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Potential Changes in Wyoming Energy Production and Revenue Base

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Scenario Analysis

- Based on results from EIA NEMS model using information current at the end of 2022.
  - Summarizes current state of information regarding energy system
- Reference scenario assumes current laws, economic, cost and technological trends.
- Side cases: each varies elements individually of the reference case
  - Also consider alternative policy cases
  - Reference case + 15 side cases (18 in natural gas projection).
- Side cases allow understanding of how specific changes affect projections.

** These are not predictions! They are projections that allow understanding of how changes in economic, cost and policy conditions may affect future outcomes given current data and understanding of the energy system.

- Taken together, scenarios can describe a range of possible outcomes.

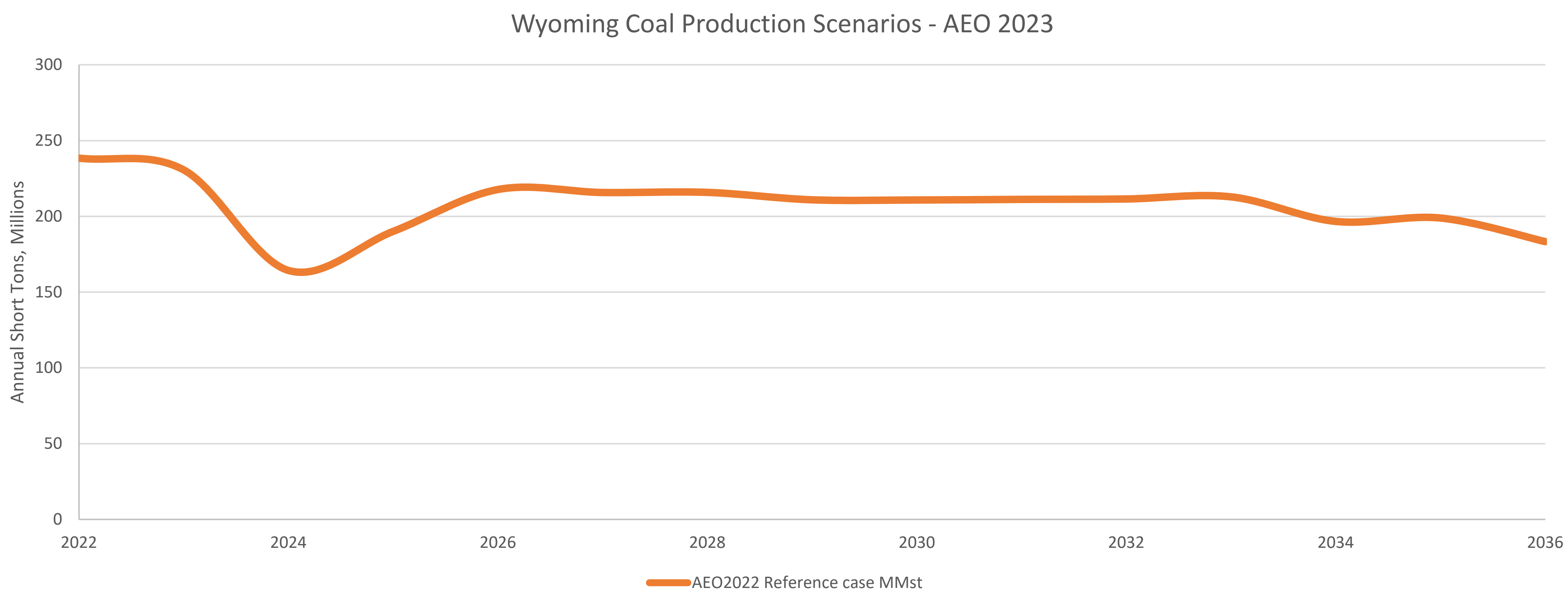
Scenario Main Assumptions

Reference case (AEO2023 - March)	Economic growth 1.9% annually, other variables at current trend values, current legislation stays in place.
Low IRA Uptake (AEO2023 - March)	Production tax credit values in IRA reduced by 80% in assumptions, number of EV's qualifying for tax credit halved from reference case.
High/Low Oil Price (AEO2023 - March)	Oil Prices higher/lower than in reference case. By 2050, Brent crude is $190/bbl vs $101/bbl in high case, $51 in low (in 2022 dollars).
High/Low Oil/Gas Supply (AEO2023 - March)	Recovery is 50% higher/lower per well than reference, Technological growth lowering costs 50% higher/lower than reference
CREG (Oct 2022/Jan 2023 revisions)	Assumptions based on current trends/information (to 2024 only)

Scenario choice and probability

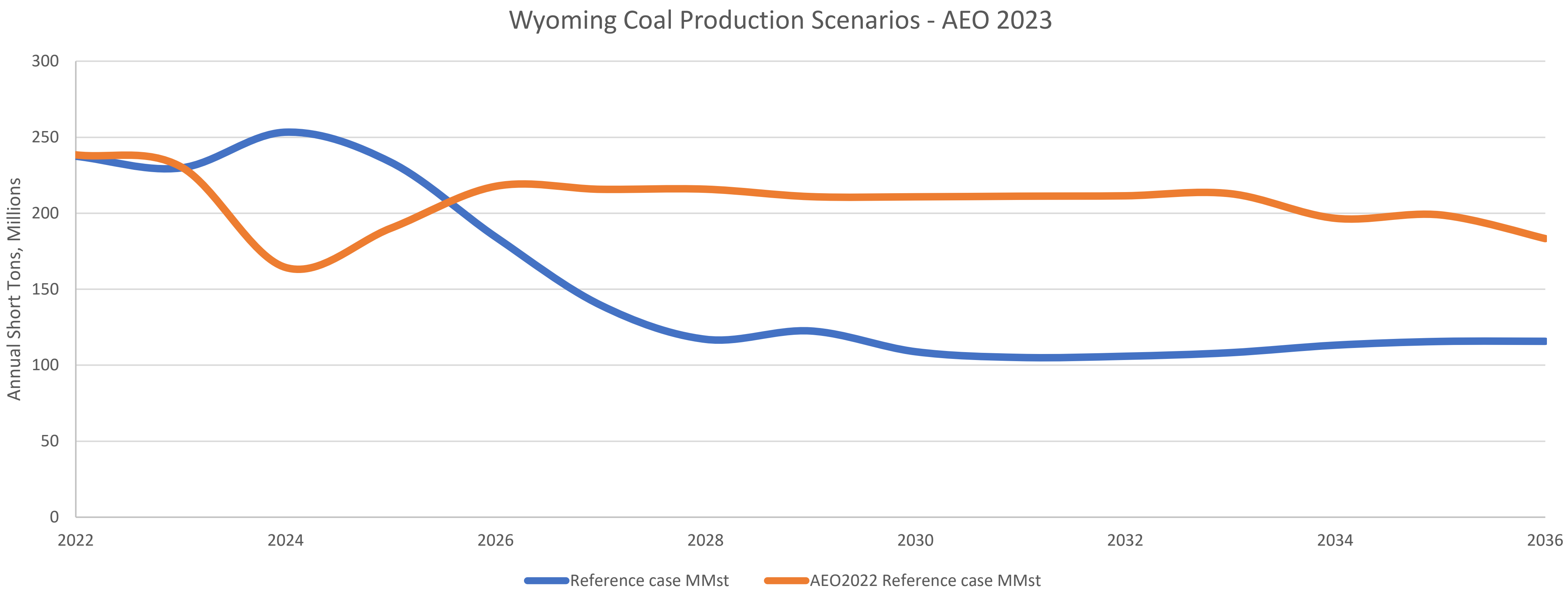
- EIA cases chosen for the range of assumptions and outcomes.
    - Reflects current trends in energy markets and demographics.
    - Considers current, higher or lower oil gas depletion rates
    - Considers current, higher or lower technological improvement in mineral production
    - National economic growth assumed constant at 1.9% (current rate of GDP growth)
- CREG forecast generally reflects conditions as of late fall 2022.
- Each case is not currently perceived as equally likely.
    - Range of policy, economic and technical changes.

Wyoming AEO Coal Projection Reference Case 2022



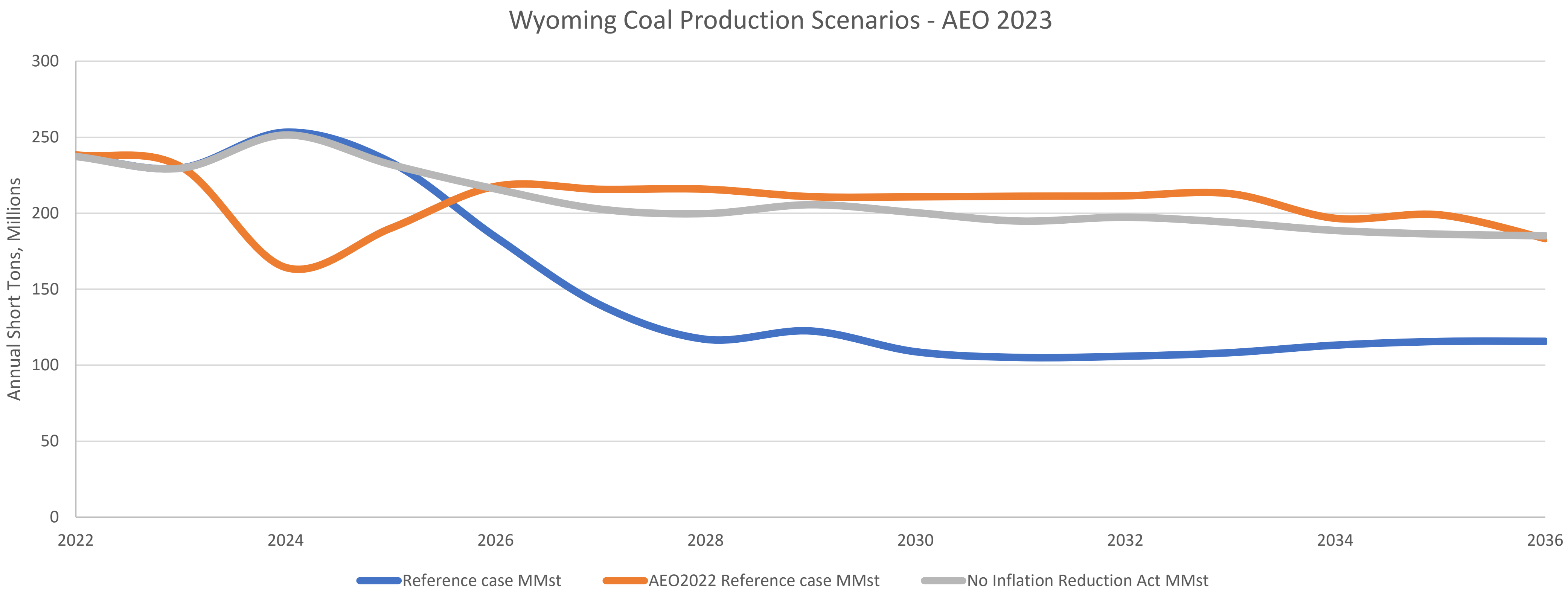
Annual production decline of 55 million tons (23%) in next 13 years from 2022 levels.

Coal Production: Change to Reference Case 2023



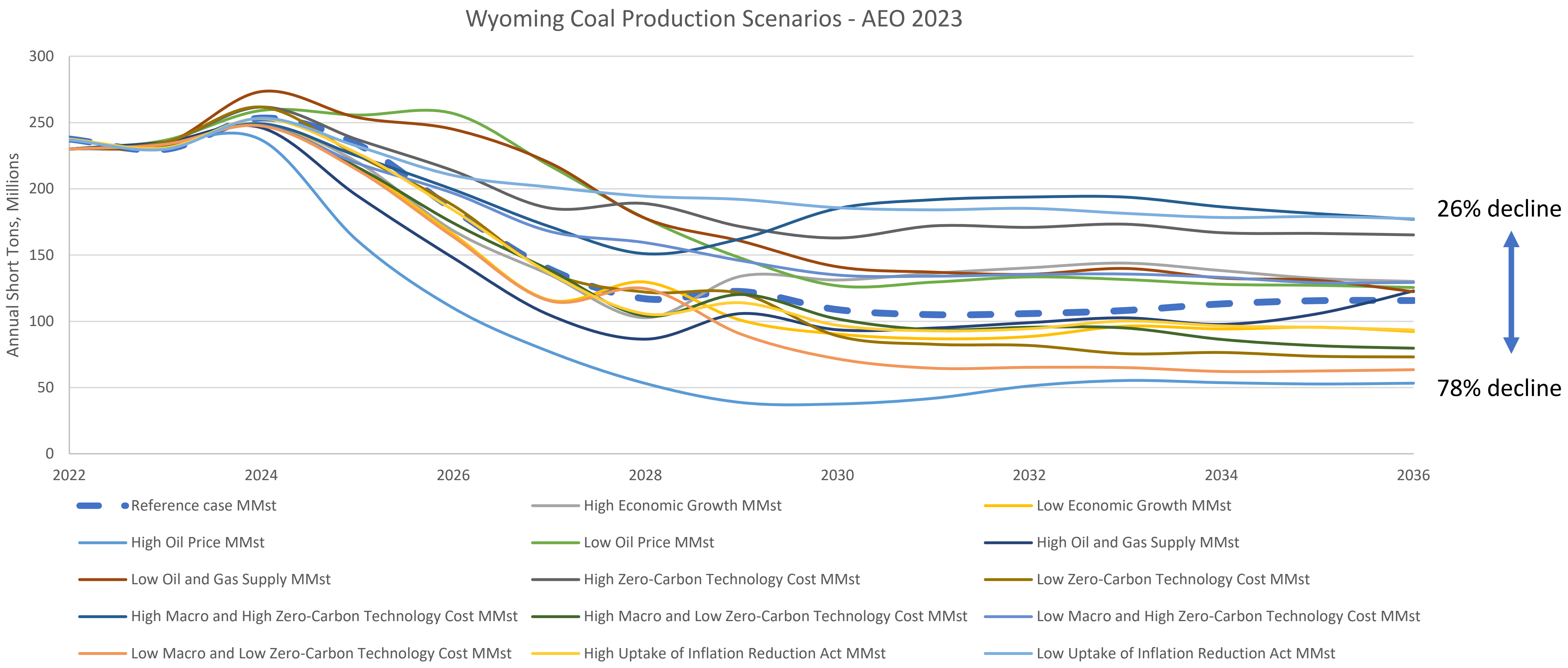
Annual production decline now projected to be of 122 million tons (51%) in next 13 years.

Drop due to passage of IRA

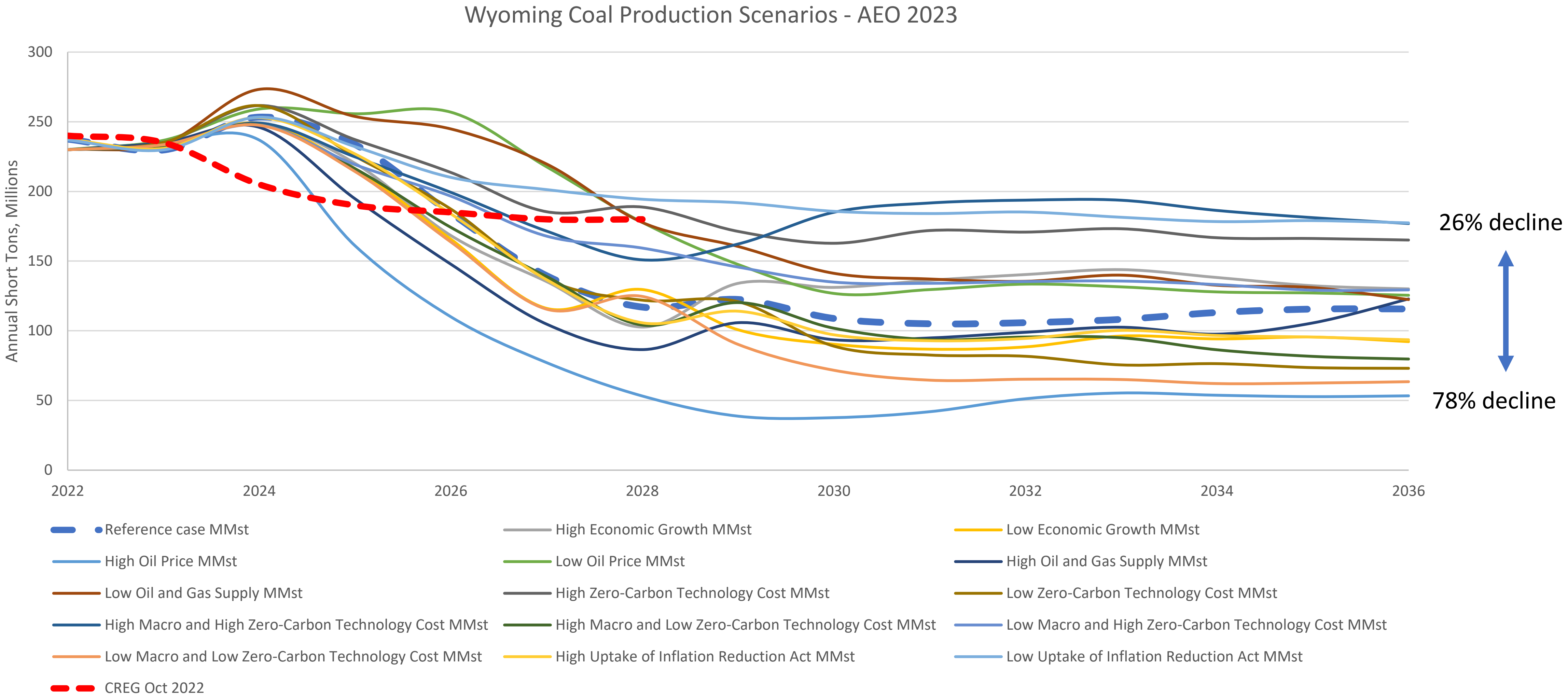


Change is due to impact of IRA incentives for new zero-carbon energy development.

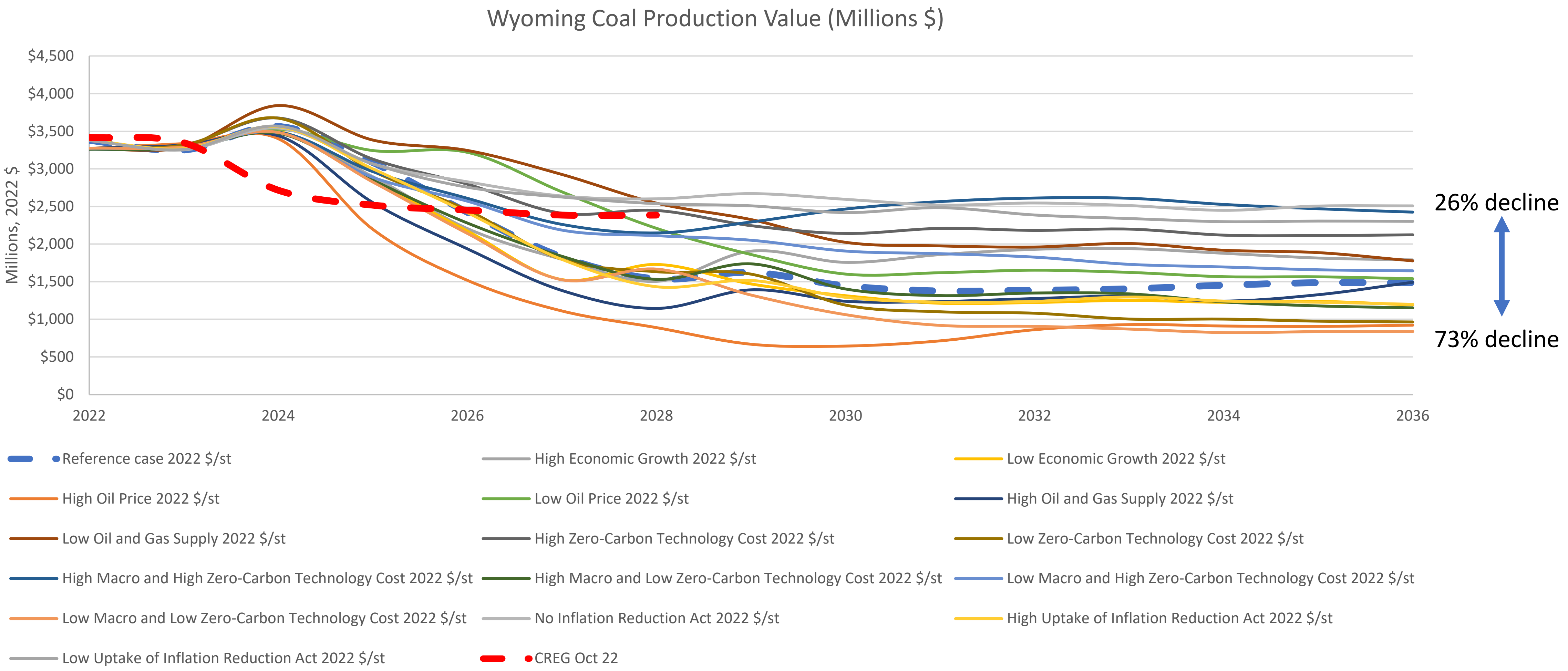
No AEO scenario with less than a 26% decline



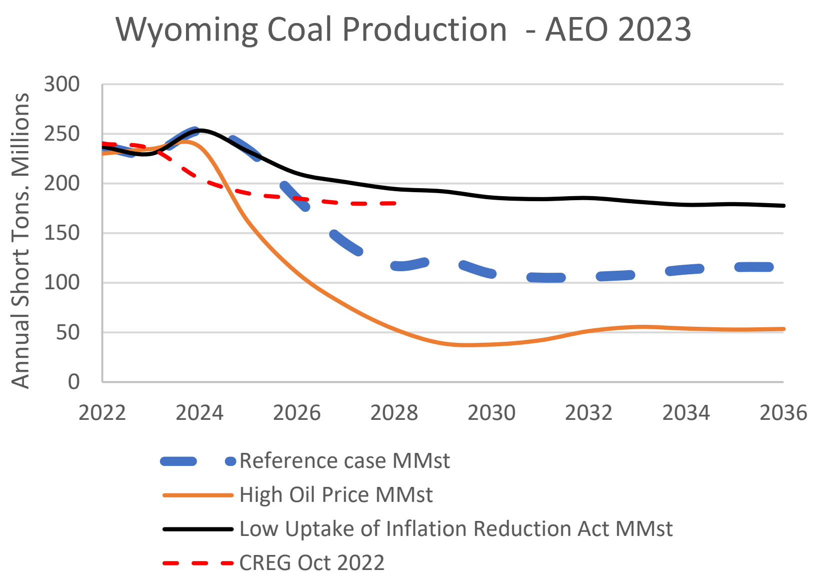
CREG Projection currently tracks within the cone of outcomes.

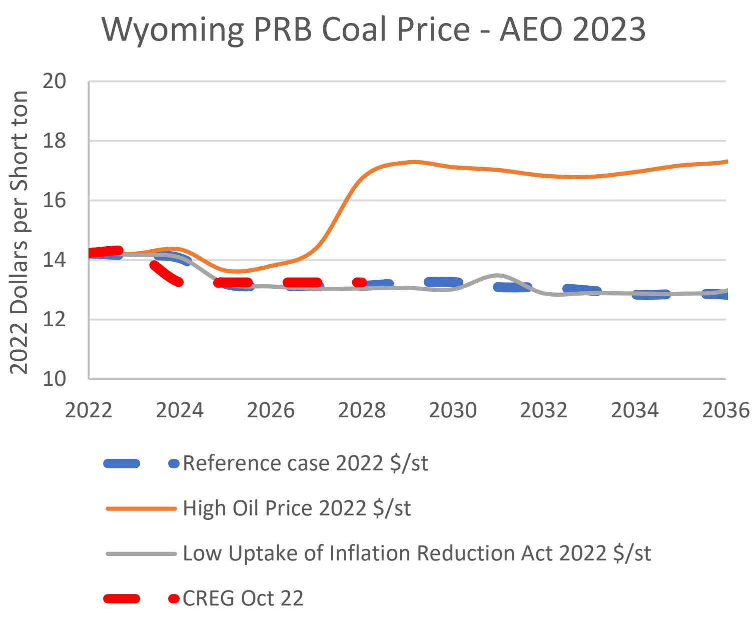


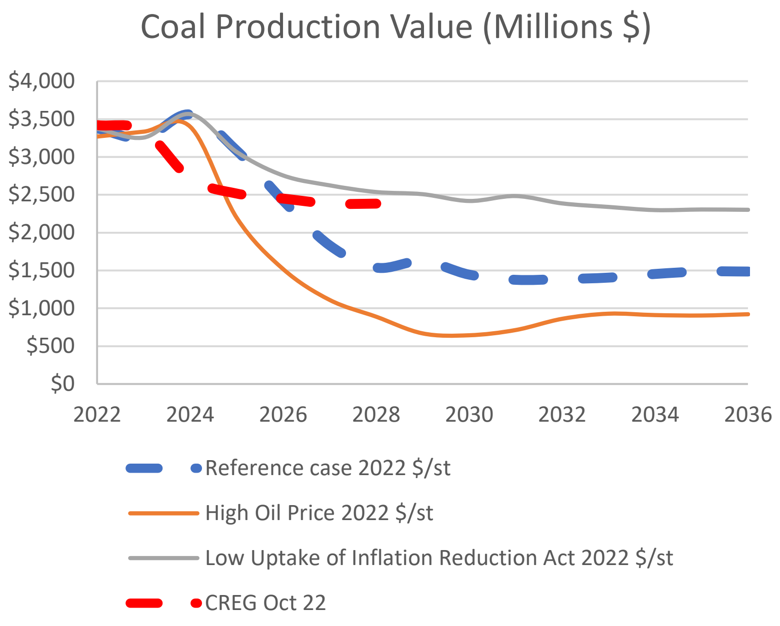
Coal Revenue: Best cases lead to minimum 25-30% decline in revenue by end of decade



Scenarios: Coal



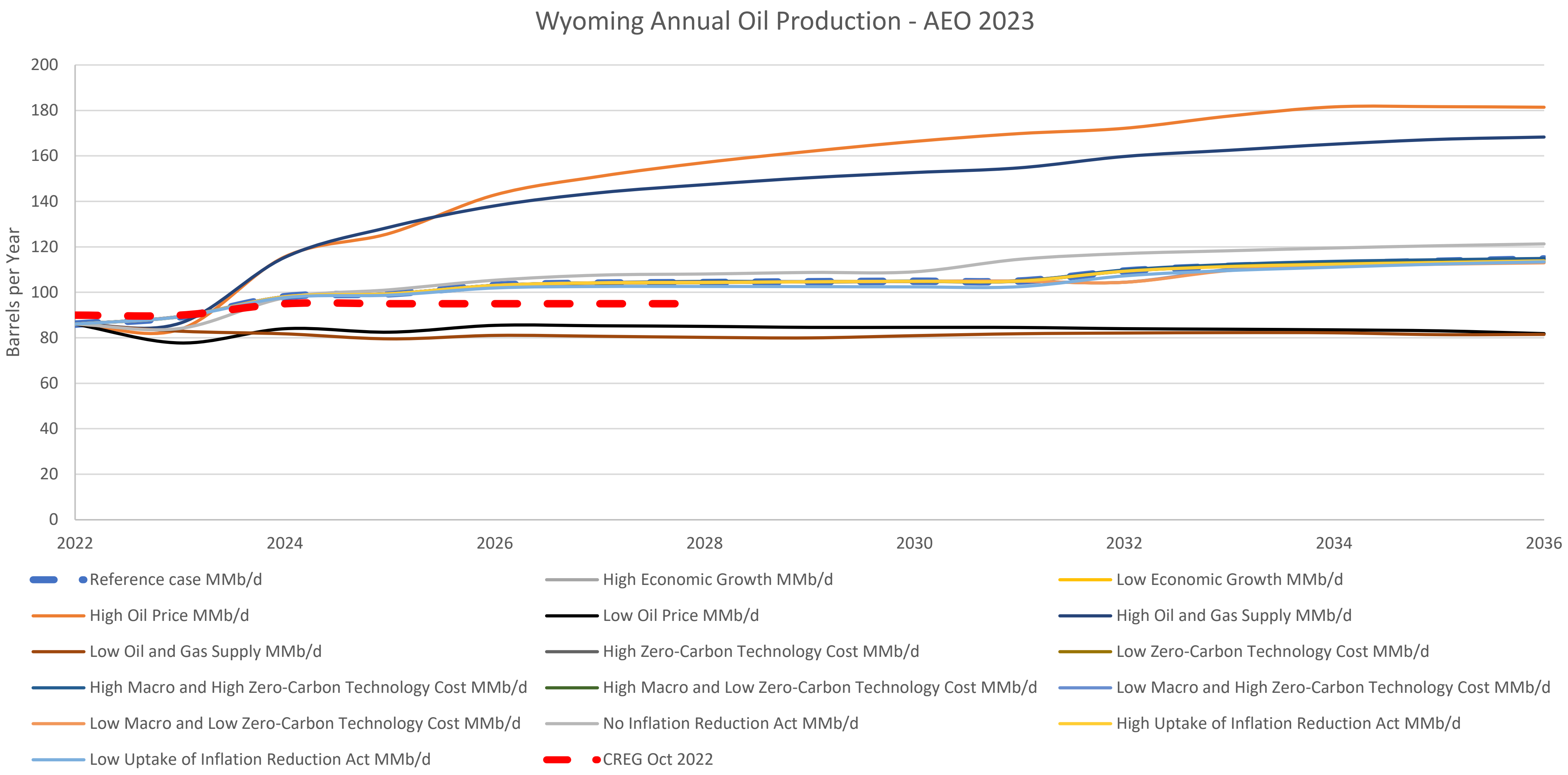




Consensus in all projections – significant declines in coal revenue occur through 2030 then stabilize.

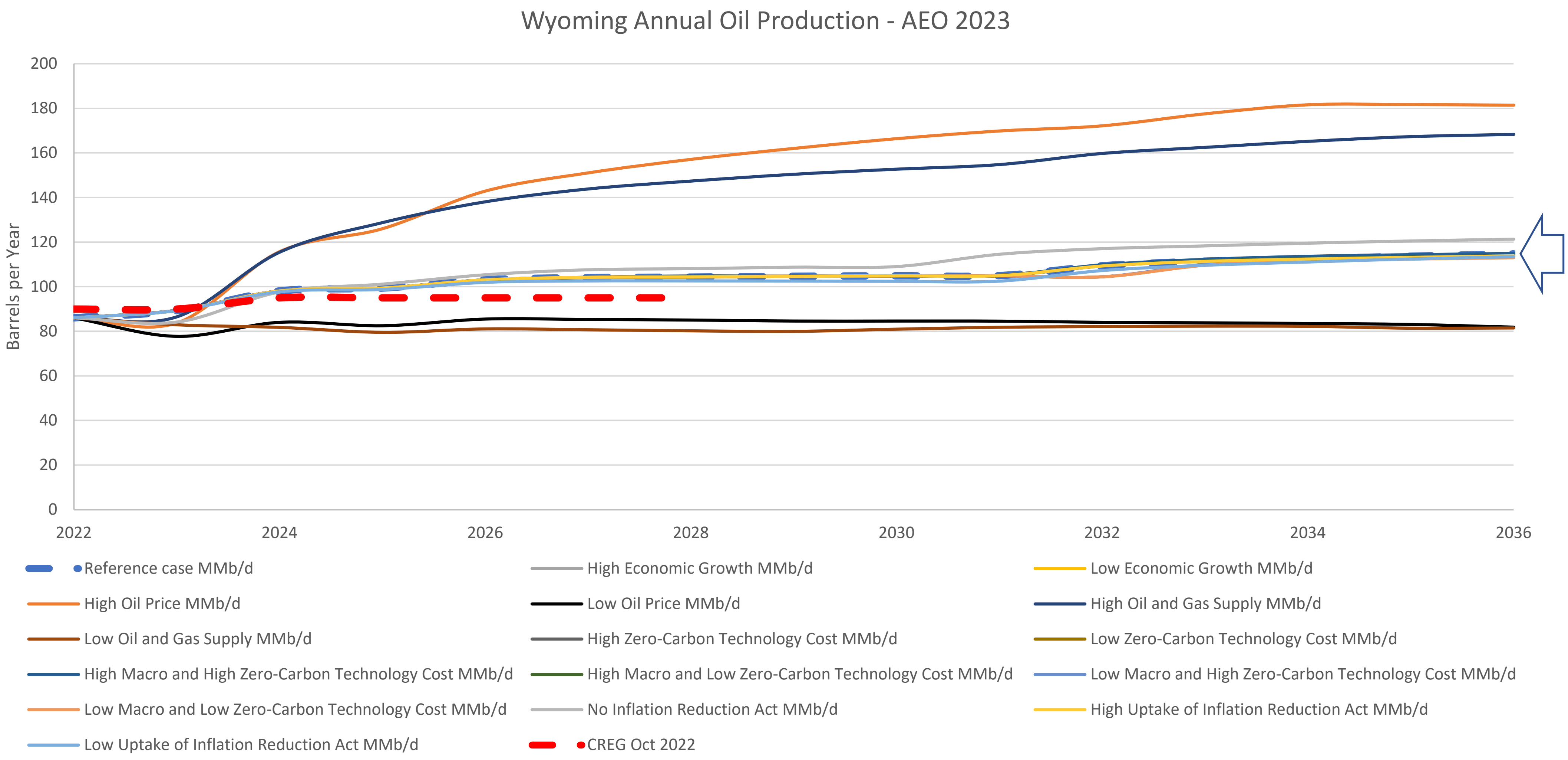
1) Coal production decline significant – question is how bad it gets.
2) Price of coal depends on market conditions but variation in revenue driven primarily by production.
3) Coal revenue base declines by 26% to 73%, with reference case decline of 56% by 2036.
4) CREG revenue base forecast tracks higher than most scenario projections, but still predicts 29% decline by 2028.

Oil Production



* Data is downscaled from Rocky Mountain Region estimate, assuming we maintain 2022 share. Note Permian Basin not included in this region.

Oil Production



- 12 of 16 AEO cases: between a 27% and 36% increase by 2036.
- 11 cases: 27% to 28% increase (nearly coincident production paths).

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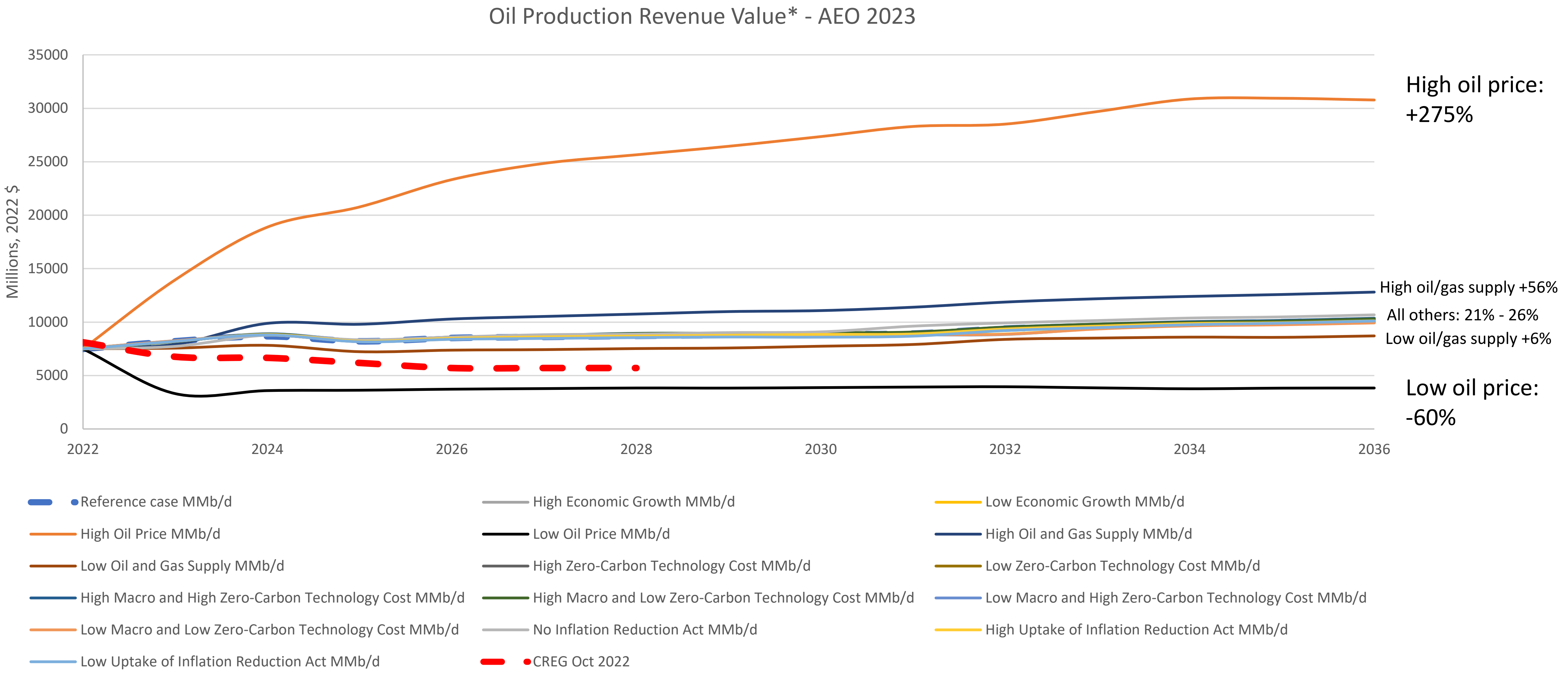
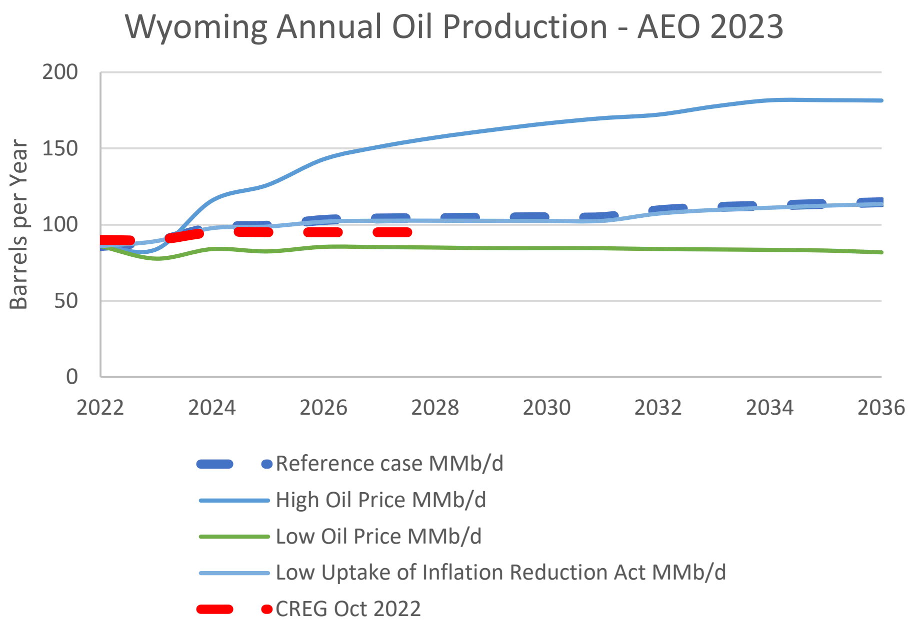
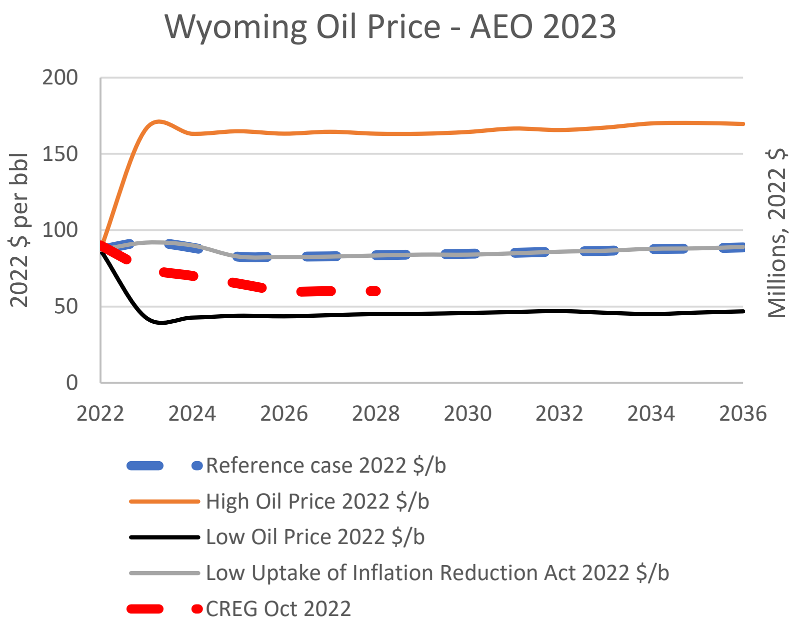
Oil Revenue

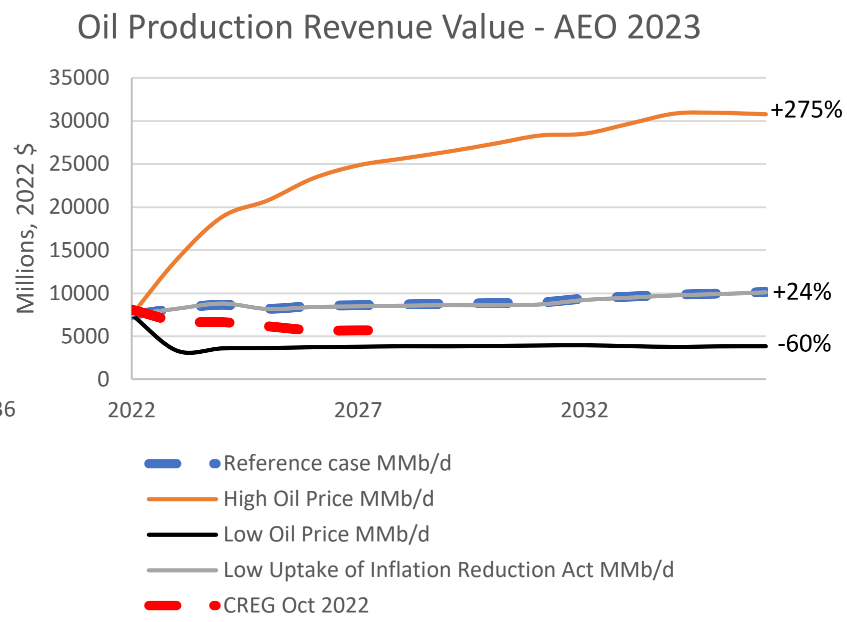


Oil Production Revenue Value* - AEO 2023
Millions, 2022 $
35000
30000
25000
20000
15000
10000
5000
0
2022
2024
2026
2028
2030
2032
2034
2036
High oil price: +275%
High oil/gas supply +56%
All others: 21% - 26%
Low oil/gas supply +6%
Low oil price: -60%
Reference case MMb/d
High Economic Growth MMb/d
Low Economic Growth MMb/d
High Oil Price MMb/d
Low Oil Price MMb/d
High Oil and Gas Supply MMb/d
Low Oil and Gas Supply MMb/d
High Zero-Carbon Technology Cost MMb/d
Low Zero-Carbon Technology Cost MMb/d
High Macro and High Zero-Carbon Technology Cost MMb/d
High Macro and Low Zero-Carbon Technology Cost MMb/d
Low Macro and High Zero-Carbon Technology Cost MMb/d
Low Macro and Low Zero-Carbon Technology Cost MMb/d
No Inflation Reduction Act MMb/d
High Uptake of Inflation Reduction Act MMb/d
Low Uptake of Inflation Reduction Act MMb/d
CREG Oct 2022

Scenarios: Oil





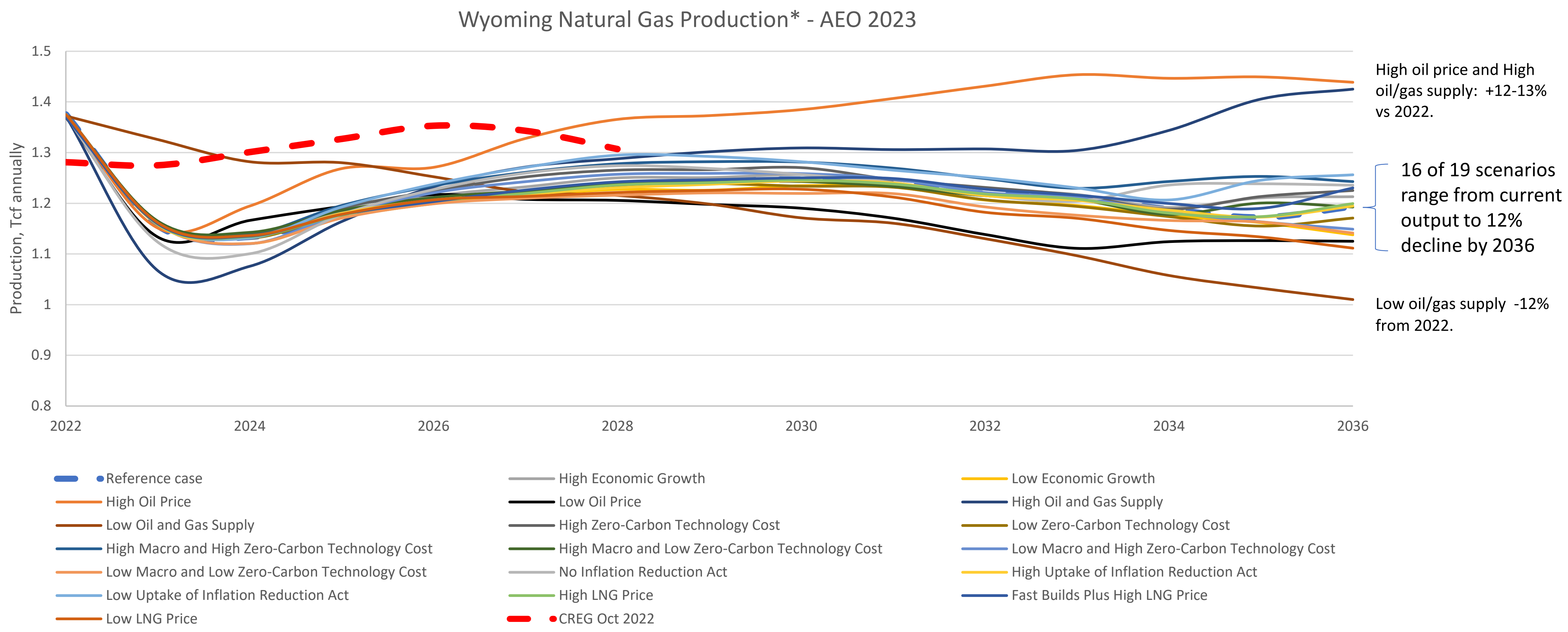


Most scenarios lead to 27-28% increase in oil production over the next decade, and stable revenue increases.

- Oil price sensitivity key: Oil price scenarios range from -60% to 275% output change by 2036.
- Reference case results in a 28% increase in production, stable prices through 2036 => 24% revenue increase.
- 14 of 16 AEO scenarios have revenue increases of 6% to 56% by 2036.
- In 12 of 16 scenarios, total production revenue increases by 21% to 26%.

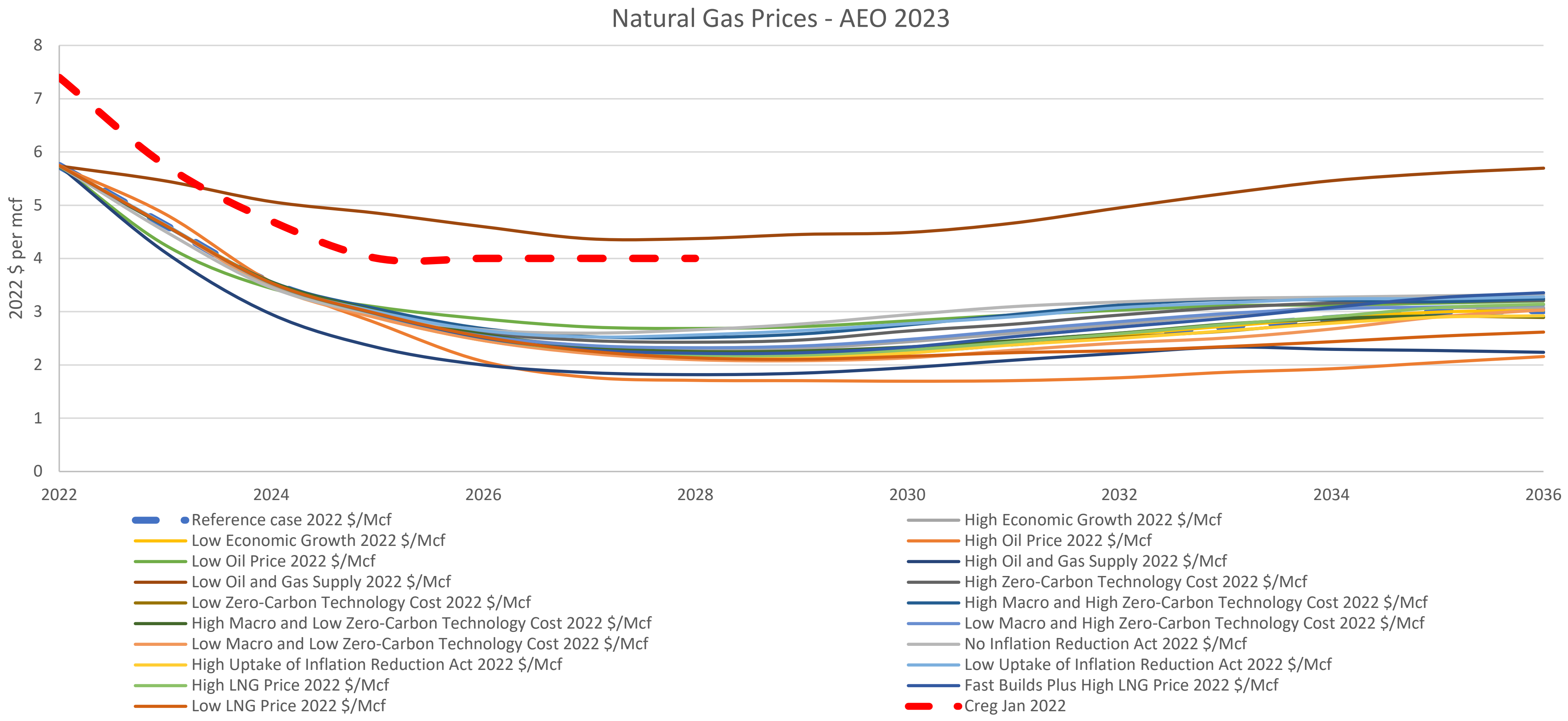
Suggest steady, stable growth

Natural Gas Production



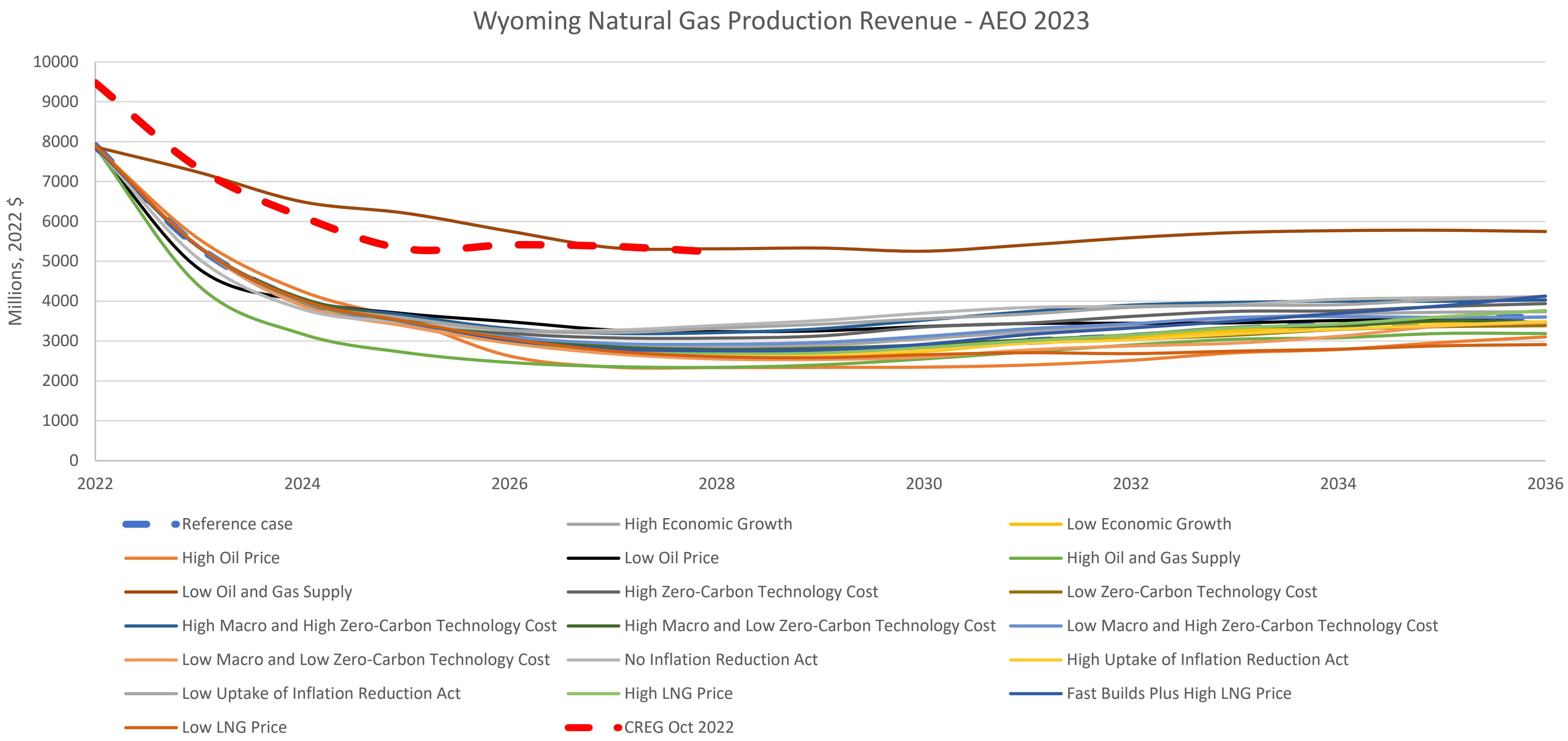
* Data is downscaled from Rocky Mountain Region estimate, assuming we maintain 2022 share. Note Permian Basin not included in this region. AEO model overestimates 2022 but tracks 2023 well.

Natural Gas Prices



18 of 19 scenarios result in $2-$3 price band through 2036

Natural Gas Production Revenue



- 18 of 19 scenarios result in stable revenues over decade at about half current levels.

Overview

Coal	Oil	Natural Gas
• Decline inevitable • 50% decline in production by early 2030s from today's levels likely (+/- 25%) • Current CREG estimates track higher than most scenario outcomes	• Majority of scenarios => steady increase in output likely • Caveat: Oil output very sensitive to price => oil volatility should be expected. (upside risk?) • Revenue growth of 20-30% over the decade seems reasonable, with the price sensitivity caveat noted.	• Production level projections have more variation than other fuels. • Price predicted to fall to range seen currently and stay there throughout decade. • Result is a 50% decline in revenue. • Weather volatility to upside should be expected.

Conclusions

- Seems inevitable that two of three pillars of Wyoming energy revenue will decline.
- These declines can be forecasted, though the only prediction we can make with certainty is that any long-term forecast will be wrong!
  - Current information – 50% declines in coal and natural gas revenues seem reasonable by end of decade.
- Losses may be partially offset by potential increases in oil in next decade.
- In addition to declines, energy revenues likely to become much more volatile as total revenues become more dependent on oil and gas.
  - Oil due to well-known price volatility
  - Gas revenues due to greater climate volatility leading to price shocks (to the upside).