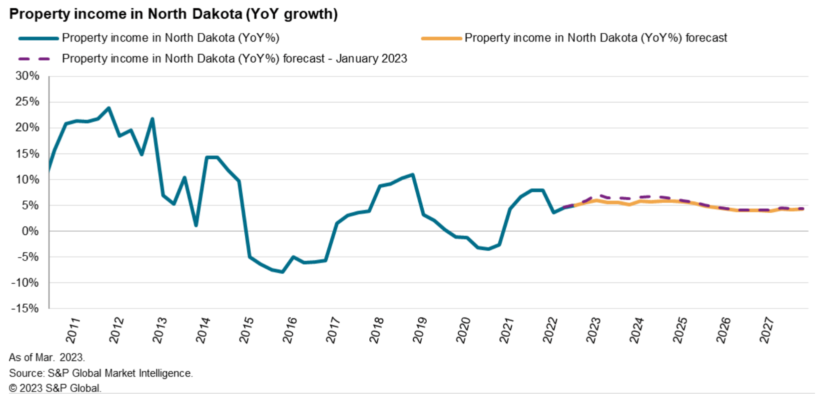
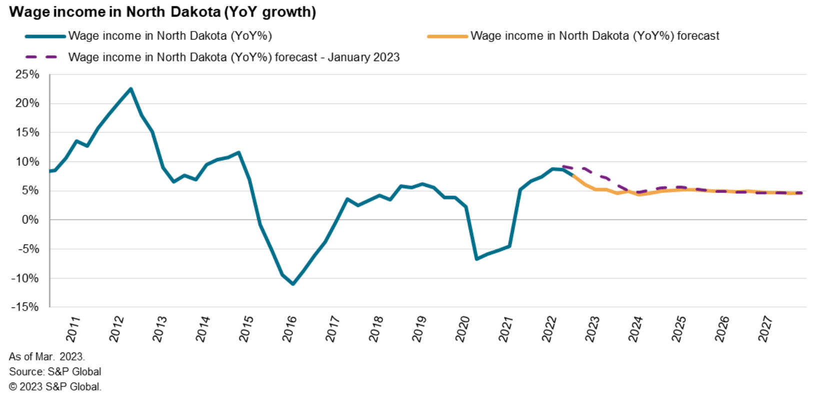
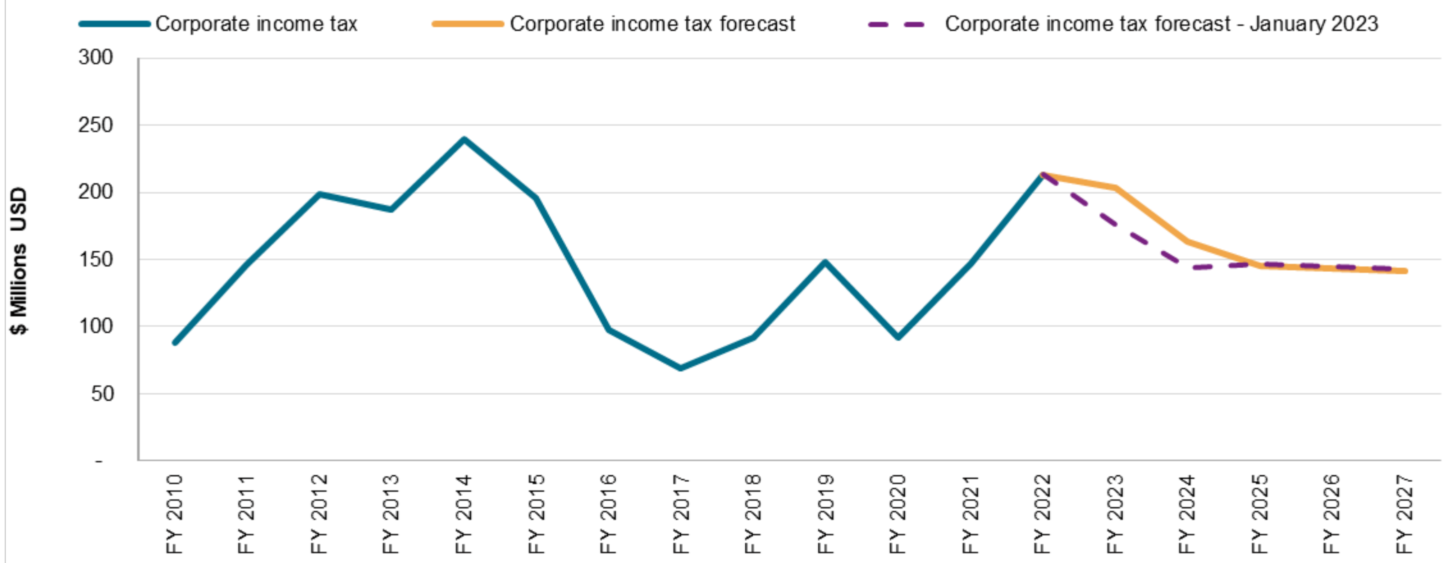
Individual income tax revenue





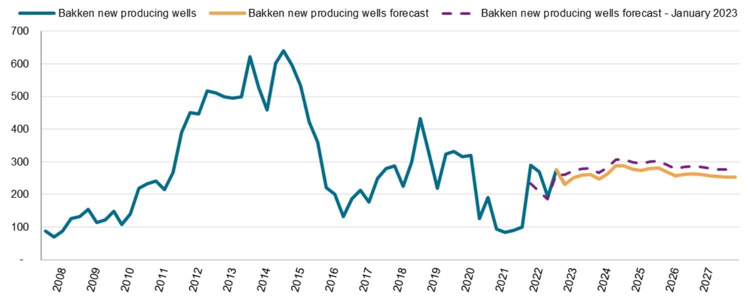
Corporate income tax revenue

Corporate income tax forecast



As of March 2023.
Source: S&P Global Market Intelligence.

Bakken new producing wells



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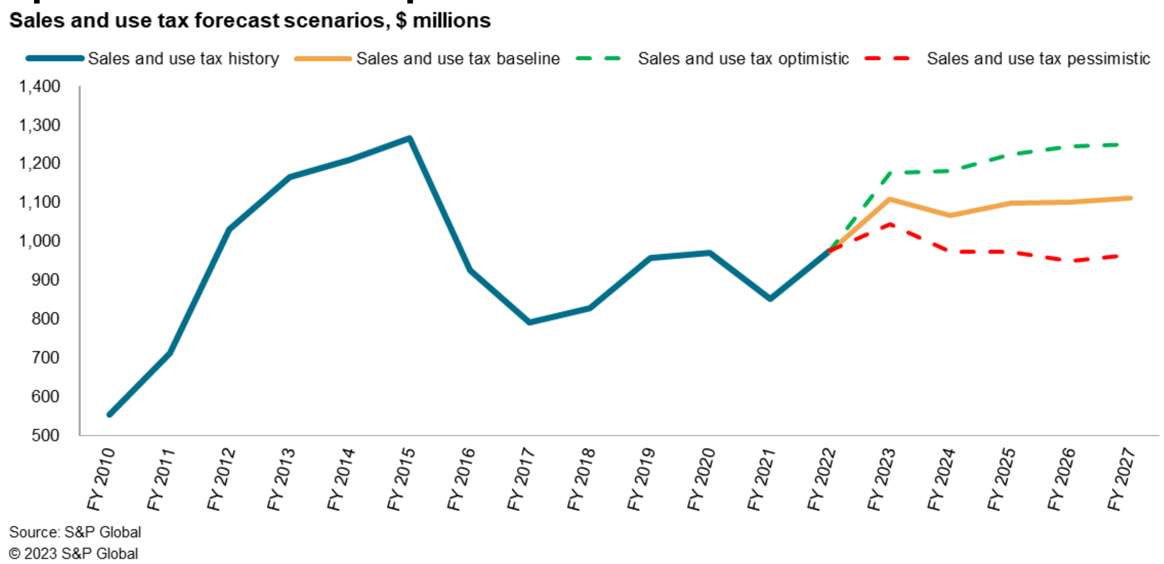
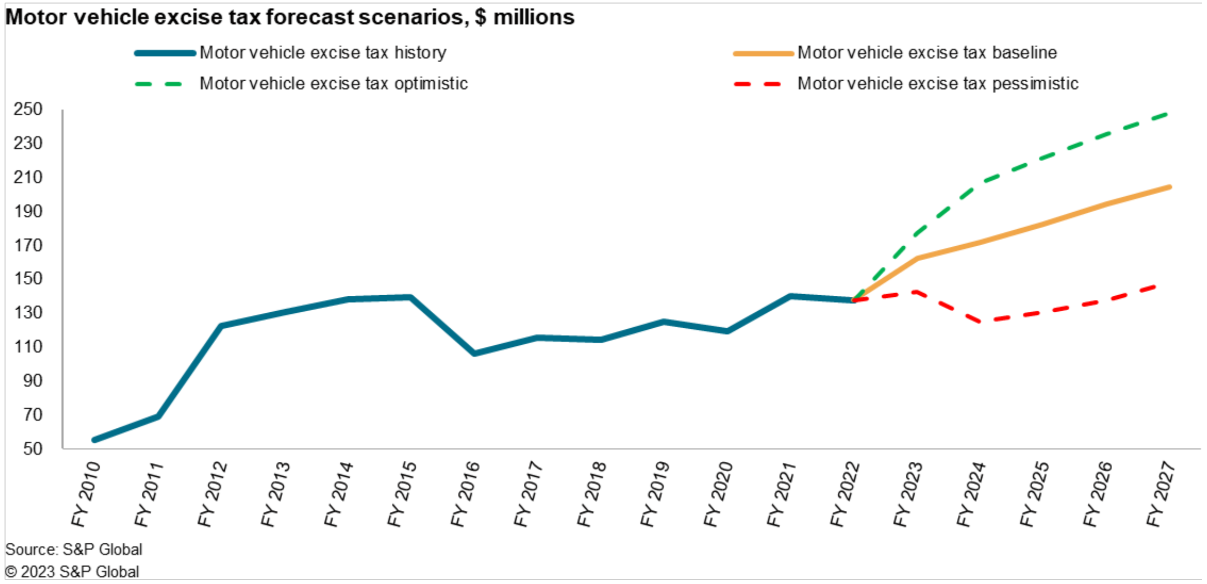
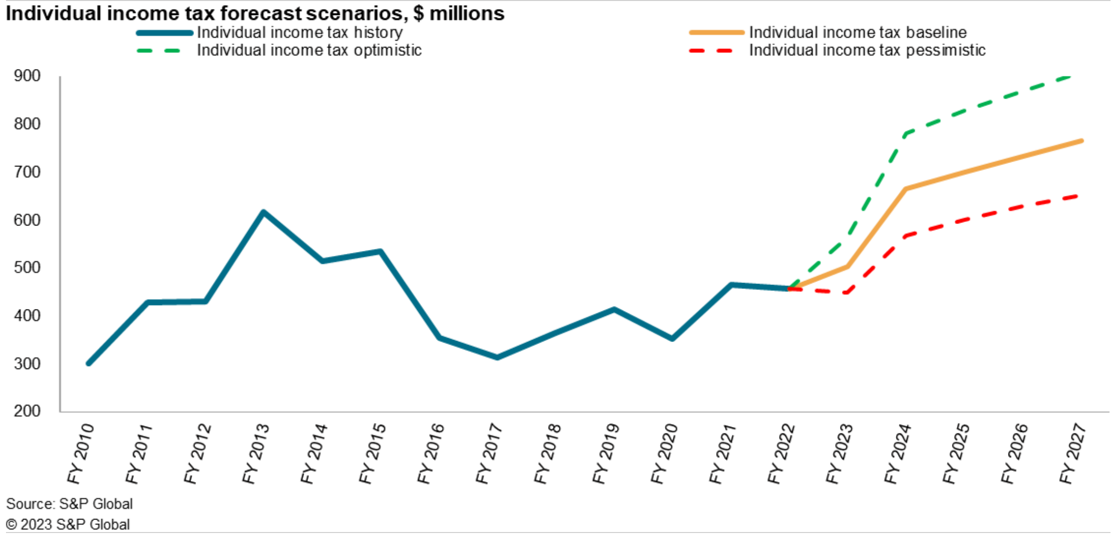
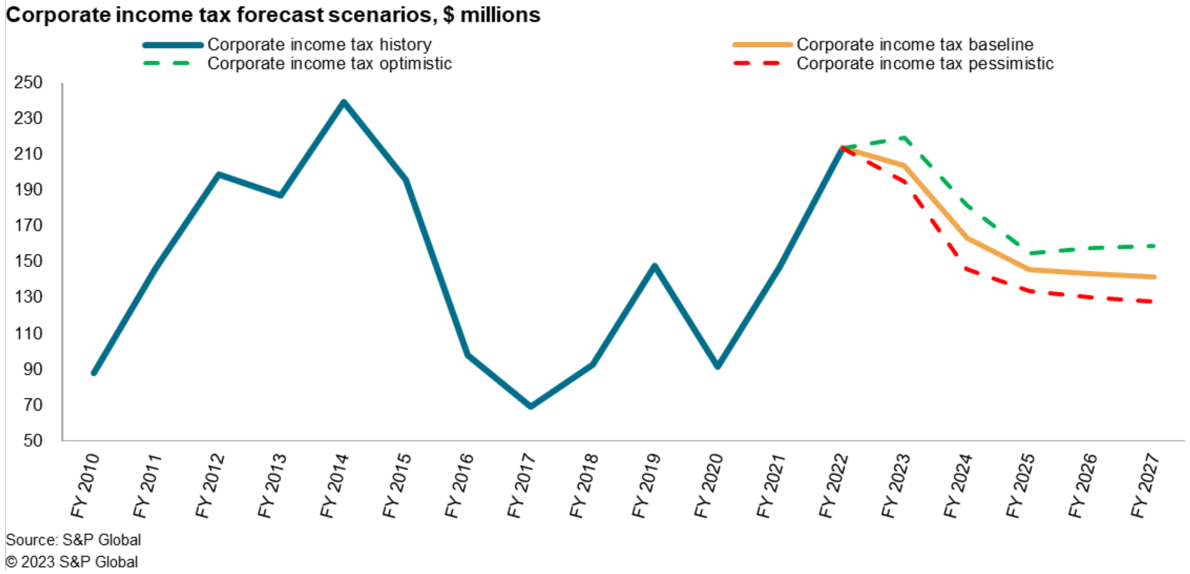
Optimistic and pessimistic scenarios









Optimistic and pessimistic scenarios

Revenue Source	2021-23 Biennium Baseline	2021-23 Biennium Optimistic	2021-23 Biennium Pessimistic
Sales and use tax	2,086,625,595 *14.4%*	2,154,010,460 *18.1%*	2,021,978,221 *10.9%*
Motor vehicle excise tax	300,472,293 *15.7%*	315,176,531 *21.4%*	280,656,456 *8.1%*
Net individual income tax	958,180,006 *17.2%*	1,020,465,821 *24.8%*	904,384,812 *10.6%*
Net corporate income tax	417,259,760 *75.0%*	432,453,741 *81.4%*	408,118,323 *71.2%*

Revenue Source	2023-25 Biennium Baseline	2023-25 Biennium Optimistic	2023-25 Biennium Pessimistic
Sales and use tax	2,166,986,725 *3.9%*	2,406,449,888 *11.7%*	1,948,918,926 *-3.6%*
Motor vehicle excise tax	354,198,262 *17.9%*	429,077,113 *36.1%*	256,019,857 *-8.8%*
Net individual income tax	1,365,350,615 *42.5%*	1,609,215,877 *57.7%*	1,167,374,489 *29.1%*
Net corporate income tax	308,905,502 *-26.0%*	336,344,982 *-22.2%*	279,486,289 *-31.5%*

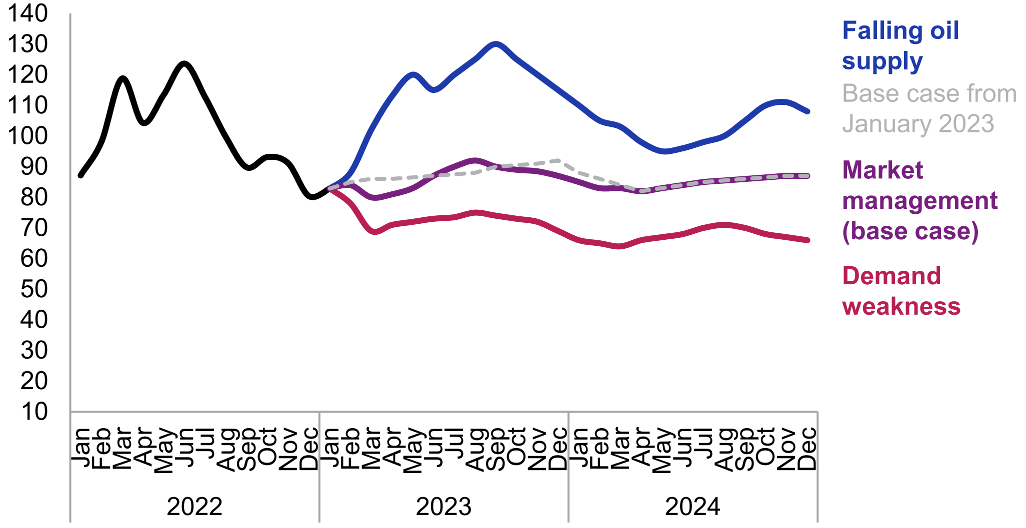
North Dakota Energy Outlook

US Markets - US production growth will be modest at about 0.8 - 0.9 million barrels per day in 2023 and 0.6 million barrels per day in 2024

- **Operators' business model continues to shun production growth in favor of a returns-driven model**
  - Based on our price outlook the industry will still generate a free cash flow margin of 35% - 40%. However, production increases are beginning to hit a wall
    - Labor shortages in the oil patch, especially with fracking crews
    - Cost inflation is rampant with costs up over 15%
    - Lack of production improvement as core areas become increasingly developed
    - High storage inventories – Increase of 40 MMbbls in the past six months
  - While operators are still declaring discipline to investors, Public companies, are forecast to grow volumes 3–4% in 2022, while privately operated production is likely to grow 10%.
- **In 2023, demand growth is concentrated in mainland China and supply growth in the United States.** If one falters, there could be disproportionate price impacts.
- **Recession fears – 2023 global oil demand increase is about 1.6 Mmbbls day – helping to keep prices down**
  - **Saudi Arabia** – improved relationships with the US will allow OPEC+ to effectively manage supply (spare capacity) which will put upward pressure on prices
  - **Russia** - Sanctions have had little effect on reducing exports which are still at 10.7 MMbbls/day; however, this situation poses the most uncertainty
    - Russia selling about 2 MMbbls/d of oil to China and India at a discount
    - Price cap of $60/bbl designed to keep supply flowing but reduce Russian revenues – Appears to be having an effect on revenue
    - Most of Europe oil demand formerly from Russia is coming from the US
  - **China** – Lockdowns currently is lifted, oil demand is expected to increase by 0.9 to 1.0 MMbbls/day for 2023

The base-case oil price scenario assumes strong Chinese demand growth amid gains in non-OPEC supply, while Russian output shows resiliency

Dated Brent price scenarios ($/bbl)



Dated Brent annual average price ($/bbl)

	2022	2023	2024
Historical	$101	-	-
Market management (base case)	-	$87	$85
Falling oil supply	-	$114	$103
Demand weakness	-	$72	$68

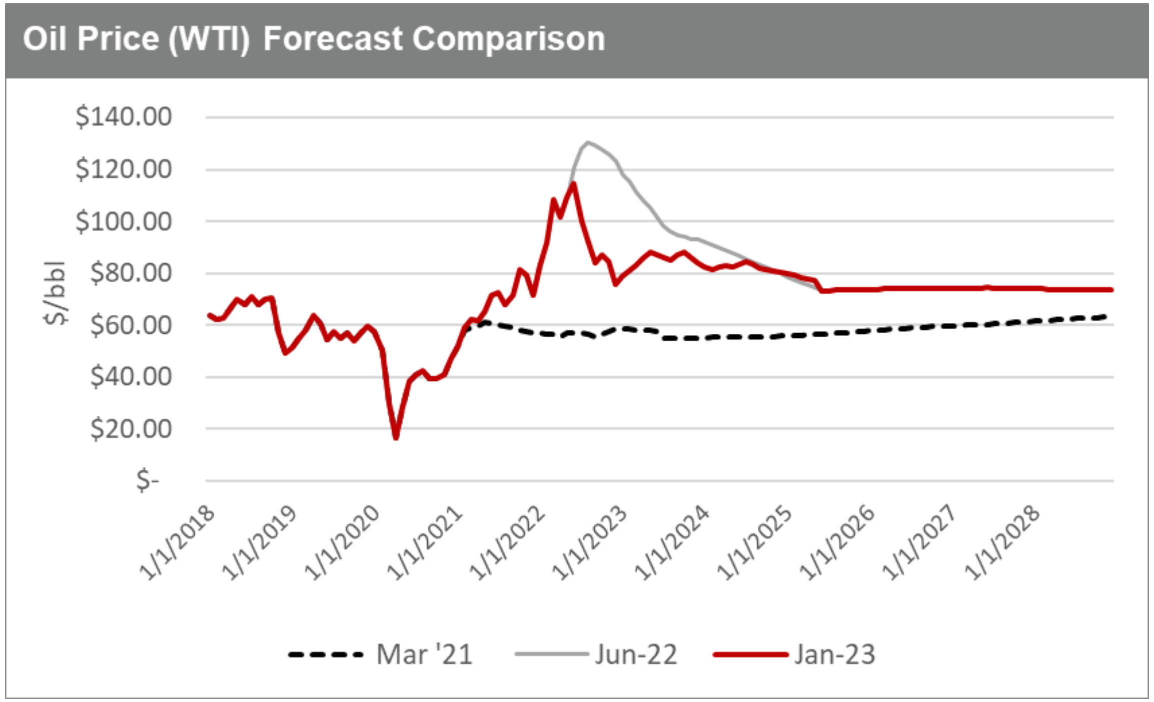
Data compiled Feb. 15, 2023.
Prices shown are indicative monthly price averages and not intended to project daily/weekly high and low prices.
Sources: S&P Global Commodity Insights; Argus Media Limited (historical prices).

Despite the large range of price uncertainty, US operators are likely to stay the course of modest production increases and conservative reinvestment strategies

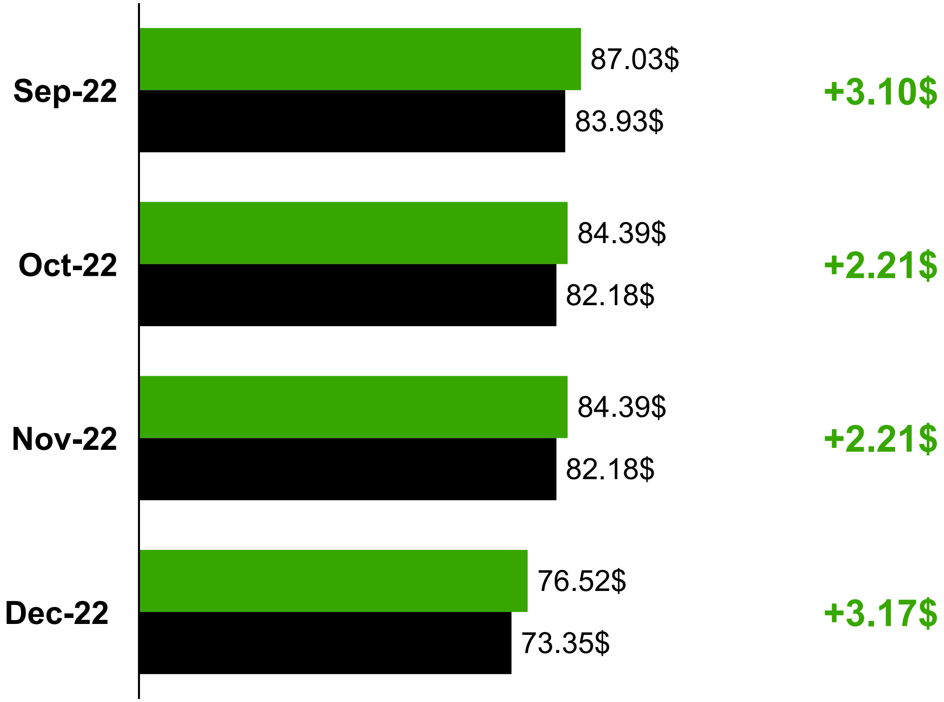
- **Market management (base case). OPEC+ effectively manages supply to support prices and mainland China returns to growth. Limited drop in Russian crude exports.**
- **Falling oil supply. Up to 2 MMb/d of Russian oil exports are lost. Spare capacity shrinks to 1 MMb/d or less.**
- **Demand weakness. Continued China lock downs and OPEC+ looses control of prices**

- *WTI is expected to be discounted about $5-6 / bbl due to tighter supply in Europe compared to the US*

Overall short-term price outlooks remain uncertain due to changing global market, reduced investment in the industry is likely to support more stable prices over the longer term



North Dakota Light Sweet vs WTI Crude Oil Price[1]

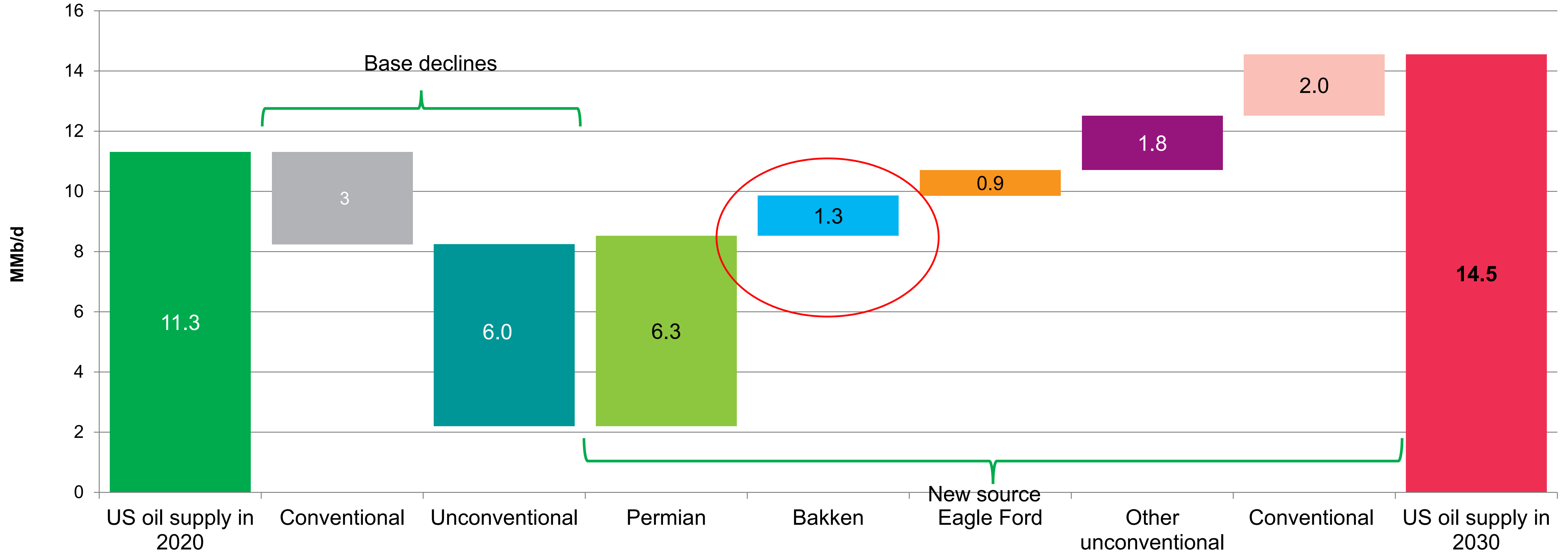


- Midterm price outlook decreased since June, but long-term projections revised up due to lower global investment in oil and gas projects, as a result of higher risk factors from energy transition, cost of capital, and global markets.
- Future investments will be more selective, with an expected 20% IRR compared to the previous average of 10%.
- From September to December 2022, WTI prices were consistently \$2-\$3 higher than Clearbrook prices, potentially due to higher transportation costs and supply and demand imbalances.

1 Source: North Dakota Department of Mineral Resources Director's Cut (January) and (February)

Significant base declines slow overall growth in US oil supply and new development will drive nearly all growth – Where does the Bakken fit in?

US oil supply in 2030



Source: S&P Global Commodity Insights, formerly IHS Markit

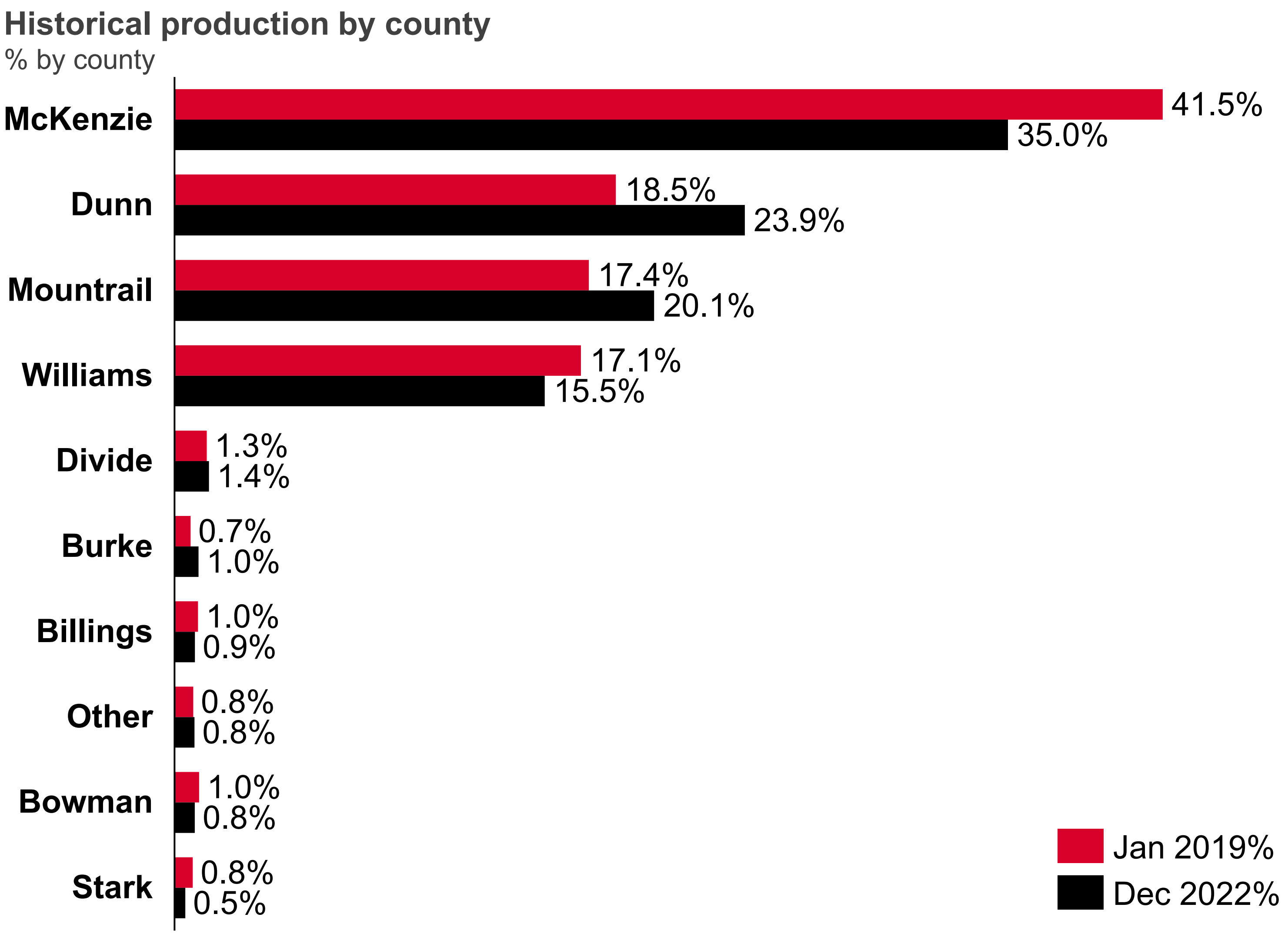
Key takeaways from recent director's cut – Oil and gas production decline while new well development rises, indicating a positive outlook for the industry in the coming months

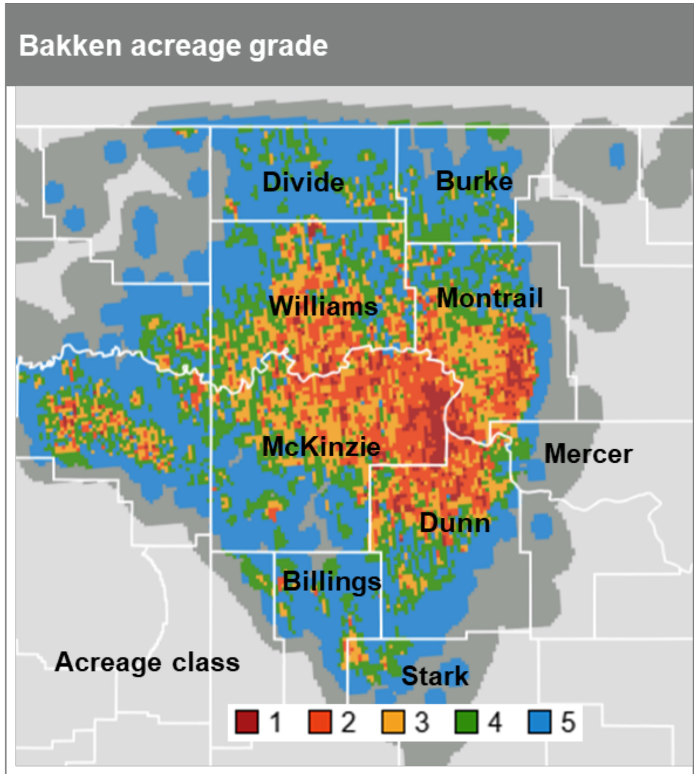
Item	October 2022	November 2022	December 2022	Change
Oil Production (MMBbl/d)	1.121	1.098	0.956[1]	↓
Gas Production (Bcf/d)	3.146	3.029	2.643[1]	↓
New Wells Spud	77	86	94	↑
Rig Count	43	40	44	—
New Wells Completed[1]	54	58	104	↑
Wells Waiting on Completion *(DUC Wells)*	489	447	450	⇩
Well Producing	17,791	17,580	17,230[1]	↓

- Since October 2022, both oil and gas production have experienced a slight decline.
- Despite this, the number of newly spudded and completed wells has continued to increase, as operators aim to maintain a permit inventory of roughly 12 months.
- The inventory of drilled but uncompleted (DUC) wells is starting to decrease as there are currently 18-20 active completion crews, which could further exhaust the DUC well inventory in the coming months.
- The number of drilling rigs has plateaued in the forties over the past few months, but a gradual short-term increase is expected over the next two years.

Source: North Dakota Department of Mineral Resources Director's Cut (January) and (February)
Note: 1 Preliminary number, will be adjusted/updated in next updates – Production estimated at about 1.05 MMbbls/d

Historical production by county – four counties have nearly 95% of all production. We are seeing a slight shift from McKenzie/Williams Counties to Dunn/Mountrail Counties, all core counties

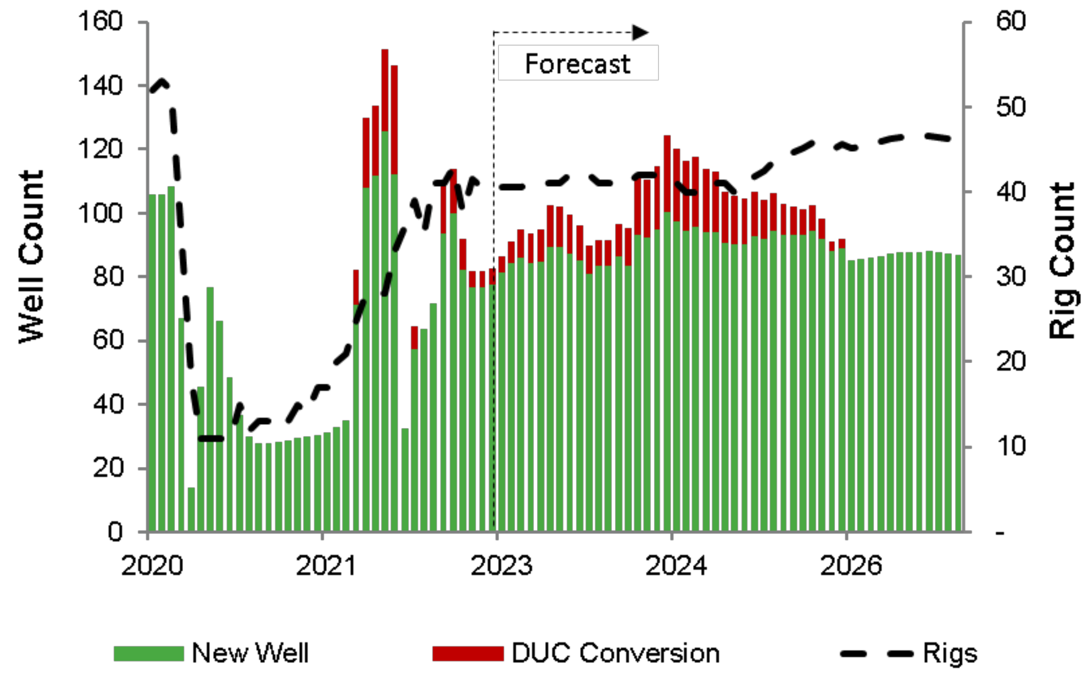




Source: Data taken from IHS Markit upstream E&P content (Energy Studio: Impact)
Underlying base map provided by © Mapbox and © OpenStreetMap contributors.

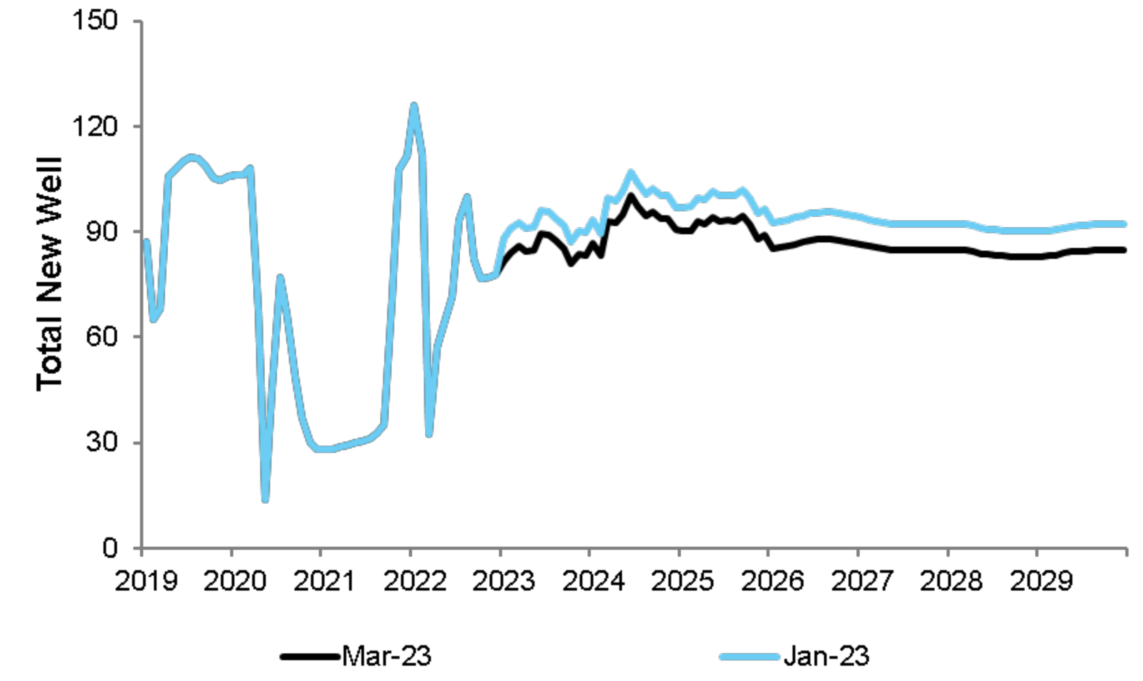
We have slightly lowered the March 2023 forecast compared to January 2023 to reflect a downward adjustment in the new well counts. This adjustment is necessary to align with the current short-term reality

Bakken New Wells and DUCs



Source: S&P Global

Bakken Base Case New Well Count Forecast Comparison

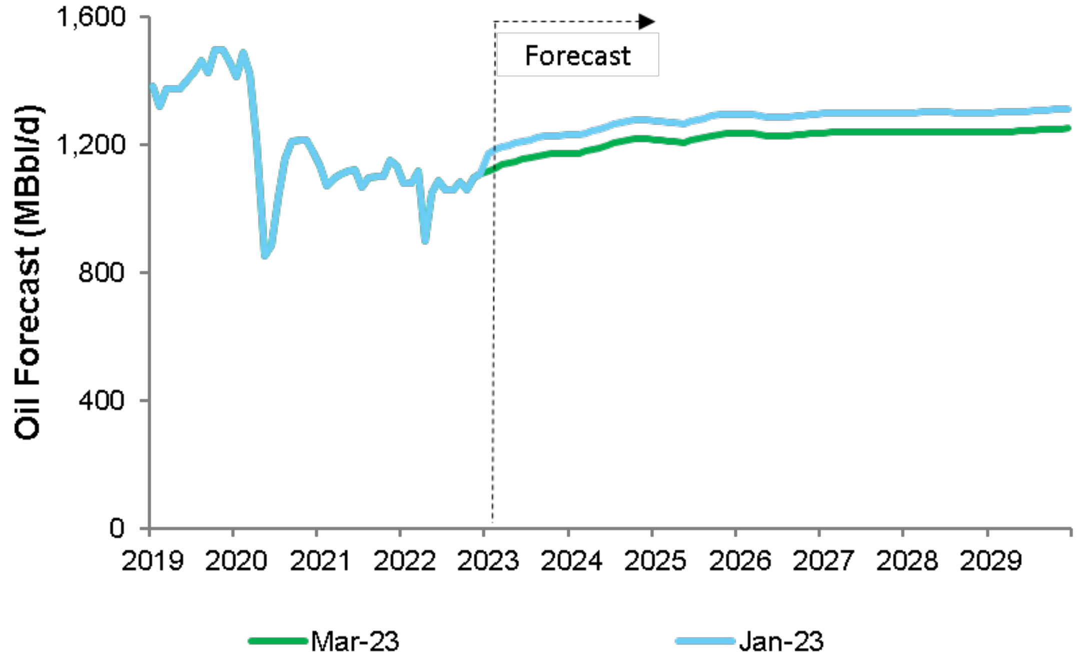


Source: S&P Global

- The actual well counts during the second half of 2022 were lower than expected, driving a downward adjustment towards the short-term oil and gas forecast starting in 2023.
- Lower-than-expected well counts may be attributed to equipment failure, delays in construction, and changes in market conditions.
- The adjustment was necessary to align with the current short-term reality, but we remain confident in the long-term prospects of the industry and will continue to monitor developments closely.

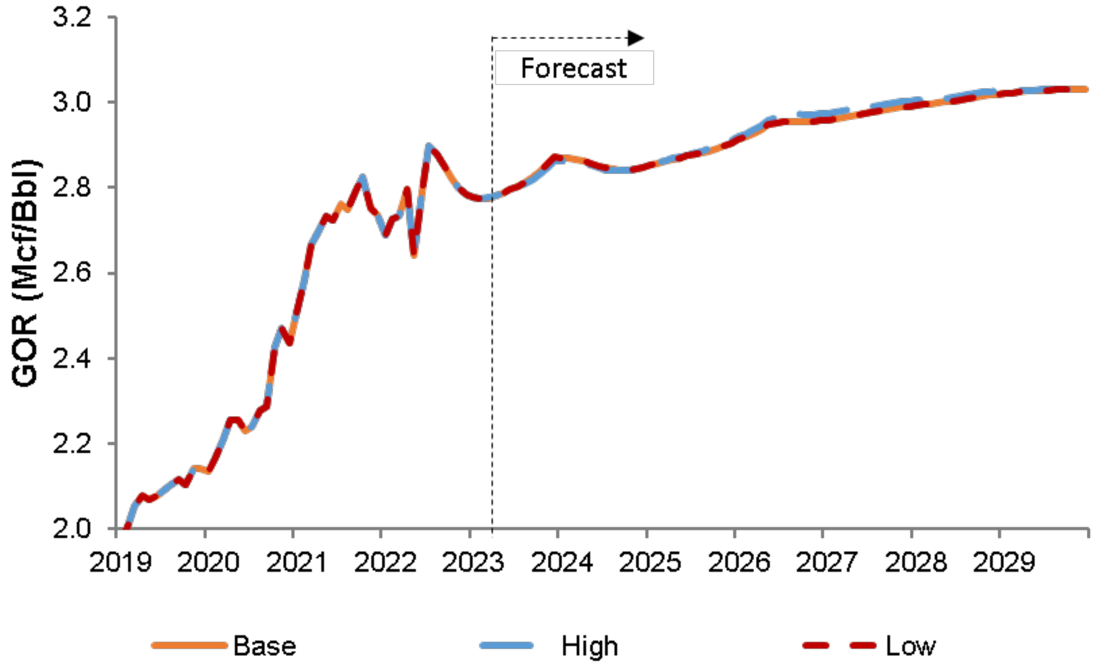
DUC inventory will help contribute to production increases from the current 1.05 - 1.1 MMbbls/d to around 1.25 MMbbls per day leveling out in 2025

Bakken Base Case Forecast Comparison



Source: S&P Global

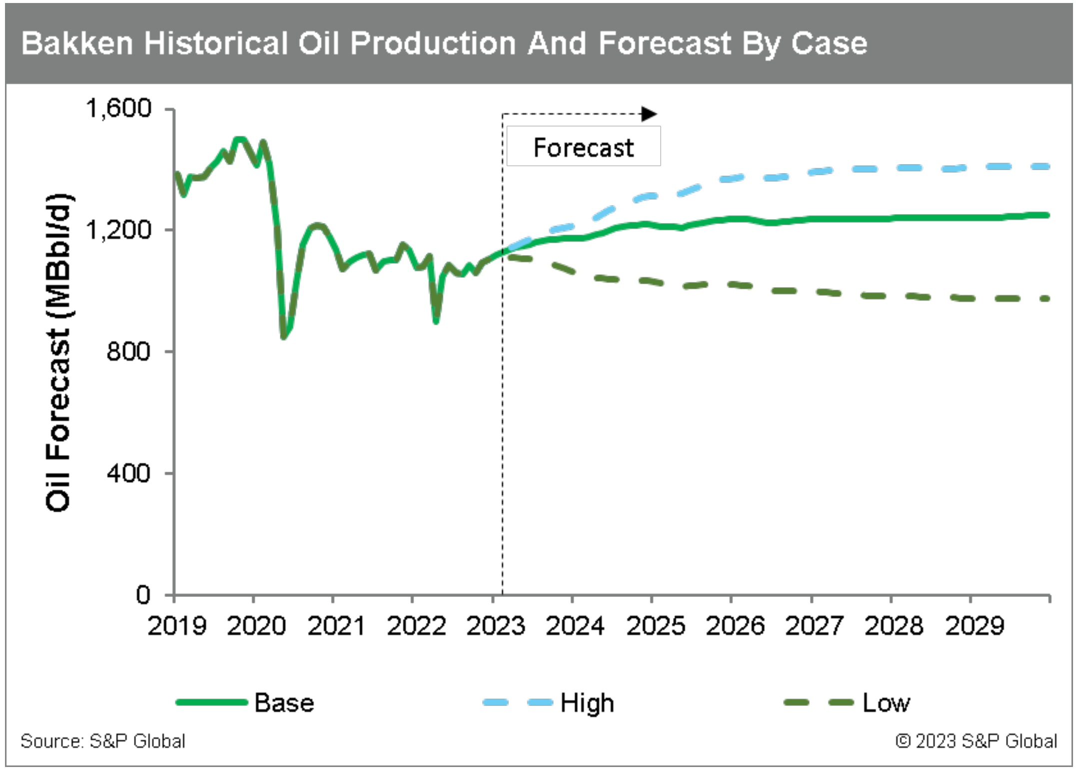
Bakken Historical GOR And Forecast By Case

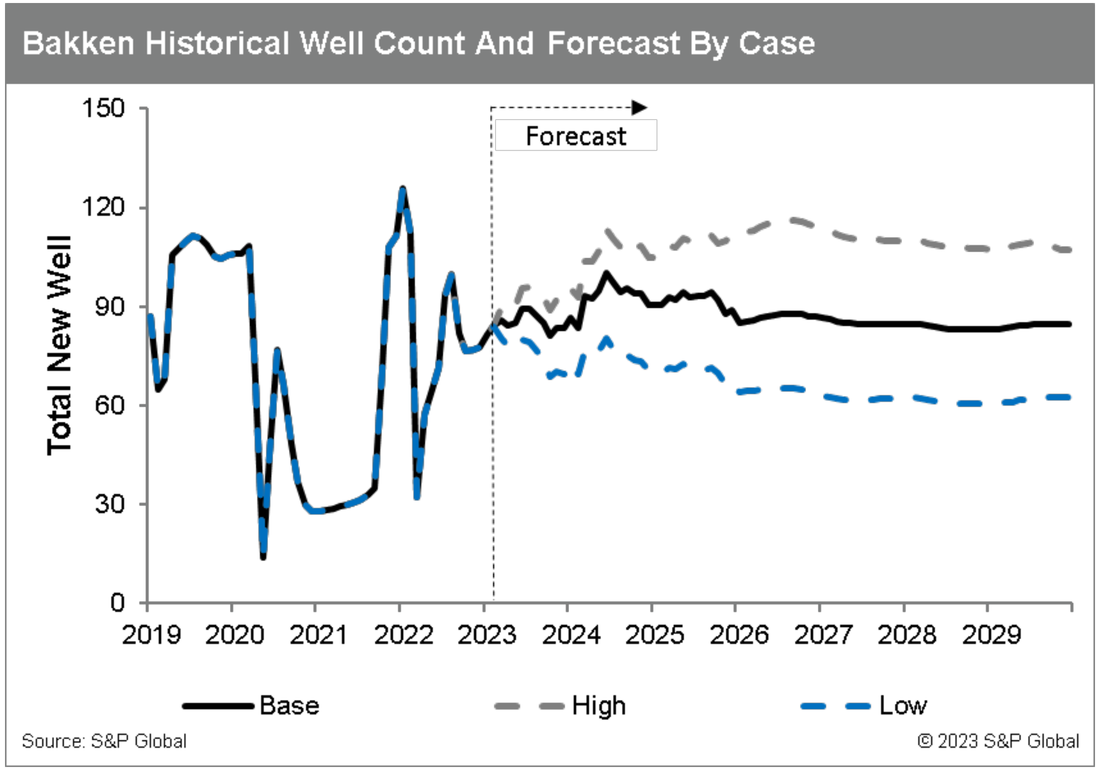


Source: S&P Global

- Growth in 2022 was hampered by weather-related production shutdowns and drilling curtailments, alongside labor shortages.
- In 2023 and 2024, a rise of roughly 125,000 barrels per day is expected, aided in part by the substantial DUC inventory.
- Short-term production gains will be subject to weather conditions and the availability of oil-field labor, specifically fracking crews. Meanwhile, long-term increases are anticipated to be modest, owing to the decreasing quantities of core acreage.
- Over time the increasing GOR (gas-oil ratio) will cause gas production to increase at a faster rate than oil production for all cases.

We created both high and low drilling predictions by modifying the price forecast by 10% and utilizing re-investment rates that were higher or lower (within ~10% of operating cash flow).





- The forecast for the Bakken resource is more sensitive to factors such as re-investment rates, capital costs, and labor, rather than the price forecast. This is because a significant portion of the Bakken resource breaks even at or below $60/bbl. In the base case, re-investment rates are estimated to be between 35-45% of operating cash flow (equivalent to approximately 60-65% of free cash flow).
- The higher price forecast would make tiers 1-4 economically viable, but if oil prices were to fall below $40/bbl, as was the case for most of 2020, the development of the resource would be severely restricted.

Several regulations and legal issues may impact drilling and production operations in North Dakota

Venting & Flaring Regulations

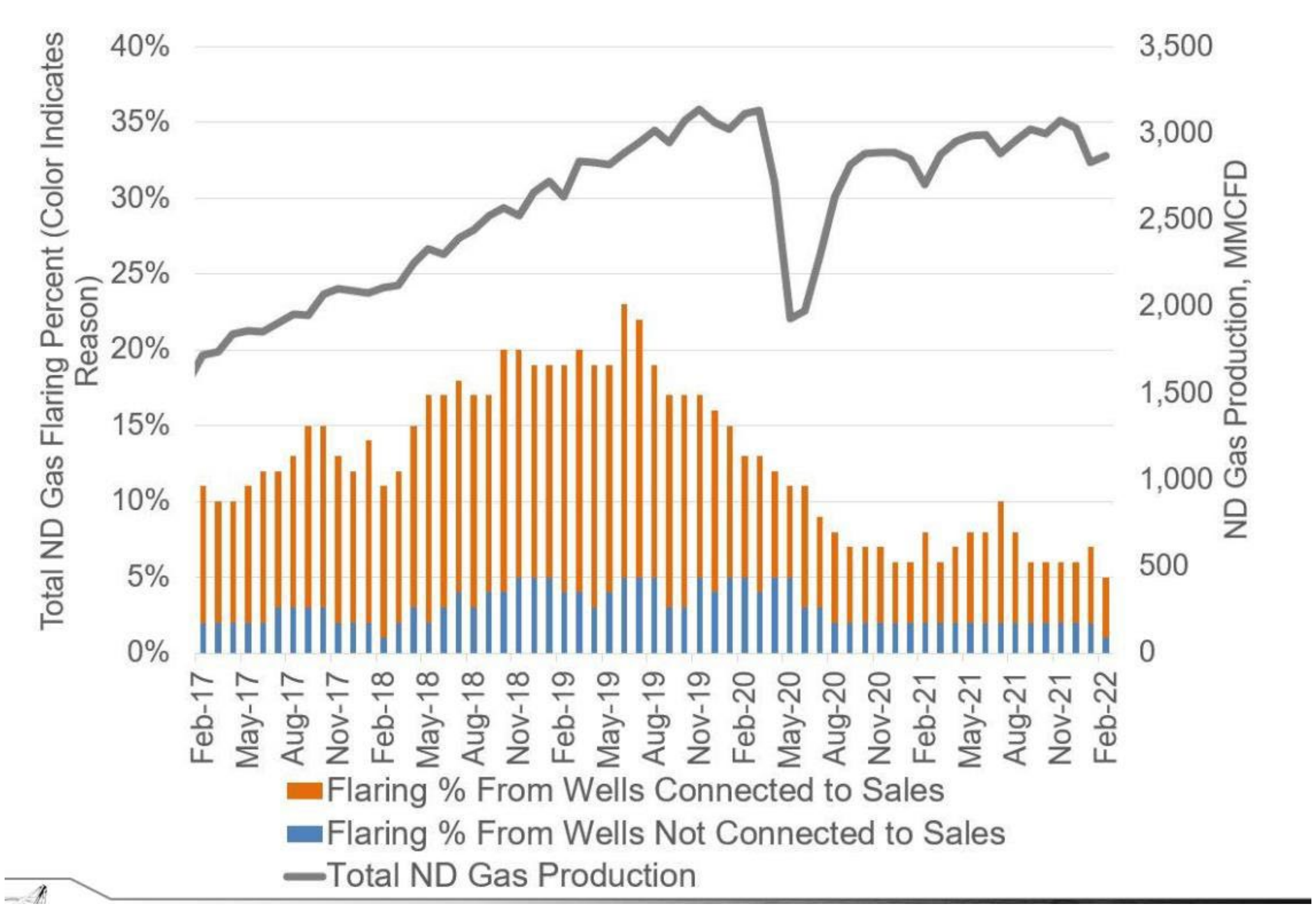
- NDIC has established a requirement for 91% of all gas to be captured or oil production will be curtailed and fines levied. Exceptions are allowed for one year, if wells are outside the core development areas or if certain conditions are met (limited rights of way, potential reservoir damage, safety issues, etc)
  - Each drilling permit is also required to submit a gas capture plan.
- Inflation Reduction Act (IRA) has added a fee methane emissions. The details have not fully been released, but it is expected to be implemented beginning in 2024 and increasing by 2026.
- The IRA also requires a royalty due on any methane vented or flared during upstream operations on federal leases.
- In December 2022, BLM proposed a regulation to allow attach conditions to applications to drill (APDs) and to require reasonable measures to prevent waste of natural gas

NEPA Review for Federal Actions

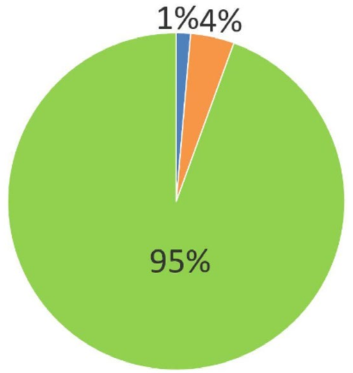
- Several NGOs sued to halt the development of 173 BLM leases in several western states
  - Note that about 9% of North Dakota's Williston Basin is federal land. 5% BLM and 4% tribal.
  - Lease sales have been delayed
- A settlement was reached to limit development of these leases pending additional National Environmental Policy Act (**NEPA**) review, which will take into account the "Social Cost of Carbon" when taking any federal actions, which include leases
  - The Trump Administration had previously issued a rule to lessen requirements for NEPA review, which had been repealed in early 2021.
  - The Biden Administration has introduced the concept or the "social cost of carbon" which will effectively increase the cost of oil and gas developments.

Gas capture progress improved greatly since the implementation of NDIC Order 24665 in 2014 leading to a more sustainable and environmentally responsible oil and gas industry in North Dakota

North Dakota gas flaring trend vs production



North Dakota gas capturing composition



Green - % of gas captured and sold

Orange - % flared from wells connected to sales

Blue - % flared from wells not connected to sales

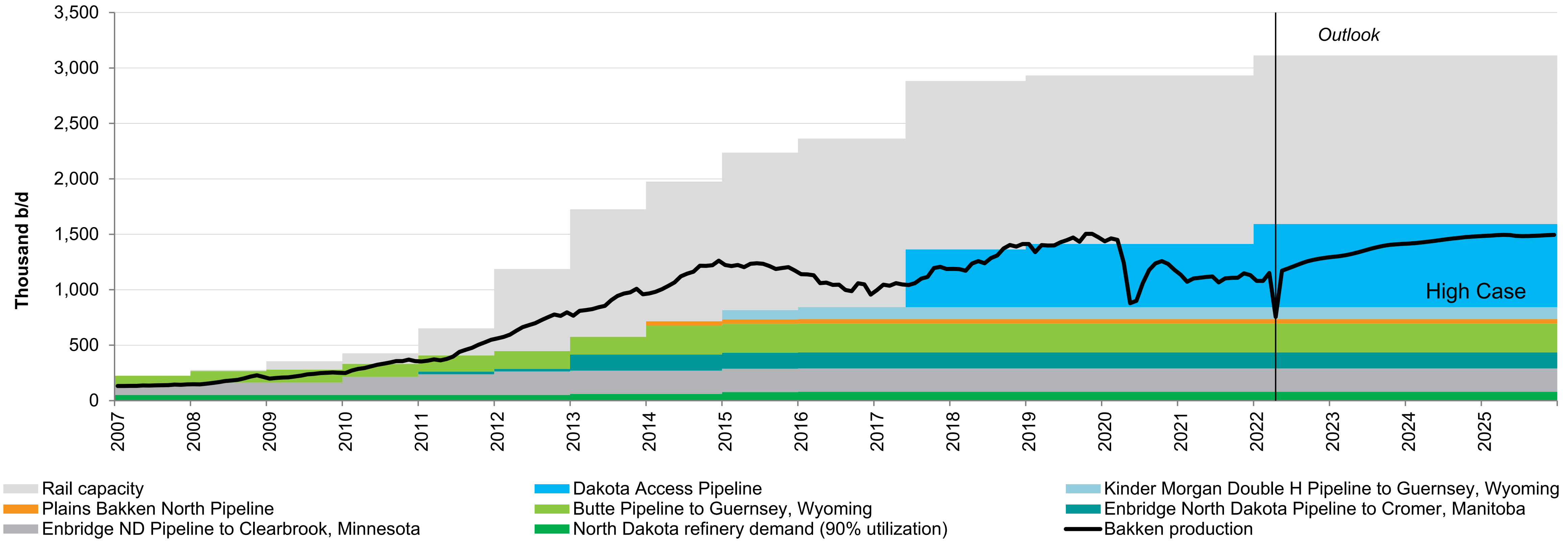
Statewide

- Introduced in 2014, North Dakota Industrial Commission Order 24665 requires oil and gas companies to limit the amount of natural gas that they flare during oil production
- The purpose of this order is to increase the volume of captured gas and reduce the percentage of flared gas as well as incentivize investment in gas capture infrastructure
- Progress has improved greatly as of Feb 2022, 94-95% of gas is already captured and sold in some term
- 1% of gas flared from wells not connected to sales, that could be due to lack of pipelines and 4% implies the current challenge on existing infrastructure

Source: Western Dakota Energy Roundtable 2022 Presentation (LINK)

DAPL is key to the Bakken remaining competitive

Bakken region takeaway capacity (monthly)



Source: IHS Markit

- DAPL Civil Action No. 16-1534 continues, but the courts have now ruled the DAPL can continue its normal operations while waiting for US Army Corps of Engineers (USACOE) to finish its Environmental Impact Statements (EIS).
- A final decision is still expected and should be forthcoming in Spring 2023.
- Permanent shut-down means that eliminating about **570,000** daily capacity which means more oil would be transported by rail, resulting in an increase of about $8-9 / bbl

Bakken oil play highlights and conclusions

Some large independents and globals have a portion of their portfolios in the Bakken, but the play is mostly dominated by mid-sized and small companies

- Compared to other tight oil plays, the Bakken is relatively mature; consequently, less drilling by smaller operators is occurring there and larger companies are likely to divest sometime in the future
- The Bakken accounted for about 10% of the total US production this year - current production 1.05 - 1.1 MMbbls/d and 3.0 bcf/d

We anticipate continued recovery and near-term growth in the Bakken play

- Of the nearly 17.6 Bn bbls of remaining technical resource, about 11.8 breaks even at under $60/bbl; however, much of the future production will come from non-core areas (Tiers 3 – 5)
- Investment in the Bakken and other plays over the next two years is expected to recover from the 2020 price crash with monthly new wells coming online averaging 85 . The DUC inventory of 447 wells will contribute 10-20 DUCs per month through 2025
- Despite the pause in production increase due to the COVID-19 price collapse, long-term production from the Bakken is expected to grow by about 0.125 MMbbls through 2023 and 2024 from the current rate of 1.05 – 1.1 MMbbls/d.
- In the longer-term production will level out at around 1.25 MMbbls/day as DUCs are used up and lower tier acreage contributes more and more to the forecast

Possible risks to future drilling and production in the Bakken

- Accelerated Energy Transition - Adaption of electric vehicles in the US will significantly reduce gasoline demand for the base case, but more especially accelerated energy transition; Over the long term, US unconventional resources will be disproportionately affected as oil prices could drop as low as $20-30/bbl
- If a permanent shut-down of the Dakota Access Pipeline were to occur, approximately 570 Kbbls/d would need to be transported by rail resulting in a nearly $8-9/bbl differential to WTI
- Labor shortages and lack of gas take-away may cause short-term disruptions

Agriculture Outlook

Key Considerations

- Corn, wheat and soybean area expected to increase in 2023/24 with largest increase in wheat.
- Major crop prices to decline in 2023/24 but remain relatively high compared with historical averages.
- Farm income to decrease in 2023 but will still be high compared with historical averages.
- Inflation makes inputs more costly.
- Interest rates likely to continue to increase.
- Sustainability becoming a greater focus.
- Strong US dollar makes US exports less competitive.
- Black sea shipping concerns with continuation of Ukraine-Russia war.
- Renewable diesel production to continue to drive crush.
- Will consumer demand continue to strengthen?
- Cattle production to continue in contraction phase.

US farm income and balance sheet outlook

Farm income forecast to drop in 2023 but remain higher than historical averages

US Farm Income

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
(Billion Dollars)												
Cash income statement:												
Cash receipts from farm marketings												
Crops	195.8	194.9	194.9	191.7	199.1	240.0	279.0	263.2	241.9	232.5	233.3	235.2
Livestock	162.7	175.6	176.3	175.6	164.4	195.8	255.4	236.2	225.9	231.7	234.5	240.5
Direct government payments	13.0	11.5	13.7	22.4	45.6	25.9	16.5	6.6	6.8	7.2	7.3	7.3
Gross cash income	399.4	413.2	414.0	424.4	443.3	494.0	596.1	540.7	507.4	504.2	507.9	516.1
Cash expenses	303.8	311.9	311.4	317.3	326.5	345.4	405.8	416.6	396.0	383.9	380.5	383.8
Net cash income	95.6	101.3	102.6	107.1	116.8	148.5	190.3	124.1	111.4	120.3	127.4	132.4
Net Farm Income	62.3	75.1	81.0	79.2	94.4	141.0	164.8	115.3	99.5	105.8	111.7	115.7

Note: Shaded years are forecasts

Source: S&P Global Commodity Insights

- Although net farm income is expected to decrease in 2023/24 it is expected to continue above historical averages.
- Lower crop prices are the main driver behind the expected drop in cash receipts.
- Cash expenses are expected to continue high.

US farm balance sheet is expected to be largely stable

Balance Sheet of the US Farming Sector

	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
(Billion Dollars)												
Farm Assets	2914.4	3005.9	3026.7	3075.1	3174.6	3497.6	3872.1	3855.4	3821.2	3758.2	3804.1	3865.2
Farm Liabilites	374.2	390.4	402.6	420.5	441.3	474.1	521.0	517.7	513.8	507.8	512.2	518.8
Farm Equity	2540.3	2615.5	2624.1	2654.7	2733.4	3023.5	3351.1	3337.7	3307.3	3250.4	3291.9	3346.4
Debt/Equity Ratio	15%	15%	15%	16%	16%	16%	16%	16%	16%	16%	16%	16%
Debt/Asset Ratio	13%	13%	13%	14%	14%	14%	13%	13%	13%	14%	13%	13%

Note: Shaded years are forecasts

Source: S&P Global Commodity Insights

- Farm assets are expected to moderate slightly in 2023.
  - Farm assets are largely driven by changes in farm real estate, but also include livestock and poultry, machinery, crops stores, and other purchased inputs
- Farm liabilities (largely from real estate) are expected to decrease moderately in 2023 but still be the second highest on record.
- Total farm equity and debt/equity ratios are expected to remain largely stable to 2023.

Soybean and product outlook

US soybean crush supported by renewable diesel demand

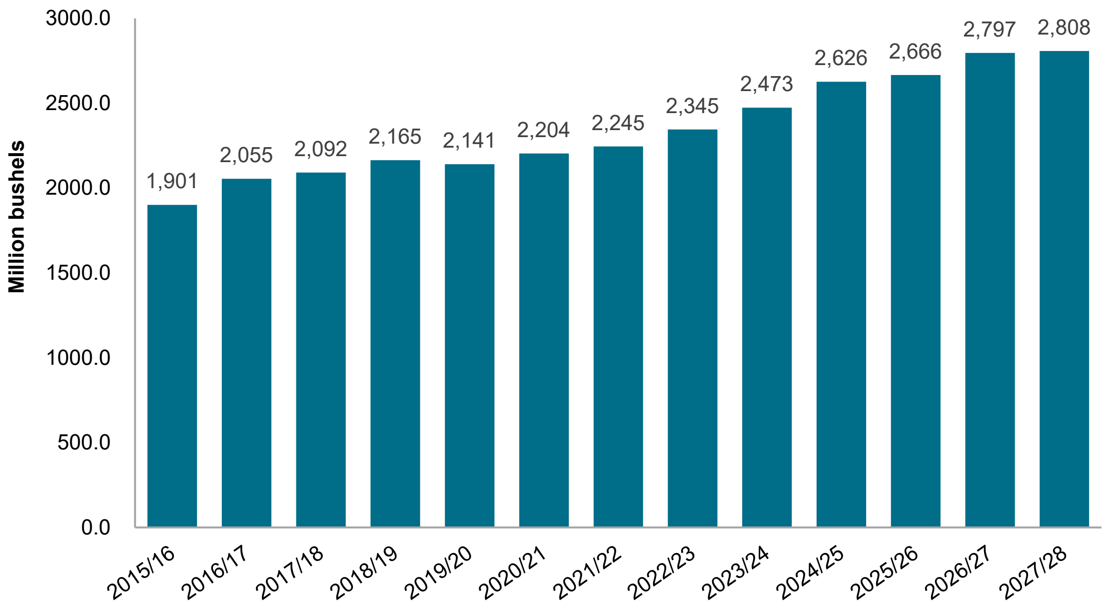
U.S. SOYBEAN COMPLEX FUNDAMENTALS

	2022	2023	2024	2025	2026	2027
Planted Area (mil. acres)	87.5	88.0	89.1	88.4	86.4	84.6
Harvested Area	86.3	87.2	88.2	87.6	85.6	83.8
Harvested Yield (bu/acre)	49.5	52.7	52.8	53.3	53.9	54.5
Beginning Stocks (mil bu)	272	213	329	666	636	643
Production	4276	4594	4656	4669	4611	4567
Imports	15.0	20.0	20.0	20.0	20.0	20.0
Total Supply	4563	4827	5005	5355	5268	5230
Crush	2220	2345	2473	2626	2666	2797
Food/Seed/Residual	120	123	132	136	134	133
Total Domestic Disappearanc	2340	2468	2605	2762	2800	2929
Exports	2010	2030	1735	1957	1824	1658
Total Disappearance	4350	4498	4340	4719	4624	4588
Ending Stocks	213	329	666	636	643	642
ES: Use Ratio	5%	7%	15%	13%	14%	14%
Futures Price (per bu)	$ 14.897	$ 13.716	$ 11.495	$ 9.879	$ 10.125	$ 10.506
Farm Price (per bu)	$ 14.45	$ 13.10	$ 10.88	$ 9.26	$ 9.51	$ 9.89

Note: Shaded years are forecasts

Source: S&P Global Commodity Insights

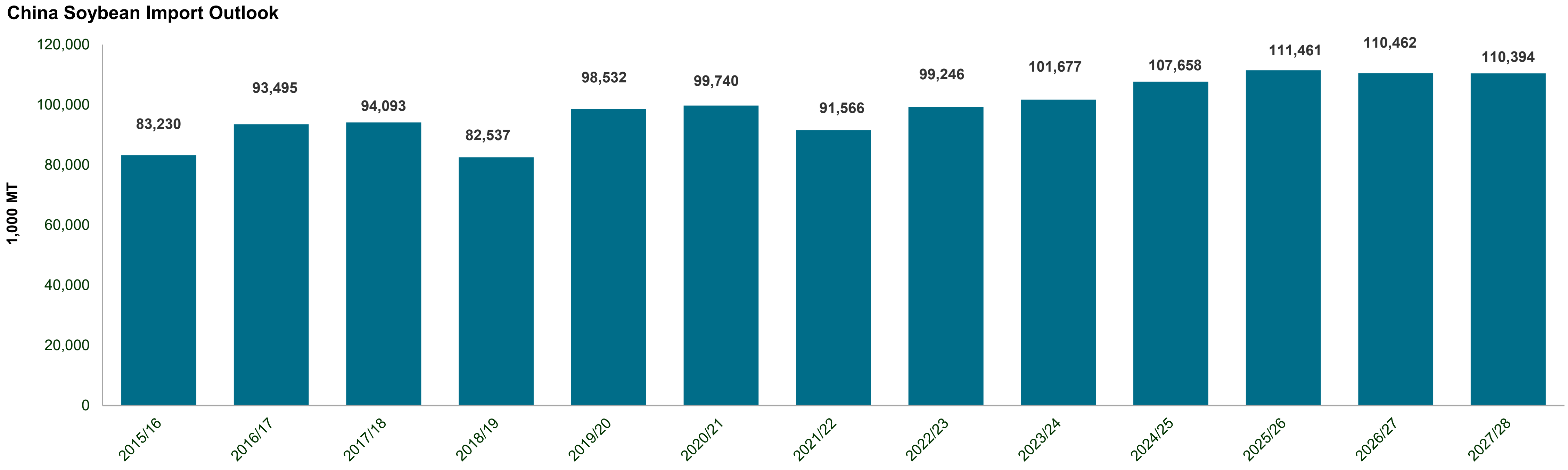
US soybean crush outlook



Source: S&P Global Commodity Insights

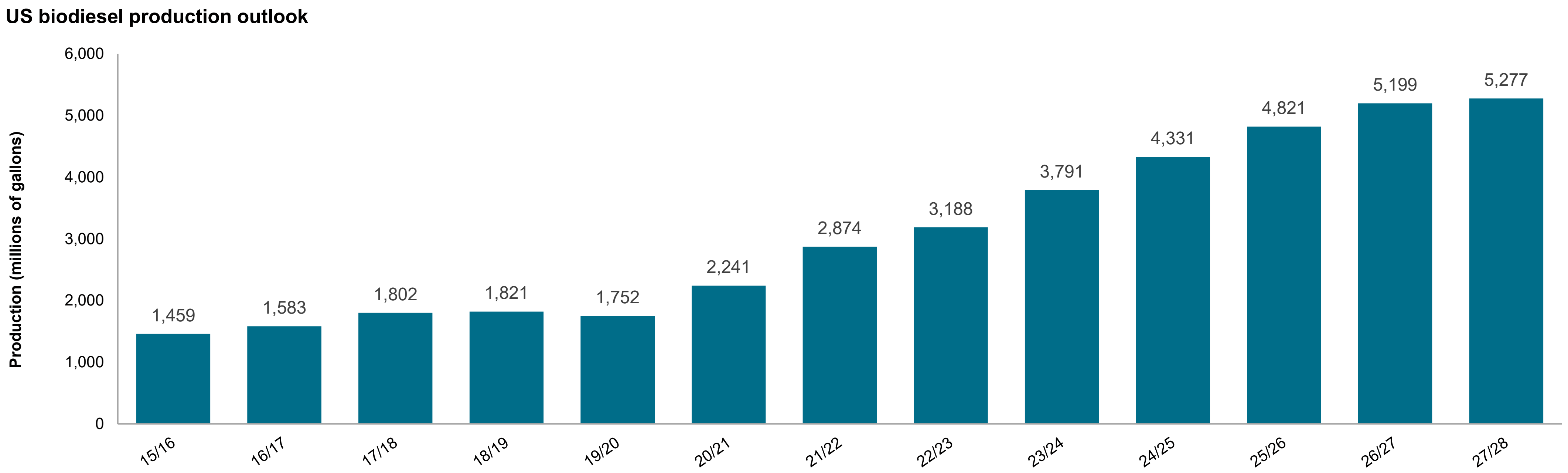
- In 2023/24, US farmers are expected to plant 88.4 million acres, slightly above the previous year as the corn/soy price ratio favors corn.
- US soybean crush is expected to continue to be supported by strong domestic renewable diesel demand.
- US soybean exports are forecast at 2.0 billion bushels in 2023/24 but are expected to face increased competition from crush and South American exportable supplies.

China soybean imports expected to resume moderate growth



- Lower crush margins and weak domestic consumption as a result of COVID-19 reduced China's soybean crushing in 2021/22.
- China soybean imports for 2023/24 are expected to reach 101.6 MMT and continue to grow at an 1.6% average annual rate, reaching 110-111 MMT by 2027/28.
- China's domestic crop is expected to remain small, maintaining the need for imports.

US biodiesel production expected to continue strong growth



Source: S&P Global Commodity Insights

- Biodiesel production is expected to increase sharply due to strong demand and reach a record high of 5.28 billion gallons in 2027/28.
- Soybean oil is expected to remain the more dominant feedstock in the US.
- Sustainable aviation fuel (SAF) presents an additional upside to growth-particularly after 2030.

Corn outlook

US corn production, exports, and ethanol use recovering

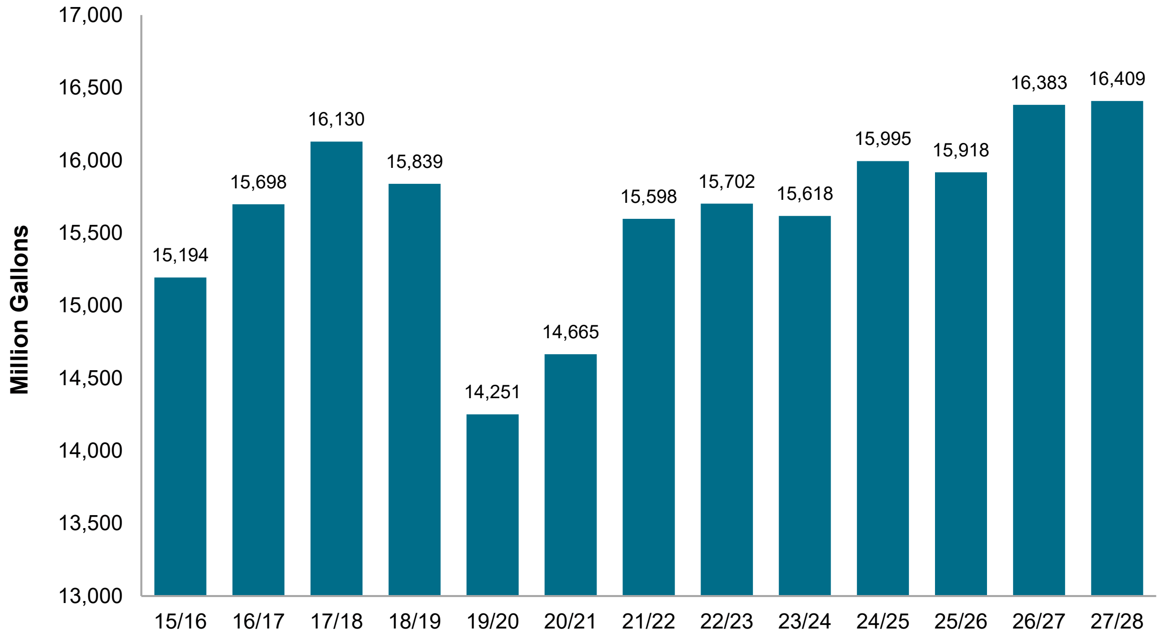
U.S. CORN FUNDAMENTALS

	2022	2023	2024	2025	2026	2027	2028
Planted Area (mil. acres)	88.6	90.5	91.2	92.6	89.9	87.9	88.5
Harvested Area	79.2	82.8	83.5	84.8	82.4	80.6	81.1
Harvested Yield (bu/acre)	173.3	180.5	180.8	182.8	185.3	187.7	189.7
Beginning Stocks (mil. bu)	1,374	1,305	1,802	1,840	2,119	2,288	2,343
Production	13,730	14,939	15,089	15,504	15,265	15,118	15,380
Imports	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Total Supply	15,144	16,284	16,932	17,385	17,423	17,446	17,763
Feed Use/Residual	5,275	5,600	5,709	5,760	5,599	5,584	5,686
Food/Seed/Industrial	6,689	6,731	6,889	6,862	7,017	7,032	7,042
Ethanol	5,250	5,282	5,418	5,390	5,548	5,556	5,556
Other Food/Seed/Industrial	1,439	1,449	1,471	1,472	1,469	1,475	1,486
Total Domestic Disappearanc	11,964	12,331	12,598	12,622	12,616	12,616	12,728
Exports	1,875	2,150	2,493	2,644	2,519	2,487	2,558
Total Disappearance	13,839	14,481	15,091	15,266	15,135	15,103	15,286
Ending Stocks	1,305	1,802	1,840	2,119	2,288	2,343	2,477
ES: Use Ratio	9%	12%	12%	14%	15%	16%	16%
Futures Price (per bu)	$ 6.30	$ 5.29	$ 4.72	$ 4.82	$ 4.90	$ 4.80	$ 4.70
Farm Price (per bu)	$ 6.30	$ 4.90	$ 4.34	$ 4.44	$ 4.51	$ 4.42	$ 4.32

Note: Shaded years are forecasts

Source: S&P Global Commodity Insights

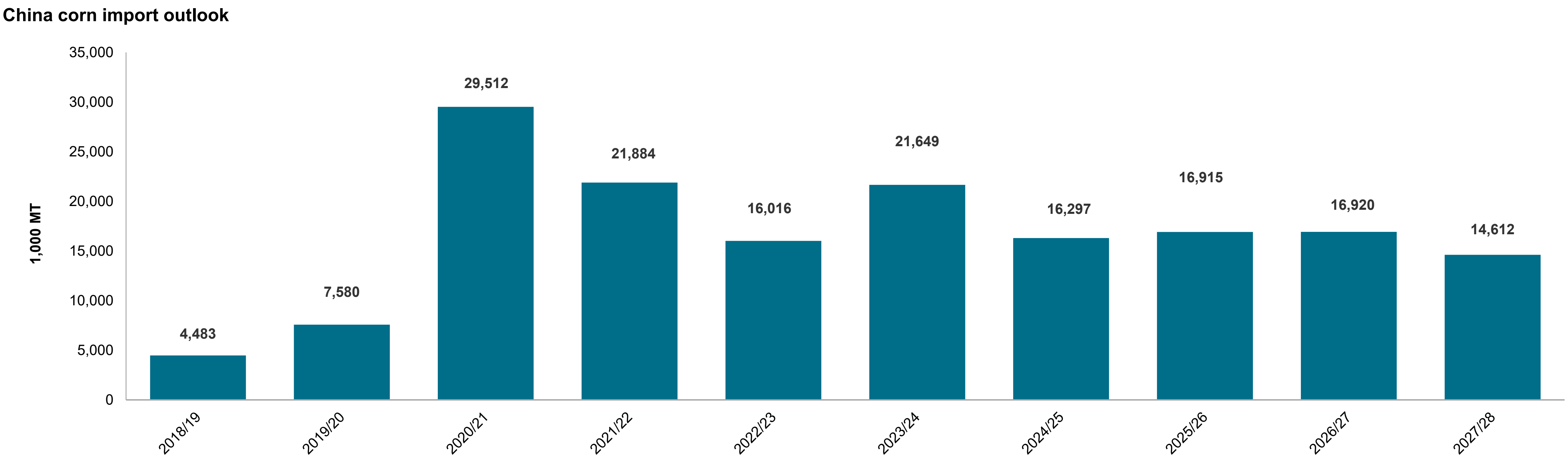
US ethanol production outlook



Source: S&P Global Commodity Insights

- US corn production for 2023/24 is forecasted at 14.9 billion bushels, 1.9 billion above the previous year based on increased plantings. Corn exports are expected to rebound in 2023/24 to 2.15 billion bushels and continue to increase through 2027/28.
- Corn prices remain elevated from global supply disruptions but are forecasted to moderate to $4.90/bushel.
- Corn for ethanol use is expected to increase slightly during the forecast period.

China’s corn imports will remain elevated after a record year



Source: S&P Global Commodity Insights

- China’s corn imports more than tripled in 2020/21 as a domestic supply crunch led to stockpiling for feed ingredients.
- For 2023/24, China’s corn imports are forecast at 21 MMT and continue roughly at that level through 2027/28.
- A strong US dollar is making Brazil exports more competitive than US corn exports.

Wheat outlook

US wheat supply/demand outlook

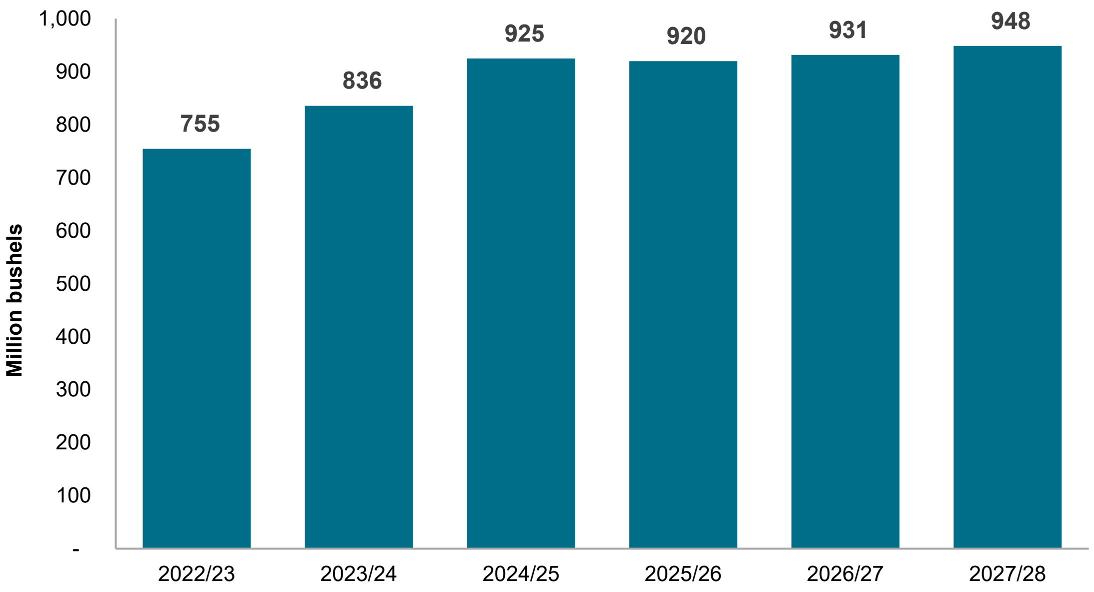
U.S. WHEAT FUNDAMENTALS

	2022	2023	2024	2025	2026	2027
Planted Area (mil. acres)	45.7	49.8	46.2	45.5	47.5	47.5
Harvested Area	35.5	39.7	37.4	36.7	38.5	38.6
Harvested Yield (bu/acre)	46.5	47.7	50.5	50.9	51.3	51.7
Beginning Stocks (mil. bu)	698	596	651	643	634	680
Production	1,650	1,892	1,890	1,870	1,973	1,993
Imports	125	110	105	107	104	102
Total Supply	2,473	2,598	2,645	2,620	2,711	2,775
Feed Use/Residual	80	79	52	39	65	79
Food/Milling and Seed	1,043	1,033	1,025	1,027	1,034	1,039
Total Domestic Disappearanc	1,123	1,112	1,077	1,066	1,100	1,118
Exports	755	836	925	920	931	948
Total Disappearance	1,877	1,948	2,002	1,986	2,031	2,067
Ending Stocks	595.8	650.8	643.1	634.2	680.3	708.3
ES: Use Ratio	0.3	0.3	0.3	0.3	0.3	0.3
KCBT Futures Price (per bu)	$ 8.95	$ 6.69	$ 6.20	$ 6.50	$ 6.18	$ 6.03
Farm Price (per bu)	$ 8.96	$ 6.62	$ 6.12	$ 6.43	$ 6.10	$ 5.95

Note: Shaded years are forecasts

Source: S&P Global Commodity Insights

US wheat export outlook



Source: S&P Global Commodity Insights

- US wheat area is expected to increase sharply in 2023/24 and production is forecast to increase from 1.65 billion bushels in 2022/23 to 1.89 billion bushels in 2023/24.
- US wheat exports are forecast to increase to 836 million bushels for 2023/24.

Cattle and beef outlook

Supply constraints continue in US cattle with herd liquidation

US Cattle Sector Fundamentals	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Item												
Cattle												
Beef Cow Inventories (Jan 1, million head)	30.166	31.213	31.466	31.766	31.339	30.844	30.125	29.200	29.042	29.783	30.110	30.293
Boxed beef cutout (dollars per cow)	206.77	209.90	213.97	222.62	238.93	279.26	263.88	272.66	274.30	274.08	271.35	271.39
Beef												
Beef retial price (Dollars per pound)	$ 5.96	$ 5.91	$ 5.92	$ 6.04	$ 6.38	$ 7.25	$ 7.59	$ 7.80	$ 7.78	$ 7.46	$ 7.35	$ 7.33
Production (mil lbs)	25,221	26,228	26,867	27,148	27,153	27,938	28,290	27,250	26,147	27,145	27,563	28,058
Imports (mil lbs)	3,015	2,993	2,999	3,057	3,342	3,311	3,375	3,438	3,240	3,190	3,175	3,158
Exports (mil lbs)	2,556	2,860	3,155	3,022	2,956	3,446	3,547	3,393	3,312	3,177	3,165	3,313
Domestic use (mil lbs)	25,673	26,371	26,665	27,167	27,484	27,828	28,105	26,694	26,104	27,125	27,556	27,886

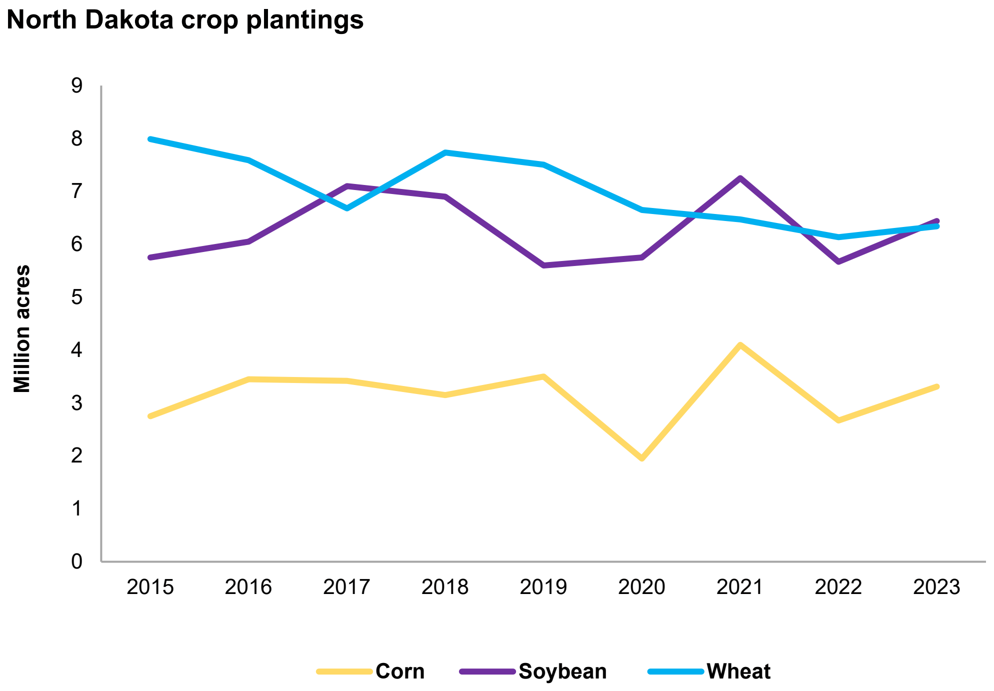
Note: Shaded years are forecasts

Source: S&P Global Commodity Insights

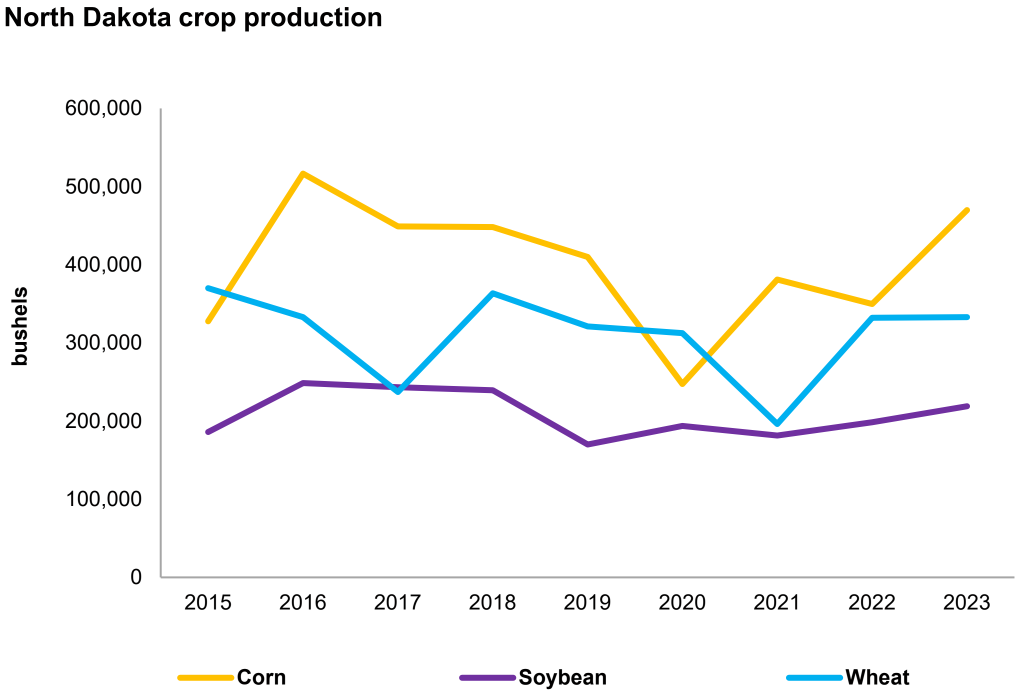
- Supply constraints continue to persist in US cattle as herd liquidation rates continue to be strong, while drought conditions continue to hamper production and boost input costs.
- Although labor shortage issues have improved, this supply hurdle continues to have an overall negative impact on production output. US beef production is forecast to be relatively flat through 2027.
- After experiencing growth in recent years, US beef exports in 2023 are set to decline as supplies face challenges.
- However, demand is to remain firm to keep prices supported. In 2024 retail beef prices are anticipated to remain strong.

North Dakota outlook

Corn expected to continue to be North Dakota's most produced crop in 2023/24



Source: S&P Global Commodity Insights



Source: S&P Global Commodity Insights

- For 2023/24, North Dakota corn and soybean plantings are expected to continue to increase while wheat planted area is largely flat and slightly below soybean planted area.
- Higher corn yields vis-à-vis soybeans and wheat point to larger corn production, estimated in crop year 2023/24 at 470k bushels (vs. 219k bushels of soybeans and 333k bushels of wheat).