

Annual Energy Outlook 2021 Working Group

Preliminary results for oil, natural gas, & liquid fuels



for

Oil and Gas Supply, Natural Gas Markets, & Liquid Fuels Markets Working Group
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By

Exploration & Production, Natural Gas Markets, and Liquid Fuels Markets Teams
Office of Petroleum, Natural Gas, and Biofuels Analysis

AEO2021 and COVID-19

- AEO2021 will reflect updated macroeconomic projections that underlie energy consumption, production, and trade
- STEO forecast incorporates short-term impacts of COVID-19 on consumption and production of petroleum, natural gas, and biofuels
- EIA released a *Trends and Expectations Report* which describes the impact of the pandemic on the energy sector and identifies key issues that are being considered in the development of AEO2021:
https://www.eia.gov/outlooks/aeo/trends_expectations.php
- EIA will host a series of workshops on the near- and long-term impacts on energy markets, with the petroleum and natural gas workshop on September 29 at 11:00 AM EST. See: https://www.eia.gov/outlooks/aeo/workshop/energy_markets/

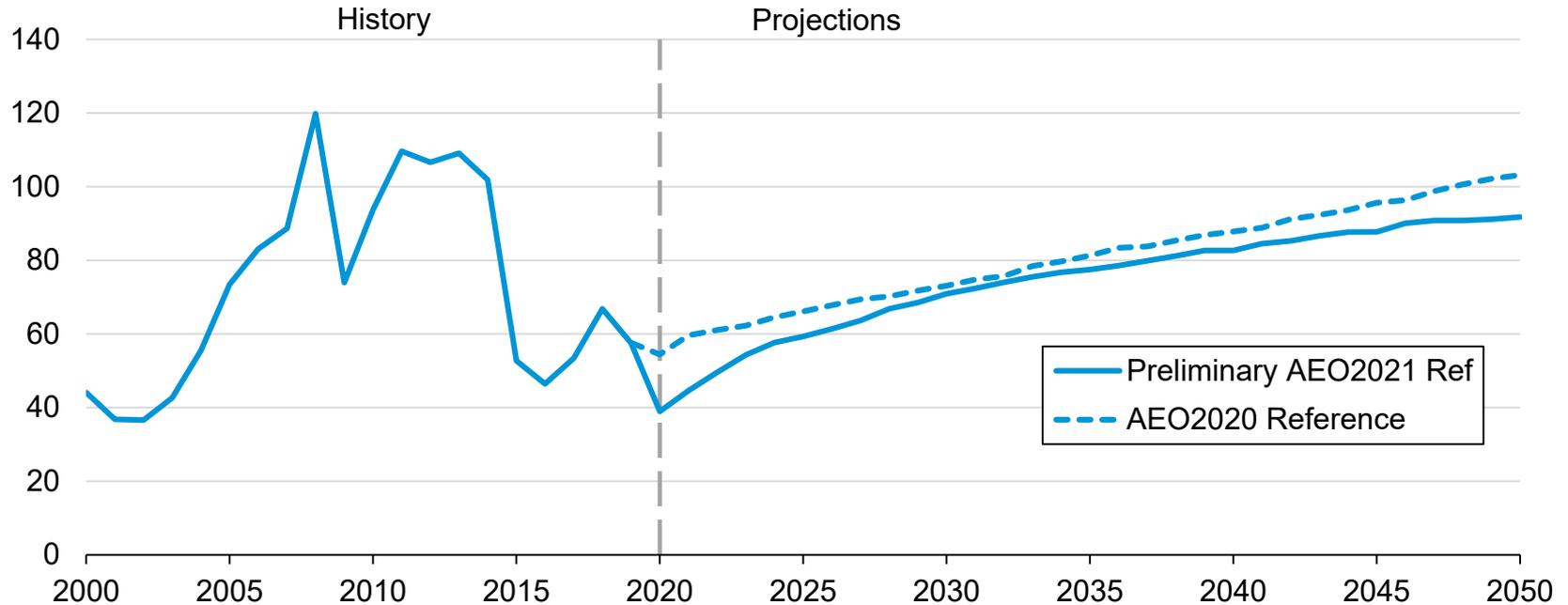
Oil and Gas Supply

AEO2021 OGSM updates

- Data updates
 - Tight/shale estimated ultimate recovery per well (EUR)
 - Lower 48 offshore and Alaska announced discoveries
 - Historical production through 2019 and estimated 2020
 - STEO calibration
- Model improvement
 - Offshore discovery process component
- COVID-19 related assumptions
 - Increased hurdle rate of return
 - Reduced drilling responsiveness to price changes in the short-term

West Texas Intermediate crude oil prices are lower than last year's AEO

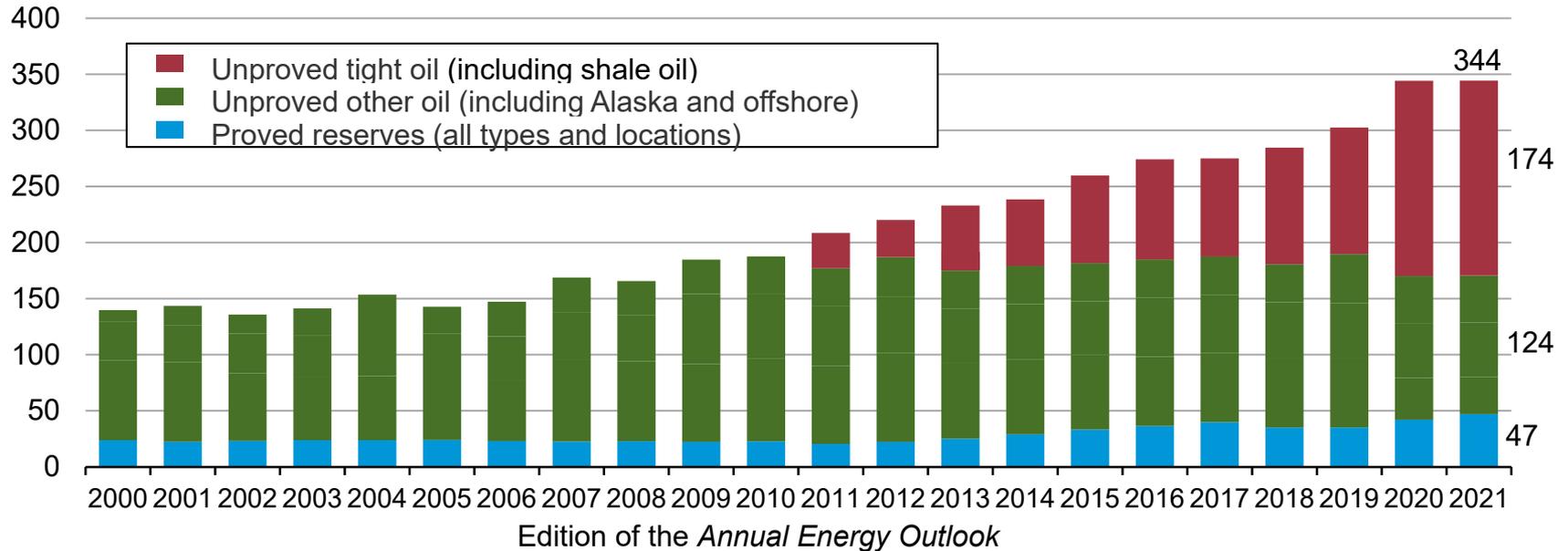
WTI crude oil price
2020 \$/barrel



Source: Preliminary AEO2021 runs, dated 9/20/20

Multiple factors have contributed to crude oil resource estimate increases over the years, with tight oil the primary contributor recently

U.S. crude oil and lease condensate resources
billion barrels

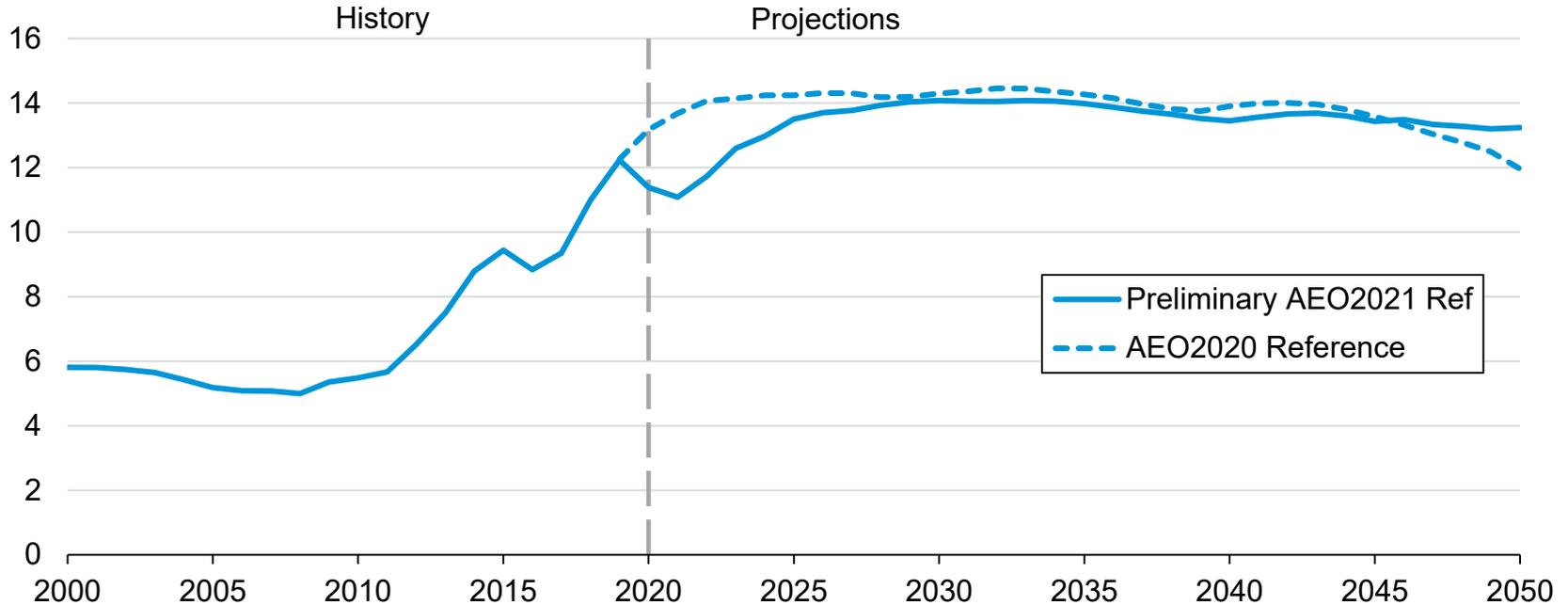


Source: U.S. Energy Information Administration, Annual Energy Outlook 2021 and prior editions

Note: Resources are as of January 1 of two years prior to the "edition" year of the AEO (e.g. AEO2021 is 1/1/2019).

U.S. crude oil production is generally lower than last year's AEO

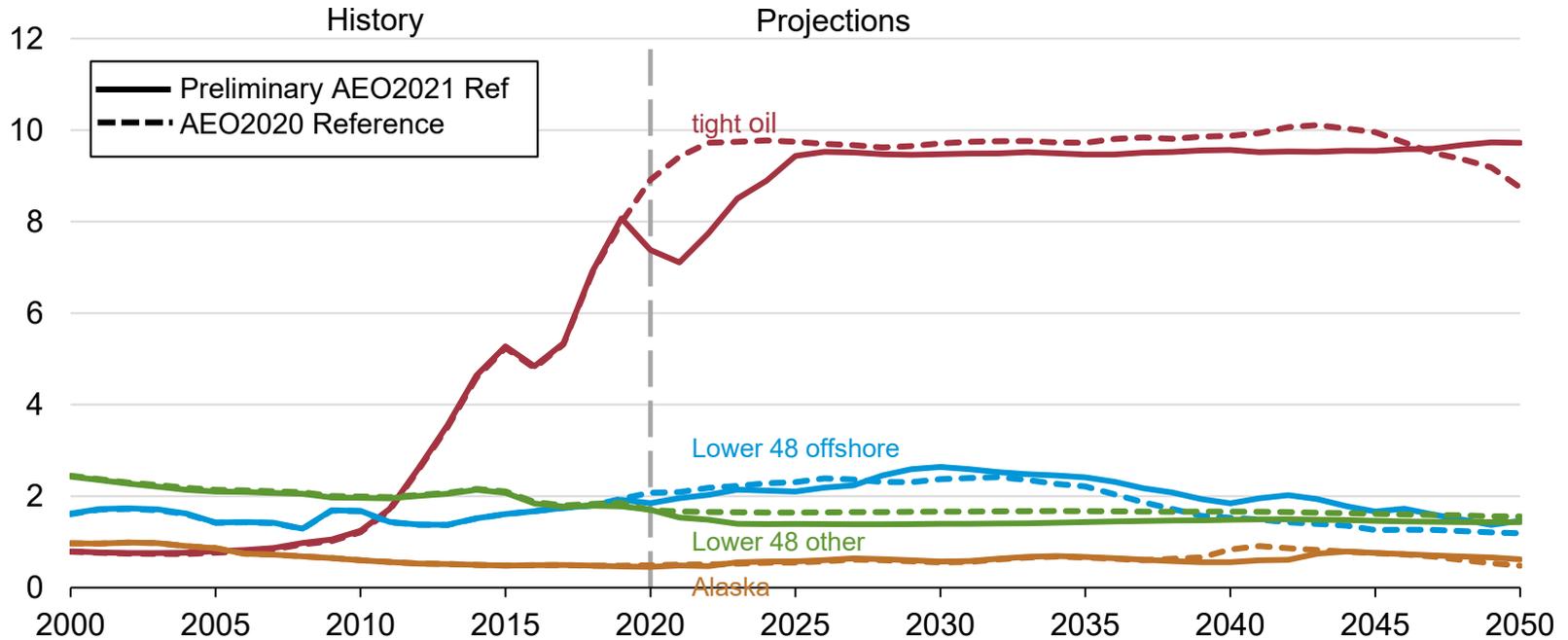
U.S. crude oil production
million barrels per day



Source: Preliminary AEO2021 runs, dated 9/20/20

Tight oil leads growth in U.S. crude oil production in AEO2021

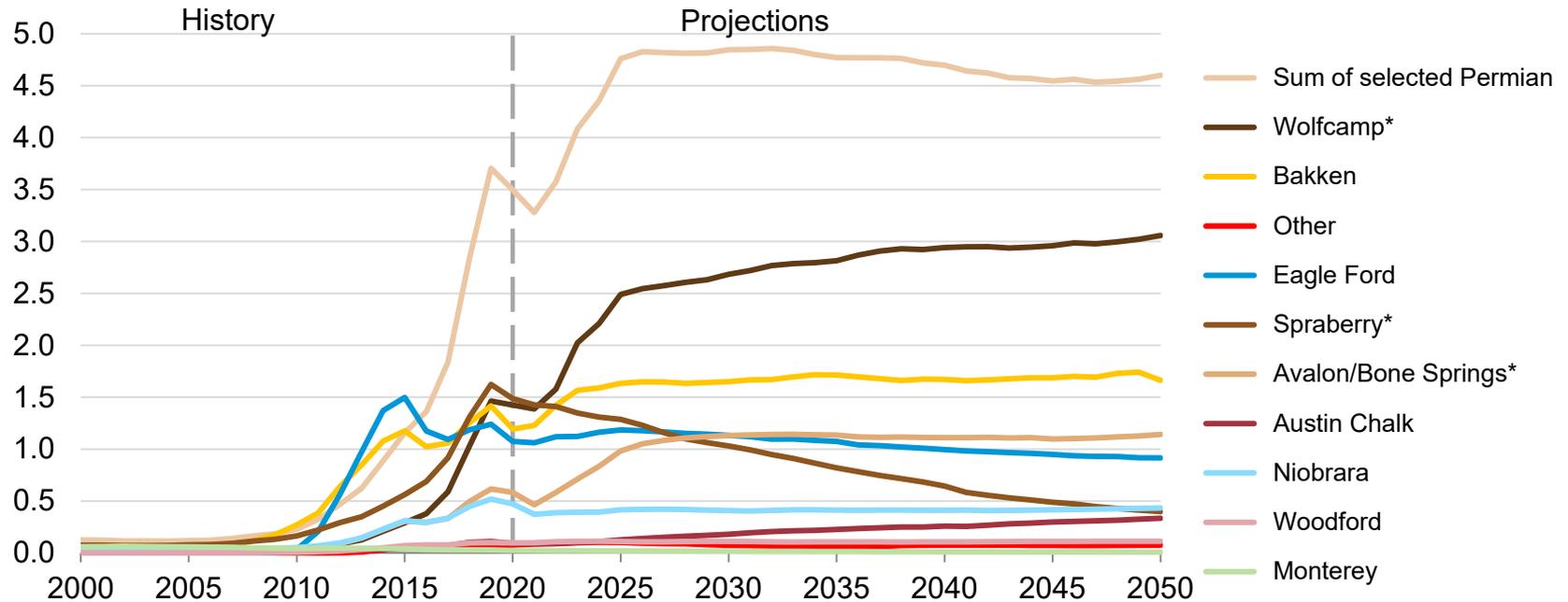
U.S. crude oil production by type
million barrels per day



Source: Preliminary AEO2021 runs, dated 9/20/20

Bakken and Wolfcamp lead growth in tight oil production

Crude oil production by selected tight oil plays
million barrels per day

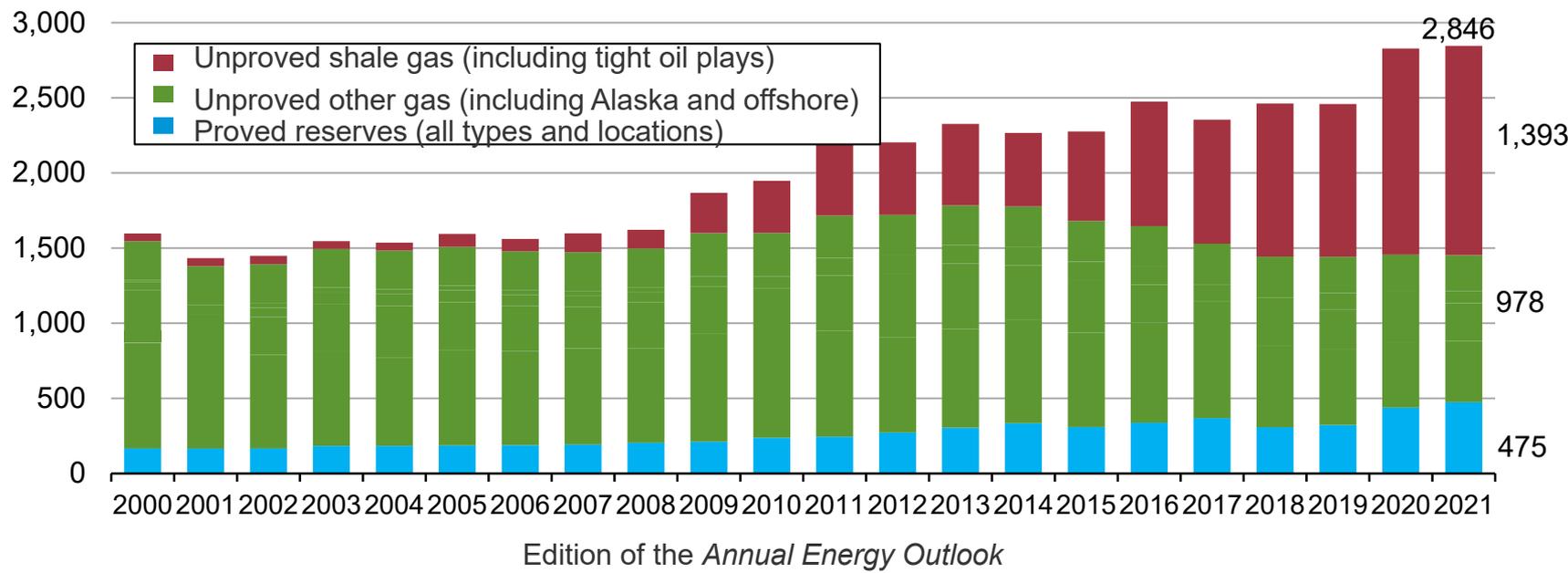


*Permian Basin

Source: Preliminary AEO2021 runs, dated 9/20/20

Technically recoverable natural gas resources reflect new information, a combination of assessments and EIA updates based on analysis of well-level production

U.S. dry natural gas resources
trillion cubic feet

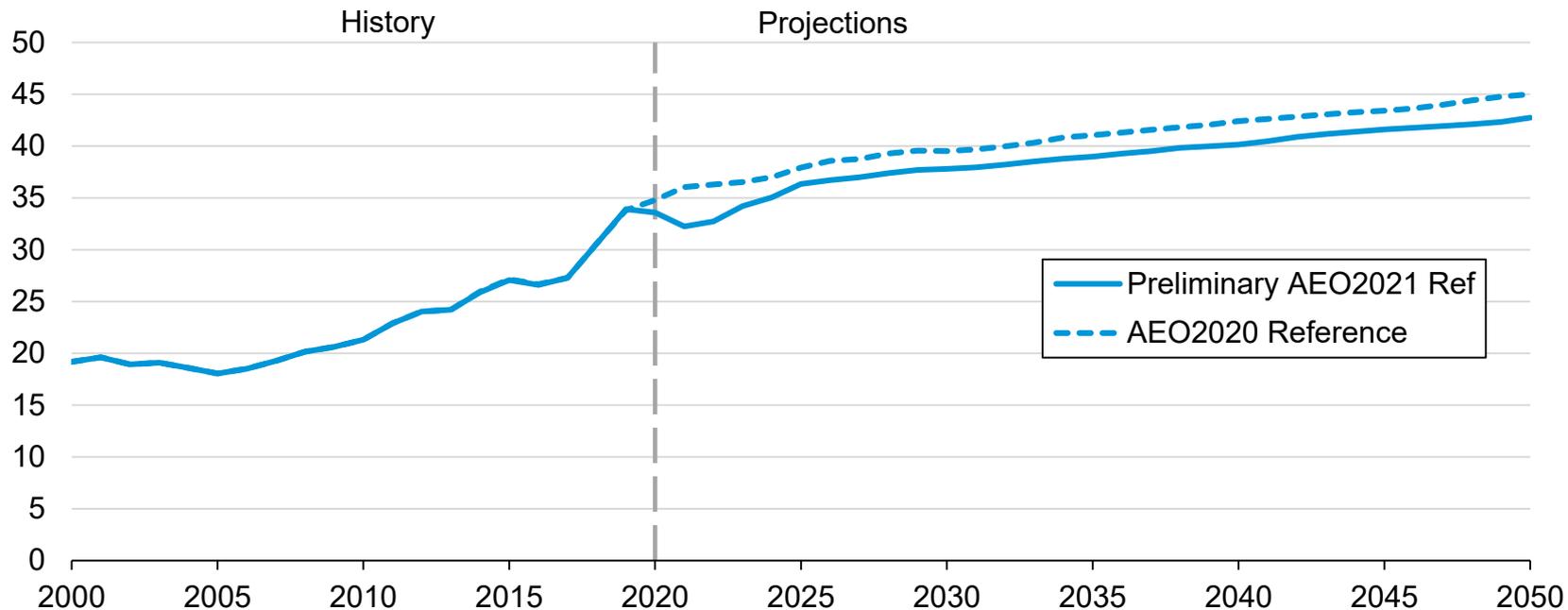


Source: U.S. Energy Information Administration, Annual Energy Outlook 2021 and prior editions

Note: Resources are as of January 1 of two years prior to the "edition" year of the AEO (e.g. AEO2021 is 1/1/2019).

U.S. dry natural gas production is lower than last year's AEO

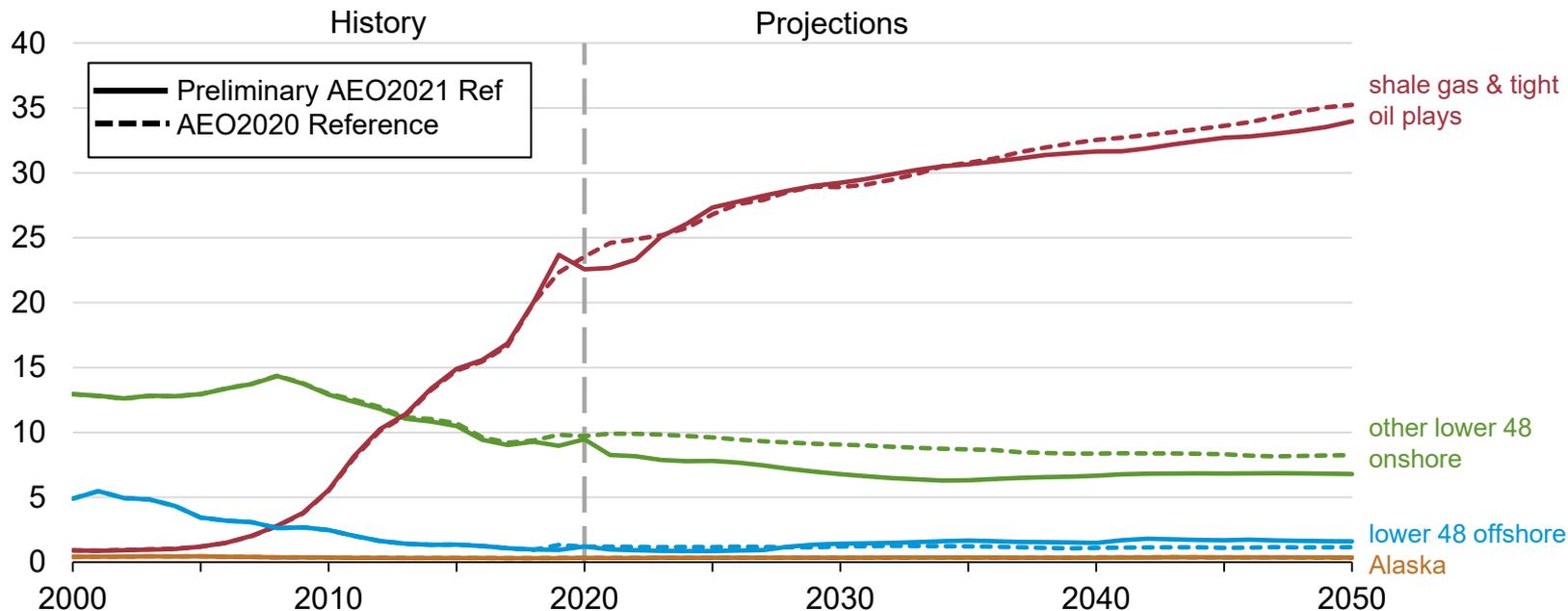
U.S. dry natural gas production
trillion cubic feet



Source: Preliminary AEO2021 runs, dated 9/20/20 (1 Tcf = 2.74 Bcf/d)

Shale gas leads growth in U.S. dry natural gas production in AEO2021

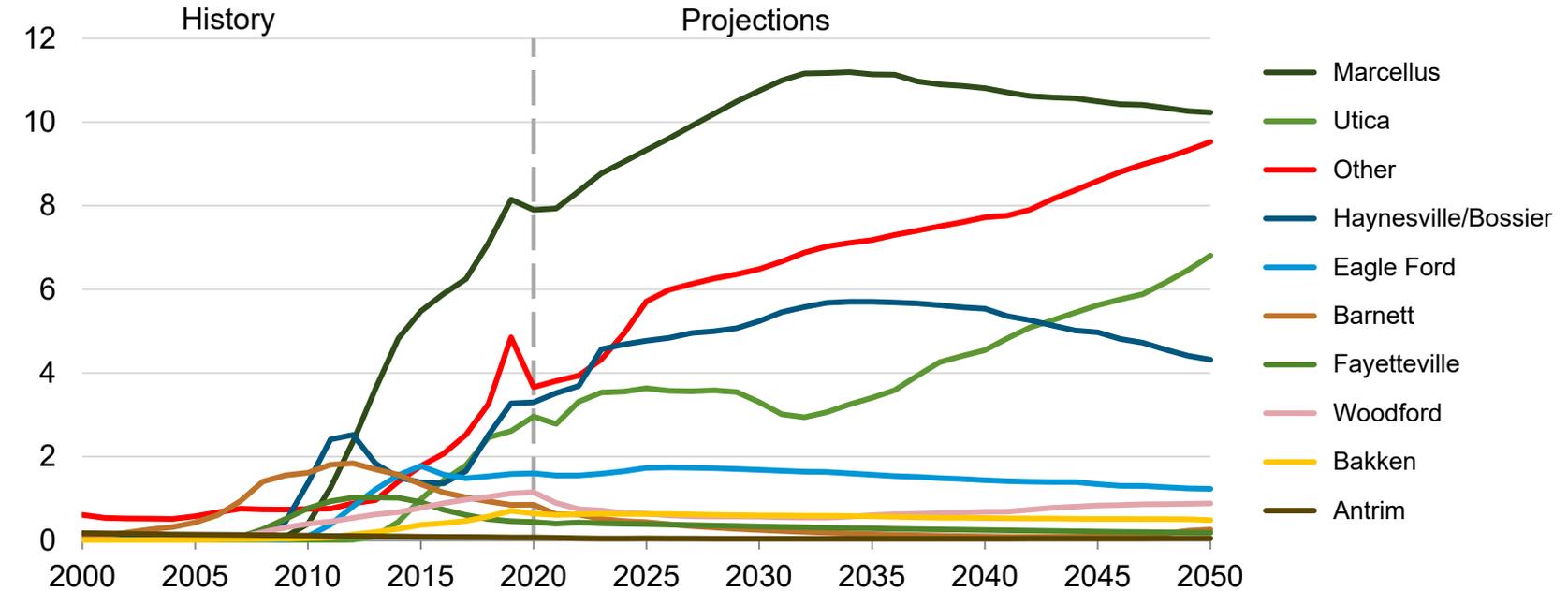
U.S. dry natural gas production by type
trillion cubic feet



Source: Preliminary AEO2021 runs, dated 9/20/20

Marcellus, Haynesville, Utica, and tight oil plays are the major contributors to U.S. shale gas production

Dry natural gas production by selected shale play
trillion cubic feet

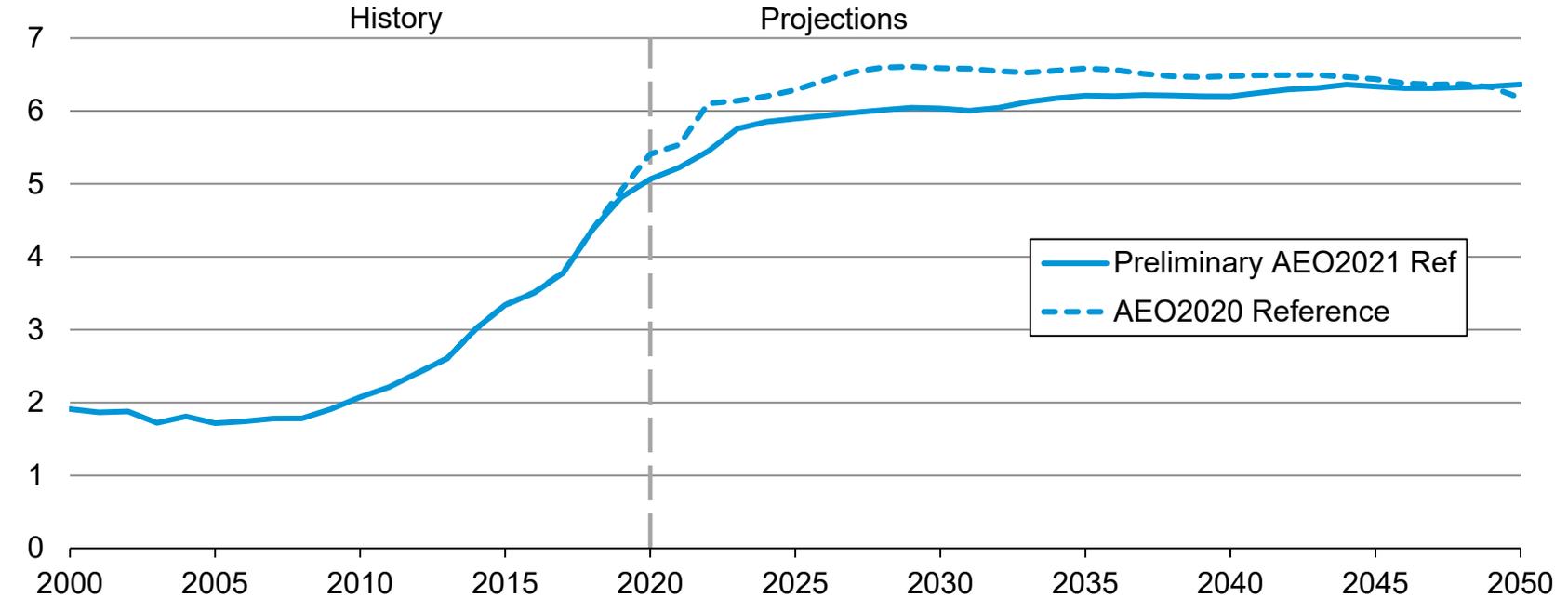


Note: Other includes natural gas production in tight oil plays.

Source: Preliminary AEO2021 runs, dated 9/20/20

NGPL production is lower than last year's AEO

Natural gas plant liquids production
million barrels per day



Source: Preliminary AEO2021 runs, dated 9/20/20

Liquid fuels markets

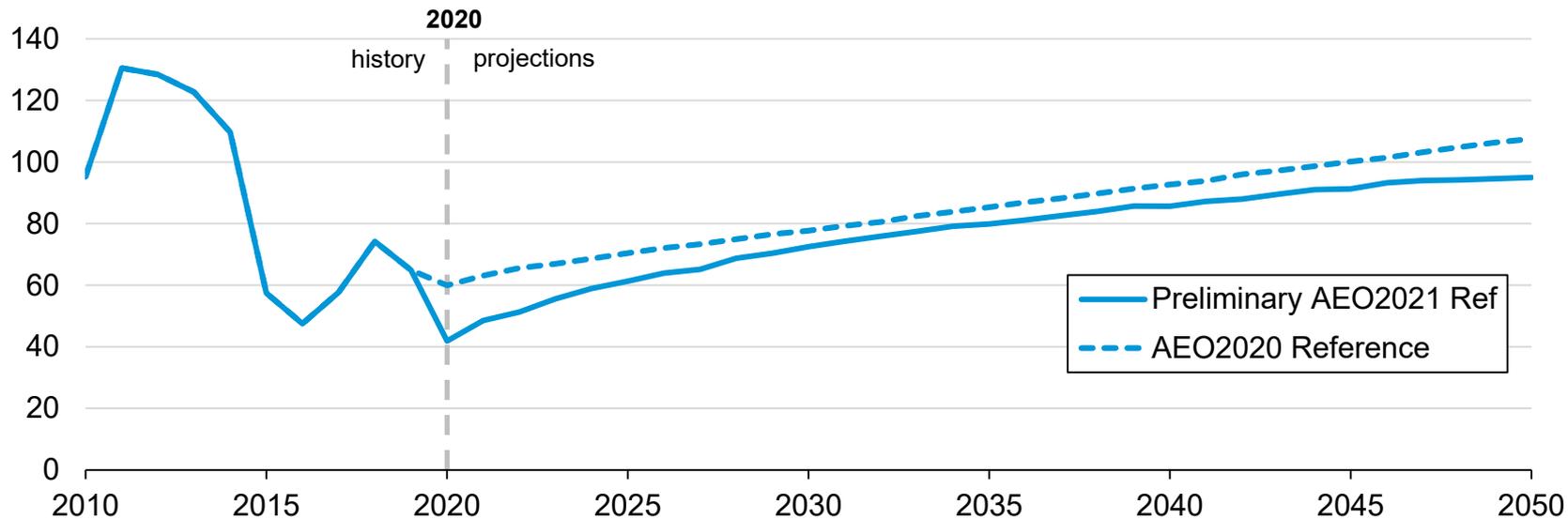
Petroleum updates for AEO2021

- Updated international crude oil and product import/export curves
- Updated crude oil type price differentials
- Updated pipeline capacity and transportation costs
- Annual update of state and federal fuel taxes
- Annual capacity updates for refinery and cogeneration

Brent crude oil prices are lower compared to AEO2020

Brent crude oil spot price

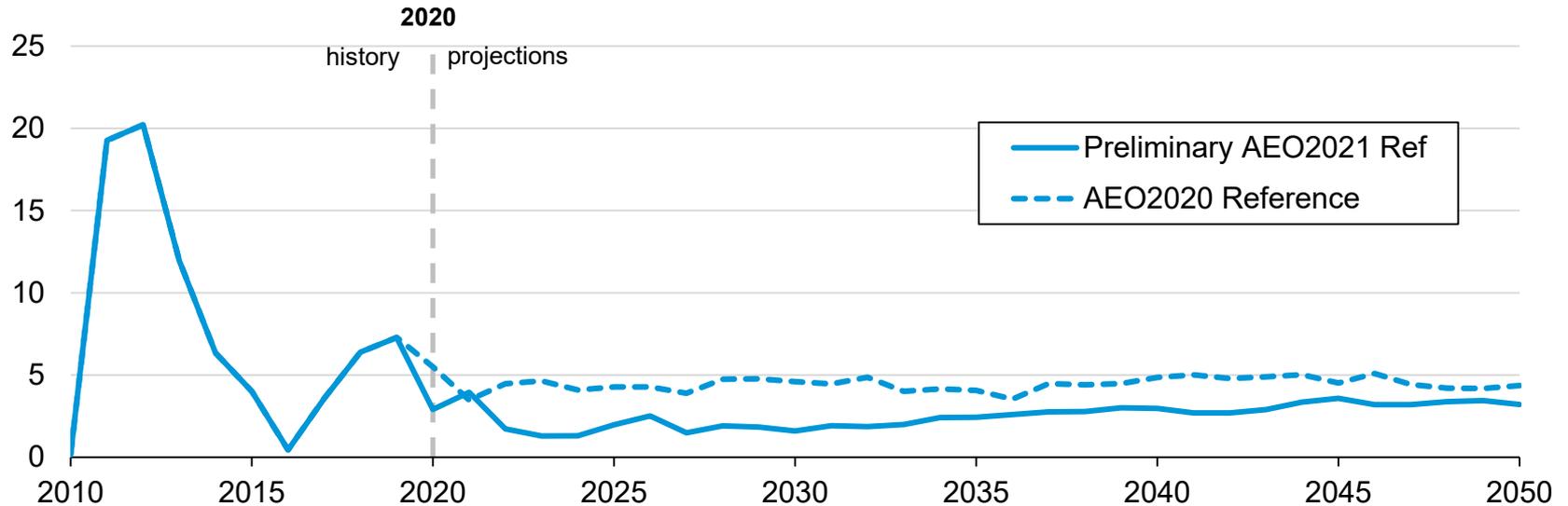
2020 \$/barrel



Source: Preliminary AEO2021 runs, dated as of 9/20/20

The Brent-WTI price spread lowers and then slowly increase in the projection period

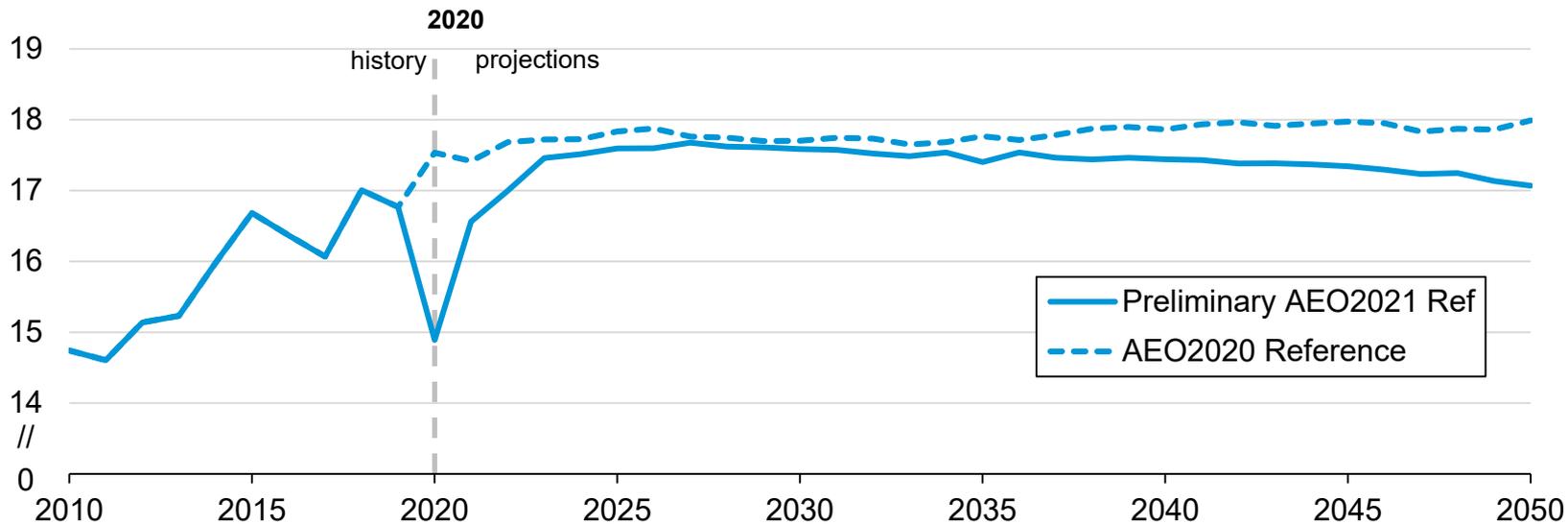
Brent-WTI price spread
2020 \$/barrel



Source: Preliminary AEO2021 runs, dated as of 9/20/20

Total crude supply to the U.S. refineries reflects lower atmospheric distillation capacity starting in 2020

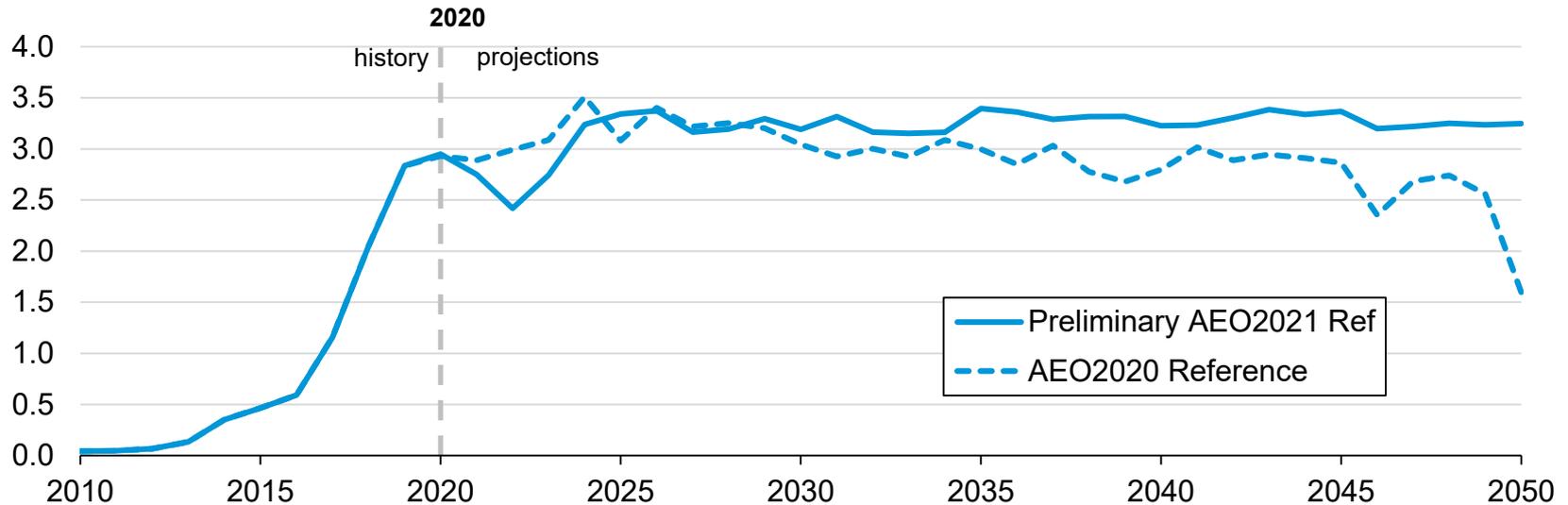
Total crude supply to the U.S. refineries
million barrels per day



Source: Preliminary AEO2021 runs, dated as of 9/20/20

Crude oil exports recover in the near future and longer term will be above AEO2020 levels

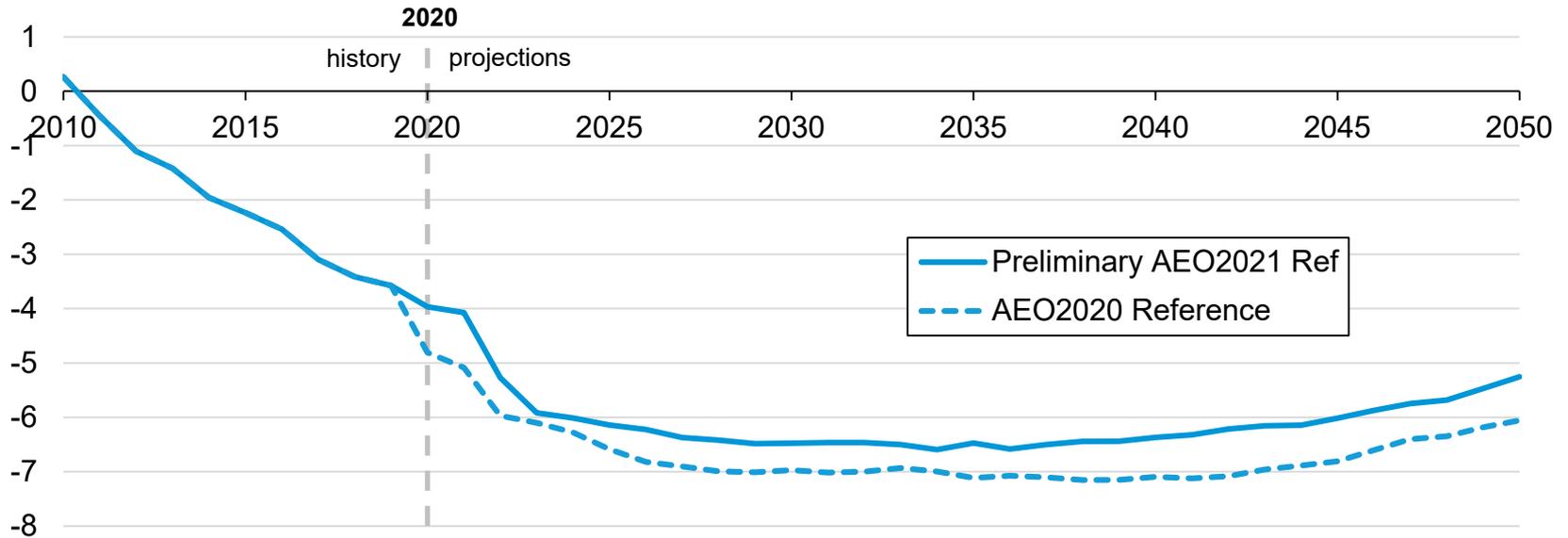
Crude oil exports
million barrels per day



Source: Preliminary AEO2021 runs, dated as of 9/20/20

Net imports of petroleum products are largely driven by trends in domestic petroleum product consumption

Net petroleum product imports
millions barrels per day

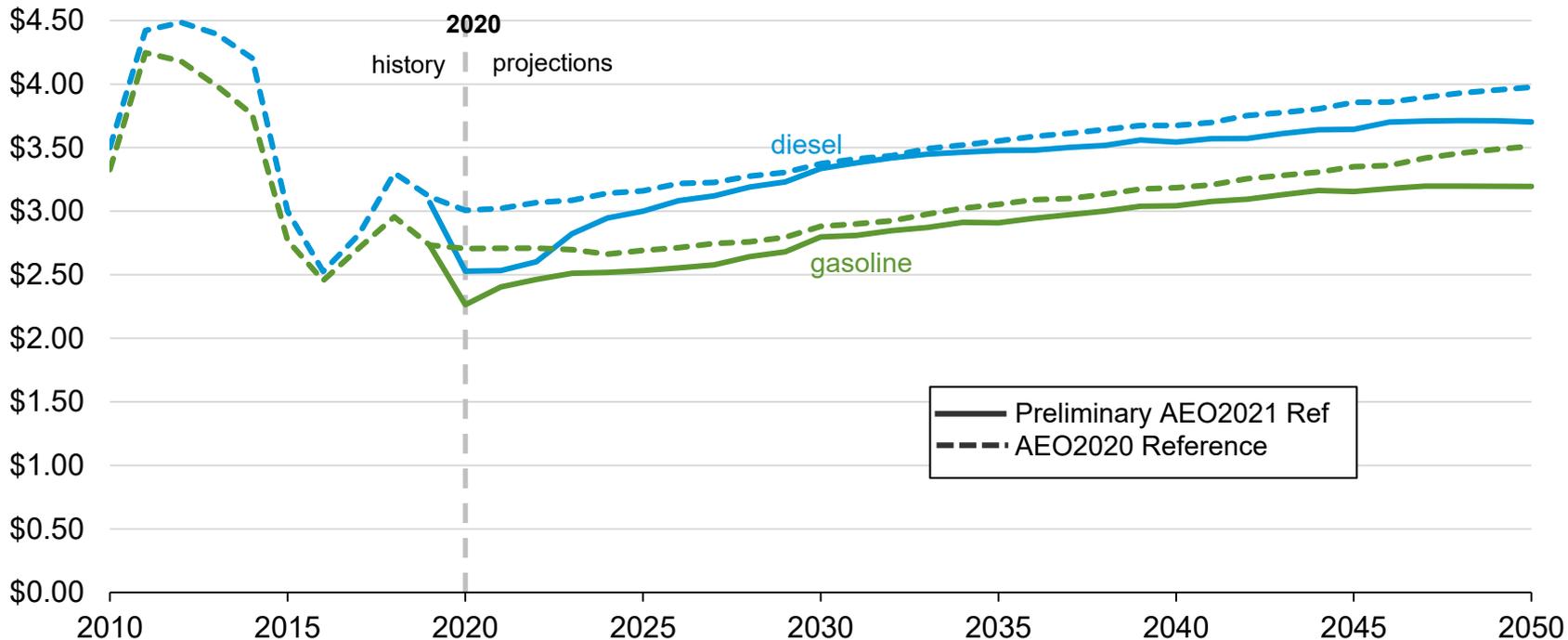


Source: Preliminary AEO2021 runs, dated as of 9/20/20

For AEO2021, the spread between gasoline and diesel prices will be lower in near-term, before evening out to similar price spread as AEO2020

Diesel and Gasoline end-use prices

2020 \$/gallon



Source: Preliminary AEO2021 runs, dated as of 9/20/20

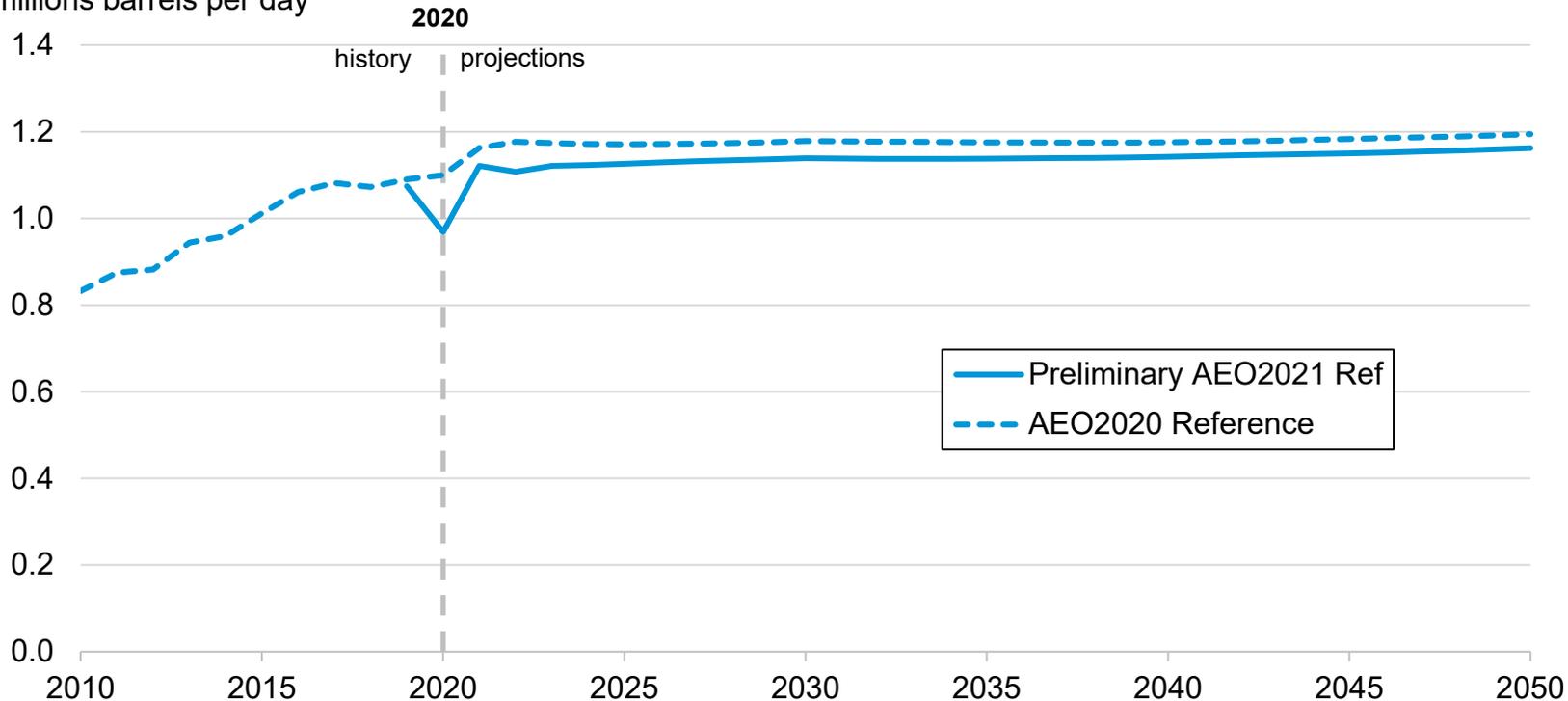
Biofuel updates for AEO2021

- Reactivated/extended the biodiesel blender tax credits through 2022, per legislation
- Added revenue for sale of distillers dried grain
- Annual capacity updates for ethanol, biodiesel, renewable diesel
- Bi-annual update of E15 maximum market penetration rates (slower growth through 2025)
- Improved representation of biodiesel imports
- Added representation of renewable diesel imports
- Updates to E85 representation

Source: Preliminary AEO2021 runs, dated as of 9/20/20

Biofuels supply is projected to recover quickly after 2020, albeit at a lower level than AEO2020

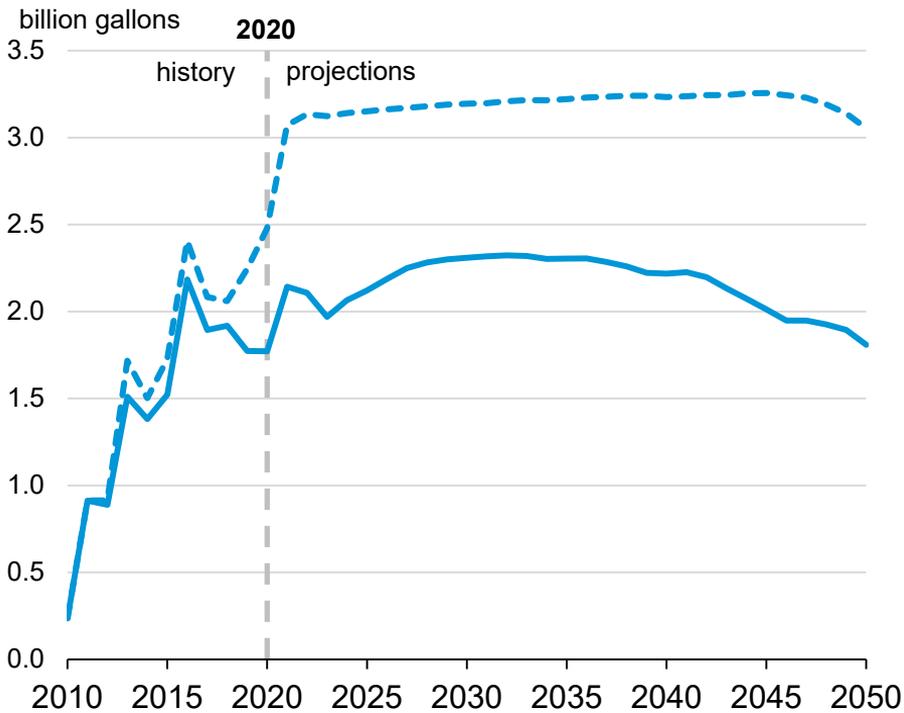
Biofuels supply
millions barrels per day



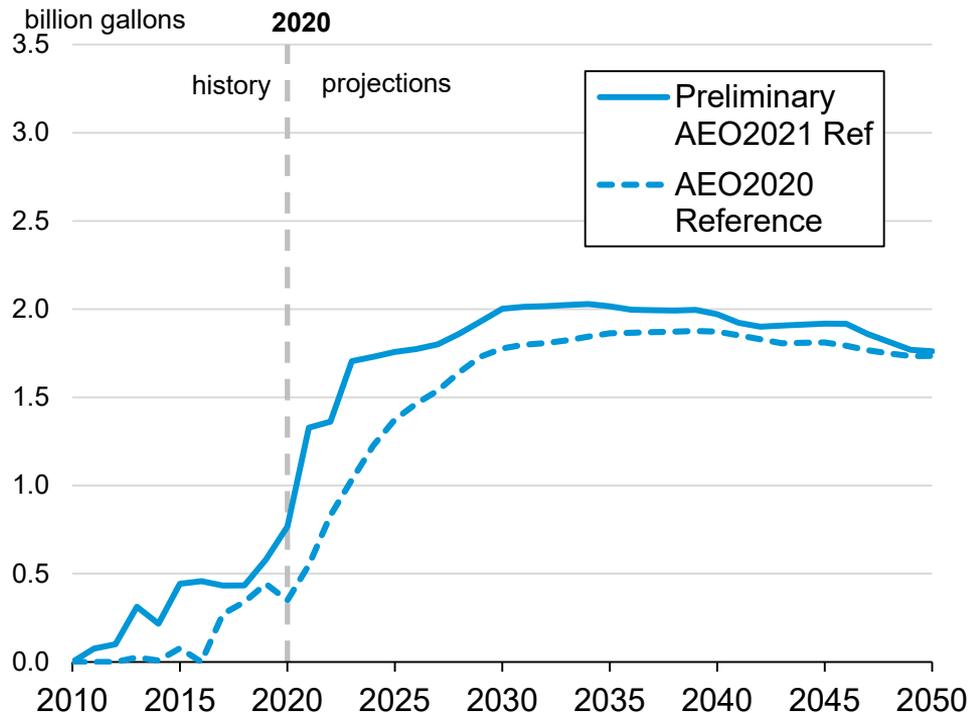
Source: Preliminary AEO2021 runs, dated as of 9/20/20

Biodiesel and renewable diesel supply are more in line with historical levels after improvement made to the feedstock curves and import supply representation

Biodiesel Supply



Renewable Diesel Supply



Source: Preliminary AEO2021 runs, dated as of 9/20/20

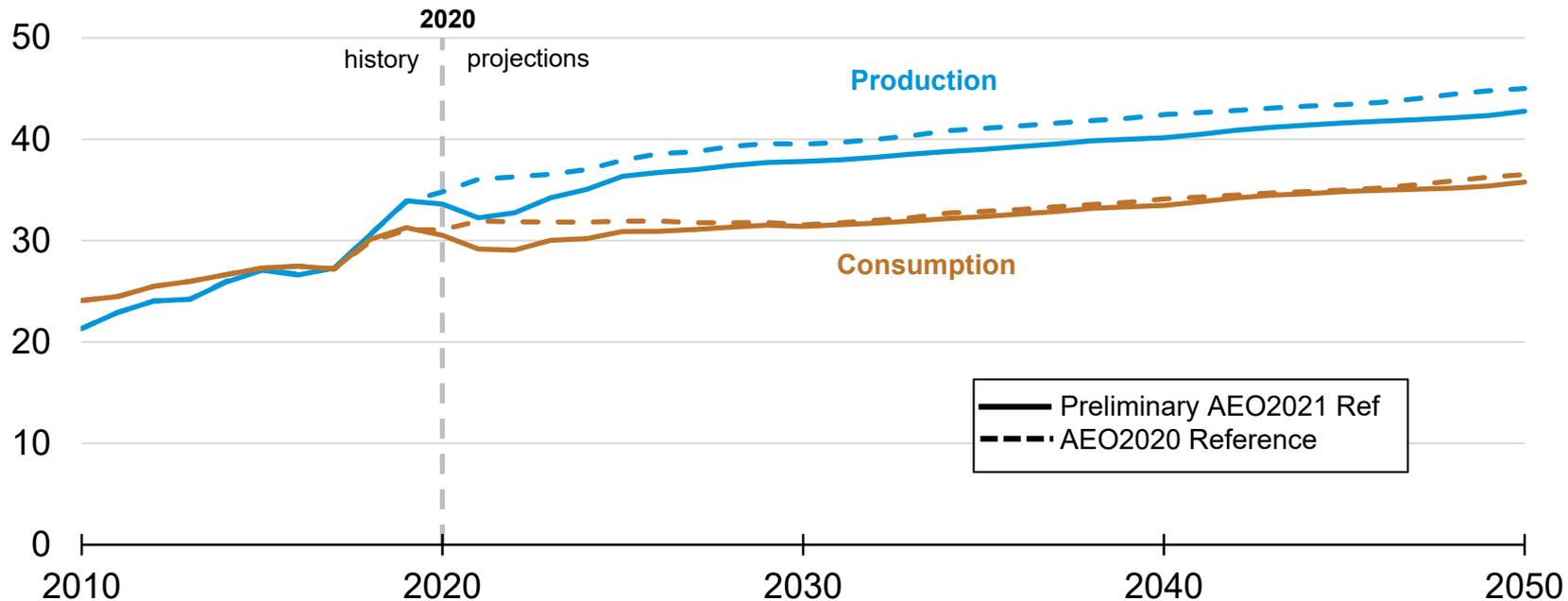
Natural gas markets

Data updates and changes for AEO2021

- *Natural Gas Annual* released November 2019 (2018 annual data)
- *Natural Gas Monthly* through April 2020 (complete 2019 history)
- Mexican, Canadian historical data through 2019
- Pipeline capacity, pipeline projects tracked by EIA
- Natural gas spot price data through May 2020
- However, these changes between AEO2020 and preliminary AEO2021 projections are driven by external changes in assumptions:
 - World oil price assumptions
 - COVID-19 related consumption changes
 - *Short Term Energy Outlook* forecast

U.S. natural gas consumption and production are significantly lower in the short term. In the long term, consumption remains largely unchanged from AEO2020, while production trends lower.

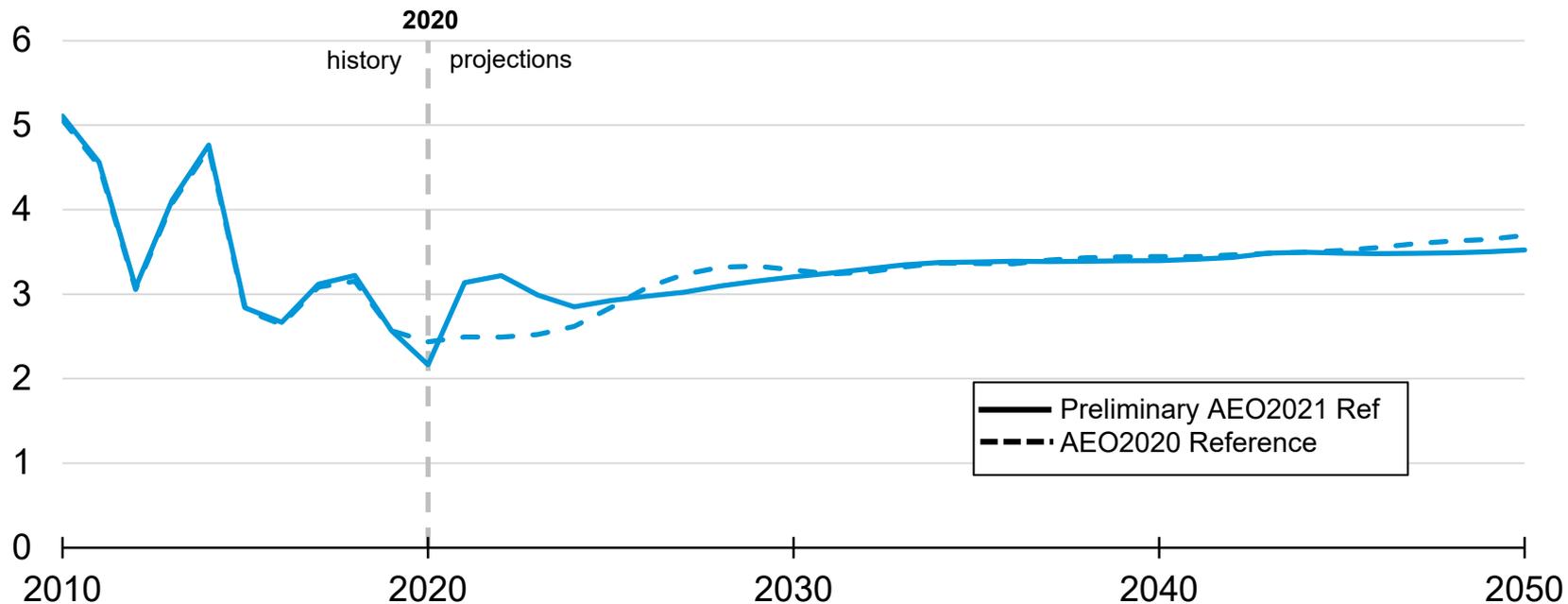
U.S. dry natural gas production and consumption in the Reference case
trillion cubic feet



Source: Preliminary AEO2021 run dated 9/20/20, EIA Annual Energy Outlook 2020

In AEO2021, U.S. Henry Hub natural gas spot prices are much higher in the near term; however, long term price trends remain relatively unchanged, approaching \$3.50/MMBtu in 2050

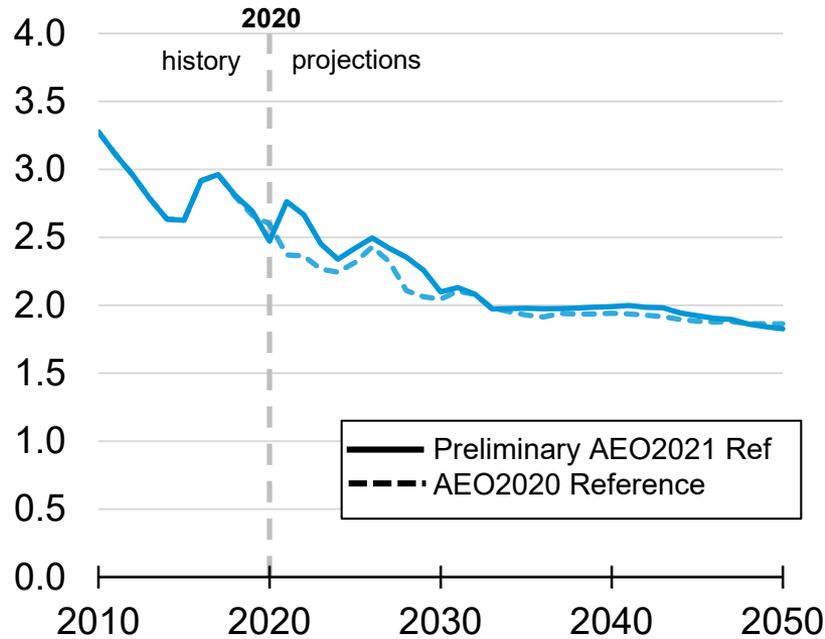
Henry Hub natural gas spot price in the Reference case
2020 dollars per million British thermal unit



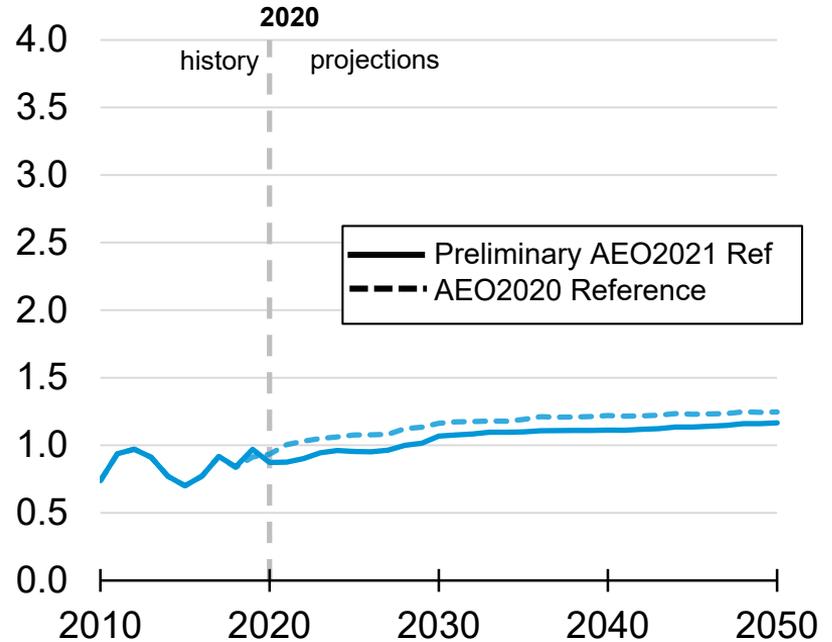
Source: Preliminary AEO2021 run dated 9/20/20, EIA Annual Energy Outlook 2020

While long term trend in U.S. imports from Canada remains unchanged, projected U.S. exports to Canada are expected to decline as demand in eastern Canada shifts away from natural gas

U.S. natural gas imports from Canada
trillion cubic feet



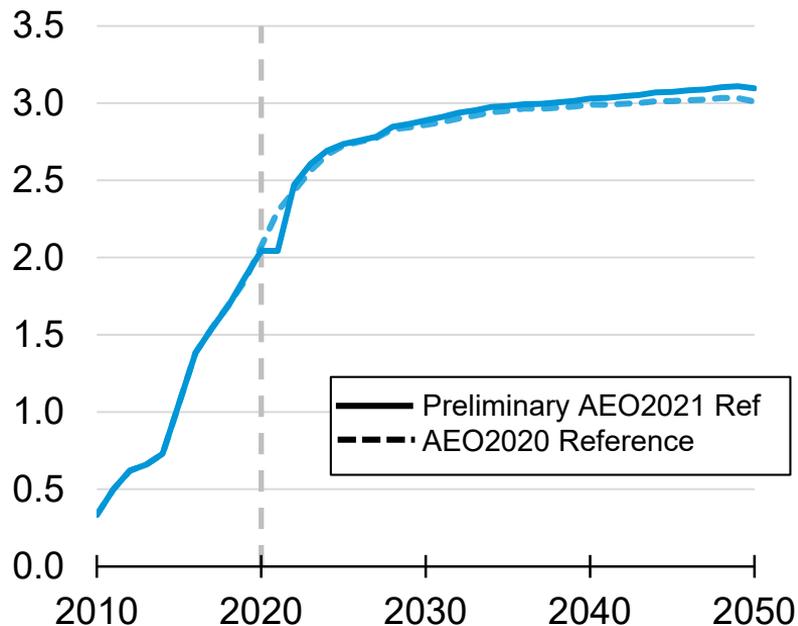
U.S. natural gas exports to Canada
trillion cubic feet



Source: Preliminary AEO2021 run dated 9/20/20, EIA Annual Energy Outlook 2020

Current long-term trends in U.S. natural gas exports to Mexico remain the same, subject to additional updates in assumptions in AEO 2021

U.S. pipeline exports to Mexico
trillion cubic feet



- October STEO updates are expected to increase U.S. gross pipeline exports in 2021
- Pending assessment of current market trends in Mexico
 - Domestic production declines
 - Changes to expected consumption patterns given Mexican policies, COVID-related declines in short term

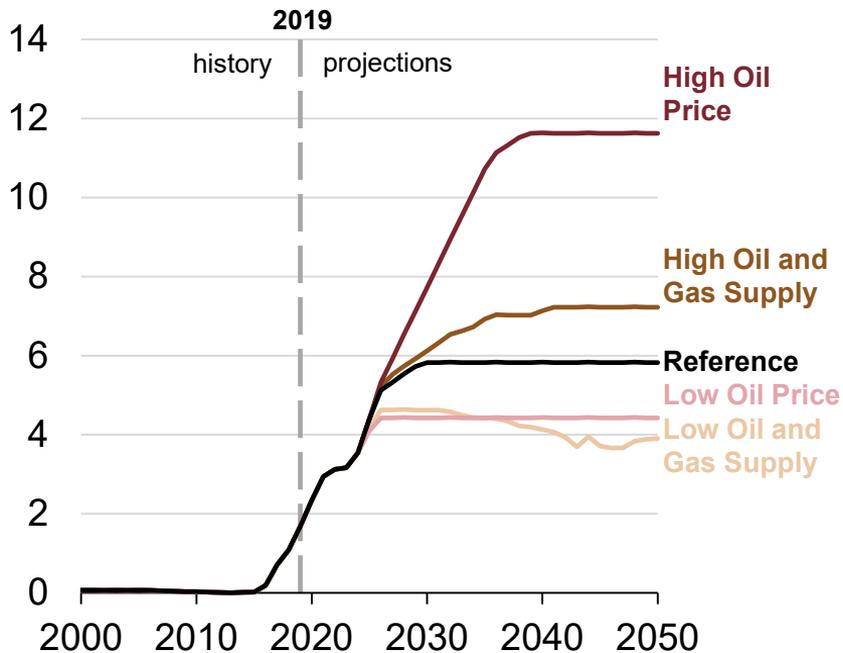
Source: Preliminary AEO2021 run dated 9/20/20, EIA Annual Energy Outlook 2020

LNG exports and COVID-19

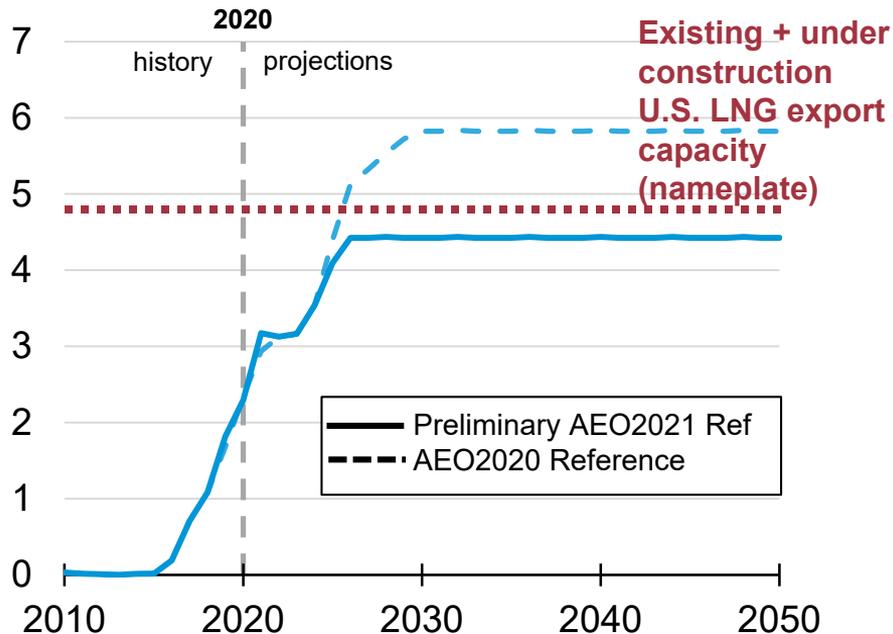
- **Short Term: Present-2021**
 - the latest STEO forecast assumes that lower global natural gas demand as a result of responses to the COVID-19 pandemic and an unfavorable LNG pricing environment will lower U.S. LNG exports, primarily in the second and third quarters of 2020
 - declines in forecast LNG exports are largely based on announced and anticipated cargo cancellations and weak global natural gas forward prices
- **Medium Term: 2022-2025**
 - we do not expect any unplanned export capacity to be added before 2025
 - EIA expects the world oil price to be lower from 2022 to 2025, which would likely affect the competitiveness of U.S. LNG exports may decrease capacity utilization
- **Long Term: 2025 and Beyond**
 - with lower international oil prices, EIA expects LNG exports to be lower
 - the other major driver of LNG exports is international demand for natural gas, remains very uncertain

LNG export, world price assumptions are still be reviewed, but preliminary results suggest no additional capacity will be built in Reference case

AEO2020 U.S. LNG exports by side case
trillion cubic feet



U.S. LNG exports in Reference case
trillion cubic feet



Source: Preliminary AEO2021 run dated 9/20/20, EIA Annual Energy Outlook 2020

Updated LNG export assumptions

- Dates of projects under construction in AEO2020 updated
- No new projects reached FID since those that were added in AEO2020:
 - Golden Pass LNG (February 2019): 3 trains, 2.04 Bcf/d, 2024-2025
 - Sabine Pass Train 6 (June 2019): 0.7 Bcf/d, 2023
 - Calcasieu Pass (August 2019): 10 trains, 1.32 Bcf/d, 2023-2024
- Several potential projects that have been approved have announced scaled- back plans, delays, or have been cancelled
 - Lake Charles LNG (March 2020): Shell withdrew from 2.2 Bcf/d project, Energy Transfer delayed FID to 2021
 - Magnolia LNG (September 2020): Glenfarne purchased project for \$2.24 million, received extension through 2026 to construct 1.2 Bcf/d terminal
 - Delayed decisions to 2021: Driftwood LNG, Delfin LNG, Venture Global Plaquemines Parish, Annova's Brownsville
- Additional potential updates
 - Nameplate vs. peak capacity
 - Updated shipping costs from U.S. Gulf, East Coast to Asia and Europe

Contacts for liquid fuels markets including biofuels

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We welcome feedback on our assumptions and documentation

- Working group meetings <http://www.eia.gov/forecasts/aeo/workinggroup/>
- The AEO Assumptions report <http://www.eia.gov/forecasts/aeo/assumptions/>
- NEMS Model Documentation
 - Oil and gas supply (OGSM)
[https://www.eia.gov/outlooks/aeo/nems/documentation/ogsm/pdf/m063\(2020\).pdf](https://www.eia.gov/outlooks/aeo/nems/documentation/ogsm/pdf/m063(2020).pdf)
 - Natural gas market (NGMM)
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 - Liquid fuels market (LFMM)
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 - International energy (IEM)
[https://www.eia.gov/outlooks/aeo/nems/documentation/international/pdf/m071\(2020\).pdf](https://www.eia.gov/outlooks/aeo/nems/documentation/international/pdf/m071(2020).pdf)
- Trends and Expectations Surrounding the Outlook for Energy Markets
https://www.eia.gov/outlooks/aeo/trends_expectations.php/

For more information

U.S. Energy Information Administration home page | www.eia.gov

Short-Term Energy Outlook | www.eia.gov/steo

Annual Energy Outlook | www.eia.gov/aeo

International Energy Outlook | www.eia.gov/ieo

International Energy Statistics database | www.eia.gov/ies

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