



The Economic Importance of New Mexico Oil and Natural Gas Infrastructure

PREPARED FOR
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 - Crude oil, natural gas and natural gas liquids (NGL) production and infrastructure
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 - Prices, capital expenditures, value of production, value added, jobs, and tax revenues

Notes:
M = one thousand
MM = one million
Mbb/d = thousand barrels per day
MMbb/d = million barrels per day
MMcf/d = million cubic feet per day

Introduction

- **ICF estimated future needs for oil and gas infrastructure in New Mexico and related economic impacts in the Base Case.**
- **A second scenario was created based on several factors that could delay infrastructure development:**
 - Major delays in state and federal permitting
 - Statewide environmental policy review
 - Rights of land tenants
 - Environmental activism
 - Regulatory conflicts
 - New environmental regulations
 - More constrained site/route selection
- **Using this Alternative Infrastructure Scenario, ICF estimated the potential economic losses and environmental impacts to the State if that infrastructure were not to be built.**

Specific Work Items Completed for the Study

- **Collect Historical Activity, Income, and Tax Data**
 - This task included the collection of historical data and making calculations to develop historical activity and economic impact estimates.
- **Estimate Base Case Infrastructure Needs**
 - This task included estimating all infrastructure that will be needed over the next ten years to accommodate projected oil and gas production most economically.
- **Develop an Alternative Future Market Scenario**
 - This included conceptualizing the Alternative Scenario and estimating the infrastructure buildout and energy market impacts consistent with that scenario. The same infrastructure items as describe in the Base Case were also estimated in the Alternative Case.
- **IMPLAN Economic Impact Modeling for New Mexico**
 - This task included all of the work related to running the IMPLAN model to develop estimates for the historical year and for the ten-year forecast of direct, indirect and induced jobs and contributions to state income.
- **Write Draft and Final Reports**

Data Provided in Report for Base and Alternative Cases

- Crude oil, natural gas, NGL and CO2 production volumes and revenues
- Revenues from gathering and processing, storage, pipeline, and refinery operations
- Capital expenditures for new drilling and midstream infrastructure builds and for replacement and refurbishment
- Contributions to State product and job counts
- State and local tax revenues attributable to oil and gas sector

❖ “Base Case” assumes that infrastructure needed over the next twelve years to accommodate projected oil and gas production is built.

❖ “Constrained Infrastructure Development Case” (also called the “Alternative Case”) limits major gathering line and pipeline infrastructure development in New Mexico. This scenario (a) includes only future pipeline projects that are currently under construction and (b) limits gas flaring in New Mexico to maximum observed historic levels (which constrains crude oil production).

Primary Conclusions (1 of 5)

- The oil and gas industry currently plays a major role in the New Mexico economy.
 - The value oil, gas, NGL, and CO2 at the point of first sale was \$13.2 billion in 2017.
 - The value of output from the oil and gas industry's full value chain (that is, adding in refining, transportation, distribution and retailing) was \$17.1 billion in 2017.
 - The income earned within in New Mexico in the forms of employee compensation, lease bonus and rent payments, production royalty payments, investment income, severance taxes, property taxes and state income taxes was \$13.5 billion.
 - This amount represents 14.3% of 2017 New Mexico GDP and accounts for direct, indirect and induced economic effects from activities along the full oil and gas value chain.

Primary Conclusions (2 of 5)

- In the future, the oil and gas industry's contribution to New Mexico economy could be much larger.
 - Oil and gas production has been increasing in the state in recent years due to the application of new horizontal drilling and hydraulic fracturing technologies.
 - Under the national and regional oil and natural gas prices assumed for this study, these existing and expected future technological advances will allow oil and gas production in the state to further increase. Under Base Case assumptions, production in the state in 2030 compared to 2017 will be higher by 358% for crude oil, 106% for natural gas and 136% higher for natural gas liquids.
 - In 2030 state direct, indirect and induced income in the state stemming from the oil and gas value chain could be as high as \$60.0 billion, representing over 45% of total state income in that year.

Primary Conclusions (3 of 5)

- Considerable investment in oil and gas infrastructure will be needed for the potential to be realized.
 - To realize this larger role, the industry will need to undertake large capital expenditures for well construction; gathering systems; gas processing plants; refineries; and crude oil, petroleum product, NGL, natural gas and carbon dioxide pipelines.
 - Under Base Case assumptions, those investments would total \$174 billion between 2019 and 2030.
 - Upstream investments for items such as site preparation, well drilling, well completion and lease equipment make up 88% of this total investment amount.
 - Investments in new natural gas, crude oil, NGLs and carbon dioxide pipelines and other processing or transportation infrastructure make up 6% of total investment.
 - The replacement and refurbishment of existing infrastructure make up the remaining 5% of the Base Case investment expected through 2030.

Primary Conclusions (4 of 5)

- Economic losses would be high if the needed infrastructure were not built.
 - Infrastructure investment from 2019 to 2030 in the Alternative Case would be \$63 billion lower (-36%) than the Base Case. This reduction come from fewer pipeline and gathering systems project being built (as defined in the Alternative Case) and the knock-on effects that lead to less upstream and other investment.
 - Less investment in pipeline and gathering systems would bottleneck production and lead to the adoption of higher-cost alternative transportation modes. This would cause the average 2019-2030 New Mexico Permian wellhead prices in the Alternative Case to be lower by \$3.26/bbl. for crude oil, \$3.03/bbl. lower for natural gas plant liquids and \$0.50/Mcf lower for natural gas.
 - Total Alternative Case crude oil production during the 2019-2030 period would be reduced by 1 billion barrels (-14%) compared to the Base Case.
 - Total New Mexico natural gas liquids oil production during the 2019-2030 period would be reduced by 440 million barrels (-29%) compared to the Base Case.
 - Total New Mexico dry natural gas production during the 2019-2030 period would be reduced by 6.6 trillion cubic feet (-27%) of the Base Case amount.
 - The value of crude, NGL and natural gas production would decline by \$123 billion or 24% during the 2019-2030 period compared to the Base Case.

Economic losses would be high if the needed infrastructure were not built (continued)

- Overall value of output (including crude, NGL, and natural gas production) declines by \$134 billion (-23%) during the 2019-2030 period compared to the Base Case.
- Oil and gas-related income earned in New Mexico in the form employee compensation, lease bonus and rent payments, production royalty payments, investment income, severance taxes, property taxes and state income taxes goes down by \$112 billion (- 23%) compared to the Base Case.
- The direct, indirect, and induced “traditional” private sector jobs supported by the oil and gas industry in New Mexico fall by 133,700 job-years (-12%) through 2030 due to infrastructure constraints.
- “Nontraditional” private sector jobs (independent contractors, temporary workers, etc.) supported by the oil and gas industry in New Mexico decline by 20,800 (-13%) through 2030.
- Because of the lower levels of value added and fewer jobs, the cumulative state and local tax revenue generated by oil and gas activity falls by \$12 billion (-18%) over the 2019-2030 period in the Alternative Case as compared to the Base Case.

Summary of Economic Impact Measures

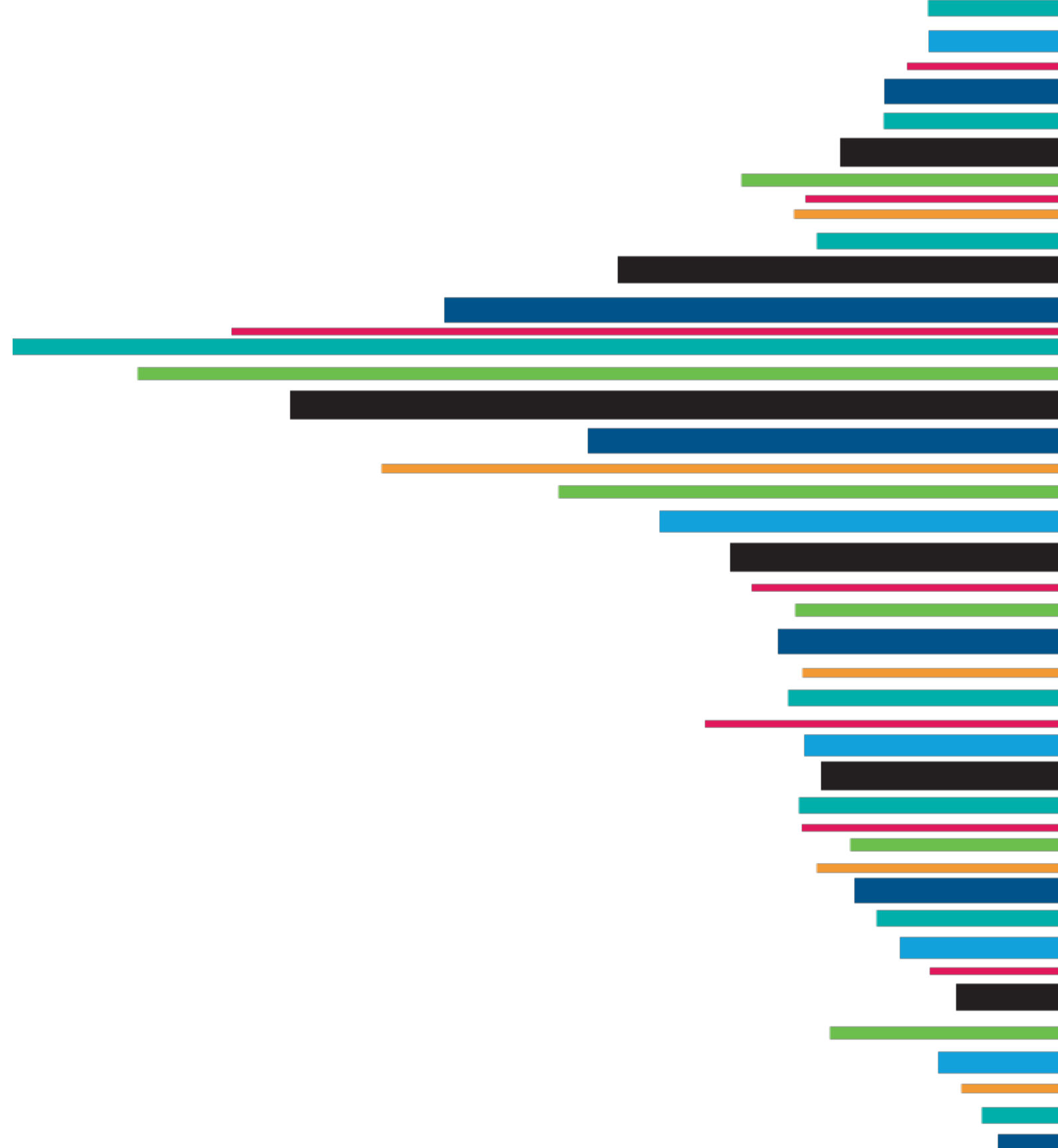
(Alternative Case minus Base Case)

Economic Impact Measure	Cumulative Change 2019-2030	Units	Percent Change
Natural Gas Production	-6,614	bcf	-26.7%
Natural Gas Liquids Production	-437	million barrels	-28.9%
Crude Oil Production	-1,020	million barrels	-14.4%
Oil & Gas Related Capital Expenditures	(\$63)	2017\$ billion	-36.3%
Value of Output (oil, gas, NGLs, CO2)	(\$123)	2017\$ billion	-24.3%
Value of Output Full Oil & Gas Value	(\$134)	2017\$ billion	-22.6%
New Mexico Income	(\$112)	2017\$ billion	-23.0%
State and Local Tax Revenues	(\$12)	2017\$ billion	-17.5%
Private Sector Traditional Jobs	-133,730	job-years	-12.1%
Private Sector Nontraditional Jobs	-20,795	job-years	-12.9%

Primary Conclusions (5 of 5)

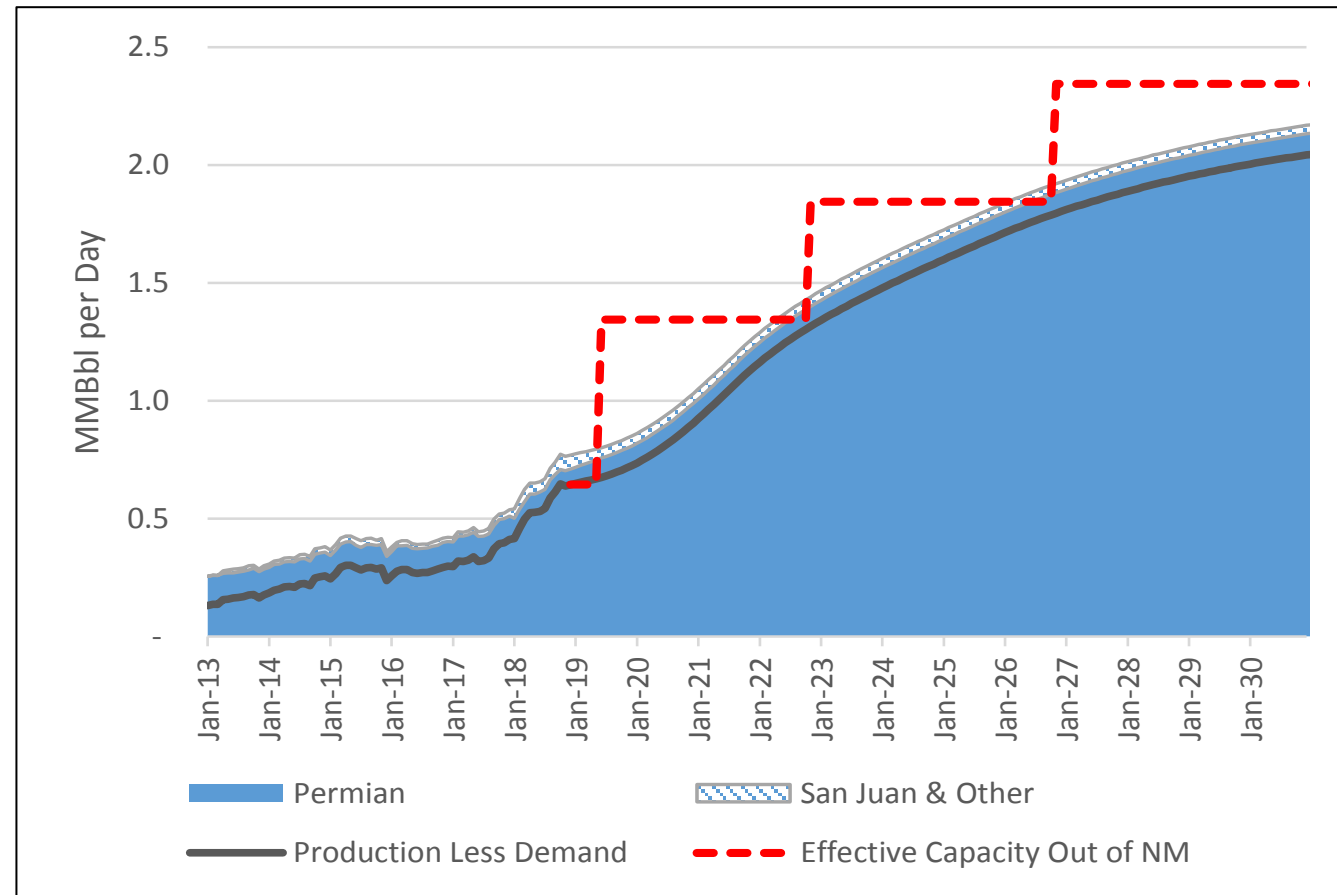
- The high economic value of oil and gas infrastructure highlights the need to strike the right balances.
 - Policymakers may wish to consider the large potential economic benefit to New Mexico of future oil and gas infrastructure development when considering actions that could affect where, when and how such infrastructure can be developed in the state.
 - The environmental and other benefits of such actions should be weighed against the direct implementation/compliance costs of the action and the larger potential economic losses to the state if oil and gas economic activity where to be reduced.

Appendices



Crude Oil Pipeline Takeaway Capacity in the Base Case

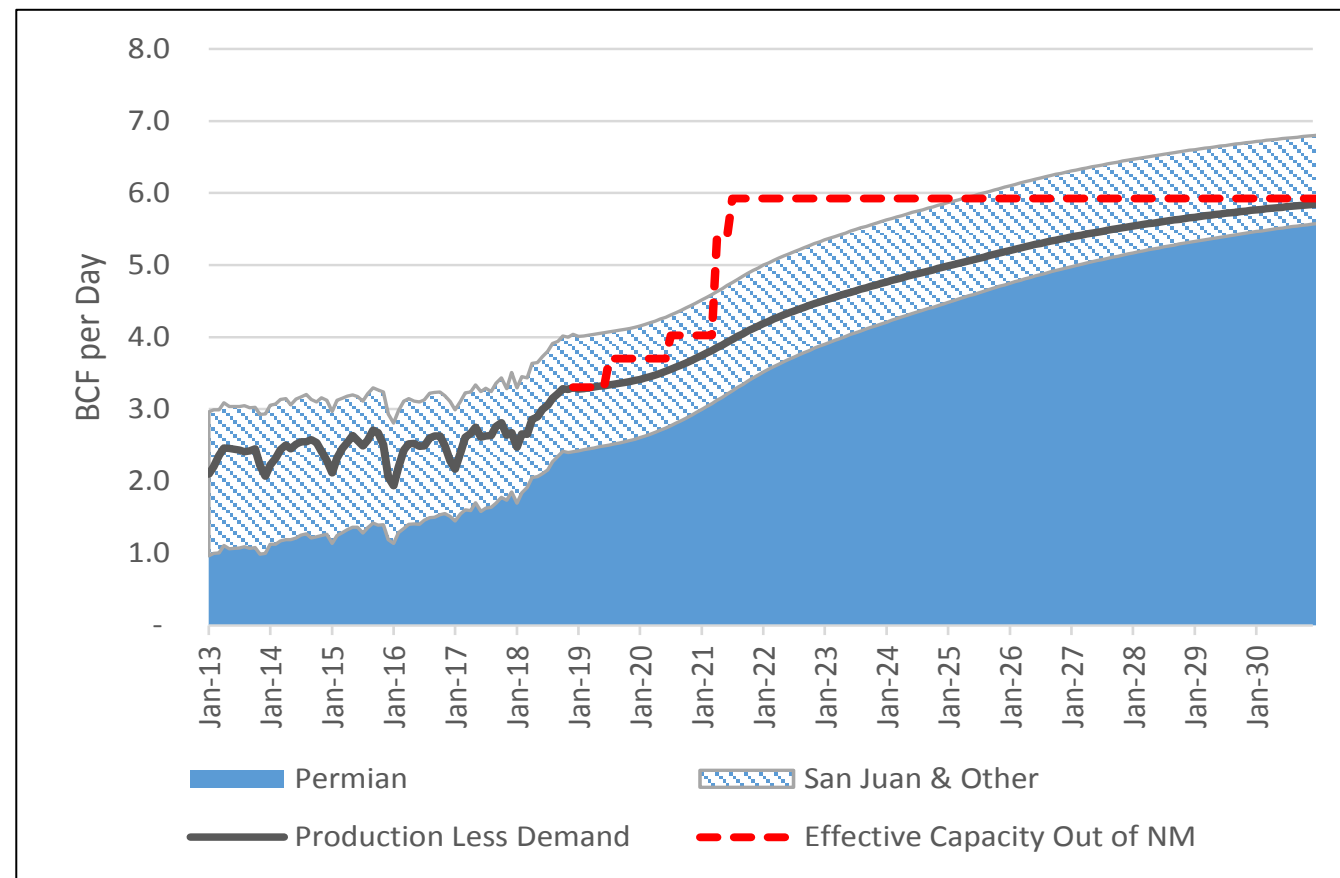
- New Mexico crude oil demand (input to the two refineries in the state) is projected flat at .126 MMbbl/d in the Base Case.
- As local crude production from the Permian is expected to grow more than three times the 2018 level by 2030, most of the crude will be exported to be refined in Texas and other states or exported out of the country.
- Recent crude oil pipeline takeaway capacity out of New Mexico is estimated at about 0.6 million barrels per day.
- The Base Case projection includes 0.7 MMbbl/d of new Oryx pipeline in the Delaware basin in mid 2019 and two generic projects in 2022 and 2026 each with 0.5 MMbbl/d capacity.
- As an alternative to the Base Case, the crude oil could be transported via other means (e.g. rails or trucks).



Date	Project Name	Status	Project Capacity (Million Bbl/d)	Effective Capacity out of New Mexico (Million Bbl/d)
Jun-19	Oryx Midstream Regional Pipeline	Under Construction	0.7	1.3
Nov-22	Generic		0.5	1.8
Nov-26	Generic		0.5	2.3

Natural Gas Pipeline Takeaway Capacity in the Base Case

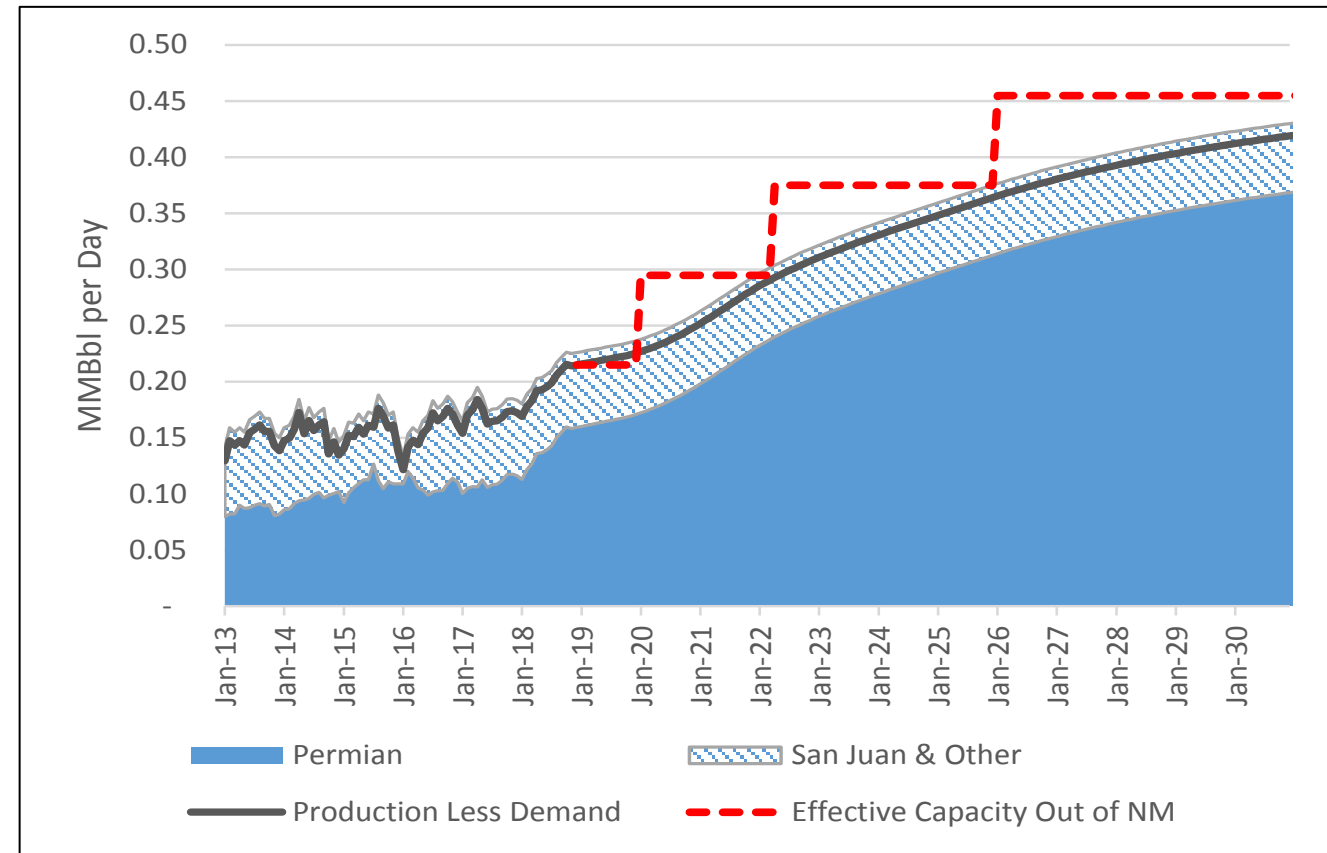
- Total natural gas pipeline capacity out of New Mexico is currently estimated at 6.2 Bcfd.**
 - This includes gathering line to Texas with an estimated capacity of 0.9 Bcfd.
- Effective natural gas pipeline capacity out of New Mexico is limited to 3.3 Bcfd.**
 - This is estimated by netting out Texas and Colorado gas transport into New Mexico.
- The Base Case projection includes 2.6 Bcfd of new Permian pipeline capacity (i.e. header lines) that have been proposed.**



Date	Project Name	Company Name	Status	Project Capacity (Bcfd)	Effective Capacity out of New Mexico (Bcfd)
Dec-18					3.3
Jul-19	Sendero Carlsbad Gateway	Sendero Midstream	FERC Application	0.4	3.7
Jul-20	South Mainline Expansion Project	El Paso Natural Gas	FERC Application	0.3	4.0
Apr-21	Double E Pipeline	Summit Midstream Partners LP	FERC Application	1.4	5.4
Jul-21	Steady Eddy Pipeline	WhiteWater Midstream	Announced	0.5	5.9

NGL Pipeline Takeaway Capacity in the Base Case

- NGL pipeline takeaway capacity out of New Mexico is currently estimated at 0.21 MMBbl/d.
- The Base Case projection includes 0.4 MMbpd new EPIC NGL pipeline project that is currently under construction and is expected to come online in January 2020. The EPIC NGL pipeline will run 700 miles from the Permian to the Gulf Coast and portions of the project will operate as a crude oil pipeline until the project is completed in 2020. Only 20% of the EPIC capacity, 0.08 MMBbl/d, is dedicated for N.M. NGL volumes.
- The Base Case also includes two generic projects to come online in 2020 and 2026.



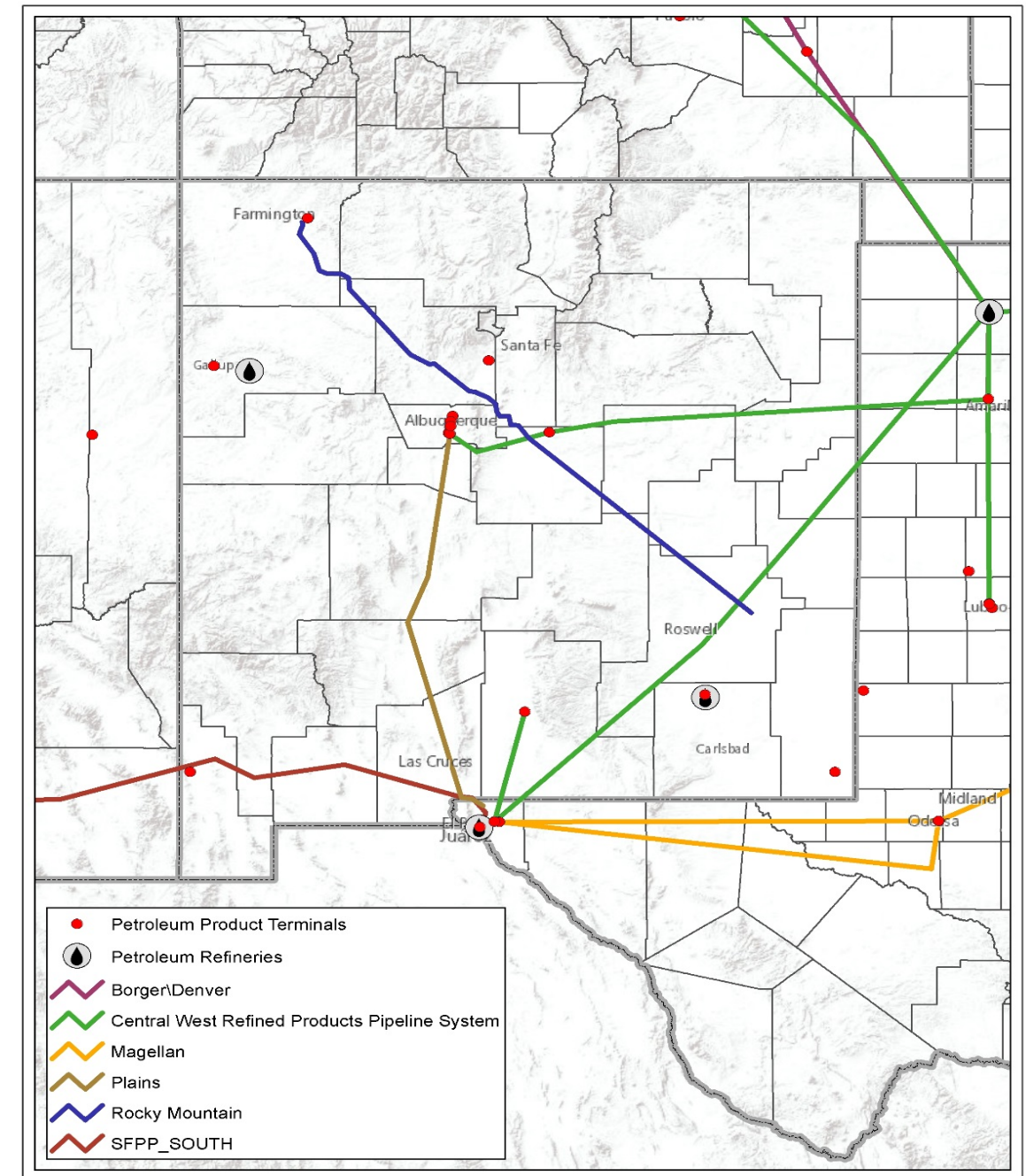
New Mexico Refined Petroleum Products Market

- The Base Case assumes that current refinery capacity and throughput will remain constant in the future.
- Future petroleum demand in the state will be consistent with the EIA/AEO forecast (change of -0.3%/year nationally and +0.4%/year in Mountain region).
- The Base Case also assumes that Petroleum Product pipelines will not have any significant expansions or additions.

NM Petroleum Product Balance
2016 (barrels per day)

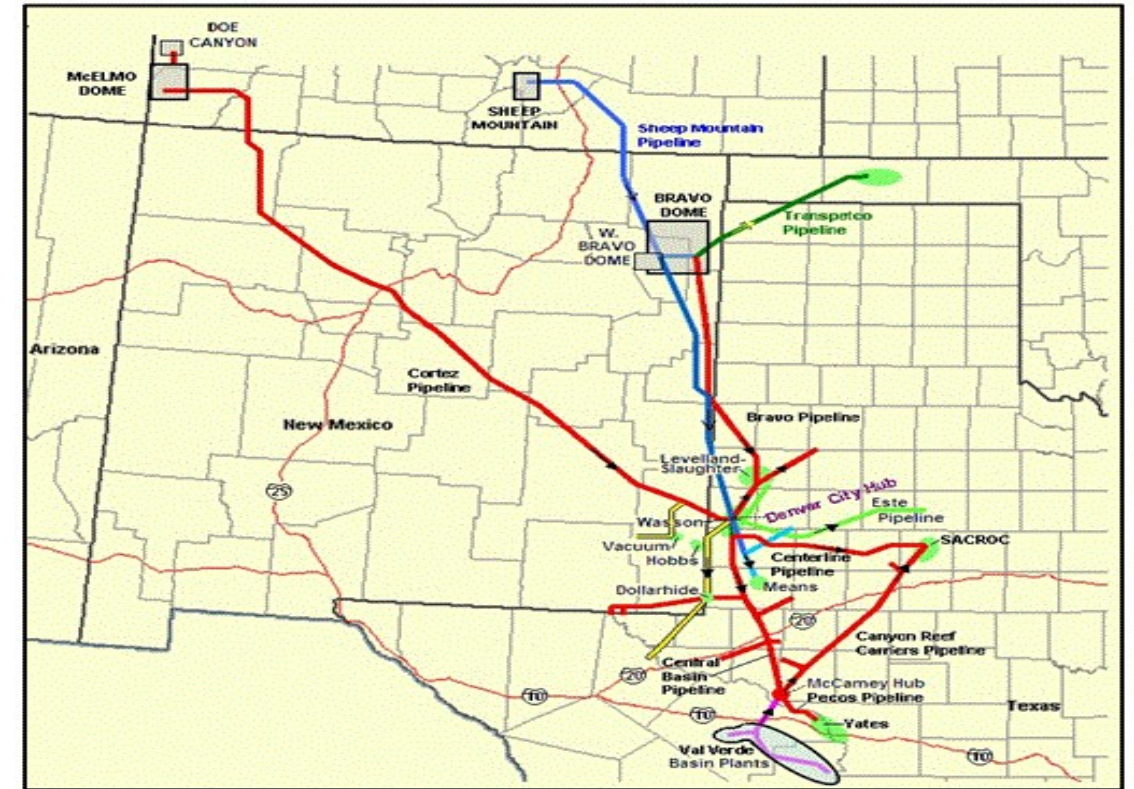
Petroleum Product Volume	2016
Produced in State	129,365
Net Flow from Texas	144,873
Consumed in State	(109,882)
Exiting State to Arizona	(164,355)
Balance	0

NM Petroleum Product Pipelines,
Refineries and Terminals



New Mexico Carbon Dioxide Market

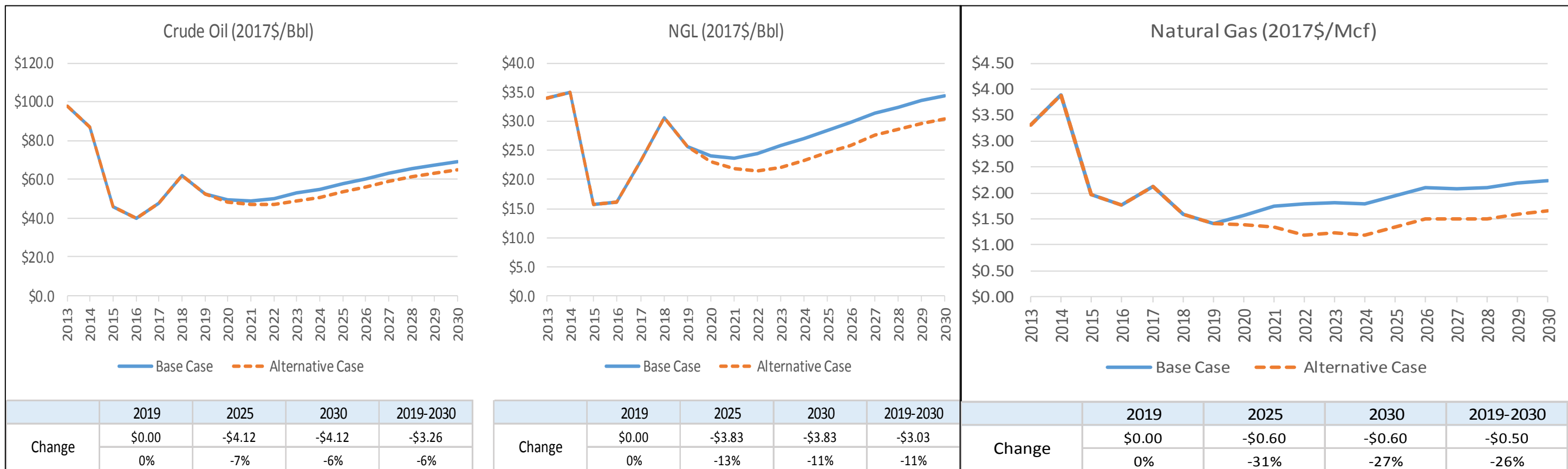
- Carbon dioxide is produced and consumed in NM.
- The state also contains pipelines that transport CO2 from Colorado, through NM and into Texas.
- The ICF Base Case assumes that NM CO2 production will remain close to recent levels of 260 MMcfd and that imports from Colorado will remain close to current levels of 1,200 - 1,300 MMcfd.
- The Base Case also assumes that the now-suspended Lobos CO2 pipeline from Arizona will be built in 2023, increasing total volumes of CO2 in the state by 300 MMscfd.
- Consumption of CO2/NM CO2 for EOR will increase in NM/TX to match available supplies.



Balance (MMcfd)	New Mexico Carbon Dioxide			
	2014	2015	2016	2017
Entering State from CO	961	1,112	1,214	1,297
Produced in State	320	292	265	257
Used in State for EOR	(97)	(107)	(112)	(118)
Exiting State to TX and OK	(1,184)	(1,297)	(1,367)	(1,436)
Balance	0	0	0	0
Annual Values (\$million)				
NM CO2 Production	\$202	\$140	\$105	\$106
CO2 Used in NM	\$81	\$73	\$67	\$73
CO2 Pipeline Services in NM	\$257	\$282	\$297	\$312

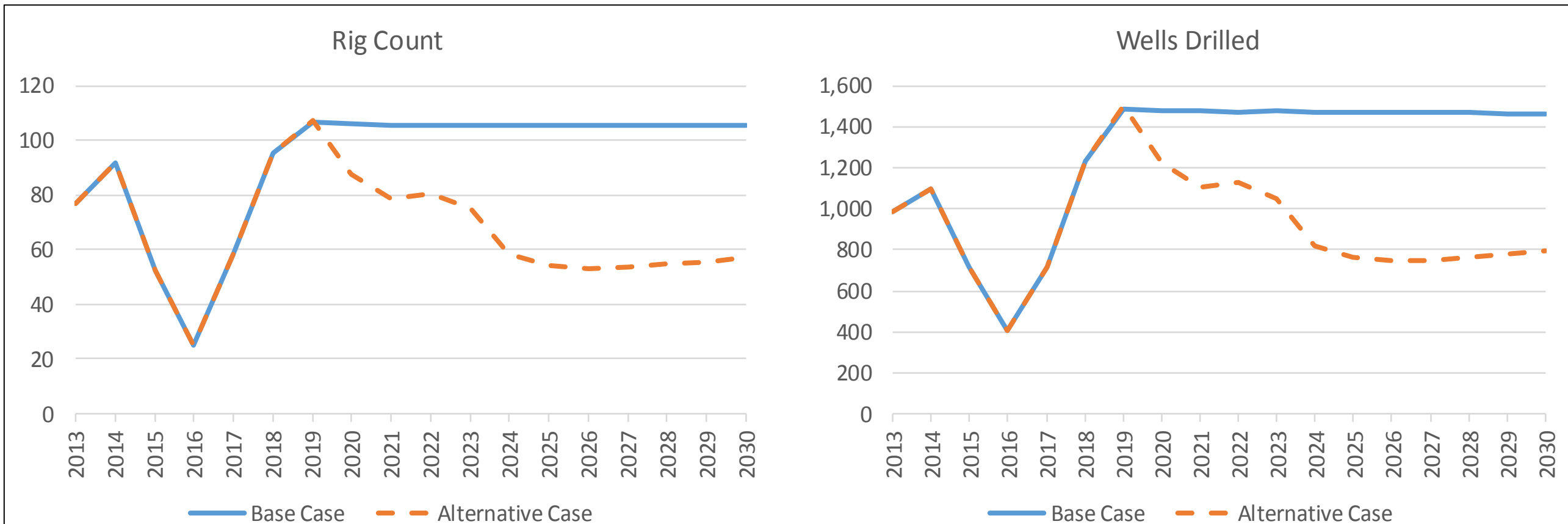
Natural Gas, Crude Oil, and NGL Prices (N.M. Permian Wellhead)

Infrastructure constraints cause wellhead values to fall



N.M. Drilling Activity: Base Case *versus* Alternative Case

In the Alternative Case, drilling activity in New Mexico is about 35% lower between 2019 and 2030 compared to the Base Case with average rig count is down by 38 rigs and average drilling is down by about 520 wells per year during the projection period.



	2019	2025	2030	2019-2030
Change	1	-51	-48	-38
	1%	-48%	-46%	-36%

	2019	2025	2030	2019-2030
Change	15	-707	-670	-521
	1%	-48%	-46%	-35%

N.M. Oil & Gas Capex: Base Case *versus* Alternative Case

Capital expenditures for new oil and gas infrastructures and for replacement and refurbishment of existing infrastructures in New Mexico are projected to total between 2019 and 2030 an average of \$14.5 billion per year. Less investment in the Alternative Case drops the CAPEX by 36% to \$9.2 billion per year.

Capital Expenditures (Million 2017\$)	Actual 2017	Actual 2018		Base Case 2030	Alternative Case 2030		Base Case Average 2019-2030	Alternative Case Average 2019-2030		Alternative vs. Base Case: Impact in 2030 as %	Alt. vs. Base Case: Impact for 2019-2030 as %
Drilling	\$5,160	\$9,982		\$13,236	\$7,177		\$12,803	\$8,223		-46%	-36%
Natural Gas	\$366	\$688		\$483	\$96		\$495	\$142		-80%	-71%
Crude Oil	\$91	\$169		\$207	\$36		\$226	\$120		-83%	-47%
NGL	\$98	\$27		\$60	\$1		\$72	\$22		-98%	-69%
CO2	\$25	\$0		\$122	\$0		\$102	\$0		-100%	-100%
Replacement/Refurbishment	\$694	\$682		\$839	\$711		\$781	\$715		-15%	-8%
Total	\$6,434	\$11,547		\$14,948	\$8,021		\$14,478	\$9,223		-46%	-36%

N.M. O&G Value of Output: Base Case *versus* Alternative Case

The Alternative Case has lower production with 2019-2030 total of 6.1 billion barrels of crude oil, 18.2 trillion cubic feet of dry gas, 1.1 billion barrels of NGLs, and 1.14 trillion cubic feet of carbon dioxide. The total value of this production will be \$381 billion or 24% lower than the Base Case over the 2019-30 period.

Value of Output (Million 2017\$)	Actual 2017	Actual 2018	Base Case 2030	Alternative Case 2030	Base Case Average 2019-2030	Alternative Case Average 2019-2030	Alternative vs. Base Case: Impact in 2030 as %	Alt. vs. Base Case: Impact for 2019-2030 as %
Production	\$12,225	\$19,649	\$64,047	\$41,404	\$42,008	\$31,790	-35%	-24%
Gathering & Processing	\$983	\$1,203	\$2,704	\$1,778	\$2,161	\$1,687	-34%	-22%
Pipeline Transmission	\$2,017	\$2,204	\$3,897	\$2,923	\$3,286	\$2,803	-25%	-15%
Gas Distribution	\$327	\$377	\$336	\$336	\$336	\$336	0%	0%
Other	\$1,592	\$1,594	\$1,587	\$1,587	\$1,590	\$1,590	0%	0%
Total	\$17,144	\$25,025	\$72,571	\$48,027	\$49,380	\$38,206	-34%	-23%

Value Added in N.M. from Oil and Gas Activity: Base Case *versus* Alternative Case

Total direct, indirect, and induced value added from oil and gas activities in New Mexico is projected to total in the Base Case between 2019 and 2030 an average of \$40.4 billion per year. The corresponding estimate for the Alternative Case is 23% lower.

State GDP/Value Added (Million 2017\$)	Actual 2017	Actual 2018	Base Case 2030	Alternative Case 2030	Base Case Average 2019-2030	Alternative Case Average 2019-2030	Alternative vs. Base Case: Impact in 2030 as %	Alt. vs. Base Case: Impact for 2019-2030 as %
Total O/G NM Income (direct & indirect)	\$10,390	\$15,499	\$46,175	\$30,403	\$31,115	\$23,955	-34%	-23%
Total NM Induced Income (30% of D&I)	\$3,117	\$4,650	\$13,853	\$9,121	\$9,334	\$7,187	-34%	-23%
Total O/G NM D,I & Induced Income	\$13,507	\$20,149	\$60,028	\$39,524	\$40,449	\$31,142	-34%	-23%
State GDP (from BEA to 2018) (2017\$)	\$94,211	\$96,474	\$132,181	\$116,409	\$112,588	\$105,428	-12%	-6%
State non-energy GDP (2017\$)	\$80,704	\$76,325	\$86,005	\$86,005	\$81,473	\$81,473	0%	0%
ICF NM D,I,&I O/G Income as % of NM GDP	14.3%	20.9%	45.4%	34.0%	35.9%	22.7%	-25%	-37%

N.M. Jobs from O&G Activity: Base Case *versus* Alternative Case

The average for direct, indirect, and induced jobs in the Base Case is 92,000 each year. In the Alternative Case, the number of jobs is 12% lower than the Base Case..

"Wages & Salary" Jobs	Actual 2017	Actual 2018		Base Case 2030	Alternative Case 2030		Base Case Average 2019-2030	Alternative Case Average 2019-2030		Alternative vs. Base Case: Impact in 2030 as %	Alt. vs. Base Case: Impact for 2019-2030 as %
Oil and Gas Sector Jobs	31,306	34,941		37,775	31,854		37,512	32,915		-16%	-12%
Other Related Direct and Indirect Jobs	18,582	20,692		22,335	18,895		22,189	19,513		-15%	-12%
Total Direct and Indirect Jobs	49,888	55,634		60,111	50,750		59,701	52,428		-16%	-12%
Induced Jobs	27,125	30,173		32,544	27,573		32,338	28,467		-15%	-12%
Direct, Indirect, and Induced Jobs	77,013	85,806		92,654	78,323		92,039	80,895		-15%	-12%
Other Jobs											
Independent Contractors, On-call Workers, Temporary Help, etc.	11,617	11,767		14,087	11,477		13,410	11,678		-19%	-13%

N.M. Tax Revenues from O&G Activity: Base Case *versus* Alternative Case

Oil and gas related activities in New Mexico will create an average of \$5.5 billion per year of state and local tax revenue in the Base Case from 2019 to 2030. The tax revenue will be lower by 17% in the Alternative case with a total of \$4.6 billion per year.

Tax Revenues (Million 2017\$)	Actual 2017	Actual 2018	Base Case 2030	Alternative Case 2030	Base Case Average 2019-2030	Alternative Case Average 2019-2030	Alternative vs. Base Case: Impact in 2030 as %	Alt. vs. Base Case: Imp for 2019-2030 as %
State General Funds Attributed to All O&G Segments	\$2,014	\$2,522	\$6,440	\$4,692	\$4,460	\$3,718	-27%	-17%
Local Revenues Attributed to All O&G Segments	\$398	\$535	\$1,611	\$1,083	\$1,076	\$850	-33%	-21%
Sum of State Gen. Funds & Local Revenues	\$2,413	\$3,057	\$8,051	\$5,775	\$5,535	\$4,568	-28%	-17%