Economic Impact Assessment of Canadian Conventional Oil and Gas

Energy Transition Consulting

Economic and Country Risk Consulting

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S&P Global
Commodity Insights

Significant investment in the conventional oil & gas sector is expected between 2024 and 2035 to meet oil & gas demand and decarbonization efforts & policies

Key takeaways

Conventional upstream activity, estimated at **$519 billion** between 2024 and 2035, has a Canadian GDP contribution[1] of **$1.2** Trillion, or **2.4x** every dollar spent

- S&P Global forecasts conventional oil & gas **production growth of 0.8%** YoY from 5.4 Mboe/d in 2023 to 5.9 Mboe/d in 2035 – under the Reference Case, absolute **emissions fall by 8**%[4] between 2024 and 2035
- Spend in production and infrastructure CAPEX and OPEX between 2024 and 2035 could total **$519 billion**
- This investment provides **$627 billion** of spend-based GDP contribution[1], **$588 billion** of estimated oil & gas export sales and **$102 billion** of estimated royalties – and supports **347 thousand** jobs annually[5]

8% higher production by 2035, under a high case, leads to an additional **10%** growth in spend and **9%** growth in GDP

- Canada is strategically positioned to deliver LNG to East Asian countries (largest demand-growth region) as shipping costs and delivery times are lower relative to other relevant exporters
- The Montney play holds 300 TCF of natural gas resources beyond producing assets, that are economic at US$2.5/MMBtu – this is equivalent to ~20 additional LNG trains[3]
- Through debottlenecking, existing gas pipelines and LNG export capacity, Canada's production could be **8% higher** than the Reference case and drive an additional **10% growth in spend** and **9%**, or **$105 billion**, of sales & export-based GDP (and added royalty revenue)

A production cut driven by a **stringent 40%** emission cap[2] could cause **$75 billion** lower upstream spend and **$247 billion** lower GDP contribution[1] (vs. Reference Case)

- With a stringent 40% emissions cap by 2030 relative to 2021 in oil & gas, S&P Global estimates that total conventional production could be **17% lower than Reference Case** between 2024 and 2035
- This leads to a 14% reduction of investments in conventional oil & gas through production shutdown of higher OPEX wells, lesser drilling activity in the most expensive areas and additional decarbonization investments (such as CCS and additive methane reductions on existing facilities)
- The production cuts impact spend-driven GDP (- $92 billion) and oil & gas exports (- $155 billion)

1. GDP contribution includes both spend-driven GDP (supply chain) and Export sales for non-domestic oil & gas sales (transported by pipeline to USA or liquefaction terminals)
2. Emissions cap of 40% reduction by 2030 relative to 2021, that gradually increase to reach net zero by 2050; Resulting in 55% reduction relative to 2021 by 2035 for the oil and gas sector as a whole (including oil sands).
3. Estimated considering if all 157 Tcf (discounting 143 Tcf expected to be produced in the Reference case until 2050) were allocated in 7 Mpta trains (using LNG Canada as a reference) requiring ~1 Bcf/d of natural gas for 20 years of operations.
4: In the Reference case limited spend is allocated to decarbonization – under CAPP guidance, SPGCI excluded decarbonization spend in electrification, CCS and additive methane reductions on existing facilities from Reference Case as proposed policies not final.
5. Direct, indirect and induced jobs
Source: S&P Global Commodity Insights

CAPP engaged S&P Global to quantify the impact of different conventional oil & gas production scenarios on the Canadian Economy through supply chain and export sales

Context

- The oil & gas industry is a key contributor to Canada's GDP, labor market, and exports
- The sector is subject to increasing pressures to decarbonize its operations
- This analysis did not assume financial impact associated with oil & gas producers' emissions profiles

Objective

- Create three production scenarios and evaluate impact on related investment spend by producers
  - These scenarios **exclude** any oil sands investments or economic impact evaluation
  - GHG emissions are derived from Canada's National Inventory Report data (NIR)
  - Estimate the economic impact of the various production scenarios on the Canadian Economy (GDP contribution defined as supply chain induced and based on oil & gas export revenue)[1]

Scenarios

1 Reference case

- Conventional Oil & Gas production to 2035 based on S&P Global base case production forecast
- Conventional oil & gas production reaches **5.9 Mboe/d** by 2035 from **5.4** Mboe/d in 2023

2 High case[2]

- Conventional Oil & Gas Production is **8%** higher than Reference case by 2035
- Incremental gas production is exported from additional LNG terminals

3 Stress case[2]

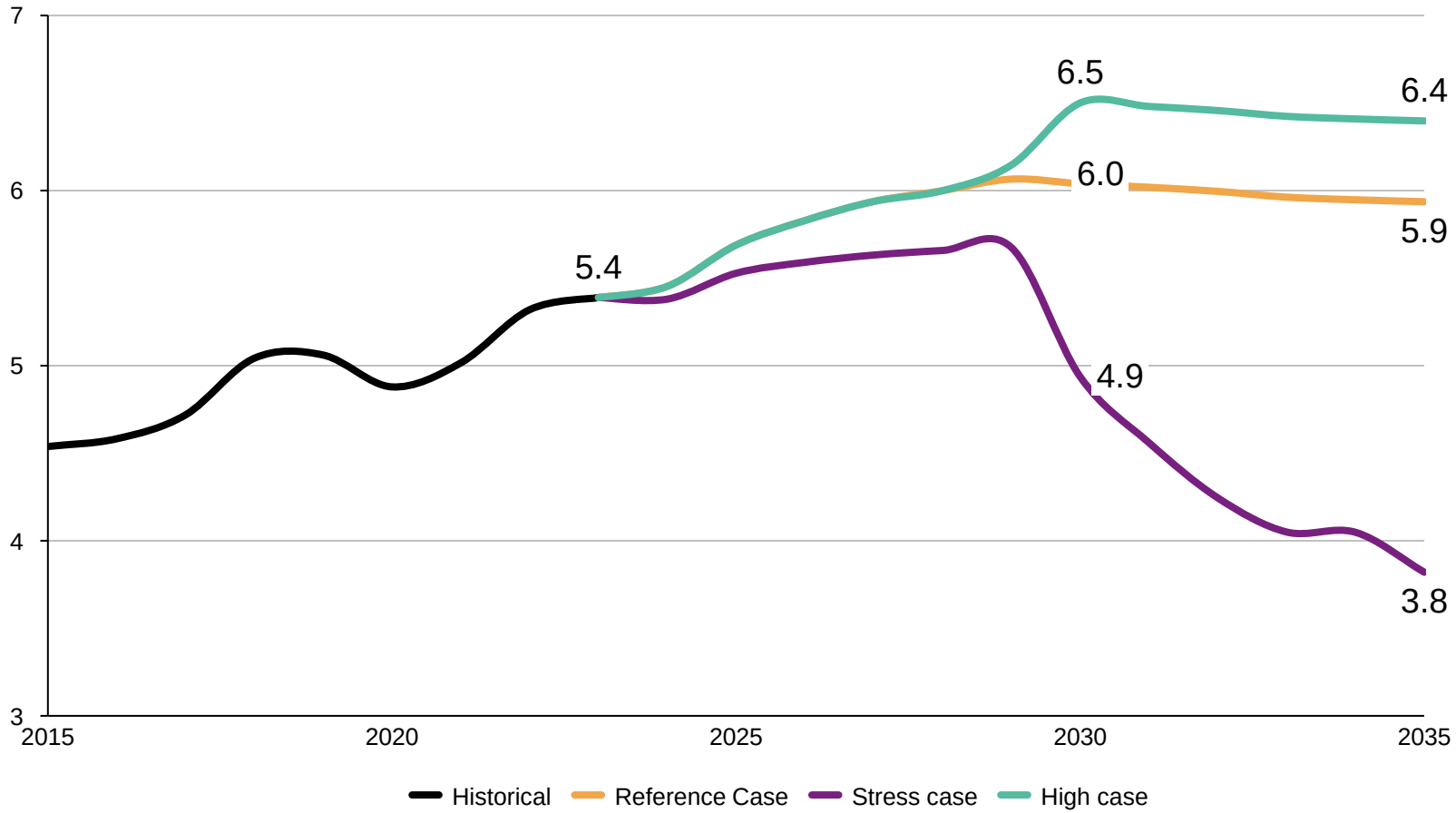
- Mandated emissions reduction of **40%**[3] in 2030 compared to 2021, gradually increasing to 55% by 2035[4]
- Production cuts are required to meet a stringent emission cap

1. Economic Impact analysis in this report is limited to supply chain and export contribution – economic impact assessment of oil & gas emissions and other environmental impact has not been completed as part of this analysis
2. Hypothetical CAPP defined scenarios – Stress Case assumptions include assumption that every dollar spent on decarbonization efforts is a dollar lost on oil & gas production effort, and that shareholder returns are stable
Emissions cap is for the entire upstream sector, including oil sands
3. Gradual increase in emission reduction target so that sector emissions are net zero by 2050
Source: S&P Global Commodity Insights, NIR (data extracted in March 2024)

Three conventional oil & gas production scenarios were analyzed, leveraging the S&P Global Base Case production scenario for reference case

Conventional oil & gas production scenarios

Million boe/day



High Case

- Additional natural gas production from Montney for LNG exports
- New wells have lower emission intensity due to efficiency increase and best operational practices
- Optimization and expansion of existing gas pipelines

Reference Case

- Conventional production grows[1] until 2027, remaining stable afterwards at ~6Mboe/d
- Growth in natural gas and light oil drive ramp up in production between now and 2030

Stress Case

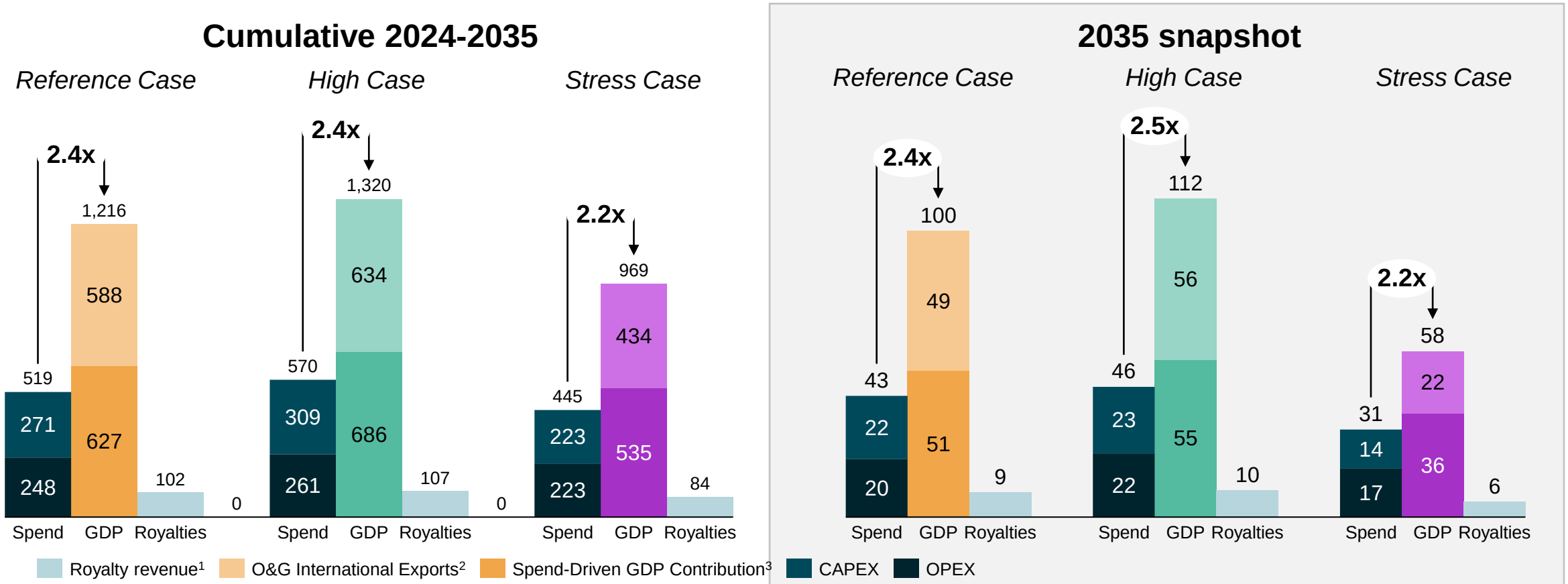
- Emissions reduction mandated for 2030
- Assumes limited electrification and CCS can be implemented for the sector before 2035
- Growth projects are idled before cap is enforced
- Production cuts are required to meet emissions cap in 2030 and beyond to reach net zero by 2050

Note: does not include oil sands.
Note: CAPP informed High and Stress Case production outlook were modeled considering as main assumption a 40% emission reduction by 2030 from 2021. As the cap is for the sector as a whole, oil sands production and emissions reductions were used as input for the conventional oil and gas estimates.
1. Driven by increase in natural gas production for increased exports (mostly LNG), increase in diluent demand and the completion of the TMX oil pipeline, allowing increased oil exports.
Source: S&P Global Commodity Insights

Investment spend in the conventional O&G sectors has a 2.4x multiplier effect on GDP, with a lower production scenario reducing total GDP impact by 20% vs. Ref. case over 2024-35

GDP impact by scenario

Real 2022 billion CAD

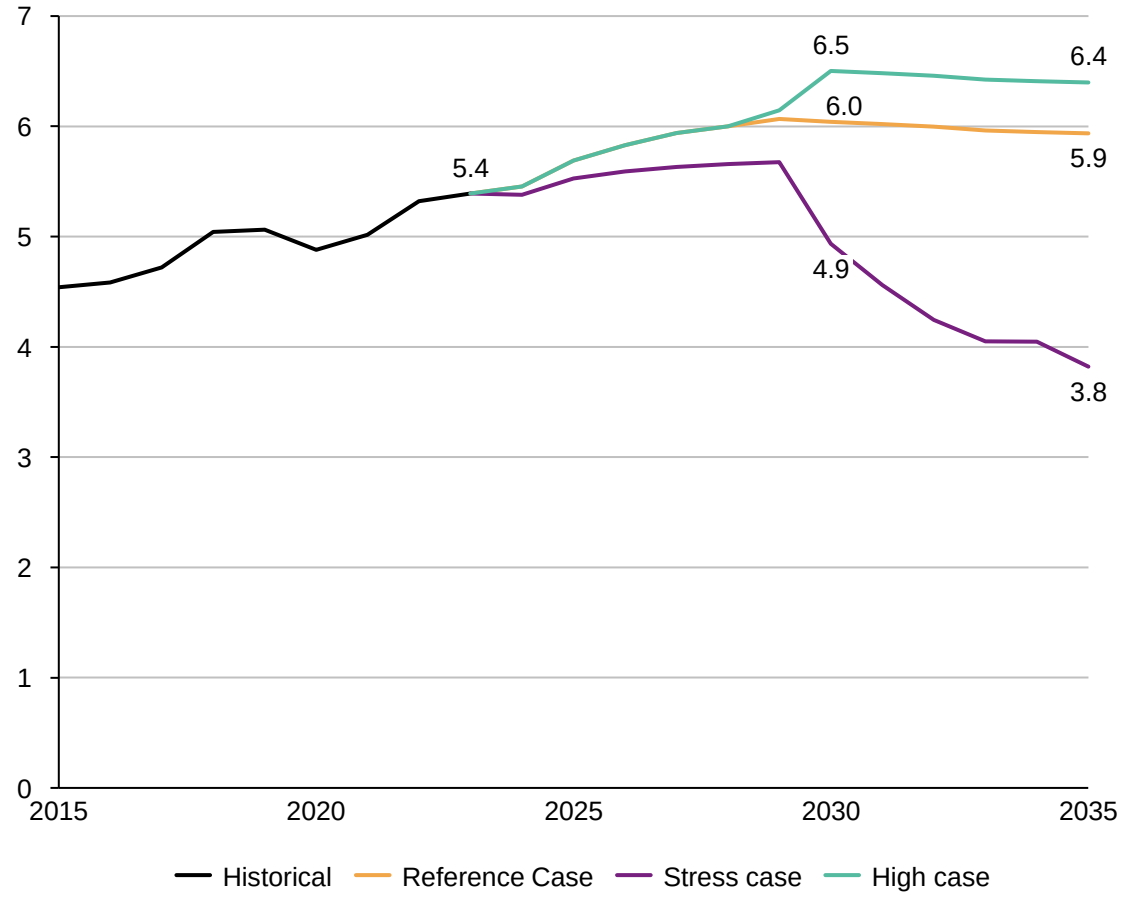


1: Royalty Revenue Averages Used: 6.2% for Heavy Oil, 12.17% for Offshore Oil, 9% for Light Oil, 8% for Natural Gas (based on historical royalty averages, aggregated by commodity); Includes royalties for oil and gas directed to domestic consumption;
2:Export Revenue: WCS price used for oil export (assumed 100% pipeline), LNG export price assumed for natural gas exported via LNG Canada & Woodfibre, and AECO for pipeline gas exports to the US **– excludes Royalty**
The bulk of export revenues received by the O&G companies must be used to cover royalty and tax payments, opex and derive profits. While some wage effects could recycle into the broader economy, quantifying these effects is complicated by the extensive use of contractors (who are paid via opex)
3: GDP contribution driven by upstream spend (production, decarbonization and infrastructure) within Canada
Economic benefits from domestic production & sales (considered an input and intermediate product in refining & petrochemicals), could provide additional indirect benefits to the Canadian Economy
Source: S&P Global Commodity Insights

Key projections summary – the Stress Case scenario with reduction in conventional oil & gas production leads to 14% lower production investments vs. Reference Case

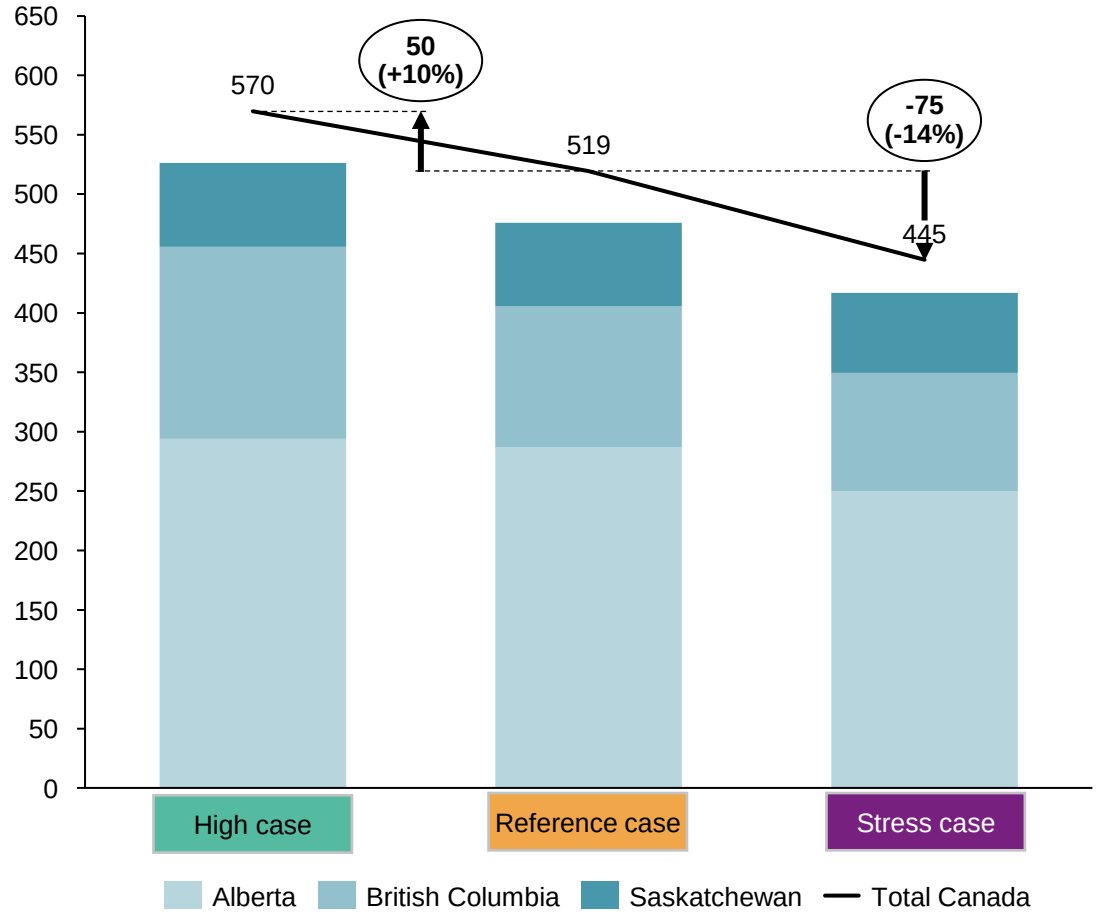
Conventional O&G production[1]

Million boe/day



Total cumulative investments[1]

Real 2022 Billion CAD

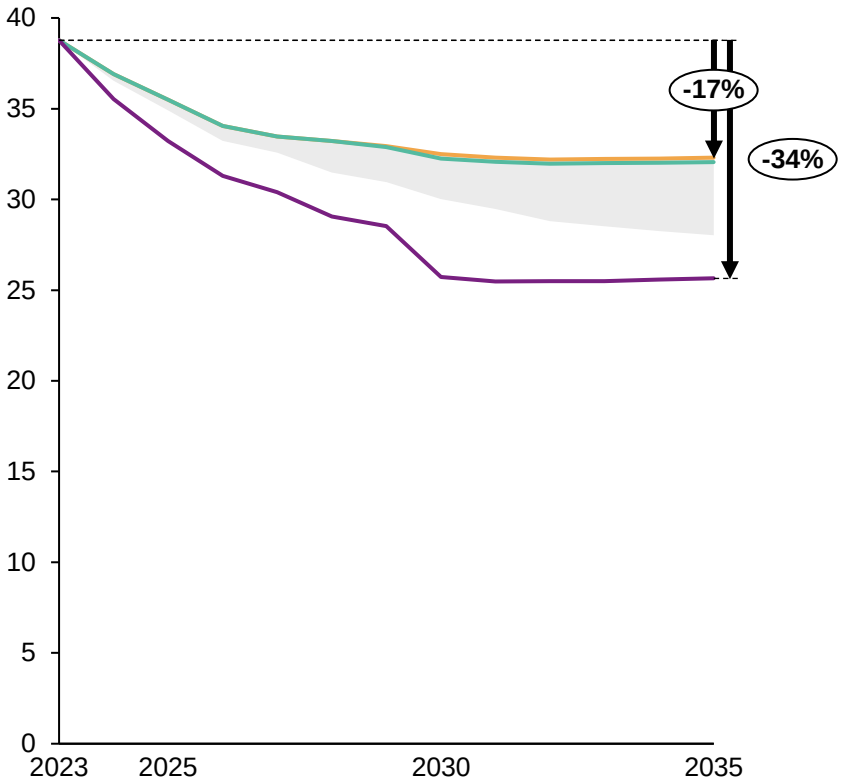


1. Excludes oil sands.
Note: CAPP informed High and Stress Case production outlook were modeled considering as main assumption a 40% emission reduction by 2030 from 2021. As the cap is for the sector as a whole, oil sands production and emissions reductions were used as input for the conventional oil and gas estimates.
Source: S&P Global, Historical emissions from NIR

The sector's GHG emission intensity is expected to decline by at minimum 17% from its 2023 levels under all production scenarios, leading to lower absolute emissions vs. 2023

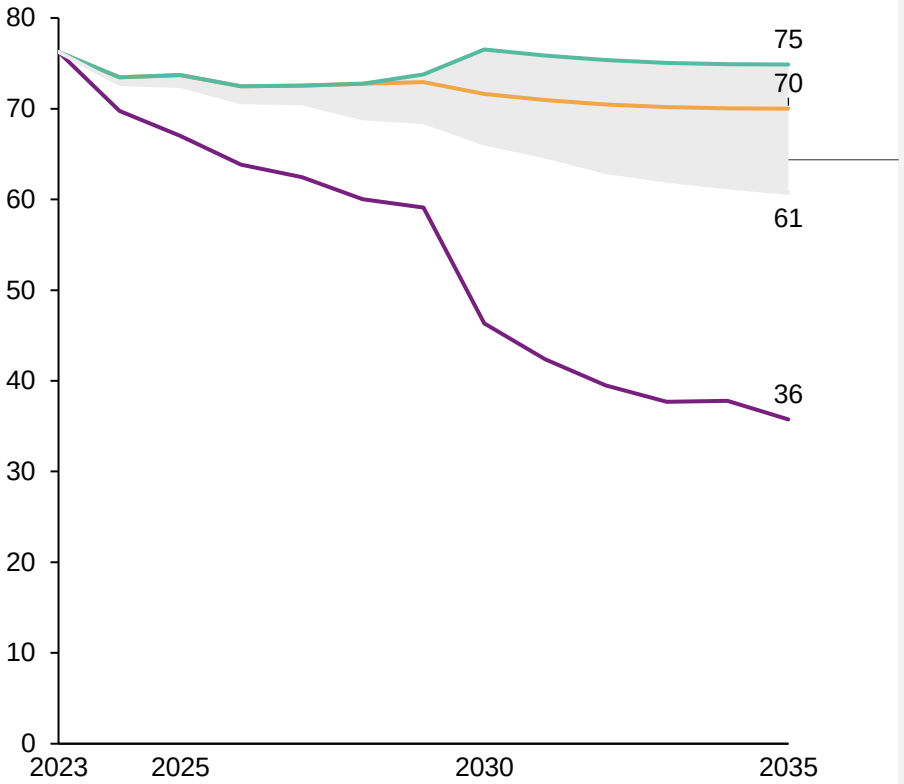
Conventional O&G[1] emission intensity[2]

$kgCO_2e/boe$



Conventional O&G[1] absolute emissions

Million metric tonnes of CO_2e



- The gray range reflects potential emission reduction pathways for the reference case and the high case
- The Reference Case includes assumptions that more aggressive emission abatement technologies are limited to new wells, and only includes partial methane abatement measures
- The lower bound in emissions in the reference and the high case could be attained through the application of additional decarbonization measures, such as 1) more methane abatement measures, 2) CCS and 3) electrification technologies[3]

Reference Case — High case — Stress case

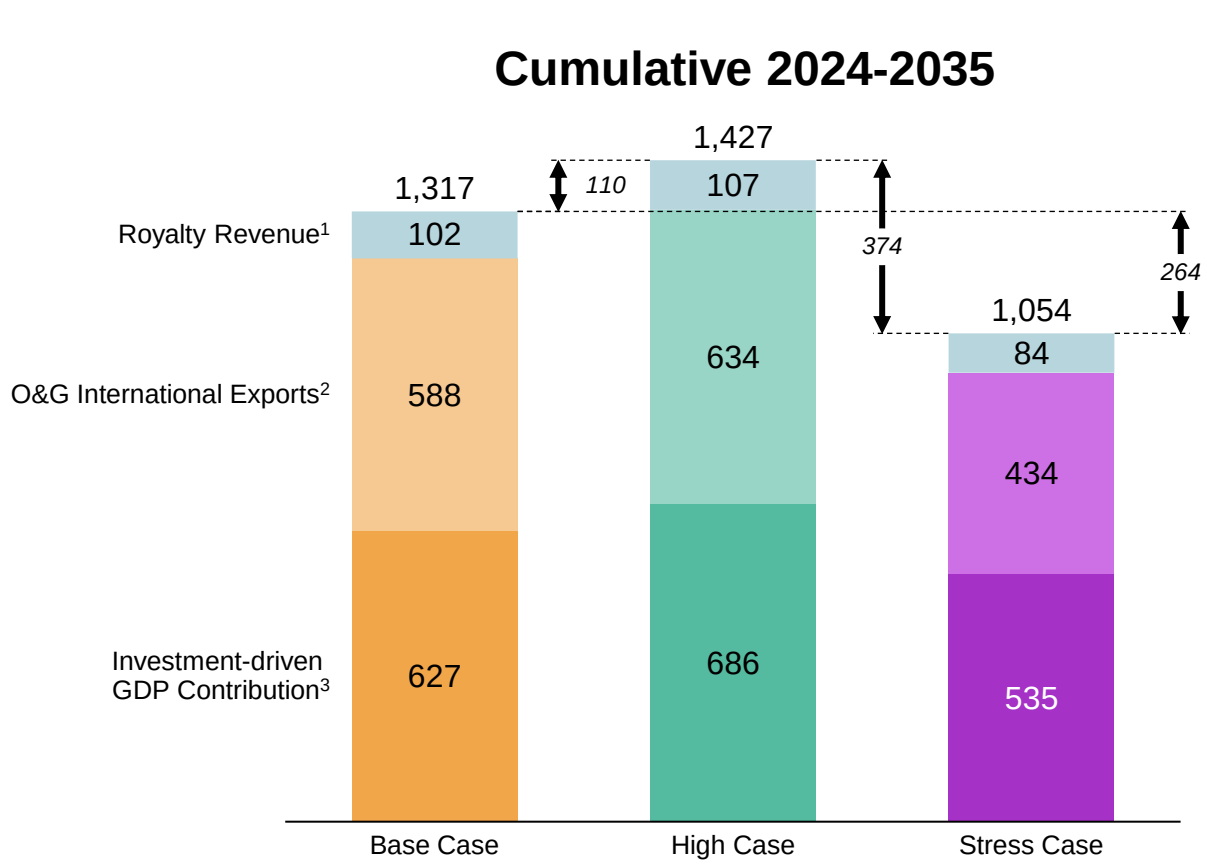
1. Does not include oil sands.
2. Emission intensity for 2021 was calculated using NIR conventional oil and gas (excludes oil sands) reported emissions and S&P Global's reported production. Emissions intensities from 2022 onwards includes implemented abatement measures and efficiency improvements expected for each scenario
3. The lower limit of the range considers 2.5 $MmtCO_2e$ CCS implementation in Alberta ramping up between 2028 and 2030, 100% implementation of general methane abatement measures (LDAR, blowdown capture, replace pumps, installation of flares, vapor recovery units (VRUs), etc.) in new wells and electrification in AB, BC and SK; excludes additive methane reductions on existing facilities. Reference case considers 80% implementation of general methane abatement measures in new wells, no CCS and no electrification.

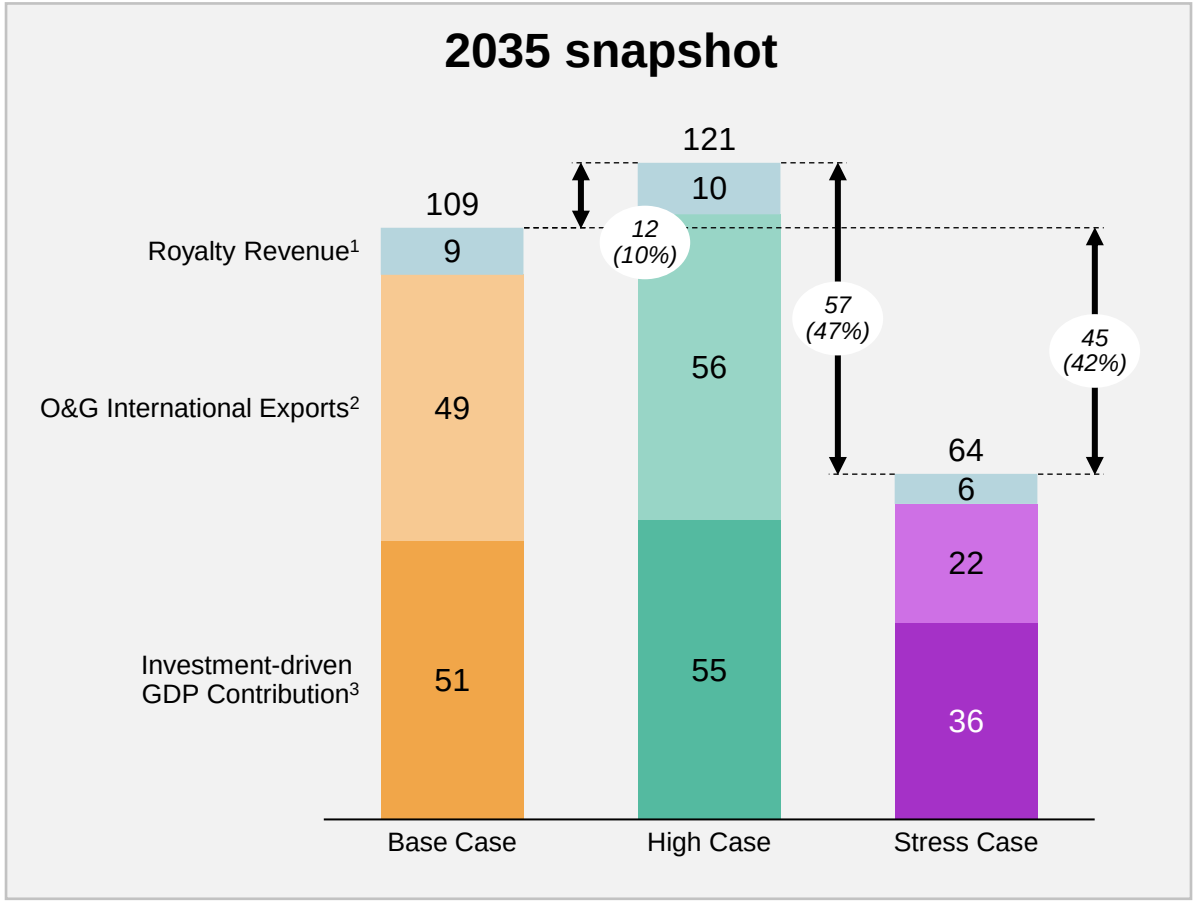
Sources: S&P Global Commodity Insights and NIR (data extracted in March 2024)

The different production scenarios can widen the GDP impact by up to $374 billion over 12 years, with a much more visible impact post 2030 (after the cap takes effect)

Aggregated Economic contribution by scenario

Real 2022 billion CAD





1. Royalty Revenue Averages Used: 6.2% for Heavy Oil, 12.17% for Offshore Oil, 9% for Light Oil, 8% for Natural Gas (based on historical royalty averages, aggregated by commodity); Includes royalties for oil and gas directed to domestic consumption;
2. Export Revenue: WCS price used for oil export (assumed 100% pipeline), LNG export price assumed for natural gas exported via LNG Canada & Woodfibre, and AECO for pipeline gas exports to the US **– excludes Royalty**
3. GDP contribution driven by upstream spend (production, decarbonization and infrastructure) within Canada

Source: S&P Global Commodity Insights

Direct conventional operation and infrastructure investments between 2024 and 2035 have GDP contribution of $1.2 Trillion over the period, with 347+ thousand jobs supported annually

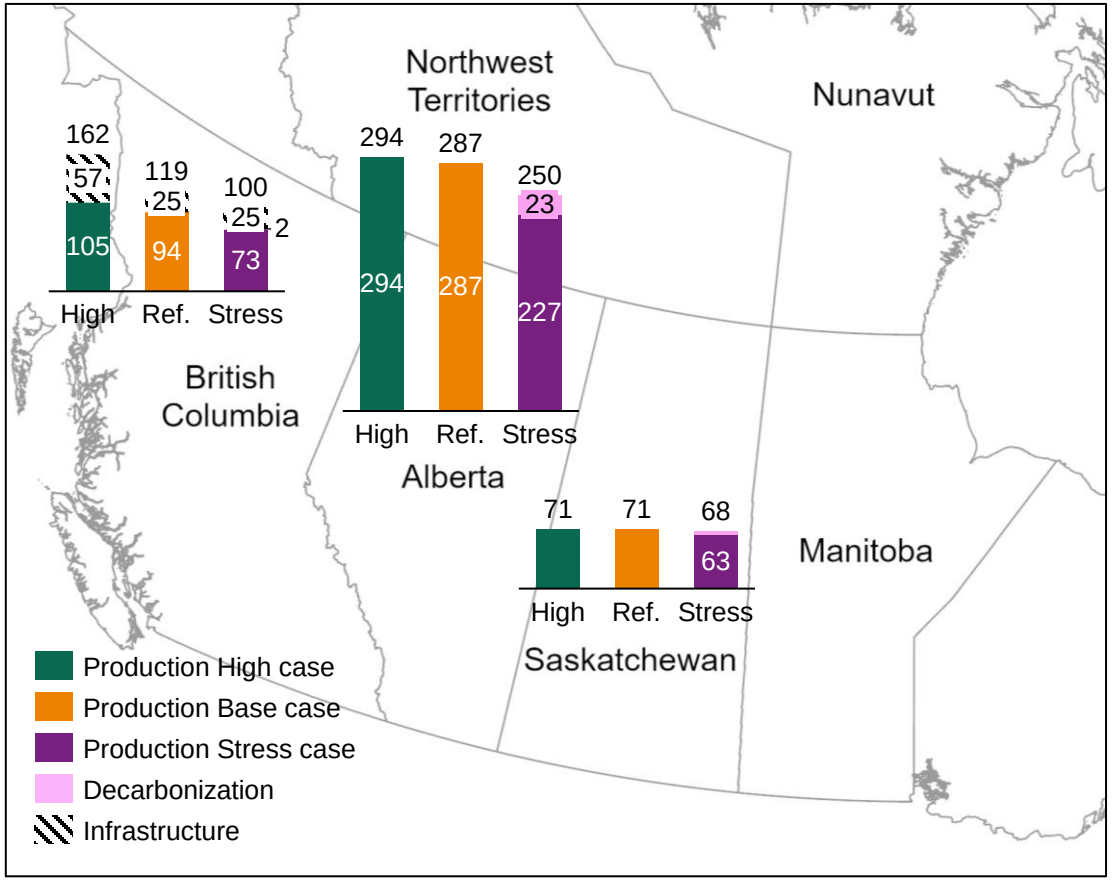
Key takeaways	Reference Case		High Case		Stress Case	
Production (2035)	Conventional oil and gas (excluding oil sands)	**5.9** **Mboe/d**	Additional LNG exports and associated liquids production	**+ 0.5** **Mboe/d**	Mandated emissions reduction leads to production cuts	**- 2.1** **Mboe/d**
Upstream Investments[1]	Production and infrastructure related investments	**519** **Billion CAD**	Increased spend in production, decarbonization and infrastructure	**+ 50** **Billion CAD**	**14%** drop in investment spend[4]	**- 75** **Billion CAD**
Spend- based GDP contribution[1]	GDP creation **~20%** over direct production spend	**627** **Billion CAD**	$9 Billion of net additional GDP contribution beyond the $50 billion spend	**+ 59** **Billion CAD**	GDP decrease by **~15%** compared to Reference case	**- 92** **Billion CAD**
Oil & gas exports[1,2]	Crude oil, pipeline gas and LNG exports	**588** **Billion CAD**	Additional LNG exports via Pacific	**+ 46** **Billion CAD**	Drop in gas & crude oil export sales	**- 155** **Billion CAD**
Employment[3]	Every billion CAD of direct CAPEX and OPEX **will support** over 8,000 jobs	**347** **thousand jobs**	**~11%** additional annual jobs supported	**+ 36** **thousand jobs**	**~15%** fewer jobs supported annually	**- 51** **thousand jobs**

Notes: Does not include Oil Sands
1. Direct, indirect and induced cumulative contribution between 2024 and 2035 (Production investments include some levels of spend in decarbonizing operations)
2. Estimated crude oil, gas and LNG exports vs. commodity price at year n,(detailed calculations in Appendix) - Excludes government royalties on exports
3. Annual averages between 2024 and 2035; GDP and employment are direct + indirect + induced results
4. Assumes capital is fixed and reallocated.
Source: NIR (data extracted in March 2024), S&P Global Commodity Insights

Cumulative spend under the Reference Case totals $519 billion, with the High Case scenario requiring an additional $50 billion spend in infrastructure and production in Western Provinces

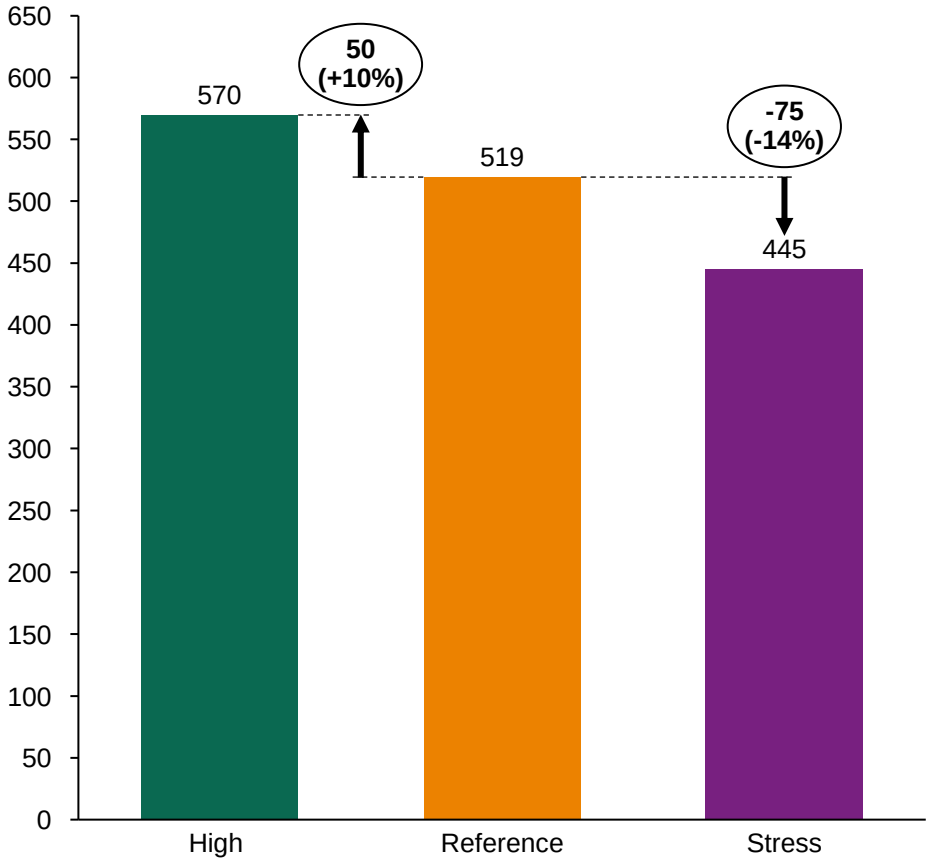
Total 2024-2035 cumulative investment for selected provinces[2]

Real 2022 Billion CAD



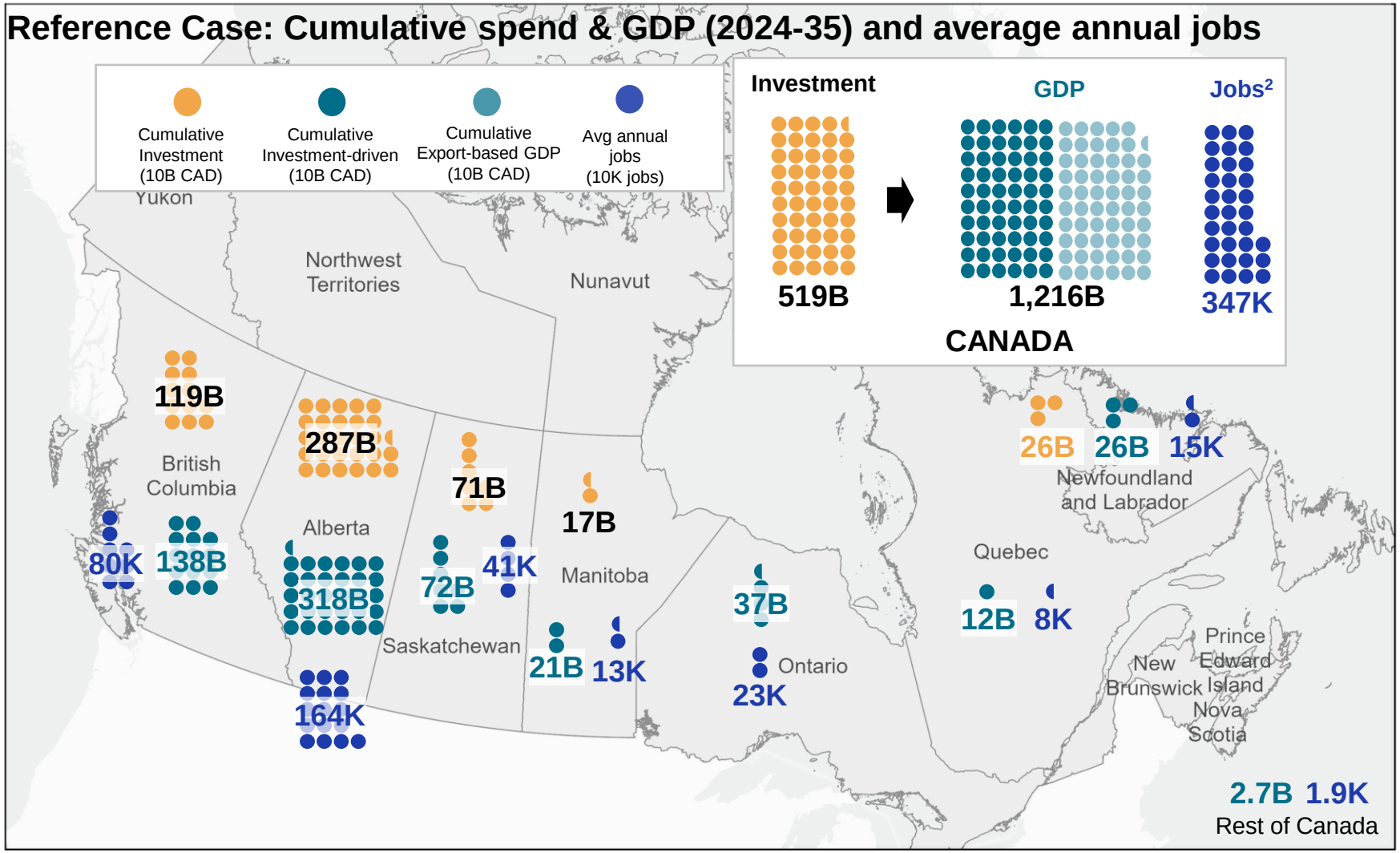
Total investments[1]

Real 2022 Billion CAD



Notes: Total investments in the stress case relative to Reference case are attenuated given the additional decarbonization investments.
1. Cumulative between 2024 and 2035; Includes investments from all provinces.
2. Excludes investments from Ontario, Manitoba and Newfoundland.
Source: S&P Global Commodity Insights

The net impact of conventional investments on GDP and jobs goes beyond the oil & gas producing Provinces, with 8% spend-based GDP and 9% jobs supported out of Province



- Every **1 billion CAD** of investment[1] yields **1.2 billion CAD** of investment-driven contribution to Canadian GDP
- On an annual basis, every **1 billion CAD** of investment supports **8,000 jobs²** across Canada
- Conventional CAPEX and OPEX contributes for **3.6%**[3] of forecasted Canadian GDP and **1.6%** of forecasted jobs from 2024 to 2035
- **~15%** of the economic contributions from investment spend in one producing province **accrue to other provinces** (5% to other producing provinces; 10% to non-producing provinces)[4]

1: Direct Conventional Upstream CAPEX and OPEX
2: Average direct, indirect and induced annual jobs supported; 3. Includes exports
4: Includes cumulative export-based GDP, excludes royalties
Source: S&P Global Commodity Insights

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