Effects of Removing Restrictions on U.S. Crude Oil Exports

for
Crude Oil Quality Association
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EIA mission: independent statistics and analysis

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- EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment
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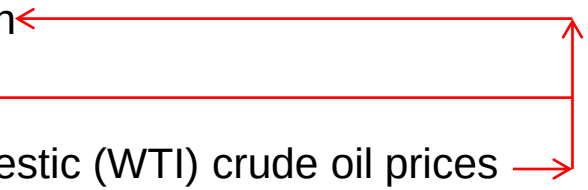
The current analysis builds on EIA work over the past 15 months related to the implications of increasing U.S. crude oil production and the potential removal of restrictions on crude oil exports

Study/Activity	Status
U.S. Crude Oil Production Forecast by Crude Oil Type	May 2014
Condensate Workshop	September 2014
What Drives U.S. Gasoline Prices?	October 2014
U.S. Crude Import Tracking Tool	November 2014
Technical Options for Processing Additional Light Tight Oil Volumes within the United States	April 2015
Implications of Increasing Light Tight Oil Production for U.S. Refining	May 2015
U.S. Crude Oil Production to 2025: Updated Projection of Crude Types	May 2015
Effects of Removing Restrictions on U.S. Crude Oil Exports	*September 2015*

Background

- EIA continues to evaluate the implications of increasing U.S. light crude oil production on refinery operations and domestic and international petroleum balances and prices

- This study uses EIA's National Energy Modeling System (NEMS) through 2025 to evaluate the effect of relaxing crude export restrictions have on:
  - U.S. crude oil production
  - U.S. gasoline prices
  - Global (Brent) and domestic (WTI) crude oil prices
  - U.S. imports and exports of crude oil, gasoline, and diesel
  - Refinery investments and margins



Feedback loop not present in May 2015 refinery impacts study

- The analysis considers four cases from the Annual Energy Outlook 2015 (AEO2015); each case was run *with* and *without* current restrictions on exports of U.S.-produced crude oil
  - AEO 2015 cases: Reference, Low Oil Price, and High Oil and Gas Resource, plus the combination of the Low Price and High Oil and Gas Resource cases

Key takeaways -1

- In the Reference and Low Oil Price cases, peak domestic crude production of 10.6 million barrels per day (b/d) can be accommodated under current export restrictions through the use of current and planned processing capacity, continued import substitution, and a modest rise in currently allowed crude exports; therefore, the modeling analysis shows little to no effect on oil or gasoline prices, domestic production, refining activity or margins, or trade in crude and products from the removal of restrictions on crude exports

- In high resource base cases where U.S. production reaches up to 13.6 million b/d by 2025, removal of crude export restrictions has the following effects (effects in 2025 unless otherwise noted):
  - Higher domestic crude price (+$5 to +$6/b)
  - Lower Brent prices (-$0.50 to -$0.90/b)
  - Lower U.S. gasoline prices (-2 cents/gal -- avg. of 2020 and 2025 values)
  - Higher domestic crude production (+0.4 to +0.5 million b/d)
  - Higher U.S. crude exports (+1.0 to +2.4 million b/d)
  - Lower U.S. product exports (-0.2 to -1.8 million b/d)

Key takeaways -2

- Roughly a $7/b to $8/b Brent-WTI spread is needed for domestic crude to reach markets beyond Canada or Mexico
- In all cases studied, domestic refiners maintain or increase their 2014 crude cost advantage over foreign refiners
- Bottom Line:
  - Analysis shows no significant effects for consumers, producers, or refiners in cases where domestic production remains below 11 million b/d
  - U.S. consumers realize a small reduction in gasoline prices from the removal of crude export restrictions under high resource assumptions; however, the largest effects (in opposite directions) are felt by producers and refiners

Effects of removing crude export restrictions reflect key drivers in petroleum markets

- An increase in WTI prices increases production of U.S. crude streams that are priced relative to WTI
- Increased U.S. crude production increases world crude supply
- Increased world crude supply decreases the price of Brent, which lowers U.S. gasoline prices
- Crude export restrictions in high resource cases widen the Brent-WTI spread by depressing WTI prices, discouraging domestic production and resulting in greater refinery investments to process domestic crude
- Increased refinery investments with export restrictions in place lead to increased petroleum product exports
- Higher domestic crude prices with restrictions removed increase producer profitability and decrease refiner profitability.

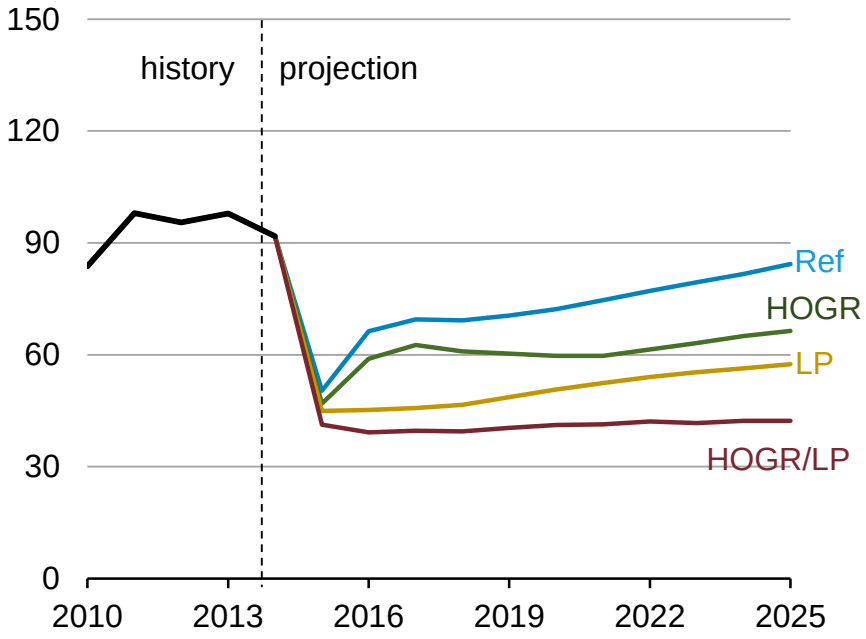
Analytic Approach: EIA compared projections *with* and *without* U.S. crude export restrictions in the context of cases from EIA's AEO2015

Case	Case overview
Reference (Ref)	Assumes global crude oil prices continue to fall through 2015, before increasing to $75/b (all prices in 2013 dollars) in 2018; after 2018, growth in demand from non-OECD countries pushes the projected Brent price in 2025 to $90/b
Low World Oil Price (LP)	Assumes lower world demand for petroleum products, higher OPEC upstream investment, and lower non-OPEC exploration and development costs; these factors hold the projected price for Brent crude oil in 2025 to $63/b, well below the Reference case projection
High Oil and Gas Resources (HOGR)	Reflects more optimistic assumptions about domestic crude oil and natural gas supply prospects than the Reference case; this significantly increases domestic production, contributing to the Brent crude oil price rising to only $81/b by 2025 (versus $90/b in the Reference case)
High Oil and Gas Resources /Low Price (HOGR/LP)	Combines assumptions from the HOGR and LP cases; the projected price for Brent crude oil rises to only $56/b in 2025

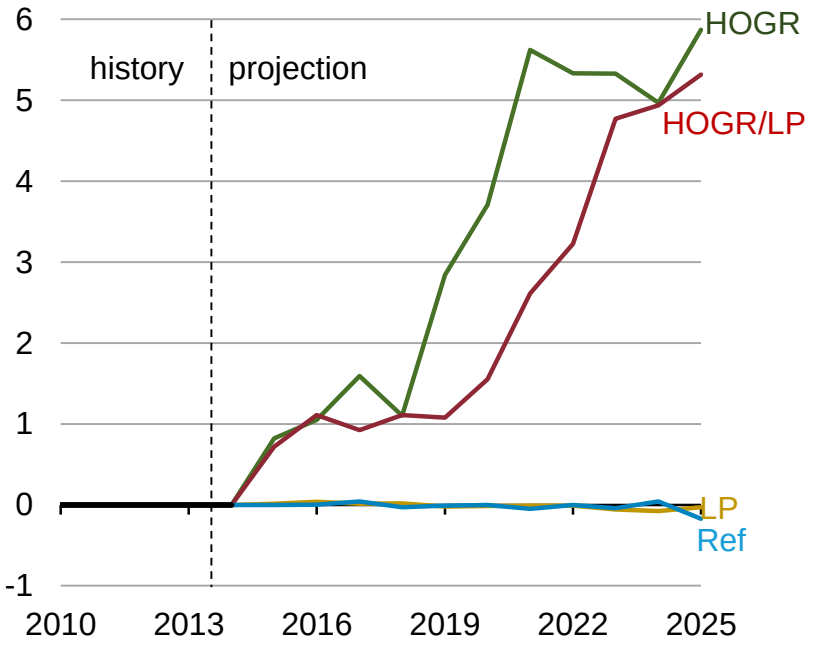
DOMESTIC CRUDE OIL PRICES: Removal of export restrictions raises WTI prices in high production cases by eliminating the need for lower prices to incent investment in domestic refining capacity

West Texas Intermediate crude oil prices 2010-25, and difference resulting from removing crude export restrictions
2013 dollars per barrel

With current export restrictions



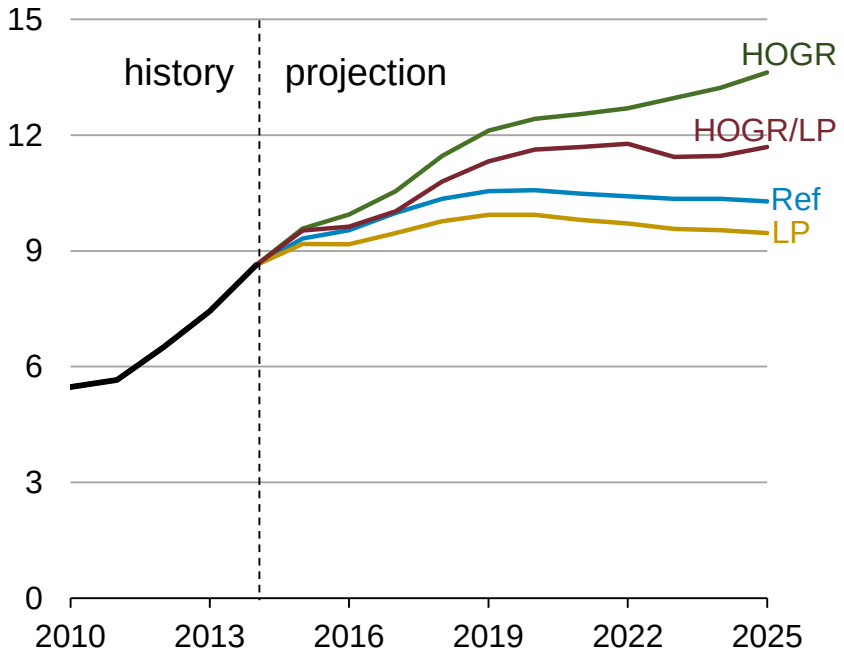
Difference resulting from removing restrictions



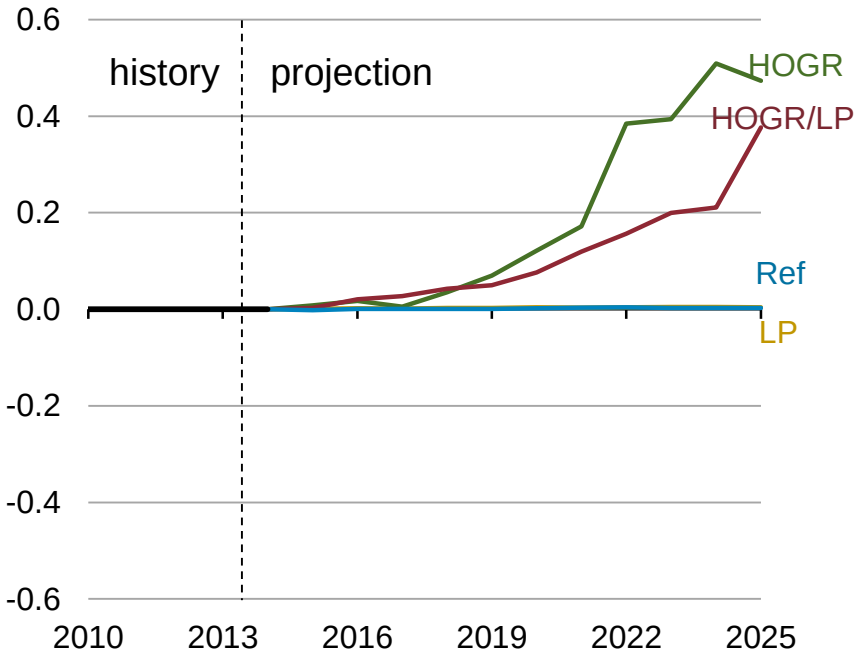
U.S. CRUDE PRODUCTION: Growth in production depends on prices and resource assumptions; removing export restrictions raises production in cases where output is high under current restrictions

U.S. crude oil production 2010-25, and difference resulting from removing export restrictions
million barrels per day

With current export restrictions



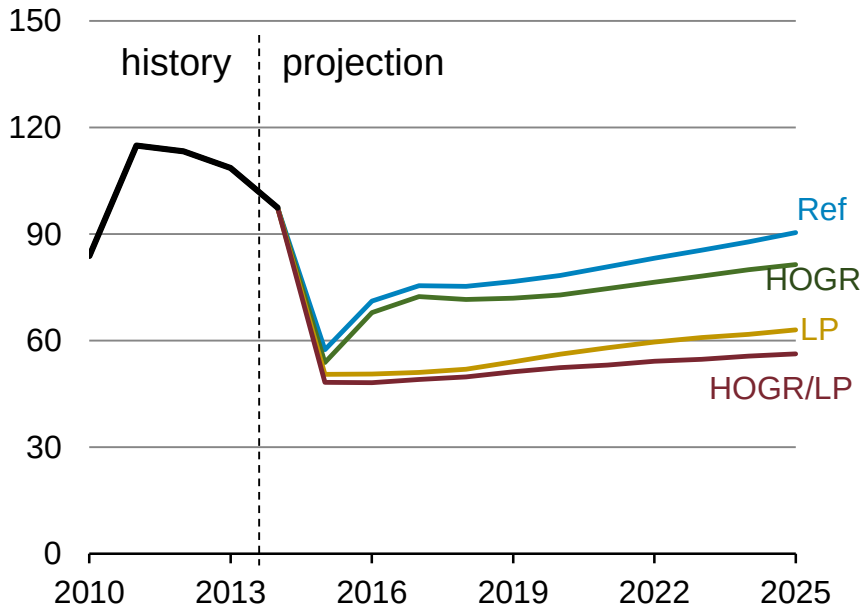
Difference resulting from removing restrictions



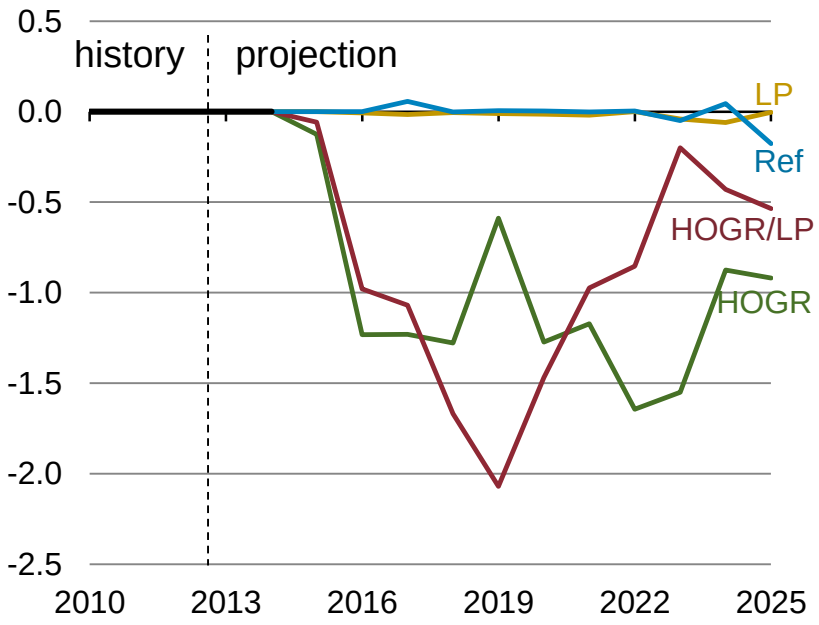
BRENT PRICES: Removal of export restrictions lowers Brent crude prices in high production cases by raising U.S. crude production, which in EIA's analysis is only partially offset by lower production elsewhere; GASOLINE PRICES are linked to global (Brent) crude prices and therefore move lower in these cases.

Brent crude oil prices 2010-25, and difference resulting from removing crude export restrictions
2013 dollars per barrel

With current export restrictions



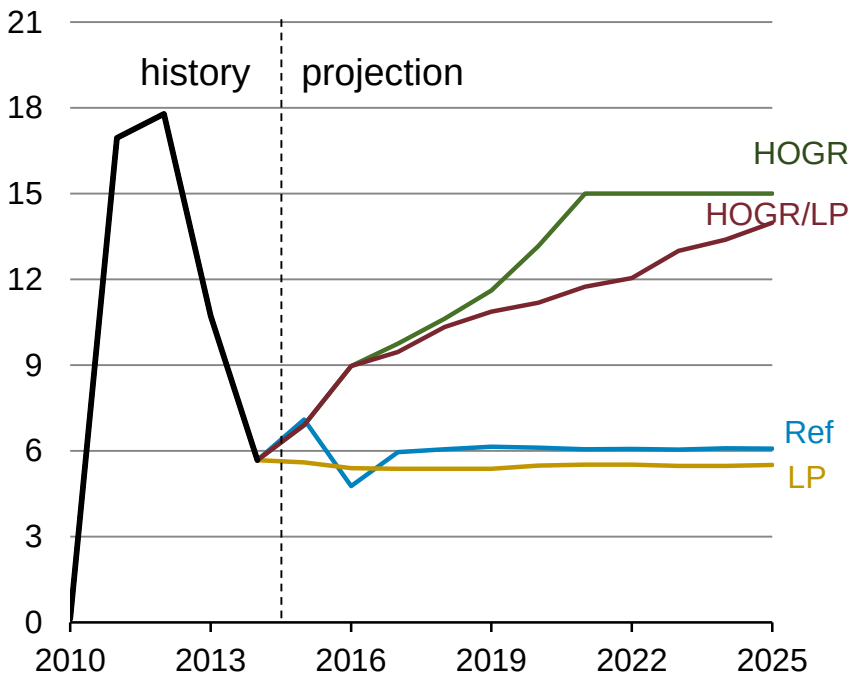
Difference resulting from removing restrictions



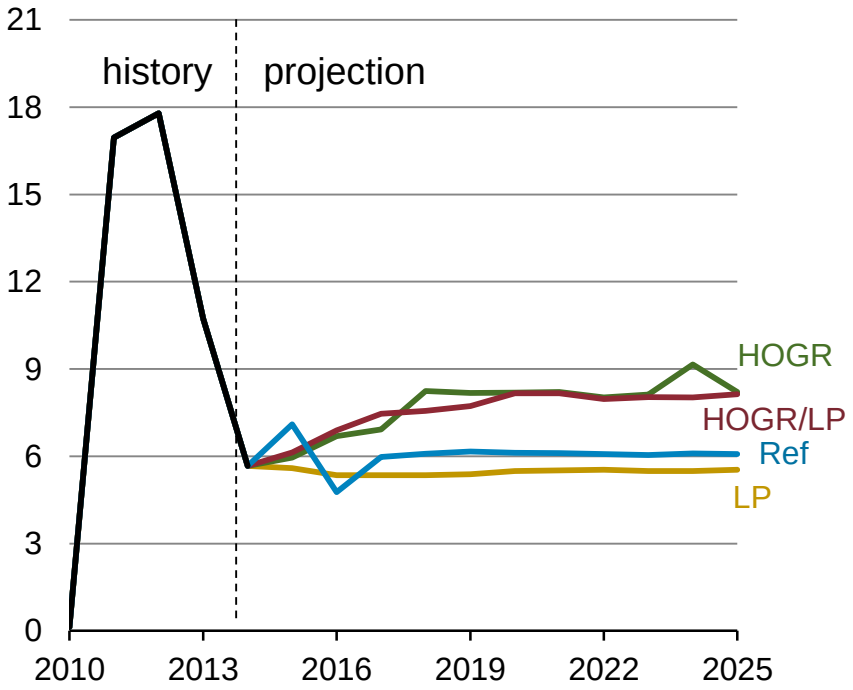
The Brent-WTI spread widens to $13/b to $15/b in cases with high production under current crude export restrictions; spreads generally do not widen beyond $8/b in any case without export restrictions

Brent-WTI price spread, 2010-25 *with* and *without* crude export restrictions
2013 dollars per barrel

With current crude export restrictions



Without current crude export restrictions

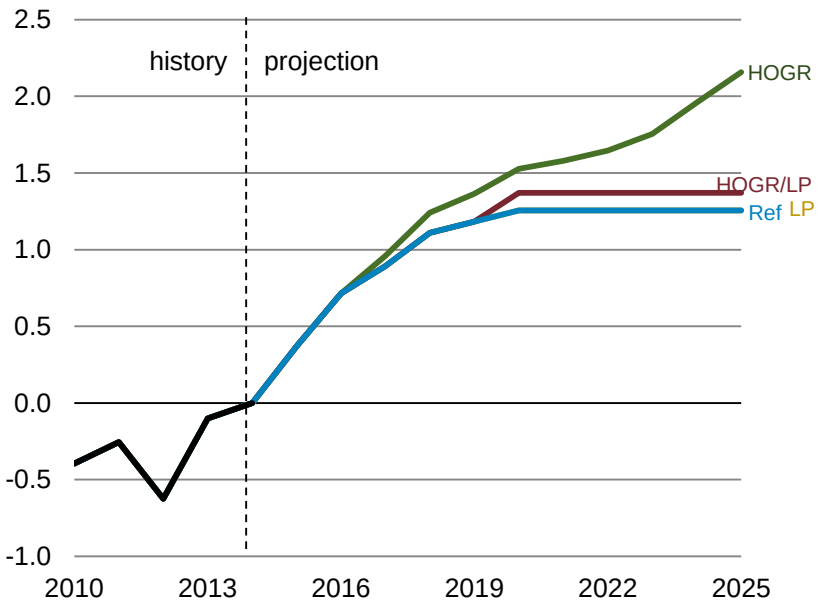


DISTILLATION CAPACITY ADDITIONS: High Brent-WTI spreads with current export restrictions result in greater investment in U.S. distillation capacity

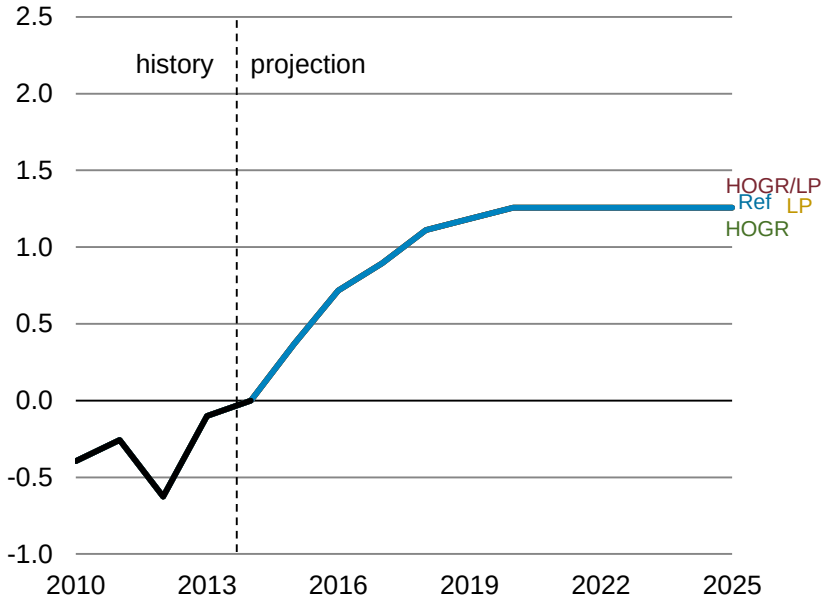
Difference in U.S. crude oil distillation capacity from 2014 levels *with* and *without* crude export restrictions

million barrels per calendar day (2014 = 0)

With current crude export restrictions



Without current crude export restrictions

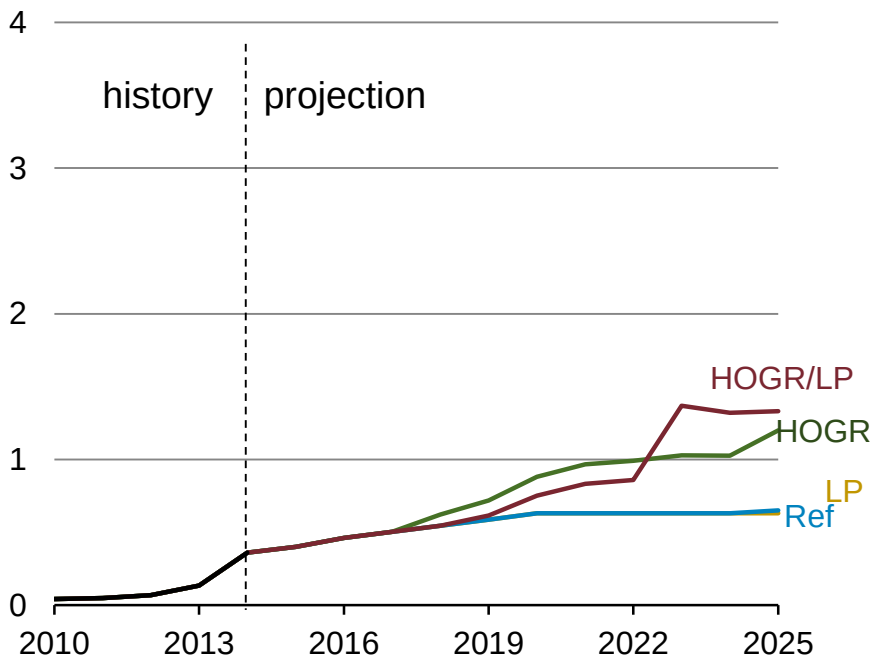


Note: All values reflect the difference from the total U.S. atmospheric distillation capacity in 2014 of 17.9 million barrels per calendar day.

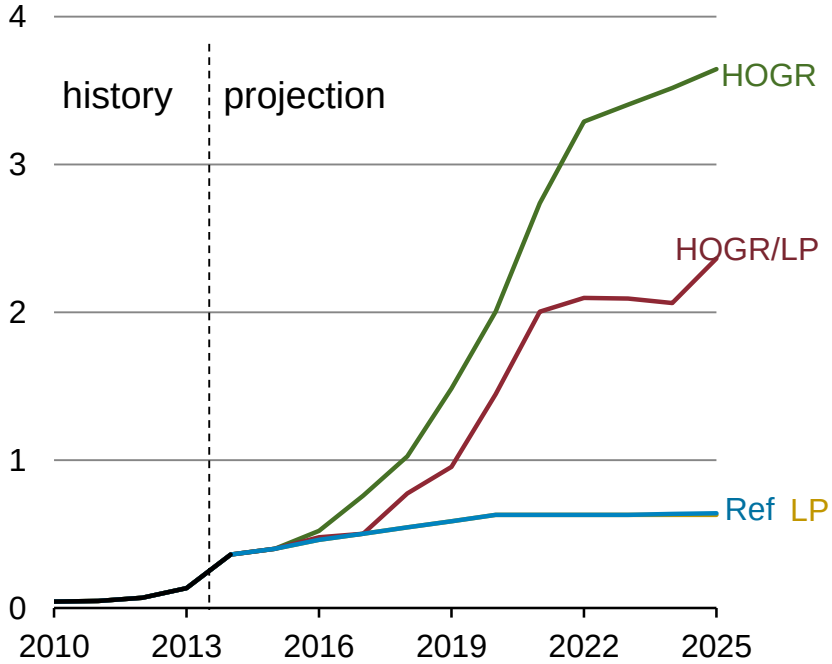
U.S. CRUDE OIL EXPORTS: Removal of crude export restrictions results in higher crude exports in cases with high production; these exports keep the Brent-WTI spread from widening beyond $8/b

U.S. crude oil gross exports 2010-25 *with* and *without* crude export restrictions
million barrels per day

With current crude export restrictions



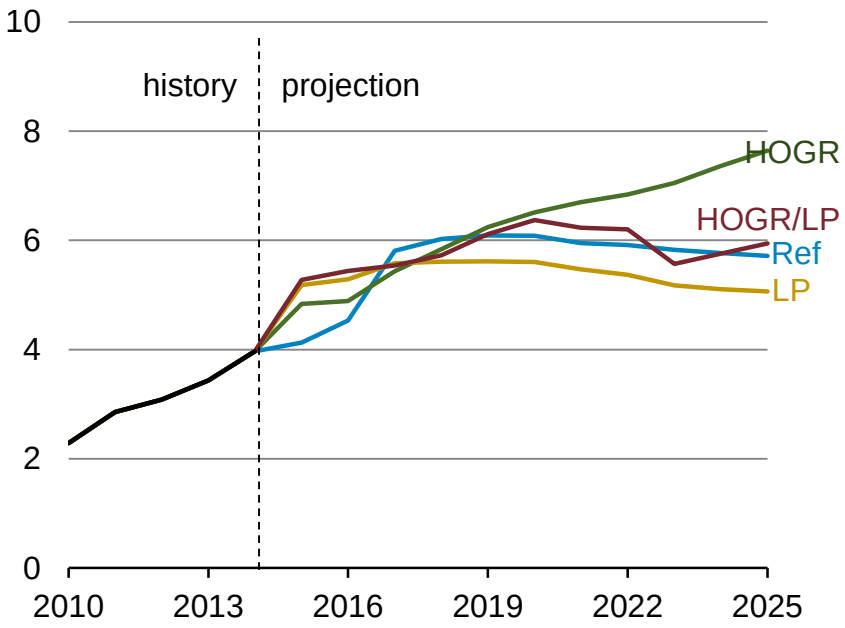
Without current crude export restrictions



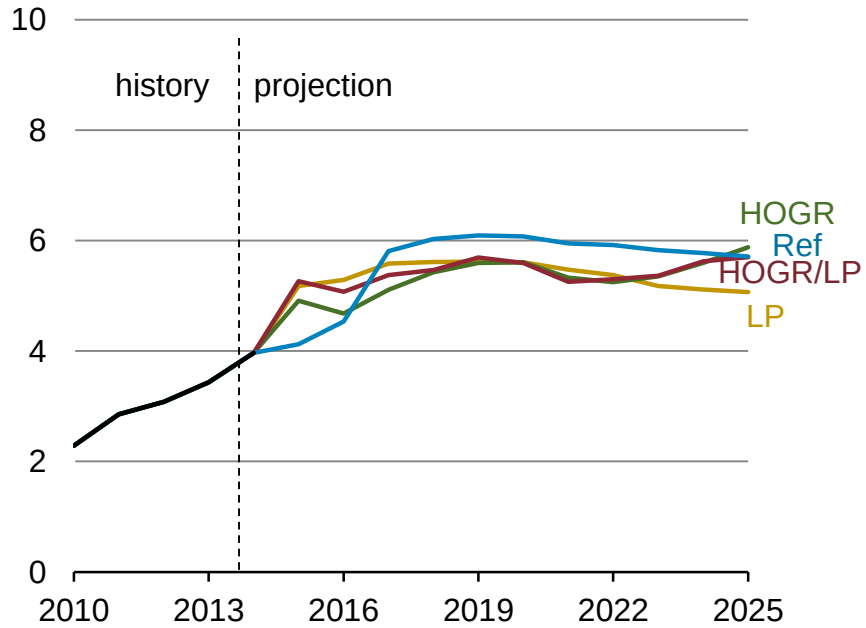
U.S. PETROLEUM PRODUCT EXPORTS: The rise in crude exports in high production cases when export restrictions are removed is mostly offset by lower petroleum product exports

U.S. petroleum product gross exports 2010-25 *with* and *without* crude export restrictions
million barrels per day

With current crude export restrictions



Without current crude export restrictions



Higher domestic crude prices resulting from a removal of export restrictions in high production cases benefit crude producers and raise costs for refiners; lower gasoline and diesel prices benefit consumers

Price and income effects of removing crude oil export restrictions, by case, in 2025

	Reference and Low Price cases	HOGR case	HOGR/LP case
Increase (decrease) in:			
WTI Price (2013 $/barrel)	negligible	5.87	5.32
Brent price (2013 $/barrel)	"	(0.92)	(0.54)
Gasoline price (2013 $/gallon)	"	(0.01)	(0.01)
Diesel price (2013 $/gallon)	"	negligible	(0.01)
Annual gain (loss) in 2025 for:			
Refiners revenue ($Billion)	"	(22.7)	(20.2)
Producers revenue ($Billion)	"	29.7	23.1
Consumers savings ($Billion)	"	1.2	2.0

Comparison of analysis results for 2025 with other widely circulated crude export studies

	EIA	IHS	ICF	NERA
Crude price range, ($/barrel)	55 to 90	115 to 125	100	100 to 105
Domestic production range, w/ crude export restrictions in place (million b/d)	9.5 to 14.0	10.0 to 12.0	10.8 to 11.3	10.4 to 11.7
Change in gasoline price with unrestricted crude exports ($/gallon)	0.00 to (0.01)	(0.08) to (0.12)	(0.01) to 0.02	0.00 to (0.10)
Increase in U.S. crude production with unrestricted crude exports (million b/d)	0.0 to 0.5	1.2 to 2.3	0.2 to 0.5	0.4 to 3.5
International crude price change with unrestricted crude exports ($/barrel)	0.00 to (1.00)	(3.50) to (5.70)	(0.35) to (0.75)	(0.80) to (5.70)
Domestic crude price change with unrestricted crude exports ($/barrel)	0.00 to 6.00	3.90 to 4.90	3.70 to 3.90	5.00 to 21.00

Caveats: The results of this study are sensitive to key assumptions used in the modeling

- **Characterization of current crude export policy**: Current policy restricts, but does not ban, crude oil exports, and is assumed to allow exports of very light production streams (at least API 50 gravity) minimally-processed through a distillation tower

- **Ability to back out existing crude oil imports**: Consistent with recent experience, import substitution or import shifting is an available option to accommodate domestic production growth, but it must remain economic to continue

- **Additions of domestic processing capacity**: Expansion of domestic processing capacity may occur in high production cases, but potential investors are assumed to require high and rapid return of investment in new processing facilities whose economic value could be adversely affected by future changes in crude export policy

- **Global market response to incremental U.S. production resulting from unrestricted crude exports**: This study assumes a partial global offset to any increase in U.S. crude oil production that may occur due to the higher prices available to domestic producers in high production cases without export restrictions

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