

U.S. Propane Market – Status and Expectations

01-February 2021

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Agenda

Market backdrop – U.S. and international views

Current weekly forecast and outlook – U.S. exports, U.S. to Asia arbitrage pricing

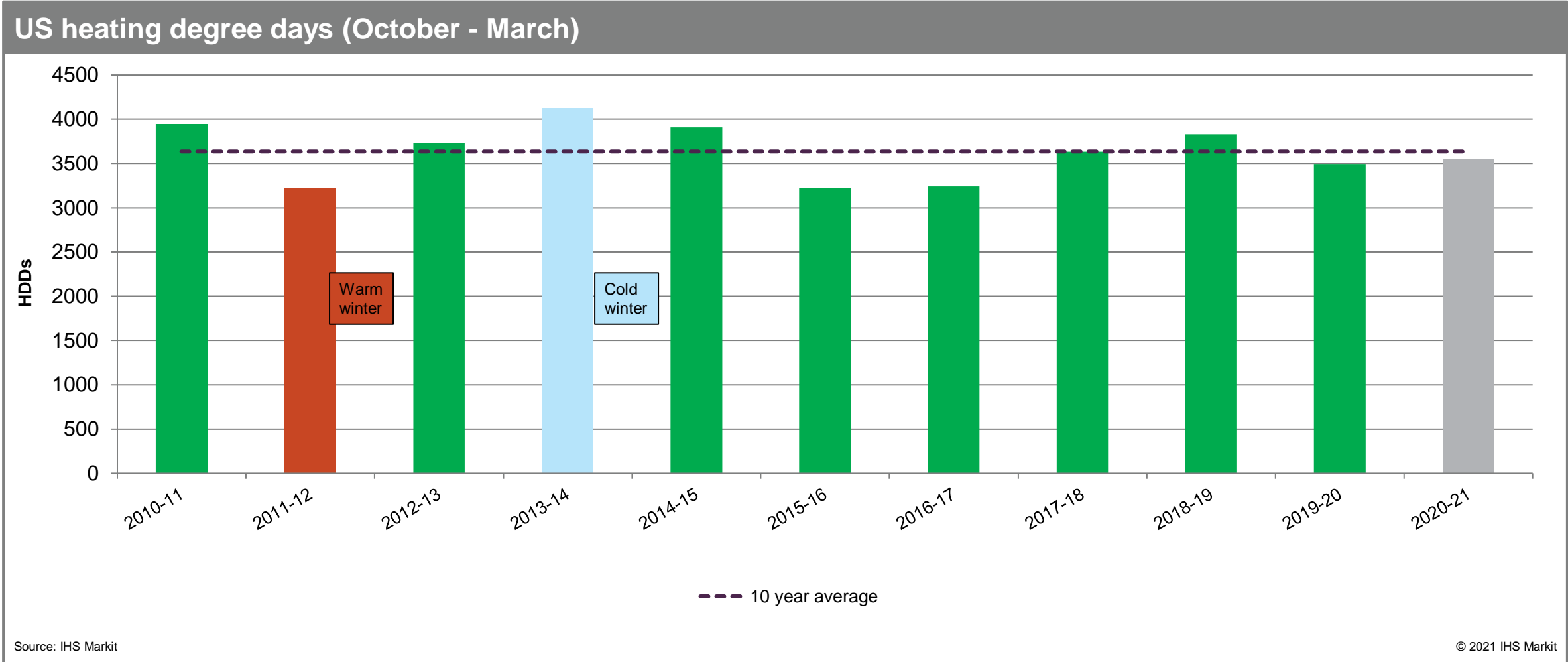
Year over year U.S. propane market fundamental changes

Implication to days of forward supply and pricing

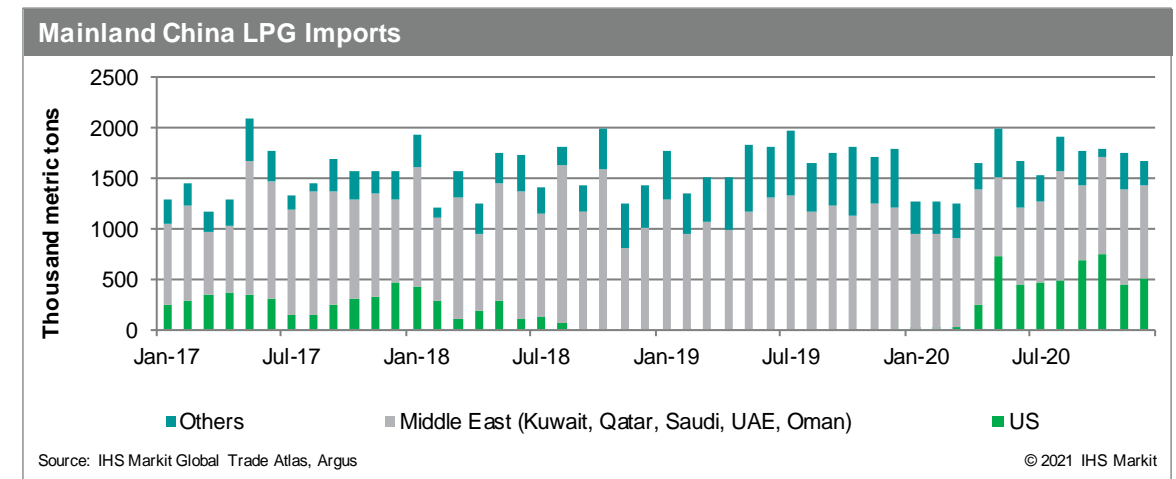
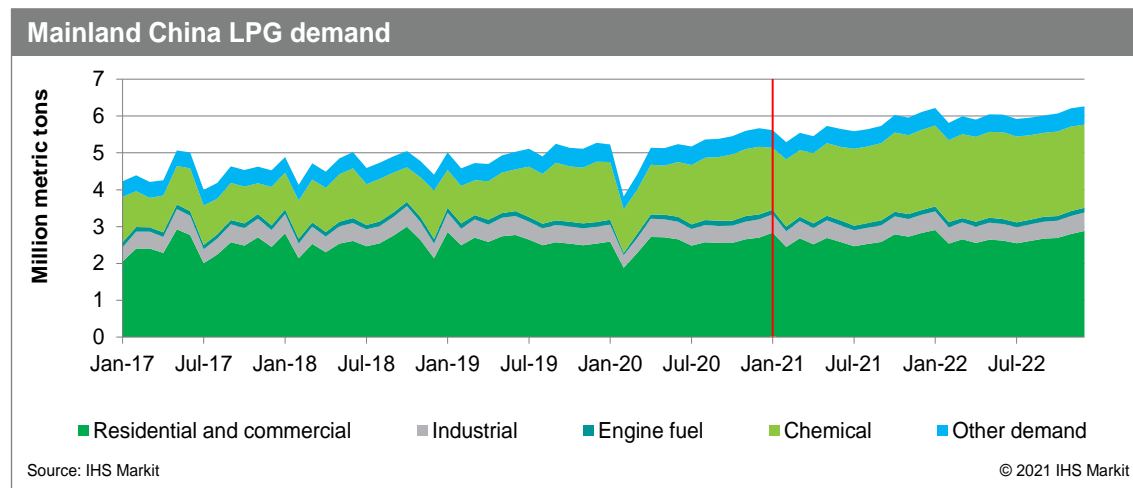
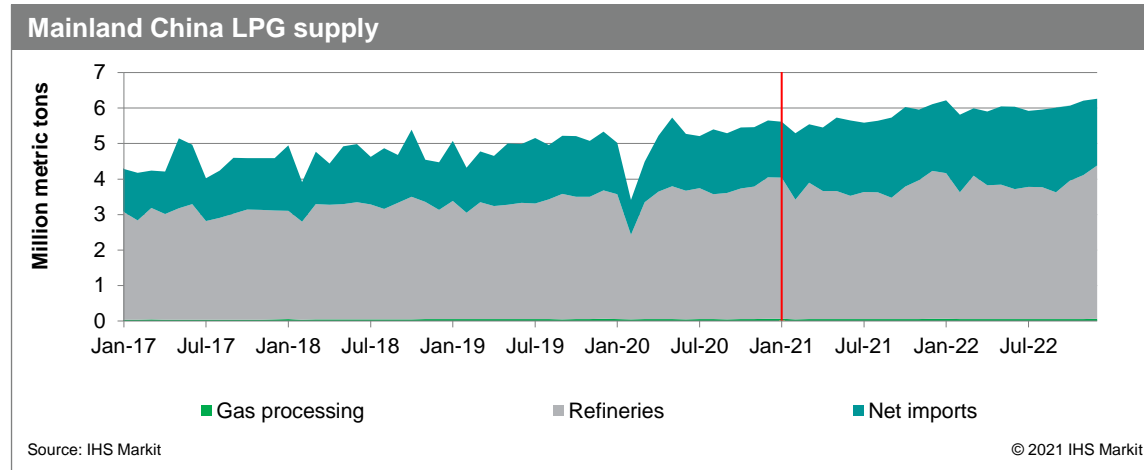
Closing and thanks

Winter demand – “old man winter” arrived late but arrived

NOAA’s HDDs forecast drops further below the 10-year average



Mainland China LPG supply and demand – incremental demand requirements mainly being met by the U.S.



Mainland China's NGL related petrochemical projects status

Developments of crackers consuming mixed feedstocks and ethane

New projects, thousand metric tons per year

| Year | Company name | Capacity | Start-up date |
|---------------------------|------------------------------|-----------------|----------------------|
| 2019 | SP Chemicals | 650 | Q3 2019 |
| | <i>Subtotal</i> | 650 | |
| | 2020 | | |
| 2020 | Company name | Capacity | Start-up date |
| | Zhejiang PC I | 1,400 | Q1 2020 |
| | Hengli Petrochemical | 1,500 | Q1 2020 |
| | Liaoning Bora PC | 1,000 | Q3 2020 |
| | Sinochem Quanzhou | 1,000 | Q3 2020 |
| | Sinopec-KPC PC JV | 800 | Q3 2020 |
| | Wanhua Chemical Group | 1,000 | Q4 2020 |
| <i>Subtotal</i> | 6,700 | | |
| 2021 | Company name | Capacity | Start-up date |
| | Zhejiang Satellite PC | 1,250 | Q1-Q2, 2021 |
| | Huatai Shengfu | 600 | Q1 2021 |
| | Petrochina Lanzhou Changqing | 800 | Mid 2021 |
| | Zhejiang PC II (stage 1) | 1,400 | Q4 2021 |
| | PetroChina Tarim | 600 | Q4 2021 |
| <i>Subtotal</i> | 4,650 | | |
| 2022 | Company name | Capacity | Start-up date |
| | Fujian Gu Lei Petro | 800 | Q1 2022 |
| | Shouguang Luqing | 750 | Q1 2022 |
| | Zhejiang PC II (stage 2) | 1,400 | Mid-2022 |
| | CNPC Jieyang (PDVSA) | 1,200 | Q4 2022 |
| <i>Subtotal</i> | 4,150 | | |
| Total, 2019 ~ 2022 | | 16,150 | |

Project plan for 2023 ~ 2025: 3.3 million metric tons

Note:

1. All the capacity numbers above represent ethylene capacity
2. Mixed feedstocks indicate crackers using both LPG and naphtha as feedstock
3. SP Chemicals' cracker consumes ethane and propane as feedstock
4. Wanhua Chemical's cracker mainly relies on propane
5. Zhejiang Satellite PC's cracker will 100% relies on import ethane from the U.S.
6. PetroChina Lanzhou and Tarim will rely on ethane from its own oilfields in Northwest China

Developments of PDH units in mainland China

PDH capacity by the end of 2020: 7.86 million metric tons per year

New PDH projects capacity, thousand metric tons per year

| Year | Company name | Capacity | Start-up date |
|---------------------------|---------------------------------------|-----------------|----------------------|
| 2020 | Huahong New Materials | 450 | Q2-Q3, 2020 |
| | Zhejiang PC | 600 | Q3 2020 |
| | <i>Subtotal</i> | 1,050 | |
| 2021 | Company name | Capacity | Start-up date |
| | Fujian Meide PC | 660 | Q1 2020 |
| | Ningbo Fuji | 660 | Q1 2021 |
| | Jinneng Science & Technology Co., Ltd | 900 | Mid 2021 |
| | Anqing Taiheng | 200 | Mid 2021 |
| | Ningxia Runfeng | 300 | Mid 2021 |
| | Shandong Huifeng | 250 | Q4 2021 |
| FPC Ningbo | 600 | Q4 2021 | |
| <i>Subtotal</i> | 3,570 | | |
| 2022 | Company name | Capacity | Start-up date |
| | Befar Group | 600 | Q1 2022 |
| | Qixiang Tengda Chem. | 700 | Q1 2022 |
| <i>Subtotal</i> | 1,300 | | |
| Total, 2020 ~ 2022 | | 5,920 | |

Project plan for 2023 ~ 2025: approx. 3.7 million metric tons per year

Note: all the capacity numbers above represent propylene capacity

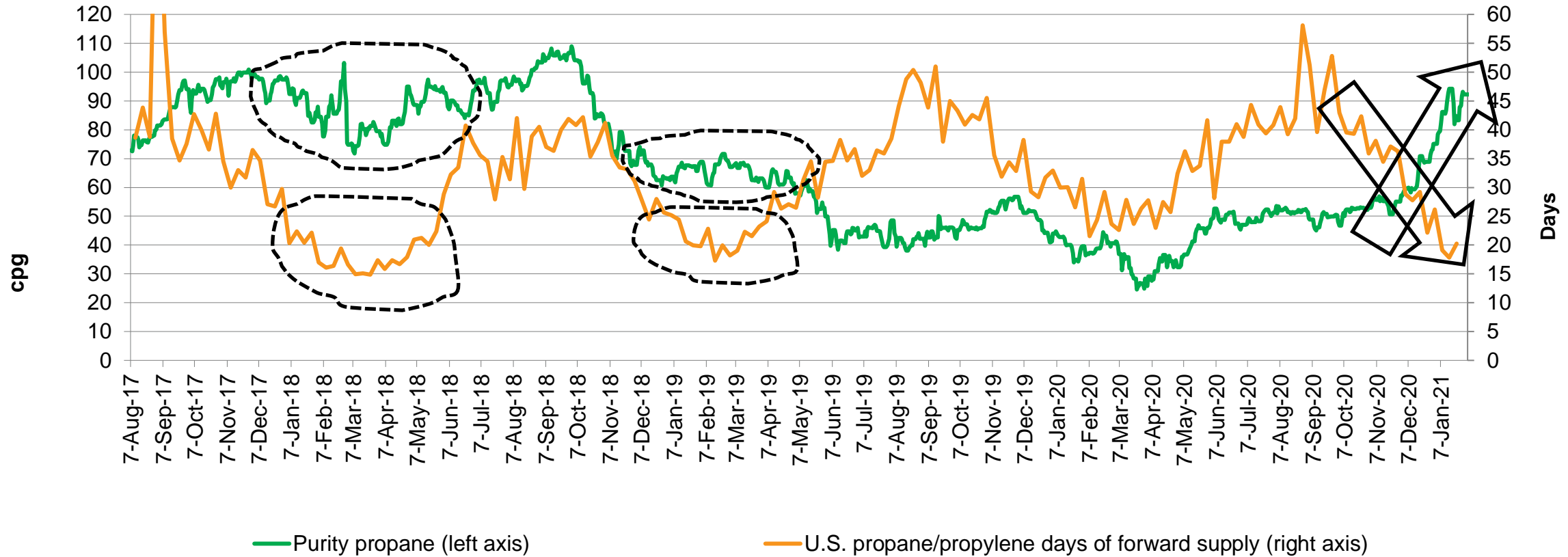
The six new flexible feeding crackers, started up in 2020, are estimated to jointly consume about 5.8 million metric tons more LPG on annual basis. Considering four of the six new crackers started up during Q3 to Q4 of 2020, they will continue to bring the incremental LPG demands for cracking in 2021.

Apart from the ethane-based crackers of Zhejiang Satellite and PetroChina, the two flexible feeding crackers of Huatai Shengfu and Zhejiang PC coming in 2021 will probably consume around 1.5 million metric tons more LPG on annual basis in total.

Fujian Meide PC's PDH unit (660,000 thousand metric tons per year propylene capacity) and Ningbo Fuji's phase II PDH unit (660,000 thousand metric tons per year propylene capacity) both started commissioning in January and are expected to reach full operation within Q1 2021.

U.S. propane market has tightened, price rises – days of forward supply falls sharply (reaching the “magic 20-day level”) and is expected to bottom out during the month of February

Daily Mont Belvieu propane price and weekly propane/propylene inventory



Source: IHS Markit

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Current U.S. propane market weekly forecast – relatively flat supply and increasing demand led by strong exports eroded inventory at a relatively high rate

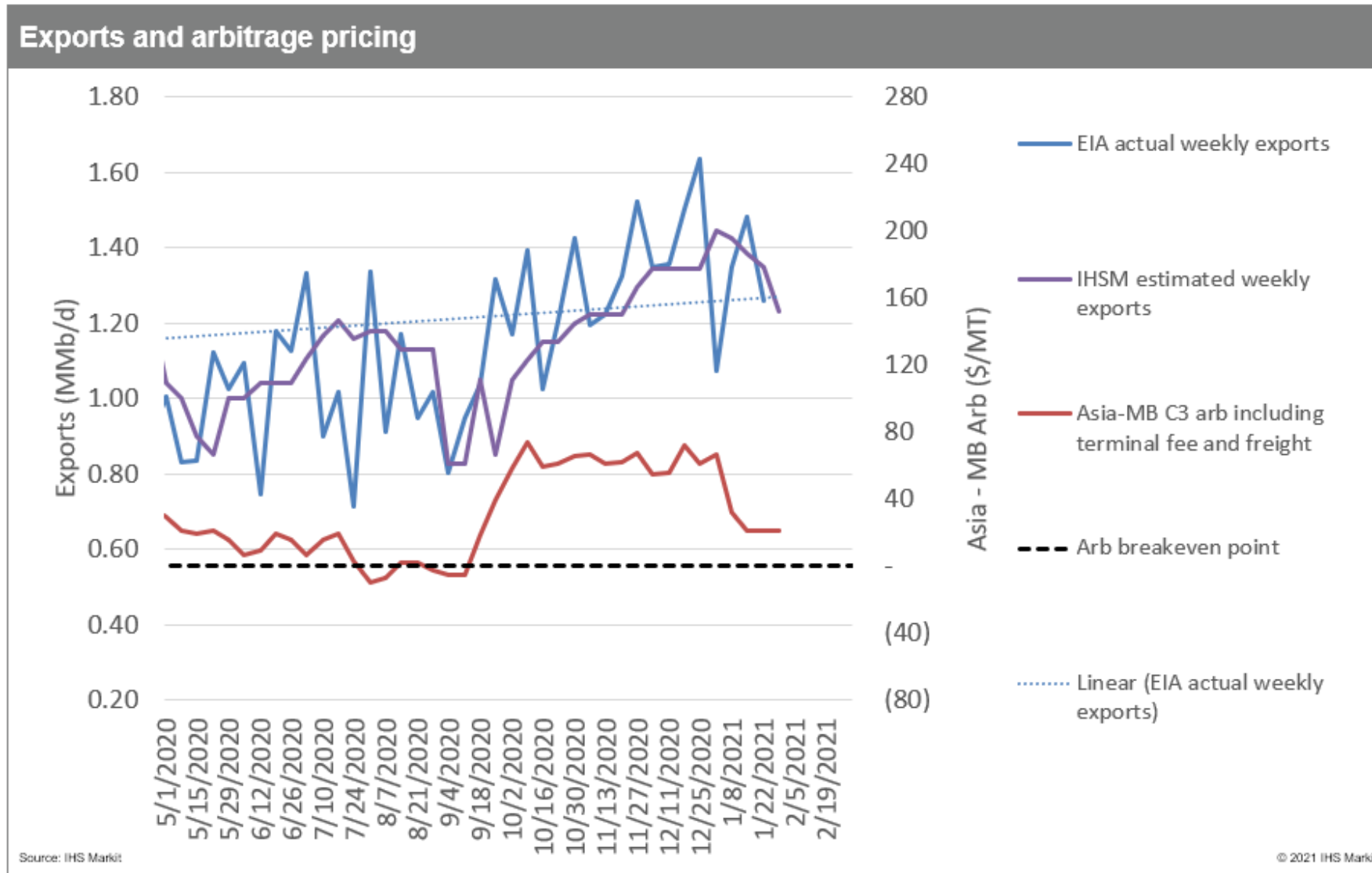
| Propane/propylene supply and demand | | | | | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Week ending | Realized | | | | Forecast | | | | |
| | 25-Dec | 1-Jan | 8-Jan | 15-Jan | 22-Jan | 29-Jan | 5-Feb | 12-Feb | 19-Feb |
| Supply (thousand b/d) | 2,467 | 2,438 | 2,489 | 2,469 | 2,513 | 2,532 | 2,510 | 2,477 | 2,459 |
| Production | 2,329 | 2,257 | 2,340 | 2,295 | 2,356 | 2,368 | 2,321 | 2,315 | 2,301 |
| <i>Natural gas*</i> | 1,689 | 1,708 | 1,707 | 1,712 | 1,712 | 1,712 | 1,712 | 1,712 | 1,722 |
| <i>Refinery*</i> | 640 | 550 | 634 | 584 | 644 | 656 | 610 | 603 | 579 |
| Imports | 138 | 181 | 149 | 174 | 157 | 164 | 188 | 162 | 158 |
| Demand (thousand b/d) | 3,389 | 2,777 | 3,451 | 3,359 | 3,121 | 3,175 | 2,903 | 2,943 | 2,848 |
| Product supplied | 1,755 | 1,702 | 2,104 | 1,879 | 1,771 | 1,825 | 1,628 | 1,668 | 1,573 |
| <i>Residential and commercial, plus other*</i> | 1,086 | 1,036 | 1,433 | 1,215 | 1,116 | 1,165 | 986 | 1,028 | 933 |
| <i>Cracking plus PDH*</i> | 324 | 320 | 325 | 318 | 309 | 314 | 296 | 294 | 294 |
| <i>Propylene*</i> | 346 | 346 | 346 | 346 | 346 | 346 | 346 | 346 | 346 |
| Exports | 1,634 | 1,075 | 1,347 | 1,480 | 1,350 | 1,350 | 1,275 | 1,275 | 1,275 |
| Stock change (thousand bbl) | -6,450 | -2,369 | -6,729 | -6,230 | -4,255 | -4,503 | -2,753 | -3,262 | -2,723 |
| Ending stocks (thousand bbl) | 75,146 | 72,777 | 66,048 | 59,818 | 55,563 | 51,060 | 48,307 | 45,045 | 42,322 |
| Days of supply/disposition | 28 | 25 | 23 | 20 | 18 | 16 | 16 | 15 | 14 |

Note: Other includes the balancing item. PDH = propane dehydrogenation. *IHS Markit internal subcomponent estimates, not reported weekly by the EIA and not included in realized supply and demand totals.
Source: IHS Markit, EIA

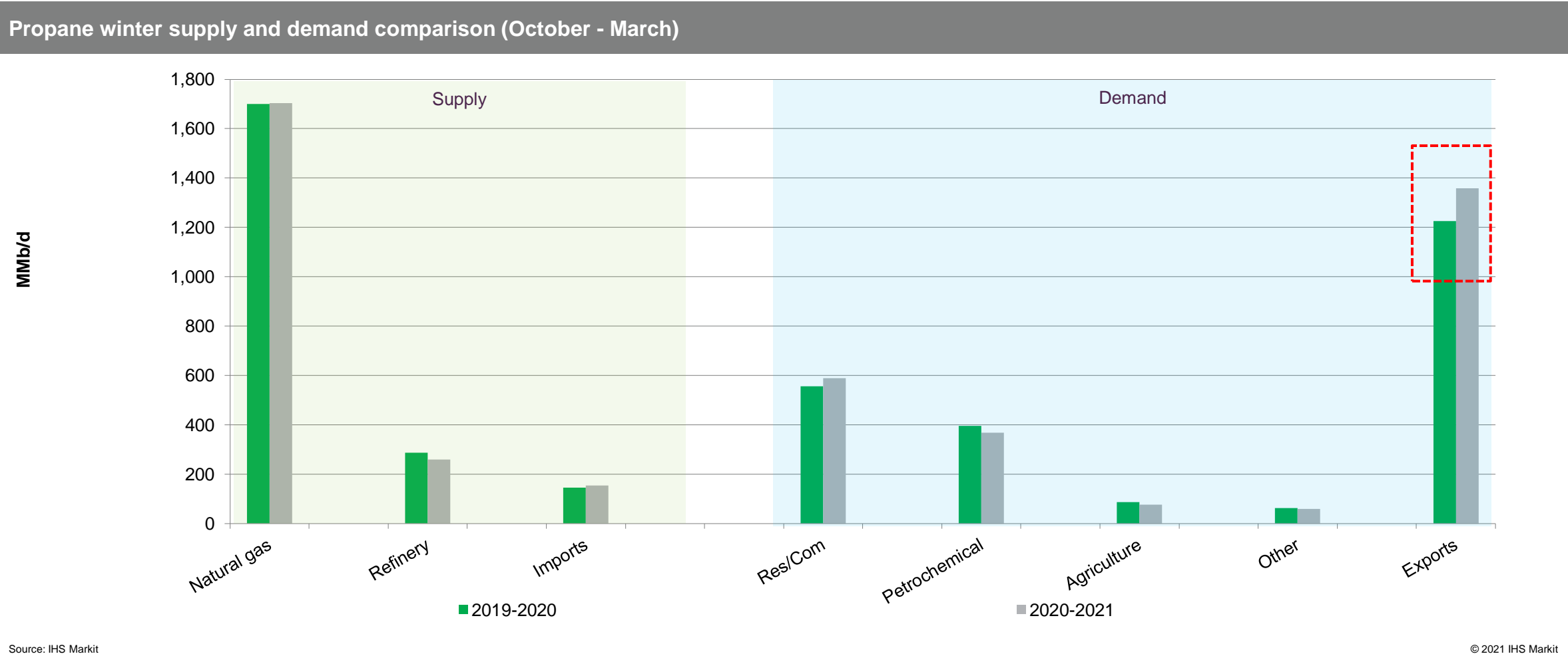
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IHS Markit-NPGA Propane Market
Weekly report – released every
Tuesday

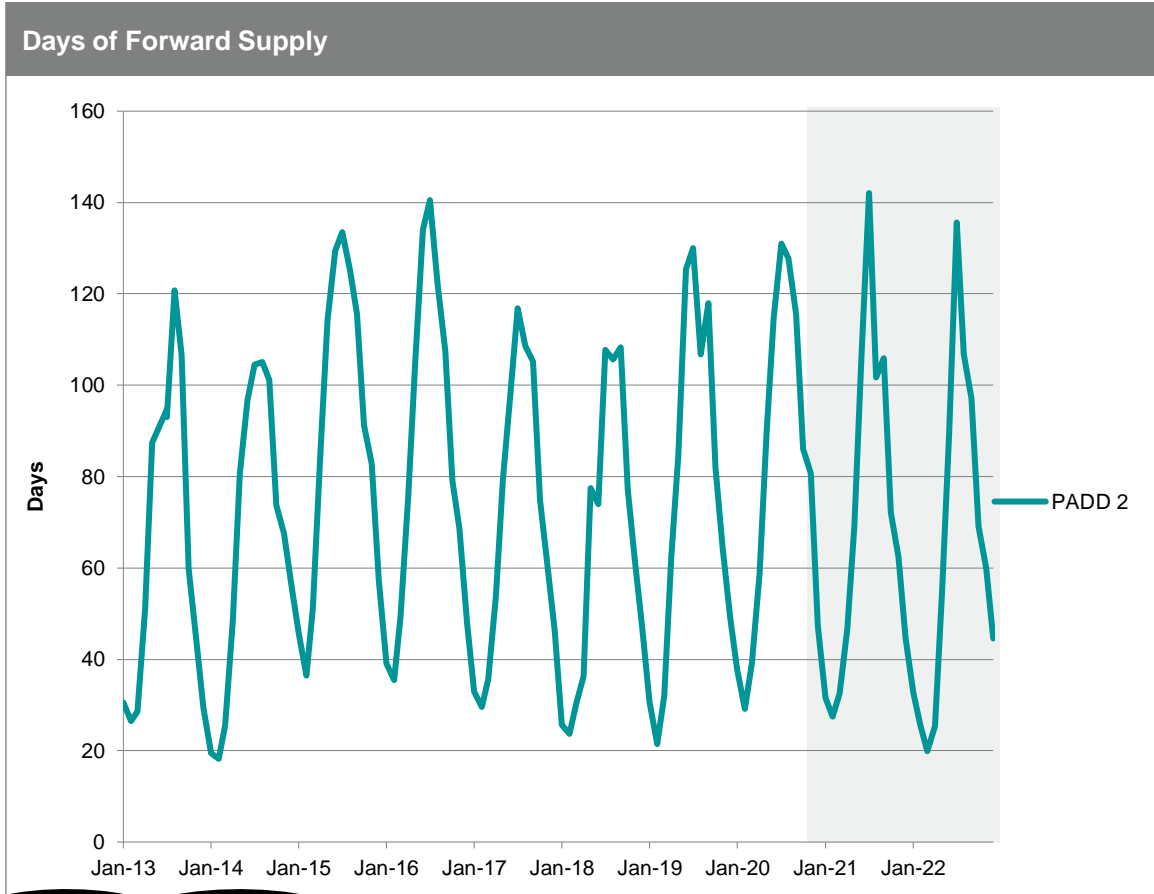
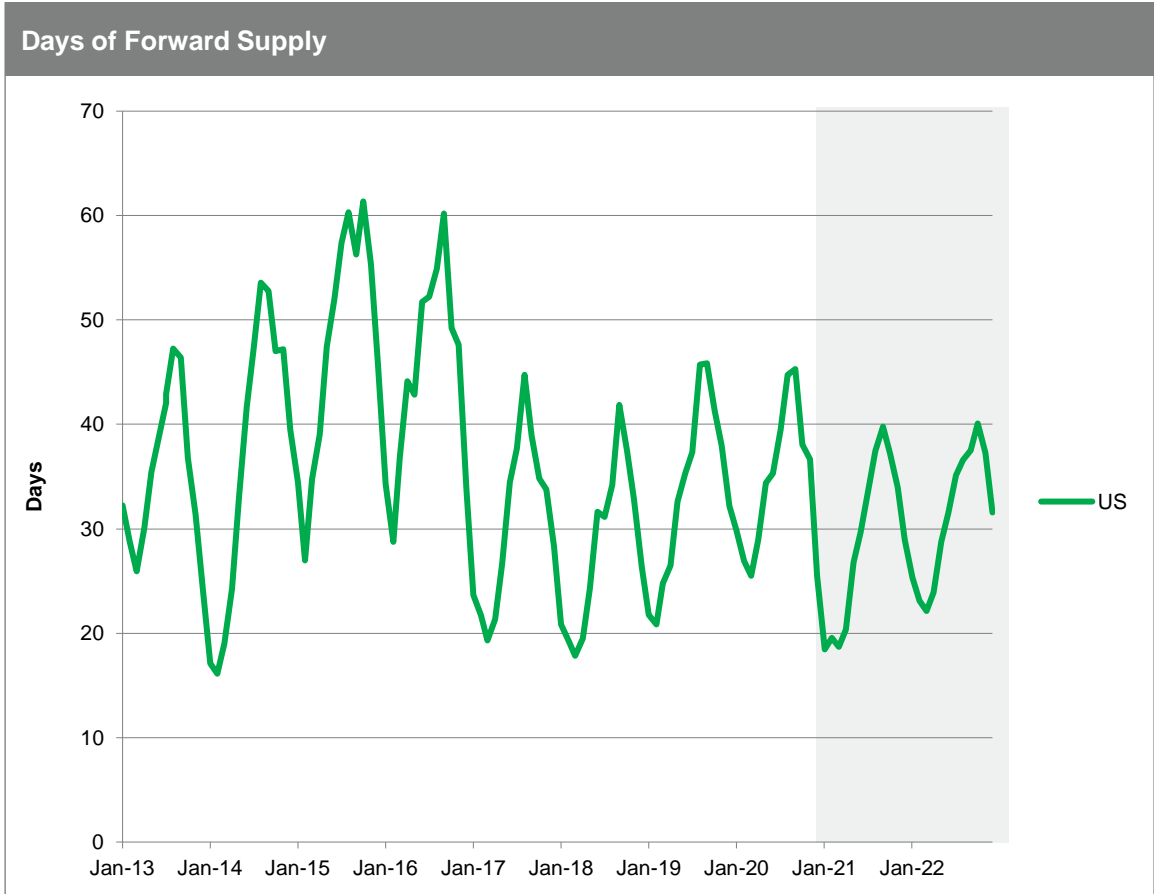
U.S. to Asia arbitrage pricing is weakening – spot/marginal volumes ease



Propane fundamentals (seasonal assessment) – minimal supply gains and higher demand drives down inventory levels



U.S. propane inventory levels – lower days of forward supply supports higher pricing (U.S. and PADD 2 noted below)

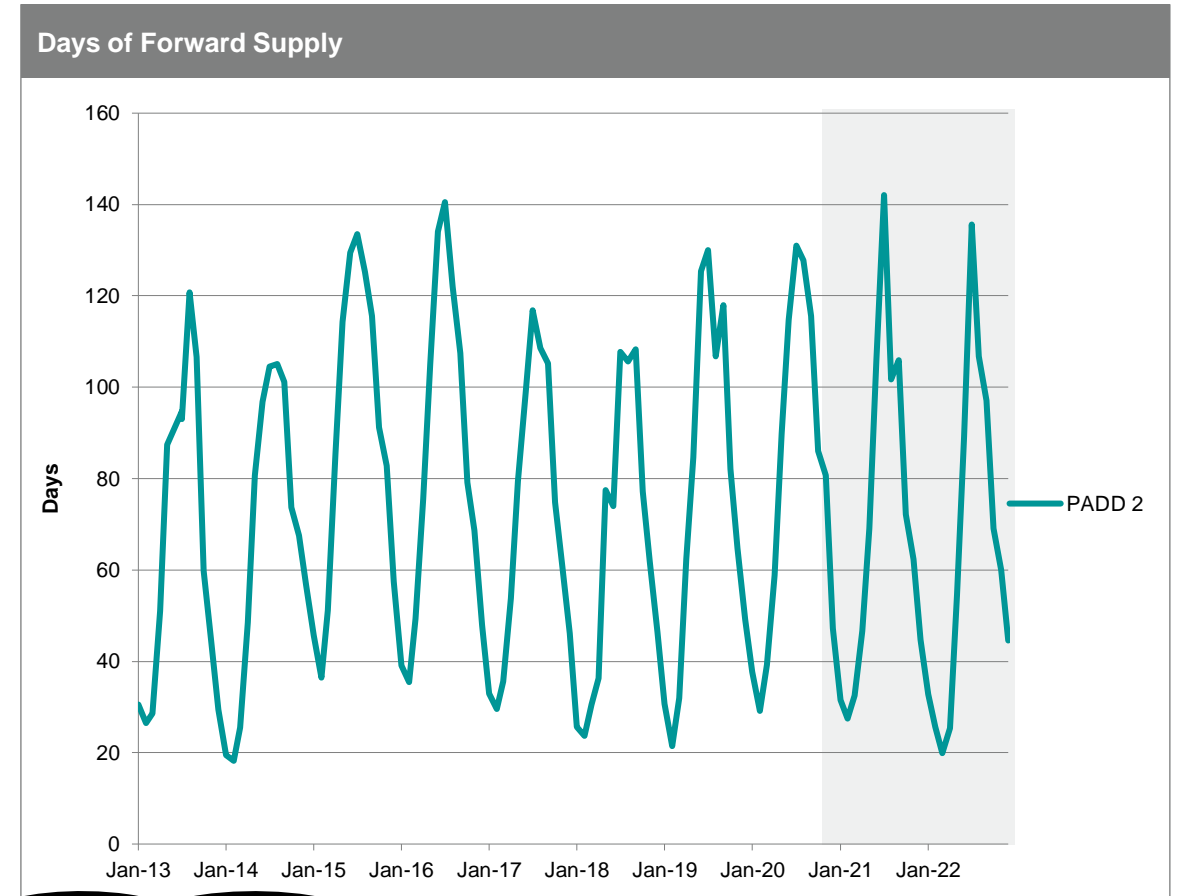
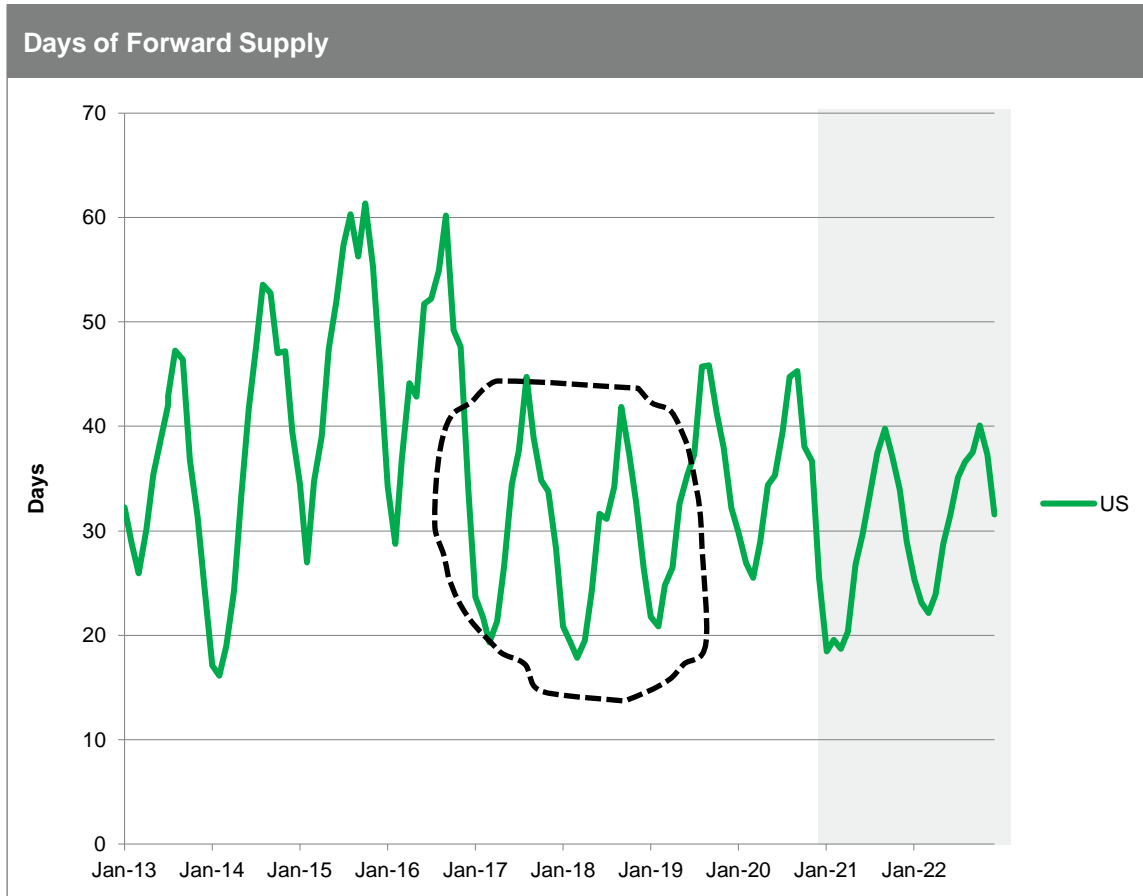


Source: IHS Markit

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IHS Markit-NPGA Propane Monthly Trend Report – released the first week of every month

U.S. propane inventory levels – lower days of forward supply supports higher pricing (U.S. and PADD 2 noted below)



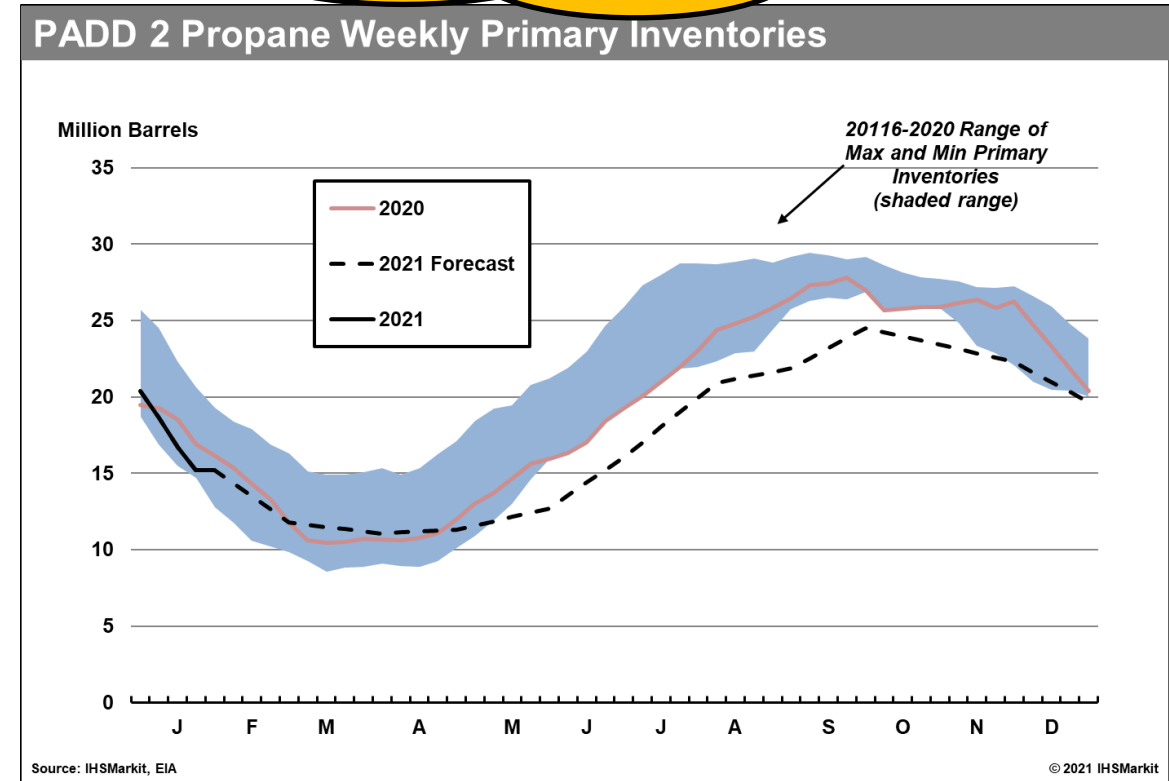
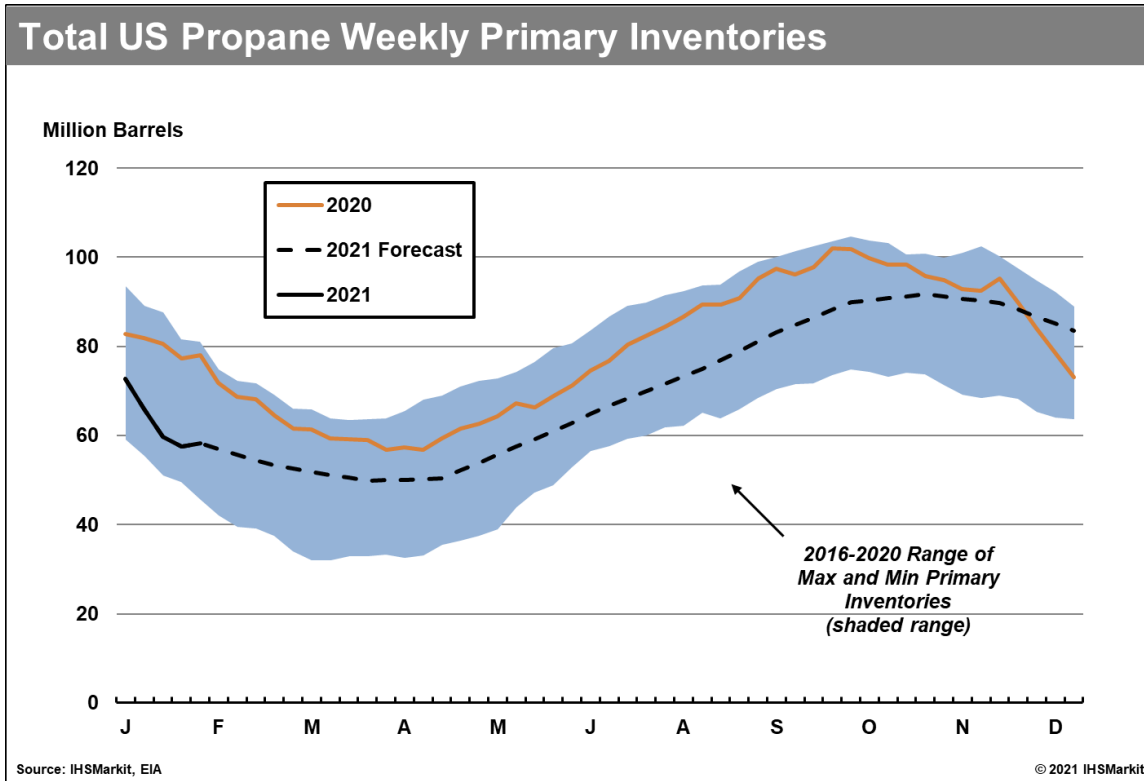
Source: IHS Markit

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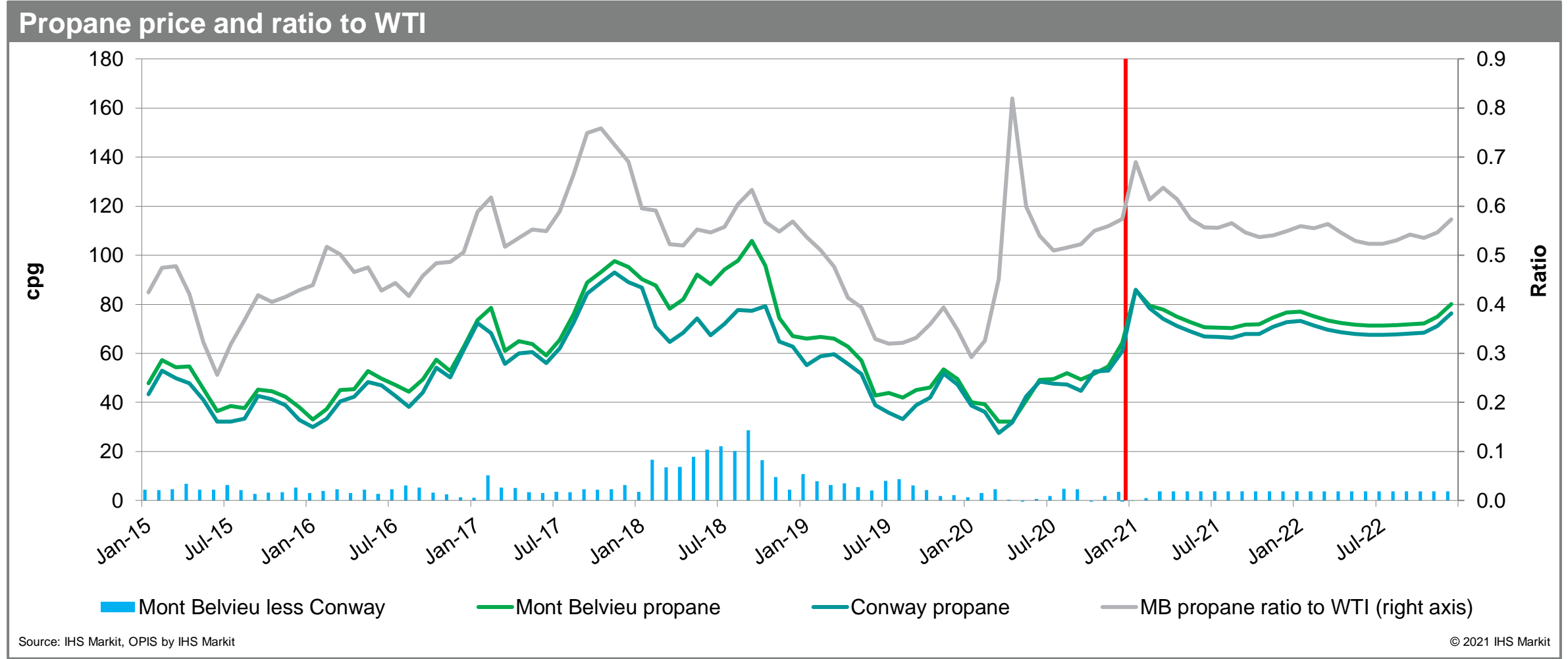
IHS Markit-NPGA Propane Monthly Trend Report – released the first week of every month

U.S. inventory levels – lower inventory levels on an absolute basis and comparisons to previous periods, minimum and maximum levels

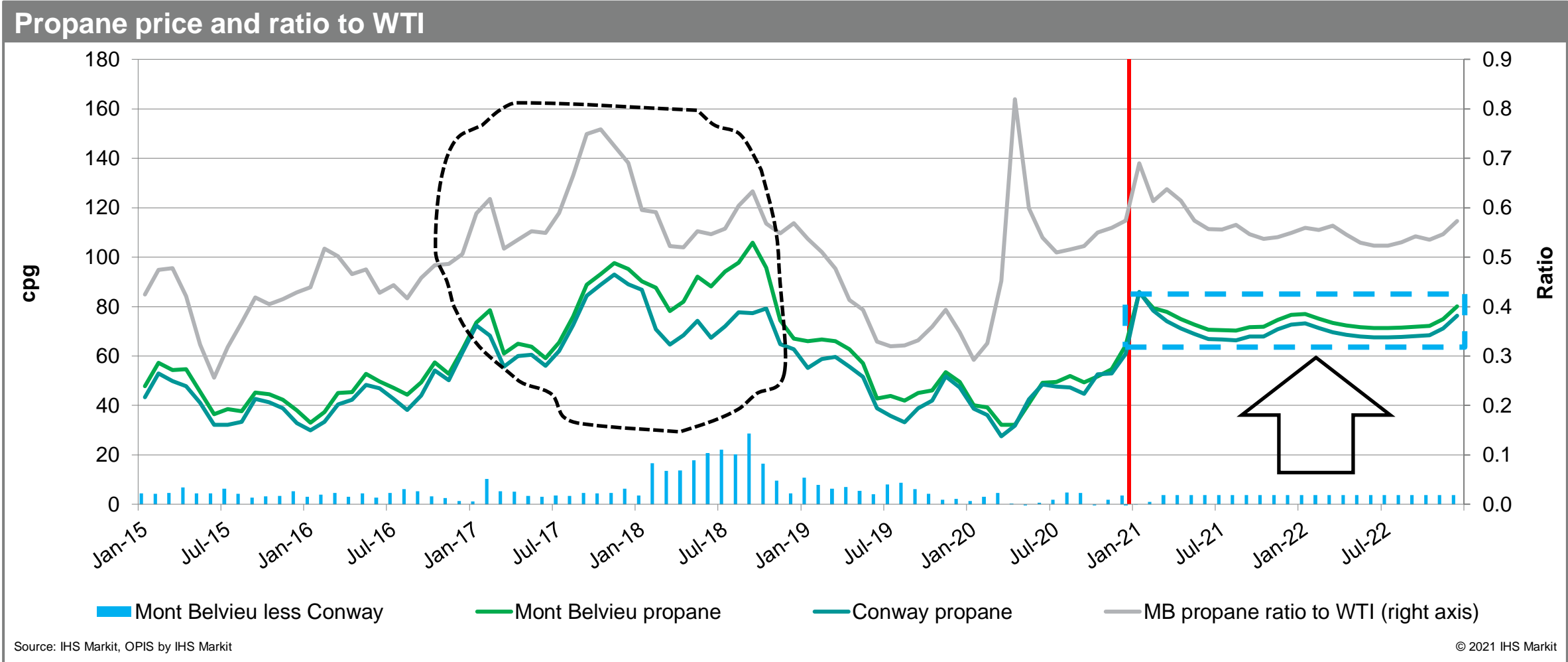
IHS Markit-NPGA Propane
 Monthly Trend Report – released
 the first week of every month



Propane's relative strength with WTI to remain strong – tight propane balances supported by domestic demand and exports



Propane's relative strength with WTI to remain strong – tight propane balances supported by domestic demand and exports



Thanks!

Look for the next weekly report and the February monthly propane trend report, both delivered this week!

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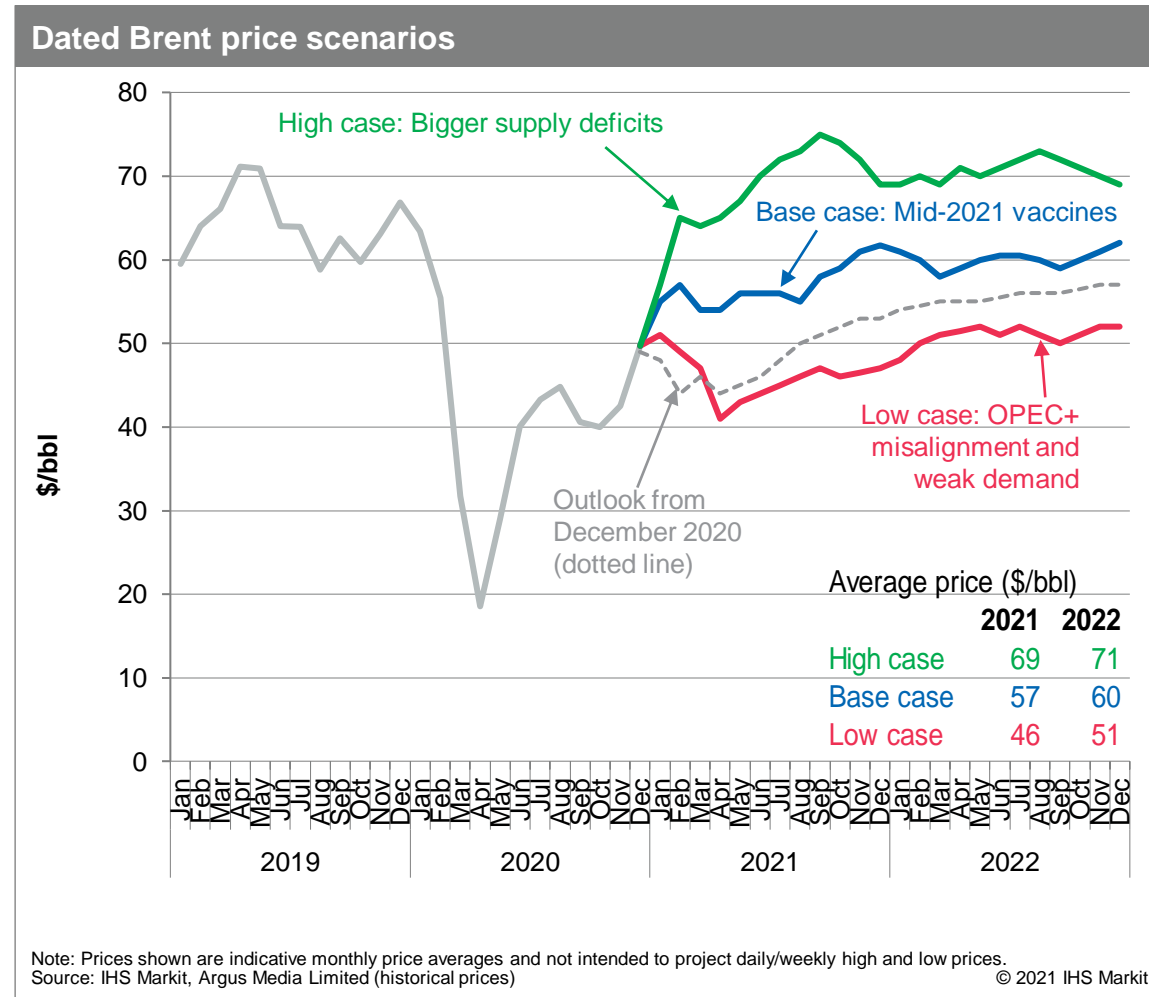
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Appendix

Dated Brent prices range from \$55/bbl to \$65/bbl in our base case. Key assumptions are Saudi defense of oil prices and vaccine-driven demand



Key scenario assumptions:

Base-case scenario: COVID-19 vaccine by mid-2021

- World GDP contracts 3.9% in 2020 and grows 4.4% in 2021 and 4.1% in 2022.
- Oil demand stays at 93–94 MMb/d in fourth quarter 2020 and first quarter 2021. With effective COVID-19 vaccines becoming widely available by mid-2021, global oil demand picks up to 99 MMb/d in fourth quarter 2021. Chinese oil demand in 2021 is higher than in 2019, while other countries lag. At times during 2022, oil demand reaches pre-COVID-19 levels, although the annual average is still slightly below the 2019 level.
- Saudi Arabia cuts production in first quarter 2021 and then gradually increases output along with other OPEC+ producers in the rest of 2021.
- US crude oil production grows during 2021, but the annual average of 11.4 MMb/d is even with the 2020 average. In 2022, US crude output increases 0.4 MMb/d to average 11.8 MMb/d.
- Iranian output rises to 2.9 MMb/d by end-2021 and above 3.0 MMb/d in second quarter 2022.
- Prices hover around \$60/bbl in 2022 as OPEC+ brings on more production, which leads to supply surpluses.

High-case scenario: Bigger supply deficits

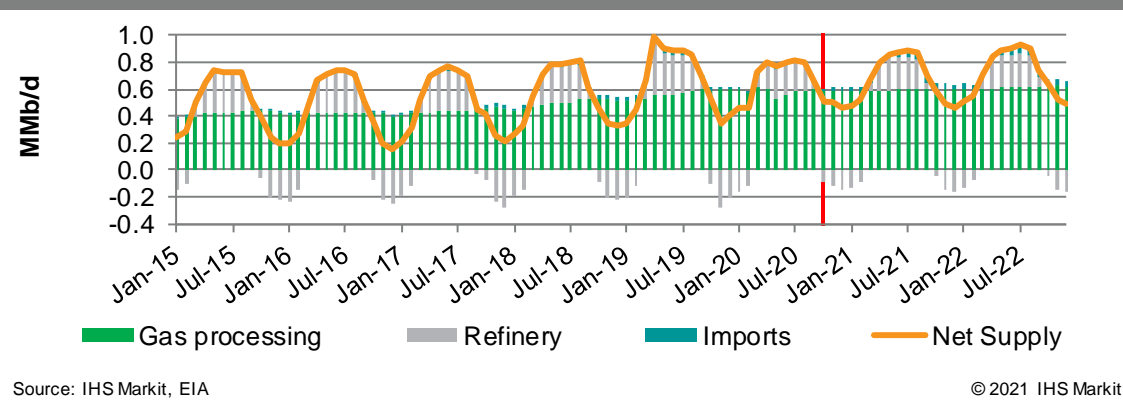
- Rapid vaccination with effective vaccines boosts economic activity faster than expected compared with the base case and drives up demand. After prices rise above \$70/bbl by second half 2021, more supply limits further price increases through 2022.

Low-case scenario: OPEC+ misalignment and weak demand

- OPEC+ unleashes more supply, while the demand recovery stumbles. Vaccinations encounter logistical bottlenecks and concerns about effectiveness, while mobility and economic restrictions continue to restrain oil demand.
- Sluggish recovery in demand from mid-2021 gradually elevates prices to about \$50/bbl by second quarter 2022.

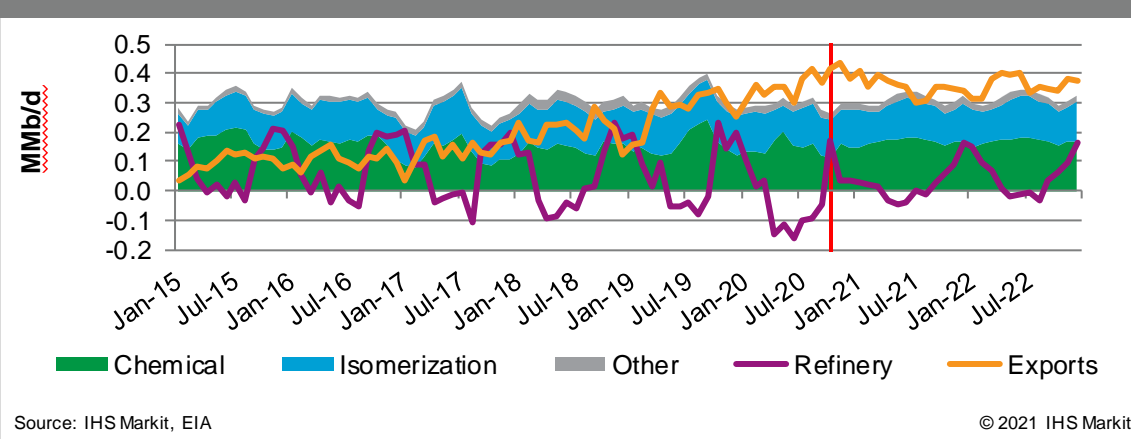
Gas plant-based production expected to be slightly higher in 2021 and will help to keep up with growing exports

US normal butane supply

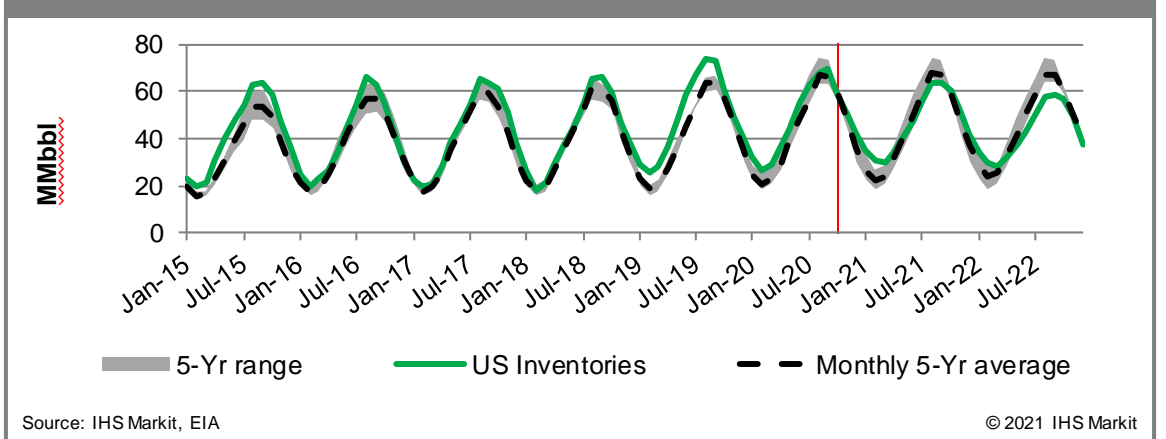


- Refinery rates have been lagging because of the COVID-19 pandemic, leading to lower than typical seasonal butane blending demand. Winter blending demand season is coming towards its end.
- Cracker demand is expected to average around 170 Mb/d in 2021-22. BASF cracker restarted in late October after going down in June, boosting USGC butane demand by ~ 50 mb/d.
- Exports of normal butane reached an all-time high of 413,000 b/d in August and are expected to average around 350,000 b/d to 400,000 b/d through the winter season.
- We expect butane inventory to remain around the 5-year range in 2021 due to low domestic demand and larger inventory needed to accommodate exports.

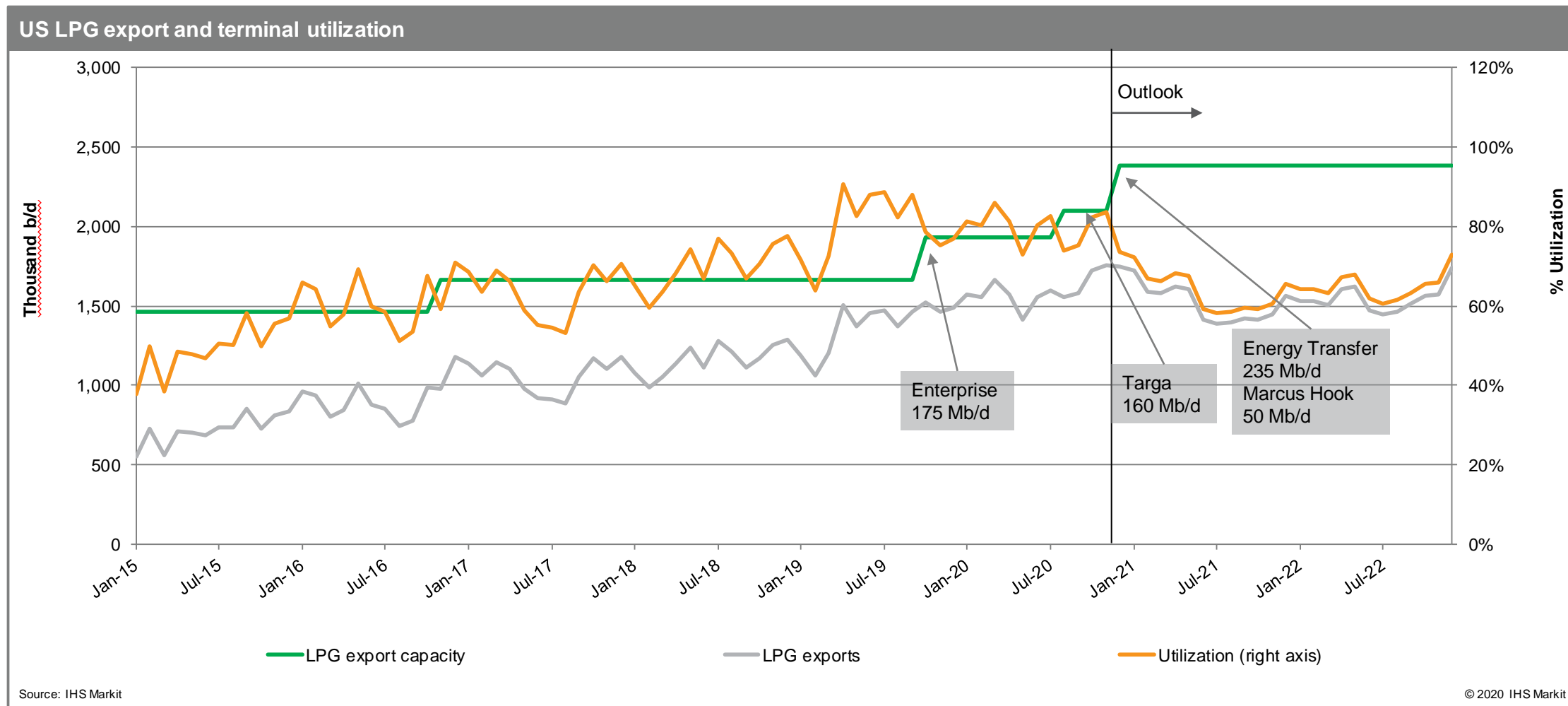
US normal butane demand



US normal butane inventories



Terminal utilization still expected to remain low as capacity increases - pressure on spot terminal fees to persist



- In December 2020, ETP expanded its Nederland terminal by an additional 235 mb/d. The 50 mb/d of LPG expansion at Marcus Hook is now expected in early 2021
- Targa's 160 mb/d expansion at Galena Park went online in August.
- Enterprise has put a hold on its 260 mb/d terminal expansion plan previously expected to be in-service by 1Q21.

North America NGL marine terminals

Operating Terminals

| Company | Terminal Name | Location | Capacity (Thousand b/d) | Capacity (Mmtpa) | Product | Import/Export | Status |
|---------------------------------|-------------------------|--------------------------|-------------------------|------------------|---------|---------------|-----------|
| NGL Energy Partners | Chesapeake | Virginia | 15 | 0.5 | LPG | Import/Export | Operating |
| Energy Transfer Partners | Marcus Hook Expansion | Pennsylvania | 50 | 1.5 | LPG | Export | Operating |
| Phillips 66 | Freeport | Texas | 200 | 6.01 | LPG | Export | Operating |
| Enterprise Products Partners | Houston | Texas | 660 | 19.84 | LPG | Export | Operating |
| Enterprise Products Partners | Houston Expansion | Texas | 175 | 5.26 | LPG | Export | Operating |
| Targa Resources | Galena Park | Texas | 230 | 6.91 | LPG | Export | Operating |
| Targa Resources | Galena Park expansion 1 | Texas | 100 | 3.01 | LPG | Export | Operating |
| Trafigura | Corpus Christi | Texas | 33.3 | 1.00 | LPG | Export | Operating |
| Energy Transfer Partners | Nederland | Texas | 200 | 6.01 | LPG | Export | Operating |
| Energy Transfer Partners | Nederland expansion | Texas | 235 | 7.06 | LPG | Export | Operating |
| EnLink | Riverside | Louisiana | 16.6 | 0.5 | LPG | Export | Operating |
| Petrogas / Alta Gas | Ferndale | Washington | 30 | 0.9 | Propane | Export | Operating |
| Alta Gas / Royal Vopak | RIPET | British Columbia, Canada | 50 | 1.5 | Propane | Export | Operating |
| Blackline | Newington | New Hampshire | 5* | 0.15 | Propane | Import | Operating |
| Sunoco/Markwest | Marcus Hook | Pennsylvania | 65 | 1.34 | Ethane | Export | Operating |
| Enterprise Products Partners | Morgan's Point | Texas | 240 | 4.94 | Ethane | Export | Operating |
| Targa Resources | Galena Park expansion 2 | Texas | 160 | 4.81 | LPG | Export | Operating |
| Energy Transfer Partners | Orbit | Texas | 175 | 3.60 | Ethane | Export | Operating |
| Total operating capacity | | | 2,635 | 74.84 | | | |

Planned Terminals

| Company | Terminal Name | Location | Capacity (Thousand b/d) | Capacity (Mmtpa) | Product | Import/Export | Status |
|-------------------------------|--------------------------------|--------------------------|-------------------------|------------------|---------|---------------|-----------------|
| Energy Transfer Partners | Nederland expansion | Texas | 235 | 7.06 | LPG | Export | Planned 4Q 2020 |
| Energy Transfer Partners | Marcus Hook expansion | Pennsylvania | 50 | 1.5 | LPG | Export | Planned 4Q 2020 |
| Blackline | Providence | Rhode Island | 7 | 0.26 | Propane | Import | Planned 2Q 2021 |
| Enterprise Products Partners | Houston Ship Channel expansion | Texas | 260 | 7.82 | LPG | Export | Deferred |
| Pembina | Prince Rupert | British Columbia, Canada | 25 | 0.75 | Propane | Export | Planned 1Q 2021 |
| Pembina | Prince Rupert expansion | British Columbia, Canada | 15 | 0.45 | Propane | Export | Deferred |
| Royal Vopak | Vopak Pacific Canada | British Columbia, Canada | 40 | 1.20 | Propane | Export | Planned 2023 |
| Pacific Traverse | Kitimat | British Columbia, Canada | 42 | 1.26 | Propane | Export | Planned 2023 |
| Total planned capacity | | | 674 | 20.3 | | | |

Note: *Capacity estimated based on year-to-date imports/exports

West Coast LPG Terminals: Operational, Announced and Under Construction

| Operational | Company | Project / Asset Name | Location | Total LPG Export Capacity (Mbpd) | Total LPG Export Capacity (MMtpa) | Commercial Operations Date | Status |
|-------------|-----------------------|----------------------|-------------------|----------------------------------|-----------------------------------|----------------------------|-----------|
| | AltaGas / Royal Vopak | RIPET | Prince Rupert, BC | 50 ¹ | 1.5 | 2Q2019 | Operating |
| | AltaGas / Petrogas | Ferndale Terminal | Ferndale, WA | 35 | 1.05 | 1Q2014 ² | Operating |
| | Total | | | 85 | 2.55 | | |

| Announced and Under Construction | Company | Project / Asset Name | Location | Total LPG Export Capacity (Mbpd) | Total LPG Export Capacity (MMtpa) | Commercial Operations Date | Status |
|----------------------------------|------------------------------|---|-------------------|----------------------------------|-----------------------------------|-------------------------------------|-----------------------|
| | Pembina Pipeline Corporation | Prince Rupert Terminal | Prince Rupert, BC | 25 | 0.75 | 1Q2021 | Under Construction |
| | Pembina Pipeline Corporation | Prince Rupert Terminal Expansion | Prince Rupert, BC | 15-25 ³ | 0.45-0.75 | Unknown | Deferred ⁴ |
| | Royal Vopak | Vopak Pacific Canada | Prince Rupert, BC | 40 ⁴ | 1.20 | Late 2023 / Early 2024 ⁵ | Announced |
| | Pacific Traverse | Kitimat LPG Export Project ⁶ | Kitimat, BC | 42 | 1.25 | Unknown | Announced |
| | Total | | | 122-132 | 3.65-3.95 | | |

Note: 1) Based on January 2020 announcement to expand export capacity to 50,000 bpd by the end of 2020.

2) Petrogas acquisition date of the export facility from Chevron USA Inc.

3) Based on Pembina's December 2020 corporate update.

4) The expansion project, announced on December 16th, 2019, would increase capacity by ~15,000 bpd with an anticipated in-service date in the first half of 2023. However, on March 18, 2020 Pembina announced a revised capital program that included the deferral of the Prince Rupert Terminal Expansion expected to cost \$175MM. As of December 2020, Pembina expects to make a final investment decision in the first half of 2021.

5) Royal Vopak's project is expected to begin construction in late 2021, following regulatory approval. A two-year construction period would result in the terminal beginning operations in late 2023 or early 2024.

6) In November 2020, the Haisla Nation approved a partnership agreement with Pacific Traverse Energy for the Cedar LNG project. It is unclear if their initially announced 1.25 million tonne per year LPG export project in Kitimat, BC is still proceeding.

North America: Marine Terminals

North America NGL marine terminals

