
2024 CRUDE AND REFINED PRODUCTS OUTLOOK MIDYEAR UPDATE



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2024 CRUDE AND REFINED PRODUCTS OUTLOOK

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**Crude and Refined Products Outlook
March 2024
Demand Outlook
Appendix 1**

**Appendix 1 - Table 1
Petroleum Products Demand Outlook
United States**

Thousands of Barrels per Day	Actual ¹							Forecast																		
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																										
<u>Other Gasoline / Naphtha</u> ²																										
Total Light Distillates																										
Distillate Fuel Oil																										
Jet Fuel/Kerosene																										
<u>Other Diesel/Gasoil</u>																										
Total Middle Distillates																										
Residual Fuels ³																										
Ethane and LPGs																										
<u>Other</u> ⁴																										
Total Petroleum Products																										
Average Annual Growth Rates																										
Motor Gasoline																										
<u>Other Gasoline / Naphtha</u> ²																										
Total Light Distillates																										
Distillate Fuel Oil																										
Jet Fuel/Kerosene																										
<u>Other Diesel/Gasoil</u>																										
Total Middle Distillates																										
Residual Fuels ³																										
Ethane and LPGs																										
<u>Other</u> ⁴																										
Total Petroleum Products																										

(1) Historical data from US DOE/EIA.
(2) Naphtha feedstock and aviation gasoline.
(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.
(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 1-1
Petroleum Products Demand Outlook
PADD 1**

Thousands of Barrels per Day	Actual ¹												Forecast													
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																										
Other Gasoline / Naphtha ²																										
Total Gasoline / Naphtha																										
Distillate Fuel Oil																										
Jet Fuel/Kerosene																										
Other Diesel/Gasoil																										
Total Middle Distillates																										
Residual Fuels ³																										
Ethane and LPGs																										
Other ⁴																										
Total Petroleum Products																										
Average Annual Growth Rates																										
Gasolines																										
Middle Distillates																										
Residual Fuels ³																										
Ethane and LPGs																										
Other ⁴																										
Total Petroleum Products																										

(1) Historical data from US DOE/EIA.
(2) Naphtha feedstock and aviation gasoline.
(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.
(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 1-2
Petroleum Products Demand Outlook
PADD 2**

	Actual ¹						Forecast																		
Thousands of Barrels per Day	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Gasoline / Naphtha																									
Distillate Fuel Oil																									
Jet Fuel/Kerosene																									
<u>Other Diesel/Gasoil</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
<u>Average Annual Growth Rates</u>																									
Gasolines																									
Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
Other ⁴																									
Total Petroleum Products																									

(1) Historical data from US DOE/EIA.
(2) Naphtha feedstock and aviation gasoline.
(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.
(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 1-3
Petroleum Products Demand Outlook
PADD 3**

Thousands of Barrels per Day	Actual ¹						Forecast																		
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
Other Gasoline / Naphtha ²																									
Total Gasoline / Naphtha																									
Distillate Fuel Oil																									
Jet Fuel/Kerosene																									
Other Diesel/Gasoil																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
Other ⁴																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Gasolines																									
Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
Other ⁴																									
Total Petroleum Products																									

(1) Historical data from US DOE/EIA.
(2) Naphtha feedstock and aviation gasoline.
(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.
(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 1-4
Petroleum Products Demand Outlook
PADD 4**

	Actual ¹						Forecast																		
Thousands of Barrels per Day	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Gasoline / Naphtha																									
Distillate Fuel Oil																									
Jet Fuel/Kerosene																									
<u>Other Diesel/Gasoil</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
<u>Average Annual Growth Rates</u>																									
Gasolines																									
Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
Other ⁴																									
Total Petroleum Products																									

- (1) Historical data from US DOE/EIA.
- (2) Naphtha feedstock and aviation gasoline.
- (3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.
- (4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 1-5
Petroleum Products Demand Outlook
PADD 5**

Thousands of Barrels per Day	Actual ¹						Forecast																		
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Gasoline / Naphtha																									
Distillate Fuel Oil																									
Jet Fuel/Kerosene																									
<u>Other Diesel/Gasoil</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
<u>Average Annual Growth Rates</u>																									
Gasolines																									
Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
Other ⁴																									
Total Petroleum Products																									

(1) Historical data from US DOE/EIA.
(2) Naphtha feedstock and aviation gasoline.
(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.
(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 2
Petroleum Products Demand Outlook
Mexico & Canada**

Thousands of Barrels per Day	Actual ¹						Forecast																		
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									

(1) Historical data from BP Statistical Review and JODI

(2) Naphtha feedstock and aviation gasoline.

(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.

(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 3
Petroleum Products Demand Outlook
South and Central America**

Thousands of Barrels per Day	<u>Actual¹</u>						<u>Forecast</u>																		
	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	<u>2027</u>	<u>2028</u>	<u>2029</u>	<u>2030</u>	<u>2031</u>	<u>2032</u>	<u>2033</u>	<u>2034</u>	<u>2035</u>	<u>2036</u>	<u>2037</u>	<u>2038</u>	<u>2039</u>	<u>2040</u>	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									

(1) Historical data from BP Statistical Review and JODI

(2) Naphtha feedstock and aviation gasoline.

(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.

(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 4
Petroleum Products Demand Outlook
Europe**

Thousands of Barrels per Day	Actual ¹						Forecast																		
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
<u>Other Gasoline / Naphtha</u> ³																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ⁴																									
Ethane and LPGs																									
<u>Other</u> ⁵																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Motor Gasoline																									
<u>Other Gasoline / Naphtha</u> ³																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ⁴																									
Ethane and LPGs																									
<u>Other</u> ⁵																									
Total Petroleum Products																									

- (1) Excludes CIS; Includes Turkey
- (2) Historical data from BP Statistical Review and JODI
- (3) Naphtha feedstock and aviation gasoline.
- (4) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.
- (5) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 5
Petroleum Products Demand Outlook
Africa**

Thousands of Barrels per Day	<u>Actual¹</u>						<u>Forecast</u>																		
	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	<u>2027</u>	<u>2028</u>	<u>2029</u>	<u>2030</u>	<u>2031</u>	<u>2032</u>	<u>2033</u>	<u>2034</u>	<u>2035</u>	<u>2036</u>	<u>2037</u>	<u>2038</u>	<u>2039</u>	<u>2040</u>	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									

(1) Historical data from BP Statistical Review and JODI

(2) Naphtha feedstock and aviation gasoline.

(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.

(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 6
Petroleum Products Demand Outlook
Middle East**

Thousands of Barrels per Day	<u>Actual¹</u>						<u>Forecast</u>																		
	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	<u>2027</u>	<u>2028</u>	<u>2029</u>	<u>2030</u>	<u>2031</u>	<u>2032</u>	<u>2033</u>	<u>2034</u>	<u>2035</u>	<u>2036</u>	<u>2037</u>	<u>2038</u>	<u>2039</u>	<u>2040</u>	
<u>Motor Gasoline</u>																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
<u>Diesel/Gasoil</u>																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
<u>Diesel/Gasoil</u>																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									

(1) Historical data from BP Statistical Review and JODI

(2) Naphtha feedstock and aviation gasoline.

(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.

(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 7
Petroleum Products Demand Outlook
Commonwealth of Independent States (CIS)**

Thousands of Barrels per Day	Actual ¹						Forecast																		
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels ³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									

(1) Historical data from BP Statistical Review and JODI

(2) Naphtha feedstock and aviation gasoline.

(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.

(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 8
Petroleum Products Demand Outlook
Asia Pacific**

Thousands of Barrels per Day	Actual ¹						Forecast																		
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									

(1) Historical data from BP Statistical Review and JODI

(2) Naphtha feedstock and aviation gasoline.

(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.

(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Appendix 1 - Table 9
Petroleum Products Demand Outlook
Total World**

Thousands of Barrels per Day	Actual ¹						Forecast																		
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									
Average Annual Growth Rates																									
Motor Gasoline																									
<u>Other Gasoline / Naphtha²</u>																									
Total Light Distillates																									
Diesel/Gasoil																									
<u>Jet/Kero</u>																									
Total Middle Distillates																									
Residual Fuels³																									
Ethane and LPGs																									
<u>Other⁴</u>																									
Total Petroleum Products																									

(1) Historical data from BP Statistical Review and JODI

(2) Naphtha feedstock and aviation gasoline.

(3) Includes resid bunker fuels, No. 6 oil and crude oil used directly as fuel.

(4) Includes other petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Crude and Refined Products Outlook
March 2024
Probable Projects
Appendix 2**

Appendix 2 - Table 1 Planned Refinery Projects Crude and Product Capacity Increases

(Unit Capacities in Thousands of Barrels per Day)

	Crude Capacity				Total	Gasoline	Mid. Dist.	Resid	Other Prod.	Total Products	New Refineries	Total Projects	Total Cost - \$MM
	Heavy	Medium	Lt. Sour	Lt. Swt.									
U.S.													
Canada/Mexico													
Latin America													
Europe													
Middle East													
Africa													
CIS													
Asia Pacific													
World Total	0	0	0	0	0	0	0	0	0	0	0	0	0

March 2023 Outlook

Appendix 2 - Table 2
Planned Refinery Projects
Conversion Unit Capacity Changes
 (Unit Capacities in Thousands of Barrels per Day)

	<u>Coking</u>	<u>FCC</u>	<u>Hydrocracking</u>	<u>Total Conv. Units</u>
U.S.				
Canada/Mexico				
Latin America				
Europe				
Middle East				
Africa				
CIS				
Asia Pacific				
World Total	0	0	0	0

March 2023 Outlook

Appendix 2 - Table 3
Planned Refinery Projects
Octane Unit Capacity Changes
 (Unit Capacities in Thousands of Barrels per Day)

	<u>Reforming</u>	<u>Alky/Poly</u>	<u>C5/C6 Isomerization</u>	<u>Total Octane Units</u>
U.S.				
Canada/Mexico				
Latin America				
Europe				
Middle East				
Africa				
CIS				
Asia Pacific				
World Total	0	0	0	0

March 2023 Outlook

Appendix 2 - Table 4
Planned Refinery Projects
Other Unit Capacity Changes
(Unit Capacities in Thousands of Barrels per Day)

	<u>Hydrotreating</u>	<u>Asphalt</u>	Hydrogen <u>MMSCF/D</u>	Sulfur <u>LT/D</u>
U.S.				
Canada/Mexico				
Latin America				
Europe				
Middle East				
Africa				
CIS				
Asia Pacific				
World Total	0	0	0	0

March 2023 Outlook

Appendix 2 - Table 5a
Planned Refinery Projects
Crude Capacity Increases By Year
 (Unit Capacities in Thousands of Barrels per Day)

	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	<u>2027</u>
U.S. PADD I					
U.S. PADD II					
U.S. PADD III					
U.S. PADD IV					
U.S. PADD V					
U.S. PADD VI					
Total U.S.	0	0	0	0	0
Canada/Mexico					
Latin America					
Europe					
Middle East					
Africa					
CIS					
Asia Pacific					
Total non-U.S.	0	0	0	0	0
World Total	0	0	0	0	0

March 2023 Outlook

Appendix 2 - Table 5b
Planned Refinery Projects
Heavy Crude Capacity Increases By Year
 (Unit Capacities in Thousands of Barrels per Day)

	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	<u>2027</u>
U.S. PADD I					
U.S. PADD II					
U.S. PADD III					
U.S. PADD IV					
U.S. PADD V					
U.S. PADD VI					
Total U.S.	0	0	0	0	0
Canada/Mexico					
Latin America					
Europe					
Middle East					
Africa					
CIS					
Asia Pacific					
Total non-U.S.	0	0	0	0	0
World Total	0	0	0	0	0

March 2023 Outlook

Appendix 2 - Table 6a Planned Construction Outlook United States

(Unit Capacities in Thousands of Barrels per Day)

State	Company	Location	Expected Compl'n	Change to Crude Capacity					Change to Product Make					Cost \$MM	
				Heavy	Medium	Lt. Sour	Lt. Swt.	Total	Gasoline ¹	Distillates	Resid.	Other ²	Total		
PADD I				0	0	0	0	0	0	0	0	0	0	0	0
PADD II															
		WI OK		0	0	0	0	0	0	0	0	0	0	0	0
PADD III															
		TX TX TX		0	0	0	0	0	0	0	0	0	0	0	0
PADD IV				0	0	0	0	0	0	0	0	0	0	0	0
PADD V				0	0	0	0	0	0	0	0	0	0	0	0
PADD VI				0	0	0	0	0	0	0	0	0	0	0	0
Total				0	0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

(3) Port Arthur coker expansion also allows for 21 MBPD increase in resid purchases and reduction of 47 MBPD of VGO purchases.

Appendix 2 - Table 6b Planned Construction Outlook United States

(Unit Capacities in Thousands of Barrels per Day)

<u>State</u>	<u>Company</u>	<u>Location</u>	<u>Expected Compl'n</u>	<u>New Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	<u>C5/C6 Isom</u>	<u>HDS</u>	<u>Asphalt</u>	<u>Hydrogen MMSCF/D</u>	<u>Sulfur LT/D</u>
PADD I			0	0	0	0	0	0	0	0	0	0	0	0	0
PADD II			0	0	0	0	0	0	0	0	0	0	0	0	0
	WI		0	0	0	0	0	0	0	0	0	0	0	0	0
	OK		0	0	0	0	0	0	0	0	0	0	0	0	0
PADD III			0	0	0	0	0	0	0	0	0	0	0	0	0
	TX		0	0	0	0	0	0	0	0	0	0	0	0	0
	TX		0	0	0	0	0	0	0	0	0	0	0	0	0
	TX		0	0	0	0	0	0	0	0	0	0	0	0	0
PADD IV			0	0	0	0	0	0	0	0	0	0	0	0	0
PADD V			0	0	0	0	0	0	0	0	0	0	0	0	0
PADD VI³			0	0	0	0	0	0	0	0	0	0	0	0	0
Total			0	0	0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

(3) Port Arthur coker expansion also allows for 21 MBPD increase in resid purchases and reduction of 47 MBPD of VGO purchases.

Appendix 2 - Table 7a Planned Construction Outlook Canada & Mexico

(Unit Capacities in Thousands of Barrels per Day)

Country	Company	Location	Expected Compl'n	Change to Crude Capacity					Change to Product Make					Cost \$MM	
				Heavy	Medium	Lt. Sour	Lt. Swt.	Total	Gasoline ¹	Distillates	Resid.	Other ²	Total		
Mexico															
Mexico															
Total				0	0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 7b Planned Construction Outlook Canada & Mexico

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Compl'n</u>	<u>New Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	<u>C5/C6 Isom</u>	<u>HDS</u>	<u>Asphalt</u>	<u>Hydrogen MMSCF/D</u>	<u>Sulfur LT/D</u>
	Pemex														
	Pemex														
Total			0	0	0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 8a
Planned Construction Outlook
Europe (excl. Former Soviet Union)
 (Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Compl'n</u>	<u>Change to Crude Capacity</u>					<u>Change to Product Make</u>					<u>Cost \$MM</u>	
				<u>Heavy</u>	<u>Medium</u>	<u>Lt. Sour</u>	<u>Lt. Swt.</u>	<u>Total</u>	<u>Gasoline¹</u>	<u>Distillates</u>	<u>Resid.</u>	<u>Other²</u>	<u>Total</u>		
France															
Croatia															
UK															
Total					0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 8b Planned Construction Outlook Europe (excl. Former Soviet Union)

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Compl'n</u>	<u>New Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	<u>C5/C6 Isom</u>	<u>HDS</u>	<u>Asphalt</u>	<u>Hydrogen MMSCF/D</u>	<u>Sulfur LT/D</u>
France															
Croatia															
UK															
Total					0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 9a Planned Construction Outlook Latin America

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	Expected <u>Compl'n</u>	<u>Change to Crude Capacity</u>					<u>Change to Product Make</u>					Cost <u>\$MM</u>	
				<u>Heavy</u>	<u>Medium</u>	<u>Lt. Sour</u>	<u>Lt. Swt.</u>	<u>Total</u>	<u>Gasoline¹</u>	<u>Distillates</u>	<u>Resid.</u>	<u>Other²</u>	<u>Total</u>		
Peru															
Total				0	0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 9b Planned Construction Outlook Latin America

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Compl'n</u>	<u>New Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	<u>C5/C6 Isom</u>	<u>HDS</u>	<u>Asphalt</u>	<u>Hydrogen MMSCF/D</u>	<u>Sulfur LT/D</u>
Peru															
Total			0	0	0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 10a Planned Construction Outlook Middle East

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	Expected <u>Compl'n</u>	<u>Change to Crude Capacity</u>					<u>Change to Product Make</u>					Cost <u>\$MM</u>	
				<u>Heavy</u>	<u>Medium</u>	<u>Lt. Sour</u>	<u>Lt. Swt.</u>	<u>Total</u>	<u>Gasoline¹</u>	<u>Distillates</u>	<u>Resid.</u>	<u>Other²</u>	<u>Total</u>		
Saudi Arabia															
Kuwait															
Iraq															
Iran															
UAE															
Iran															
Oman															
UAE															
Iran															
Bahrain															
Iraq															
Iraq															
Iran															
Total					0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 10b Planned Construction Outlook Middle East

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Compl'n</u>	<u>New Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Resid HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	<u>C5/C6 Isom</u>	<u>HDS</u>	<u>Asphalt</u>	<u>Hydrogen MMSCF/D</u>	<u>Sulfur LT/D</u>
Saudi Arabia																
Kuwait																
Iraq																
Iran																
UAE																
Iran																
Oman																
UAE																
Iran																
Bahrain																
Iraq																
Iraq																
Iran																
Total																

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 11a Planned Construction Outlook Africa

(Unit Capacities in Thousands of Barrels per Day)

Country	Company	Location	Expected Compl'n	Change to Crude Capacity					Change to Product Make					Cost \$MM	
				Heavy	Medium	Lt. Sour	Lt. Swt.	Total	Gasoline ¹	Distillates	Resid.	Other ²	Total		
Egypt															
Nigeria															
Egypt															
Senegal															
Angola															
Algeria															
Morocco															
Total					0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 11b Planned Construction Outlook Africa

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	Expected	New													
			<u>Compl'n</u>	<u>Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	C5/C6 <u>Isom</u>	<u>HDS</u>	<u>Asphalt</u>	Hydrogen <u>MMSCF/D</u>	Sulfur <u>LT/D</u>		
	MIDOR																
	Dangote Group																
	EGPC / AORC																
	SAR																
	Sonangol/GemCorp. Capital																
	Sonatrach																
	Mya Energy																
Total			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 12a Planned Construction Outlook Commonwealth of Independent States

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Compl'n</u>	<u>Change to Crude Capacity</u>					<u>Change to Product Make</u>					<u>Cost \$MM</u>	
				<u>Heavy</u>	<u>Medium</u>	<u>Lt. Sour</u>	<u>Lt. Swt.</u>	<u>Total</u>	<u>Gasoline¹</u>	<u>Distillates</u>	<u>Resid.</u>	<u>Other²</u>	<u>Total</u>		
Azerbaijan															
Russia															
Uzbekistan															
Russia															
Uzbekistan															
Russia															
Russia															
Russia															
Russia															
Total					0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 12b Planned Construction Outlook Commonwealth of Independent States

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Compl'n</u>	<u>New Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	<u>C5/C6 Isom</u>	<u>HDS</u>	<u>Asphalt</u>	<u>MMSCF/D</u>	<u>Hydrogen</u>	<u>Sulfur LT/D</u>
Azerbaijan																
Russia																
Uzbekistan																
Russia																
Uzbekistan																
Russia																
Russia																
Russia																
Russia																
Total																

(1) Includes naphtha and aviation gasoline.
(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 13a Planned Construction Outlook Asia Pacific

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Completion</u>	<u>Change to Crude Capacity</u>					<u>Change to Product Make</u>					<u>Cost \$MM</u>	
				<u>Heavy</u>	<u>Medium</u>	<u>Lt. Sour</u>	<u>Lt. Swt.</u>	<u>Total</u>	<u>Gasoline¹</u>	<u>Distillates</u>	<u>Resid.</u>	<u>Other²</u>	<u>Total</u>		
CHINA															
INDIA															

Appendix 2 - Table 13a Planned Construction Outlook Asia Pacific

(Unit Capacities in Thousands of Barrels per Day)

Country	Company	Location	Expected Completion	Change to Crude Capacity					Change to Product Make					Cost \$MM						
				Heavy	Medium	Lt. Sour	Lt. Swt.	Total	Gasoline ¹	Distillates	Resid.	Other ²	Total							
INDONESIA																				
OTHER ASIA PACIFIC																				
	Singapore																			
	Thailand																			
	Mongolia																			
	Australia																			
	Vietnam																			
Total																				

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

Appendix 2 - Table 13b Planned Construction Outlook Asia Pacific

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Completion</u>	<u>New Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Resid HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	<u>C5/C6 Isom</u>	<u>HDS</u>	<u>Asphalt</u>	<u>Hydrogen MMSCF/D</u>	<u>Sulfur LT/D</u>
CHINA																
INDIA																

Appendix 2 - Table 13b Planned Construction Outlook Asia Pacific

(Unit Capacities in Thousands of Barrels per Day)

<u>Country</u>	<u>Company</u>	<u>Location</u>	<u>Expected Completion</u>	<u>New Refinery?</u>	<u>Vacuum</u>	<u>Coking</u>	<u>FCC</u>	<u>HCU</u>	<u>Resid HCU</u>	<u>Reform</u>	<u>Alky/Poly</u>	<u>C5/C6 Isom</u>	<u>HDS</u>	<u>Asphalt</u>	<u>Hydrogen MMSCF/D</u>	<u>Sulfur LT/D</u>
INDONESIA																
			0		0	0	0	0	0	0	0	0	0	0	0	0
OTHER ASIA PACIFIC																
		Singapore														
		Thailand														
		Mongolia														
		Australia														
		Vietnam														
			0		0	0	0	0	0	0	0	0	0	0	0	0
Total			0		0	0	0	0	0	0	0	0	0	0	0	0

(1) Includes naphtha and aviation gasoline.

(2) Includes LPGs, petrochemical feedstocks, lubricants/waxes, petroleum coke, asphalt, refinery gas and other miscellaneous products.

**Crude and Refined Products Outlook
September 2023
Price Outlook
Appendix 3**

Appendix 4 – Table 1
Price Outlook - RINS
Renewable Identification Numbers (RINs)

(annual average dollars per RIN)

2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035

Cellulosic Biofuel (D3)
Biomass-Based Diesel (D4)
Advanced Biofuel (D5)
Renewable Fuel (D6)

**Crude and Refined Products Outlook
March 2024
RINs Outlook
Appendix 4**

Appendix 4 – Table 2

March 2024

Historical RIN Pricing

(cents per RIN)

	Cellulosic (Year: waiver credit / Month: D3 RIN) Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6
2011 Average	97	130	76	3
2012 Average	78	110	62	3
2013 Average	47	72	69	59
2014 Average	42	53	51	49
2015 Average	64	73	69	55
2016 Average	175	91	89	82
2017 Average	274	101	98	70
2018 Average	232	53	51	31
2019 Average	122	47	46	17
2020 Average	147	66	65	41
2021 Average	306	152	152	130
2022 Average	321	173	176	141
<hr/>				
Jan-11	113.0	80.4	75.7	3.0
Feb-11	113.0	103.9	68.9	2.8
Mar-11	113.0	114.7	51.0	3.8
Apr-11	113.0	130.2	49.6	3.3
May-11	113.0	128.9	65.9	2.0
Jun-11	113.0	137.0	68.0	3.6
Jul-11	113.0	134.5	79.3	3.4
Aug-11	113.0	154.7	99.3	3.3
Sep-11	113.0	178.1	116.3	2.9
Oct-11	113.0	130.2	81.5	1.9
Nov-11	113.0	136.7	71.8	0.8
Dec-11	113.0	126.7	80.3	0.4
Jan-12	78.0	149.7	76.9	2.0
Feb-12	78.0	143.0	69.7	2.1
Mar-12	78.0	142.7	73.8	2.4
Apr-12	78.0	143.8	73.1	2.0
May-12	78.0	136.5	79.5	1.7
Jun-12	78.0	117.6	82.2	1.3
Jul-12	78.0	121.0	64.6	3.8
Aug-12	78.0	102.8	43.3	4.0
Sep-12	78.0	93.5	41.8	2.8
Oct-12	78.0	55.2	39.2	3.5
Nov-12	78.0	54.1	45.8	3.9
Dec-12	78.0	59.6	49.6	5.1
Jan-13		44.7	40.4	12.4
Feb-13		53.3	52.9	32.3
Mar-13		85.7	83.3	76.5

Appendix 4 – Table 2

March 2024

Historical RIN Pricing

(cents per RIN)

	Cellulosic (Year: waiver credit / Month: D3 RIN)	Biomass-Based Diesel	Advanced Biofuel	Renewable Fuel
	Month: D3 RIN)	D4	D5	D6
Apr-13		84.5	80.9	72.0
May-13		96.4	92.2	83.0
Jun-13		103.2	102.9	93.6
Jul-13		120.9	120.1	116.6
Aug-13		90.0	86.0	78.5
Sep-13		72.5	66.9	59.3
Oct-13		51.9	43.9	32.9
Nov-13		30.0	28.4	24.2
Dec-13		33.1	32.2	31.4
Jan-14		34.3	35.0	33.1
Feb-14		54.3	54.2	53.8
Mar-14		53.6	52.6	51.8
Apr-14		46.0	44.9	45.1
May-14		54.2	49.6	45.0
Jun-14		55.5	53.1	49.0
Jul-14		54.8	52.7	51.0
Aug-14		54.4	53.2	51.0
Sep-14		50.2	48.8	46.8
Oct-14		52.1	48.7	46.8
Nov-14		53.7	50.6	50.2
Dec-14		67.1	66.1	64.3
Jan-15		77.2	75.1	72.8
Feb-15		85.0	81.9	71.5
Mar-15		81.4	78.7	68.7
Apr-15		83.5	80.3	70.6
May-15		86.3	81.0	70.4
Jun-15		88.1	76.2	44.0
Jul-15		76.2	72.3	43.4
Aug-15		64.1	61.6	38.8
Sep-15		45.7	43.1	33.5
Oct-15		51.4	48.2	37.1
Nov-15		62.4	50.4	42.7
Dec-15		76.3	75.0	71.4
Jan-16		72.7	71.0	67.2
Feb-16		78.0	75.6	72.2
Mar-16		77.8	75.8	72.3
Apr-16		81.2	78.7	73.2
May-16	171.1	81.1	79.0	76.3
Jun-16	176.6	88.7	86.8	84.7
Jul-16	183.7	101.5	98.3	95.0
Aug-16	188.8	96.4	92.9	87.1

Appendix 4 – Table 2

March 2024

Historical RIN Pricing

(cents per RIN)

	Cellulosic (Year: waiver credit / Month: D3 RIN) Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6
Sep-16	197.7	98.8	97.7	87.6
Oct-16	221.4	105.5	105.3	91.8
Nov-16	238.6	102.4	101.5	87.2
Dec-16	254.0	110.5	109.8	93.3
Jan-17	246.0	98.5	98.5	68.4
Feb-17	269.8	93.2	88.4	47.1
Mar-17	261.7	96.6	89.6	44.6
Apr-17	255.0	99.6	95.5	51.2
May-17	253.0	103.1	100.3	54.1
Jun-17	258.0	107.1	105.2	73.1
Jul-17	276.1	110.9	109.1	78.6
Aug-17	294.5	109.0	106.7	88.0
Sep-17	301.8	104.5	103.2	81.9
Oct-17	288.6	99.5	98.5	83.2
Nov-17	296.5	103.3	102.3	91.0
Dec-17	284.8	85.3	84.3	74.0
Jan-18	269.8	75.9	74.9	65.4
Feb-18	255.6	83.7	82.7	65.4
Mar-18	247.7	75.1	74.1	45.5
Apr-18	246.5	60.3	59.0	36.4
May-18	244.7	50.8	47.8	30.6
Jun-18	236.9	47.8	44.8	24.3
Jul-18	231.1	43.1	39.4	22.6
Aug-18	227.0	42.4	38.3	20.4
Sep-18	226.0	39.1	34.6	18.6
Oct-18	206.8	33.3	29.2	10.8
Nov-18	193.7	39.0	36.0	9.1
Dec-18	194.1	48.4	45.4	19.7
Jan-19	185.9	52.7	49.7	17.9
Feb-19	182.2	55.3	53.8	21.9
Mar-19	176.2	42.5	39.2	16.8
Apr-19	159.4	36.3	33.8	11.5
May-19	145.9	33.6	32.5	14.5
Jun-19	120.2	43.3	42.3	19.2
Jul-19	109.0	42.4	41.4	22.4
Aug-19	73.0	45.9	44.7	15.7
Sep-19	62.3	49.3	47.4	19.4
Oct-19	77.7	56.4	54.6	17.3
Nov-19	80.3	62.3	61.4	13.0
Dec-19	83.0	50.4	48.5	12.0
Jan-20	99.7	44.0	43.0	9.7

Appendix 4 – Table 2

March 2024

Historical RIN Pricing

(cents per RIN)

	Cellulosic (Year: waiver credit / Month: D3 RIN) Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6
Feb-20	159.1	53.7	52.2	25.0
Mar-20	154.2	54.5	52.5	24.7
Apr-20	107.3	56.5	54.5	26.2
May-20	116.0	55.9	53.9	35.7
Jun-20	146.0	59.3	57.3	44.1
Jul-20	146.0	64.0	58.9	44.8
Aug-20	144.7	65.7	63.7	42.1
Sep-20	156.8	76.2	75.9	46.8
Oct-20	162.4	79.4	79.2	53.2
Nov-20	166.6	86.9	86.6	62.3
Dec-20	199.6	97.3	97.1	71.4
Jan-21	228.0	106.3	106.1	88.7
Feb-21	267.4	113.6	113.1	100.4
Mar-21	284.5	137.0	136.5	128.9
Apr-21	302.0	145.1	144.5	137.4
May-21	318.8	187.6	186.6	179.5
Jun-21	310.7	179.4	178.4	169.1
Jul-21	315.2	169.0	168.0	151.4
Aug-21	318.8	176.5	175.1	155.0
Sep-21	306.3	151.8	150.8	117.0
Oct-21	318.9	162.3	161.3	125.1
Nov-21	342.9	148.4	147.4	107.1
Dec-21	358.1	153.0	152.0	99.1
Jan-22	378.3	159.4	158.2	111.1
Feb-22	368.2	159.3	158.2	115.4
Mar-22	330.7	164.1	163.1	114.8
Apr-22	350.3	185.0	166.3	129.5
May-22	364.3	197.8	196.8	153.0
Jun-22	310.7	180.7	180.0	153.5

Appendix 4 – Table 2

'March 2024

Historical RIN Price Change

(cents per RIN - annual change)

Cellulosic (Year: waiver credit / Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6
2011 Average			
2012 Average	-20%	-15%	14%
2013 Average	-40%	-35%	1867%
2014 Average	-11%	-26%	-17%
2015 Average	52%	38%	12%
2016 Average	173%	25%	49%
2017 Average	57%	11%	-15%
2018 Average	-15%	-47%	-56%
2019 Average	-47%	-11%	-44%
2020 Average	20%	40%	136%
2021 Average	109%	131%	221%
2022 Average	5%	13%	9%

Jan-11
 Feb-11
 Mar-11
 Apr-11
 May-11
 Jun-11
 Jul-11
 Aug-11
 Sep-11
 Oct-11
 Nov-11
 Dec-11
 Jan-12
 Feb-12
 Mar-12
 Apr-12
 May-12
 Jun-12
 Jul-12
 Aug-12
 Sep-12
 Oct-12
 Nov-12
 Dec-12
 Jan-13
 Feb-13
 Mar-13

Appendix 4 – Table 2

'March 2024

Historical RIN Price Change

(cents per RIN - annual change)

Cellulosic (Year: waiver credit / Month: D3 RIN)	Biomass-Based Diesel Month: D3 RIN)	Advanced Biofuel Month: D3 RIN)	Renewable Fuel D6
	D4	D5	

Apr-13
 May-13
 Jun-13
 Jul-13
 Aug-13
 Sep-13
 Oct-13
 Nov-13
 Dec-13
 Jan-14
 Feb-14
 Mar-14
 Apr-14
 May-14
 Jun-14
 Jul-14
 Aug-14
 Sep-14
 Oct-14
 Nov-14
 Dec-14
 Jan-15
 Feb-15
 Mar-15
 Apr-15
 May-15
 Jun-15
 Jul-15
 Aug-15
 Sep-15
 Oct-15
 Nov-15
 Dec-15
 Jan-16
 Feb-16
 Mar-16
 Apr-16
 May-16
 Jun-16
 Jul-16
 Aug-16

Appendix 4 – Table 2

'March 2024

Historical RIN Price Change

(cents per RIN - annual change)

Cellulosic (Year: waiver credit / Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6
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Sep-16
 Oct-16
 Nov-16
 Dec-16
 Jan-17
 Feb-17
 Mar-17
 Apr-17
 May-17
 Jun-17
 Jul-17
 Aug-17
 Sep-17
 Oct-17
 Nov-17
 Dec-17
 Jan-18
 Feb-18
 Mar-18
 Apr-18
 May-18
 Jun-18
 Jul-18
 Aug-18
 Sep-18
 Oct-18
 Nov-18
 Dec-18
 Jan-19
 Feb-19
 Mar-19
 Apr-19
 May-19
 Jun-19
 Jul-19
 Aug-19
 Sep-19
 Oct-19
 Nov-19
 Dec-19
 Jan-20

Appendix 4 – Table 2

'March 2024

Historical RIN Price Change

(cents per RIN - annual change)

Cellulosic (Year: waiver credit / Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6
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Feb-20
 Mar-20
 Apr-20
 May-20
 Jun-20
 Jul-20
 Aug-20
 Sep-20
 Oct-20
 Nov-20
 Dec-20
 Jan-21
 Feb-21
 Mar-21
 Apr-21
 May-21
 Jun-21
 Jul-21
 Aug-21
 Sep-21
 Oct-21
 Nov-21
 Dec-21
 Jan-22
 Feb-22
 Mar-22
 Apr-22
 May-22
 Jun-22

Appendix 4 – Table 2

'March 2024

Historical RIN Price Change

(cents per RIN - monthly change)

Cellulosic (Year: waiver credit / Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6	
2011 Average				
2012 Average				
2013 Average				
2014 Average				
2015 Average				
2016 Average				
2017 Average				
2018 Average				
2019 Average				
2020 Average				
2021 Average				
2022 Average				
<hr/> <hr/>				
Jan-11				
Feb-11	0.00%	29.22%	-8.86%	-5.76%
Mar-11	0.00%	10.40%	-26.09%	35.65%
Apr-11	0.00%	13.43%	-2.76%	-12.41%
May-11	0.00%	-0.99%	32.91%	-38.88%
Jun-11	0.00%	6.35%	3.18%	75.89%
Jul-11	0.00%	-1.89%	16.73%	-4.96%
Aug-11	0.00%	15.09%	25.13%	-4.70%
Sep-11	0.00%	15.11%	17.18%	-9.43%
Oct-11	0.00%	-26.88%	-29.93%	-36.72%
Nov-11	0.00%	4.96%	-11.90%	-59.17%
Dec-11	0.00%	-7.30%	11.88%	-43.85%
Jan-12	-30.97%	18.12%	-4.27%	356.01%
Feb-12	0.00%	-4.49%	-9.36%	7.69%
Mar-12	0.00%	-0.21%	5.94%	11.90%
Apr-12	0.00%	0.82%	-1.04%	-13.19%
May-12	0.00%	-5.09%	8.76%	-18.34%
Jun-12	0.00%	-13.82%	3.41%	-21.96%
Jul-12	0.00%	2.89%	-21.42%	190.29%
Aug-12	0.00%	-15.07%	-32.91%	7.20%
Sep-12	0.00%	-9.08%	-3.43%	-31.77%
Oct-12	0.00%	-40.93%	-6.27%	28.28%
Nov-12	0.00%	-1.98%	16.85%	10.42%
Dec-12	0.00%	10.02%	8.18%	29.22%
Jan-13	-100.00%	-24.91%	-18.50%	145.54%
Feb-13	#DIV/0!	19.30%	30.89%	160.59%
Mar-13	#DIV/0!	60.66%	57.46%	136.71%

Appendix 4 – Table 2

'March 2024

Historical RIN Price Change

(cents per RIN - monthly change)

	Cellulosic (Year:	Biomass-Based	Advanced	
	waiver credit /	Diesel	Biofuel	Renewable Fuel
	Month: D3 RIN)	D4	D5	D6
Month: D3 RIN)				
Apr-13	#DIV/0!	-1.45%	-2.81%	-5.88%
May-13	#DIV/0!	14.18%	13.90%	15.18%
Jun-13	#DIV/0!	6.97%	11.65%	12.79%
Jul-13	#DIV/0!	17.19%	16.70%	24.61%
Aug-13	#DIV/0!	-25.51%	-28.40%	-32.65%
Sep-13	#DIV/0!	-19.51%	-22.26%	-24.48%
Oct-13	#DIV/0!	-28.37%	-34.31%	-44.46%
Nov-13	#DIV/0!	-42.21%	-35.22%	-26.64%
Dec-13	#DIV/0!	10.44%	13.28%	29.98%
Jan-14	#DIV/0!	3.56%	8.61%	5.34%
Feb-14	#DIV/0!	58.35%	54.81%	62.75%
Mar-14	#DIV/0!	-1.26%	-2.84%	-3.75%
Apr-14	#DIV/0!	-14.16%	-14.65%	-12.93%
May-14	#DIV/0!	17.76%	10.39%	-0.32%
Jun-14	#DIV/0!	2.31%	7.11%	9.03%
Jul-14	#DIV/0!	-1.27%	-0.74%	4.10%
Aug-14	#DIV/0!	-0.67%	0.97%	-0.11%
Sep-14	#DIV/0!	-7.70%	-8.27%	-8.15%
Oct-14	#DIV/0!	3.82%	-0.33%	-0.02%
Nov-14	#DIV/0!	3.00%	4.04%	7.19%
Dec-14	#DIV/0!	24.89%	30.52%	28.12%
Jan-15	#DIV/0!	15.12%	13.55%	13.14%
Feb-15	#DIV/0!	10.10%	9.07%	-1.72%
Mar-15	#DIV/0!	-4.29%	-3.88%	-3.98%
Apr-15	#DIV/0!	2.64%	2.07%	2.79%
May-15	#DIV/0!	3.34%	0.89%	-0.28%
Jun-15	#DIV/0!	2.14%	-5.92%	-37.47%
Jul-15	#DIV/0!	-13.54%	-5.13%	-1.30%
Aug-15	#DIV/0!	-15.85%	-14.89%	-10.61%
Sep-15	#DIV/0!	-28.76%	-29.93%	-13.67%
Oct-15	#DIV/0!	12.41%	11.71%	10.68%
Nov-15	#DIV/0!	21.44%	4.59%	15.09%
Dec-15	#DIV/0!	22.27%	48.82%	67.28%
Jan-16	#DIV/0!	-4.64%	-5.27%	-5.98%
Feb-16	#DIV/0!	7.33%	6.36%	7.52%
Mar-16	#DIV/0!	-0.27%	0.26%	0.06%
Apr-16	#DIV/0!	4.38%	3.91%	1.27%
May-16	#DIV/0!	-0.23%	0.33%	4.26%
Jun-16	3.24%	9.49%	9.89%	10.98%
Jul-16	3.99%	14.39%	13.22%	12.24%
Aug-16	2.82%	-5.03%	-5.47%	-8.37%

Appendix 4 – Table 2

'March 2024

Historical RIN Price Change

(cents per RIN - monthly change)

	Cellulosic (Year: waiver credit / Month: D3 RIN) Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6
Sep-16	4.72%	2.53%	5.13%	0.60%
Oct-16	11.98%	6.76%	7.87%	4.76%
Nov-16	7.74%	-2.94%	-3.69%	-5.01%
Dec-16	6.44%	7.92%	8.26%	7.04%
Jan-17	-3.13%	-10.92%	-10.36%	-26.72%
Feb-17	9.67%	-5.37%	-10.24%	-31.07%
Mar-17	-3.00%	3.70%	1.40%	-5.38%
Apr-17	-2.56%	3.04%	6.52%	14.83%
May-17	-0.77%	3.55%	5.06%	5.58%
Jun-17	1.96%	3.84%	4.87%	35.25%
Jul-17	7.00%	3.62%	3.73%	7.51%
Aug-17	6.69%	-1.74%	-2.17%	11.96%
Sep-17	2.47%	-4.09%	-3.31%	-6.92%
Oct-17	-4.38%	-4.79%	-4.53%	1.53%
Nov-17	2.75%	3.83%	3.87%	9.35%
Dec-17	-3.97%	-17.43%	-17.60%	-18.67%
Jan-18	-5.25%	-11.07%	-11.20%	-11.56%
Feb-18	-5.26%	10.31%	10.44%	-0.03%
Mar-18	-3.09%	-10.27%	-10.40%	-30.43%
Apr-18	-0.48%	-19.71%	-20.38%	-20.00%
May-18	-0.73%	-15.75%	-18.98%	-15.93%
Jun-18	-3.19%	-5.91%	-6.28%	-20.59%
Jul-18	-2.45%	-9.83%	-12.05%	-7.00%
Aug-18	-1.77%	-1.62%	-2.79%	-9.73%
Sep-18	-0.44%	-7.78%	-9.66%	-8.82%
Oct-18	-8.50%	-14.83%	-15.61%	-41.94%
Nov-18	-6.33%	17.04%	23.29%	-15.74%
Dec-18	0.19%	24.16%	26.08%	116.70%
Jan-19	-4.19%	8.87%	9.45%	-9.28%
Feb-19	-2.00%	4.95%	8.27%	22.39%
Mar-19	-3.28%	-23.09%	-27.21%	-23.50%
Apr-19	-9.56%	-14.56%	-13.59%	-31.46%
May-19	-8.45%	-7.58%	-3.81%	26.21%
Jun-19	-17.62%	28.83%	29.85%	32.24%
Jul-19	-9.32%	-2.10%	-2.15%	16.75%
Aug-19	-33.03%	8.35%	8.00%	-29.95%
Sep-19	-14.73%	7.44%	6.14%	23.88%
Oct-19	24.88%	14.45%	15.19%	-10.80%
Nov-19	3.31%	10.35%	12.50%	-24.92%
Dec-19	3.34%	-18.99%	-21.06%	-7.60%
Jan-20	20.14%	-12.84%	-11.24%	-19.13%

Appendix 4 – Table 2

'March 2024

Historical RIN Price Change

(cents per RIN - monthly change)

	Cellulosic (Year: waiver credit / Month: D3 RIN) Month: D3 RIN)	Biomass-Based Diesel D4	Advanced Biofuel D5	Renewable Fuel D6
Feb-20	59.51%	22.11%	21.20%	157.35%
Mar-20	-3.06%	1.54%	0.68%	-1.09%
Apr-20	-30.39%	3.65%	3.79%	5.92%
May-20	8.12%	-0.99%	-1.03%	36.36%
Jun-20	25.81%	6.08%	6.30%	23.55%
Jul-20	0.00%	7.79%	2.66%	1.62%
Aug-20	-0.88%	2.65%	8.14%	-6.20%
Sep-20	8.34%	16.01%	19.26%	11.18%
Oct-20	3.56%	4.27%	4.28%	13.80%
Nov-20	2.58%	9.40%	9.43%	17.13%
Dec-20	19.82%	12.00%	12.03%	14.48%
Jan-21	14.25%	9.28%	9.27%	24.26%
Feb-21	17.29%	6.78%	6.60%	13.21%
Mar-21	6.39%	20.64%	20.73%	28.39%
Apr-21	6.14%	5.93%	5.87%	6.62%
May-21	5.58%	29.24%	29.10%	30.60%
Jun-21	-2.55%	-4.37%	-4.40%	-5.77%
Jul-21	1.45%	-5.79%	-5.81%	-10.45%
Aug-21	1.15%	4.46%	4.21%	2.34%
Sep-21	-3.93%	-13.98%	-13.85%	-24.51%
Oct-21	4.11%	6.89%	6.94%	6.89%
Nov-21	7.51%	-8.52%	-8.58%	-14.35%
Dec-21	4.45%	3.08%	3.10%	-7.52%
Jan-22	5.64%	4.20%	4.07%	12.11%
Feb-22	-2.67%	-0.12%	0.00%	3.91%
Mar-22	-10.18%	3.03%	3.10%	-0.52%
Apr-22	5.93%	12.76%	1.96%	12.80%
May-22	4.00%	6.92%	18.34%	18.15%
Jun-22	-14.71%	-8.67%	-8.54%	0.33%

**Crude and Refined Products Outlook
Mar-24
Midstream Outlook
Appendix 5**

Appendix 5 - Table 1 Pipelines to Cushing

Operating Pipelines				
Operator	Origin	Name	Capacity (MBPD)	Completion

Total Operating

Likely Expansions				
Operator	Origin	Name	Capacity (MBPD)	Completion

Operating + Planned

⁽¹⁾Expansion timing likely to coincide with Line 3 Replacement expansion and may be dependent on the outcome of Mainline contracting

Appendix 5 - Table 2 Pipelines from Cushing and Patoka

Operating Pipelines - from Cushing

Operator	Destination	Name	Capacity (MBPD)	Completion
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Total Operating

Likely Expansions - from Cushing

Operator	Destination	Name	Capacity (MBPD)	Completion
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Operating + Planned

Operating - from Patoka, IL / Memphis, TN

Operator	Destination	Name	Capacity (MBPD)	Completion
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Likely Expansions - from Patoka, IL / Memphis, TN

Operator	Destination	Name	Capacity (MBPD)	Completion
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Appendix 5 - Table 3 Permian Crude Oil Pipelines

Operating Pipelines				
Operator	Destination	Name	Capacity (MBPD)	Completion

Total Operating

Likely Expansions				
Operator	Origin	Name	Capacity (MBPD)	Completion

Operating + Planned

⁽¹⁾Also know as "Seminole - Red"; Possible conversion back to NGL service at a future date

⁽²⁾Represents undivided joint interest in Wink-to-Webster Pipeline

Appendix 5 - Table 4 Permian NGL Pipelines

Operating Pipelines				
Operator	Origin	Name	Capacity (MBPD)	Completion

Total Operating

Likely Expansions				
Operator	Origin	Name	Capacity (MBPD)	Completion

Operating + Planned

⁽¹⁾Also know as Midland-to-Echo 2

⁽²⁾Expected conversion originally planned for 2021, but now delayed indefinitely

Appendix 5 - Table 5 Permian Natural Gas Pipelines

Operating Pipelines				
Operator	Destination	Name	Capacity (BCF/D)	Completion

Total Operating

Likely Expansions				
Operator	Destination	Name	Capacity (BCF/D)	Completion

Operating + Planned

Cancelled / Deferred				
Operator	Destination	Name	Capacity (BCF/D)	Completion

Appendix 5 - Table 6 Bakken Crude Oil Pipelines

Operating Pipelines and other Takeaway Capacity				
Operator	Destination	Name	Capacity (MBPD)	Completion
Total Operating			0	
Proposed Expansions				
Operator	Destination	Name	Capacity (MBPD)	Completion
Operating + Planned			0	

⁽¹⁾Terminate at Enbridge Mainline, which provides access to downstream markets

⁽²⁾Wider regional differentials would be necessary to incentivize sustained rail movements above ~250 MBPD

Appendix 5 - Table 7

Western Canadian Sedimentary Basin Crude Oil Pipelines

Operating Pipelines				
Operator	Destination	Name	Capacity (MBPD)	Completion
Likely Expansions				
Operator	Destination	Name	Capacity (MBPD)	Completion
Cancelled / Deferred				
Operator	Origin	Name	Capacity (MBPD)	Completion

⁽¹⁾Represents portion available to WCSB crude / condensate; Includes Line 3 Replacement

⁽²⁾Represents portion available to WCSB crude / condensate; 10% of total capacity is assumed to be dedicated to refined products

⁽³⁾Represents portion available to WCSB crude / condensate; 5% of expansion capacity is assumed to be dedicated to refined products

**Crude and Refined Products Outlook
March 2024
Crude and NGL Production Outlook
Appendix 6**

Appendix 6 – Table 1
U.S. Crude Production Outlook
 Thousand Barrels per Day

	2016	2017	2018	Actual 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Forecast 2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Appalachia								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bakken								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Permian								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Eagle Ford								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Niobrara								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Anadarko								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gulf of Mexico								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Alaska								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
California								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
U.S. Total								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Appendix 6 – Table 2
U.S. NGL Production Outlook
 Thousand Barrels per Day

	Actual						Forecast																		
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
PADD 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IN, IL & KY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ND, SD, WI, MN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OK, KS, MO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TX Inland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Texas Gulf Coast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA Gulf Coast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N LA / AR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PADD 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PADD 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 6 – Table 3 Canada Crude Production Outlook

Thousand Barrels per Day

	Actual			Forecast																		
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Eastern Canada Light																						
<u>Eastern Canada Hvy</u>																						
Total Eastern Canada																						
W Canada Light																						
W Canada Condensate																						
W Canada Conv Hvy																						
W Canada Upgraded Bitumen ⁽¹⁾																						
<u>W Canada Non-Upgraded Bitumen</u>																						
Total Western Canada																						
Total Canada Crude Oil Production																						

(1) Includes partially and fully upgraded bitumen

Appendix 6 – Table 4
Western Canada Supply (Incl. Diluent)
 Thousand Barrels per Day

	Actual		Forecast																			
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
W Canada Lt																						
W Canada Condensate																						
W Canada Conv Hvy																						
W Canada Fully Upgraded Bitumen																						
Synthetic / Bitumen Blend (SynBit)																						
Partially Upgraded Bitumen(1)																						
W Canada Whole Bitumen																						
W Canada DiIBit																						
Total Diluent Demand																						
Refinery Diluent Production																						
Local Condensate Used as Diluent																						
Local Lt Crude Used as Diluent																						
Imported Diluent Demand																						
Total W Canadian Supply (Incl Imported Diluent)																						
Western Canadian Lt/Med Supply																						
Western Canadian Heavy Supply																						

Appendix 7 – Table 1 Global EV Sales Outlook

Thousands of Units per Year

		China	EU + EFTA	U.S.	RotW	Total
Actual	2012					
	2013					
	2014					
	2015					
	2016					
	2017					
	2018					
	2019					
	2020					
	2021					
	2022					
	Forecast	2023				
2024						
2025						
2026						
2027						
2028						
2029						
2030						
2031						
2032						
2033						
2034						
2035						
2036						
2037						
2038						
2039						
2040						