

Panama Canal Expansion

Shipping Domestic Crude from the US Gulf to the USWC

Crude-by-Water North America Conference
Houston, Texas

04 February 2015



Makai Marine Advisors LLC

Topics for discussion

- **Motive** -- Why move it?
- **Means** -- What would move it?
- **Opportunity** -- Will there be a chance to move it?

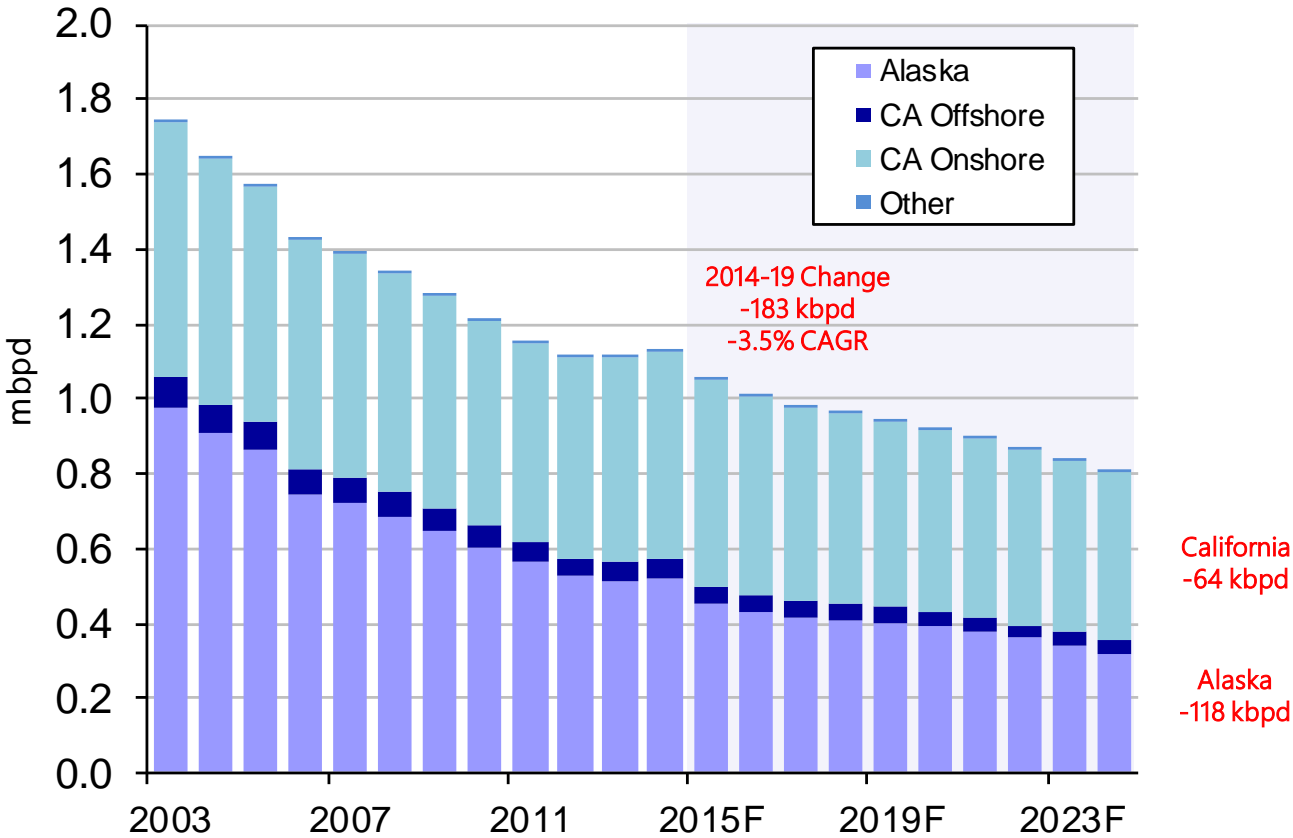


USWC Refiners & Motivation for USG Crude



After two years of stability, renewed declines in Alaskan crude production leads PADD5 output lower

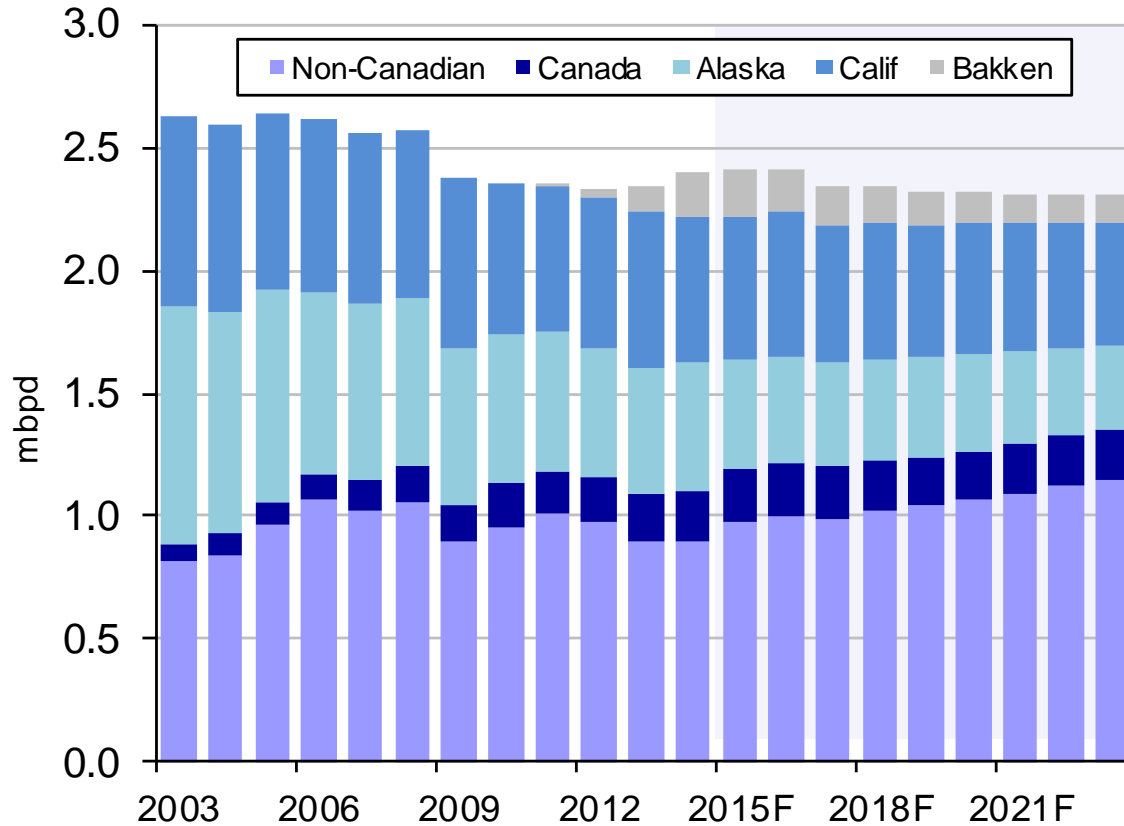
PADD5 Crude Production



Sources: EIA, Makai Marine Advisors

Stable crude runs and declining regional production would boost PADD5 crude import requirements

PADD5 Crude Runs by Source



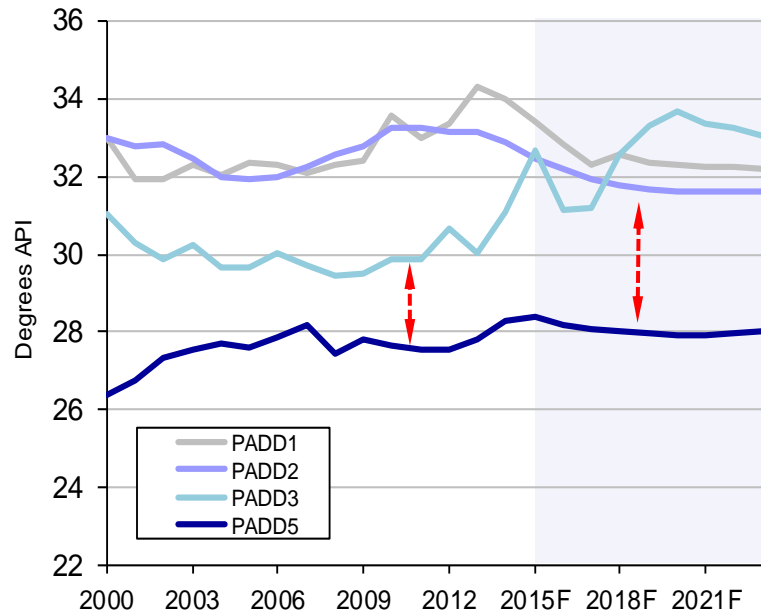
Sources: EIA, Makai

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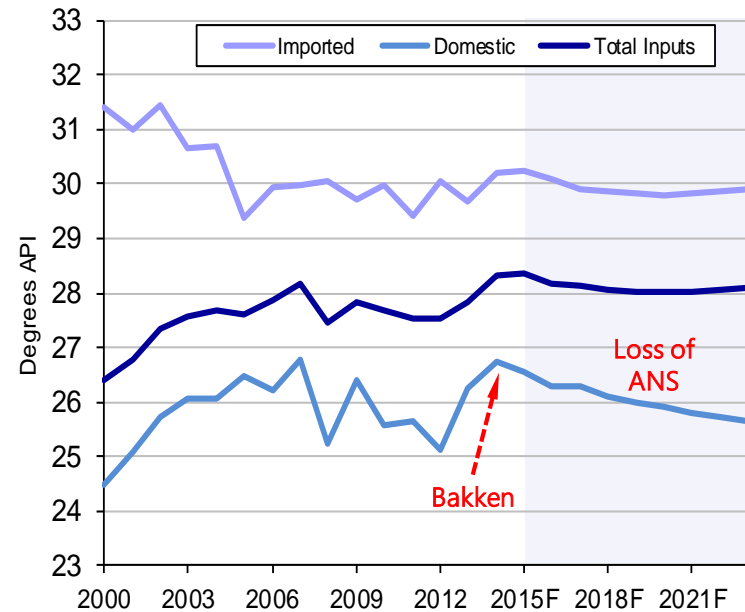
PADD5 refineries have the heaviest crude slate in the US, given the quality of Californian crude production...

US Crude Intake Gravities by PADD



Sources: EIA, Makai

PADD5 Average Gravities by Source

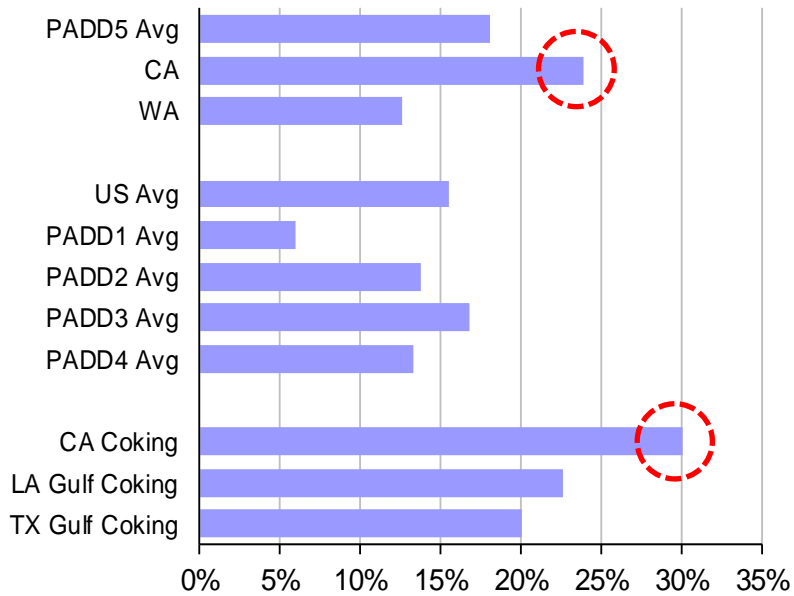


Sources: EIA, Makai



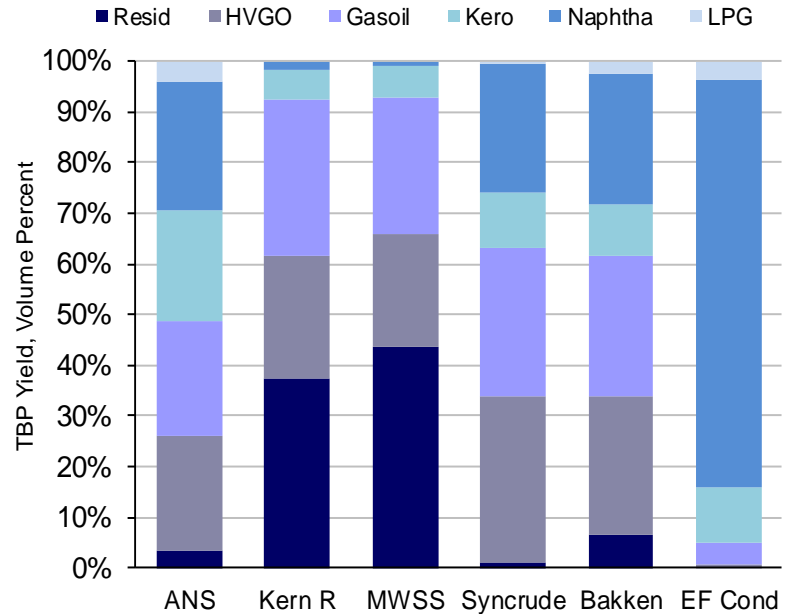
...but have the refinery configuration to deal with it, with highest concentration of cokers in US, relative to distillation capacity

Coking Capacity as Pct of Atm Distillation



Sources: EIA, Makai

Crude Assay Yields for Various Crudes

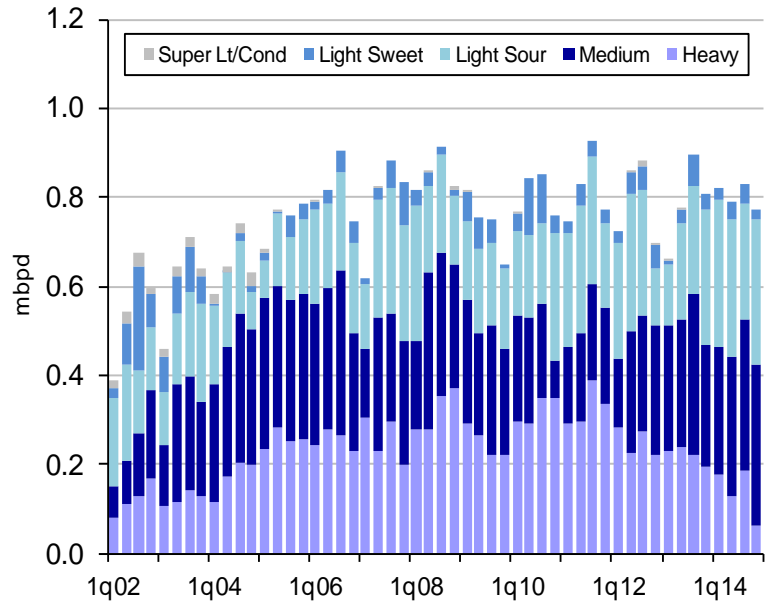


Sources: Various, Makai



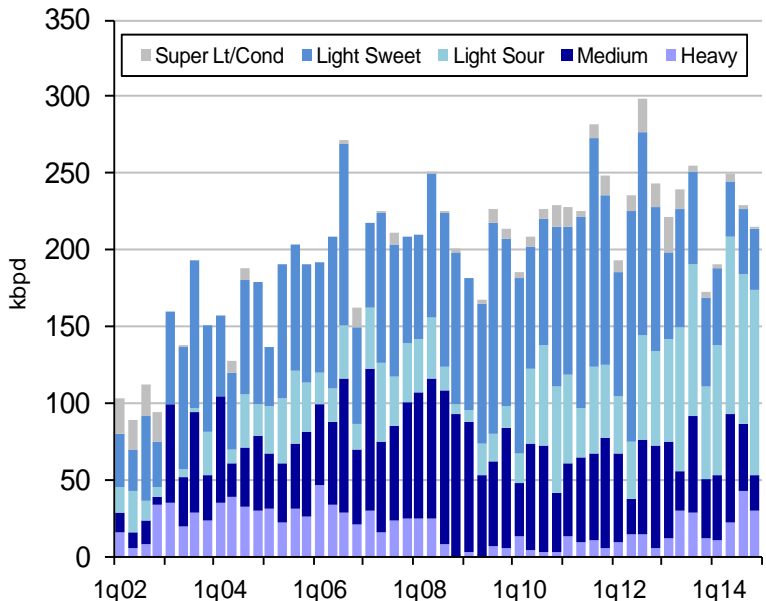
With lower coking capacity, Washington refineries feature a lighter crude import slate than California

California Crude Imports by Grade



Sources: EIA, Makai

Washington Crude Imports by Grade

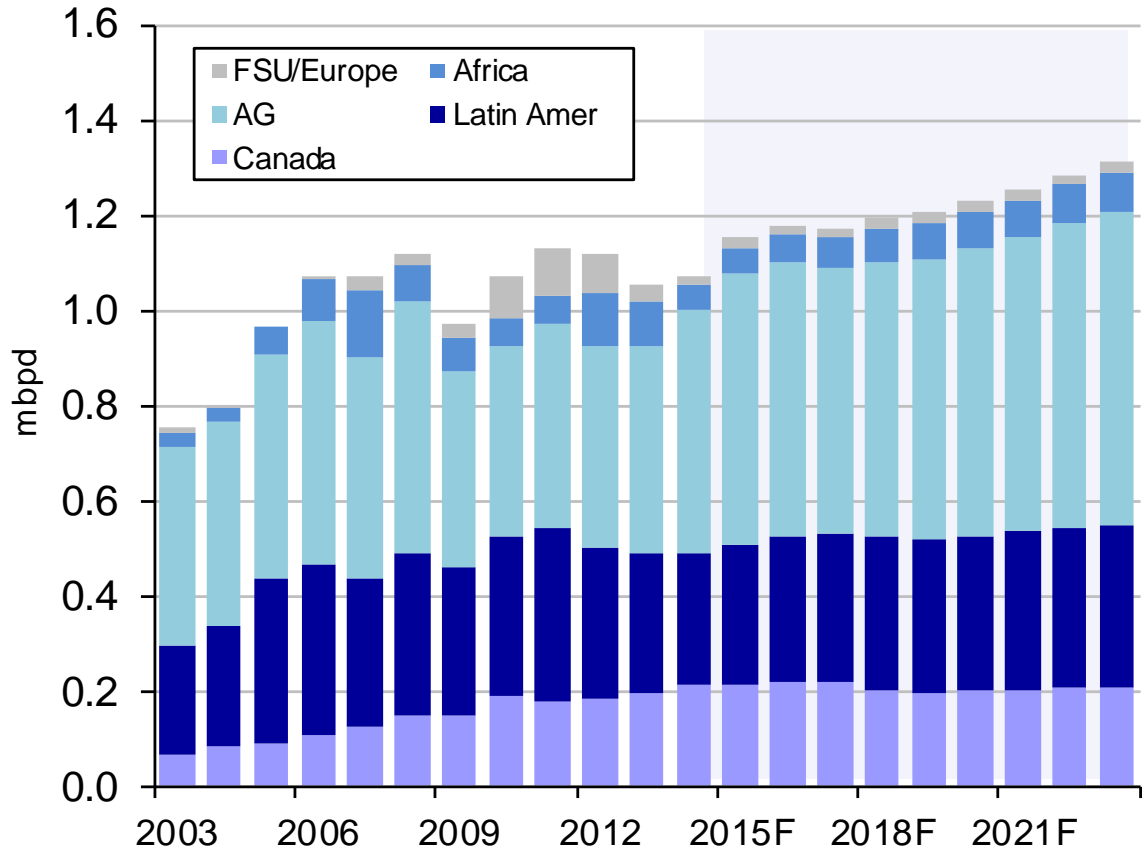


Sources: EIA, Makai



Expanded imports of AG and Latin American grades most likely replacements for declining ANS and CA heavy production

PADD5 Crude Imports by Source



Sources: EIA, Makai



Verdict: West Coast refiners seeking new crudes, but have limited interest in surplus USG light crudes and condensates

- USWC refining system faces rising import requirements from declining production of ANS and California heavy crudes
- Eagle Ford condensate not a good match for California refining system, with heavy crude configuration and negligible naphtha demand
- Washington refineries run a lighter crude slate, but Bakken-by-rail a better match for refiners and regional demand
- California refineries can replace local heavy grades with Latin American, but need medium/sour replacement for ANS besides AG grades
- Possible interest in blending lighter USG grades with heavier crudes to mimic ANS
- Condensate processing might be favourable if surplus naphtha provides triangulation trade with Asian jet/diesel imports, once CA economy recovers and product deficits return

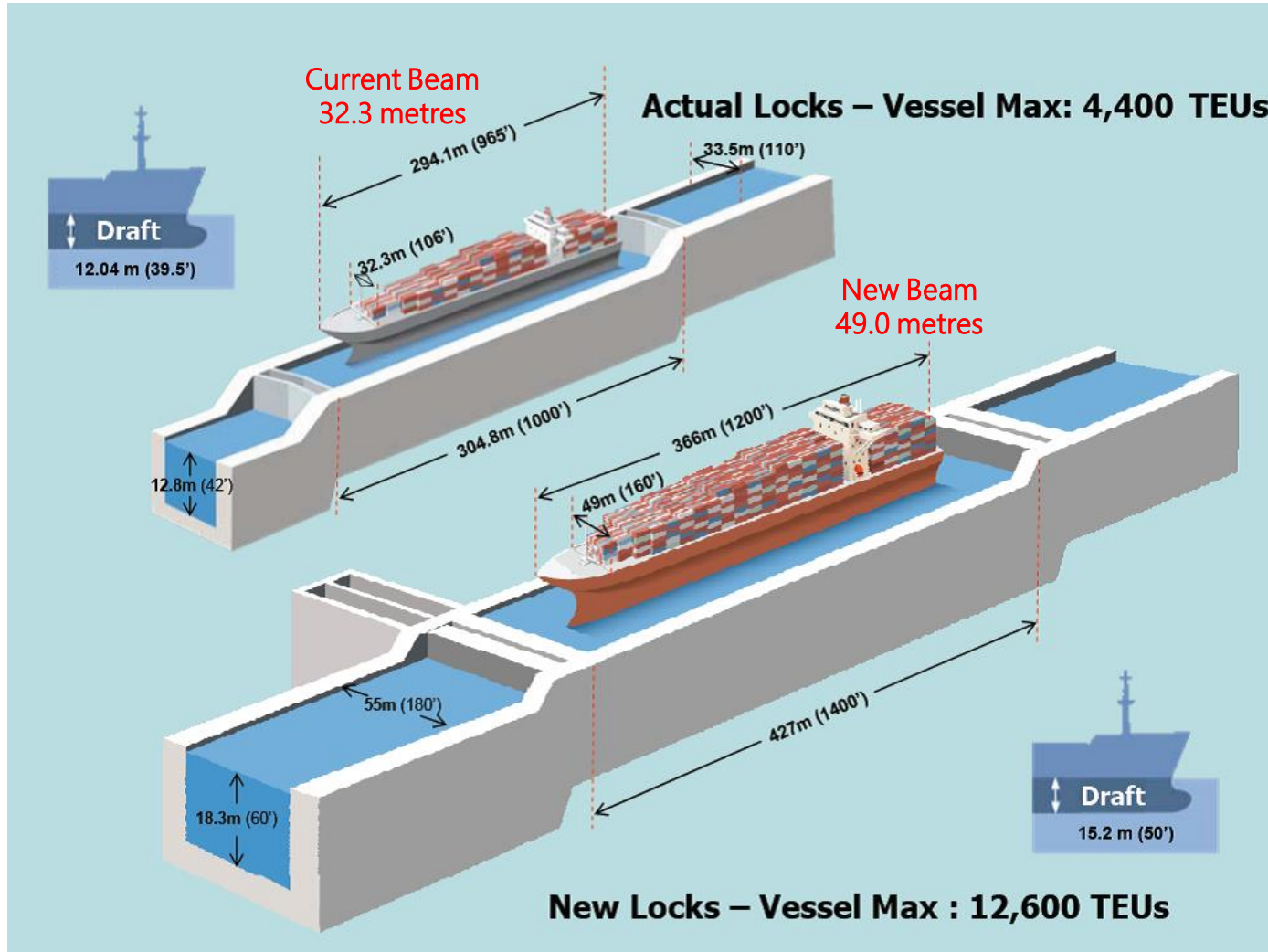


Panama Canal Expansion



New Panama Canal lock dimensions would allow all Aframaxes and *most* Suezmaxes to transit physically

12.04-metre draft has been a constraint



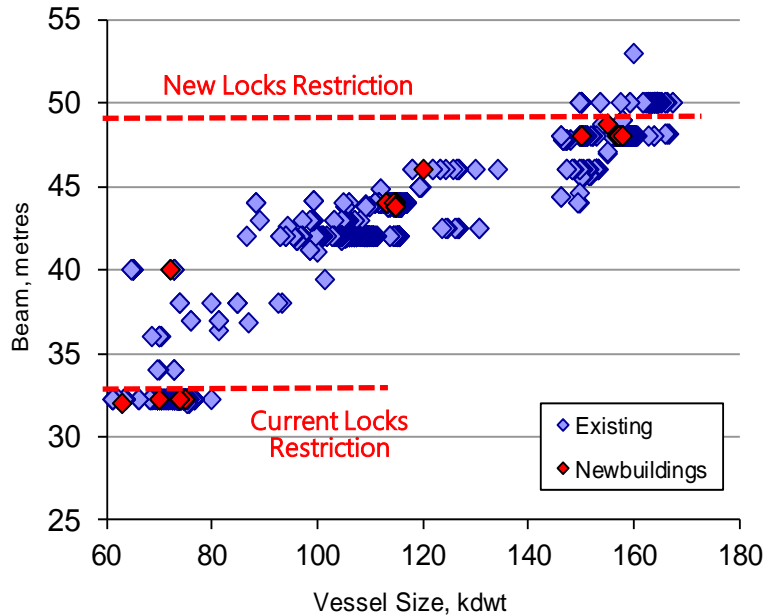
15.2-metre draft remains a constraint for larger Afras

Source: ACP



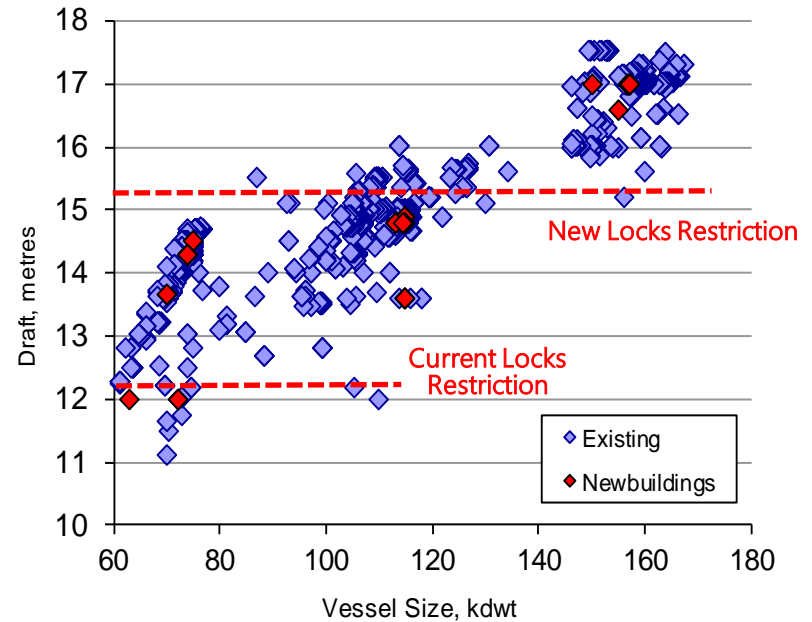
Draft restrictions for new locks would imply deadfreight for all Suezmaxes, but unlikely for normal Aframax/LR2 cargo sizes

Tanker Beam vs Deadweight



Sources: Clarksons, SeaWeb

Tanker Draft vs Deadweight

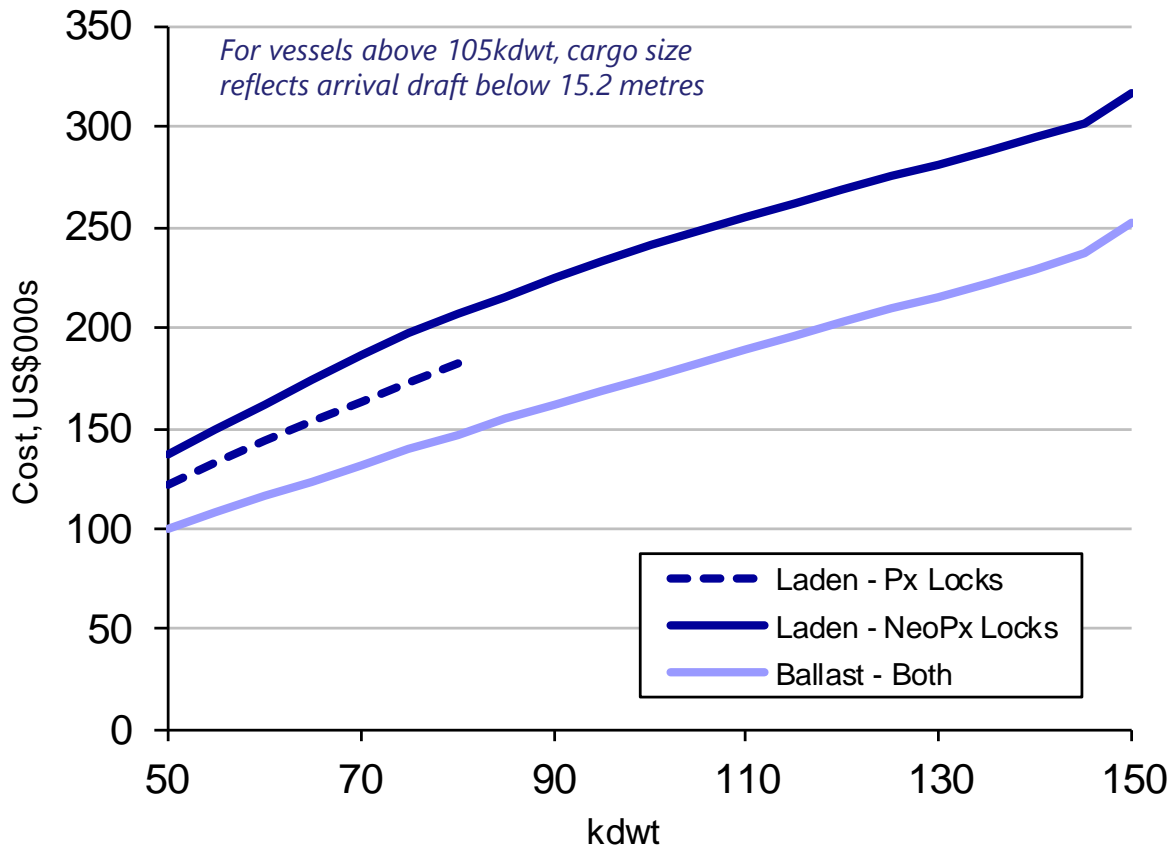


Sources: Clarksons, SeaWeb



Proposed Panama Canal tolls to charge tankers usual capacity charge, plus a cargo carried charge, for new locks

Proposed Panama Canal Tolls by Vessel Size

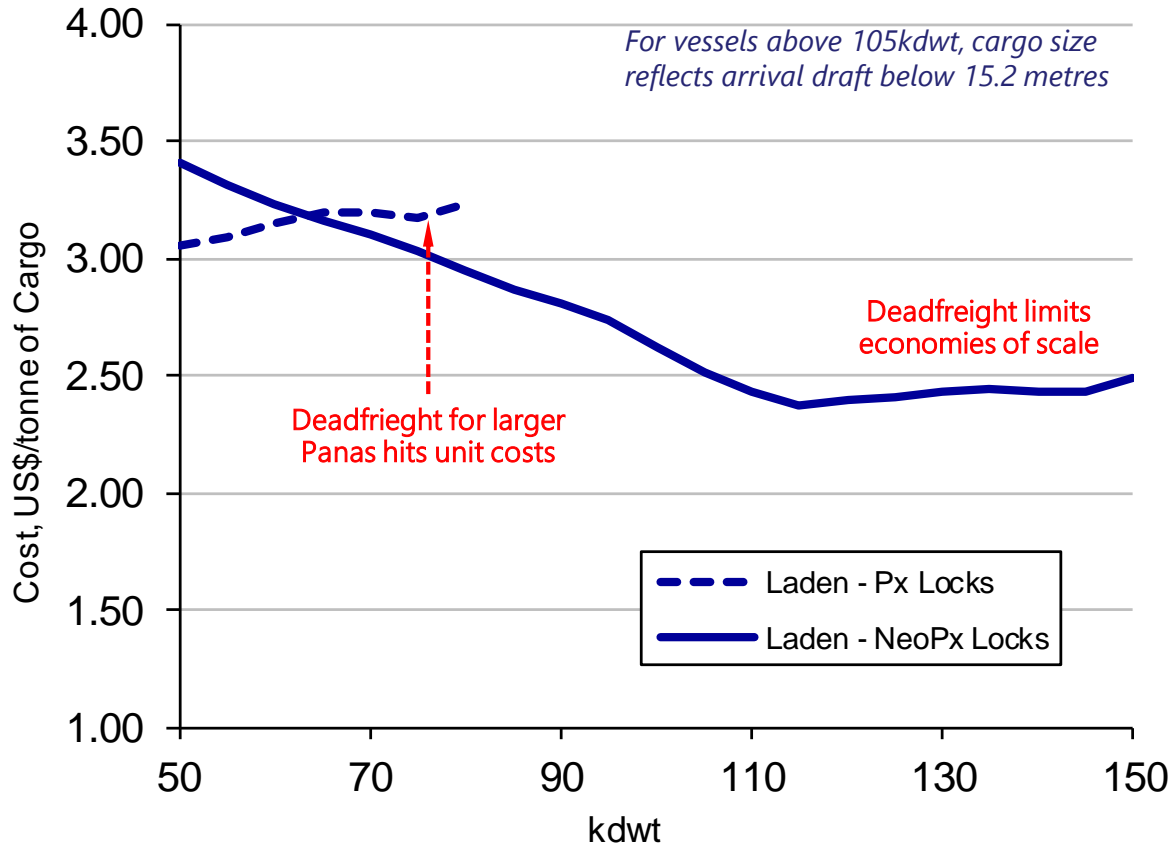


Sources: ACP, Makai

Panama Canal Universal Measurement System (PC/UMS) based roughly on total vessel volume

New Panama Canal locks offer economies of scale for vessels up to average Aframax size, then deadfreight limits gains

Proposed Panama Canal Tolls by Vessel Size, US\$/tonne



Sources: ACP, Makai



Jones Act Suspects



Nine of the large Jones Act vessels could transit the new Panama Canal locks, but seven would face significant deadfreight

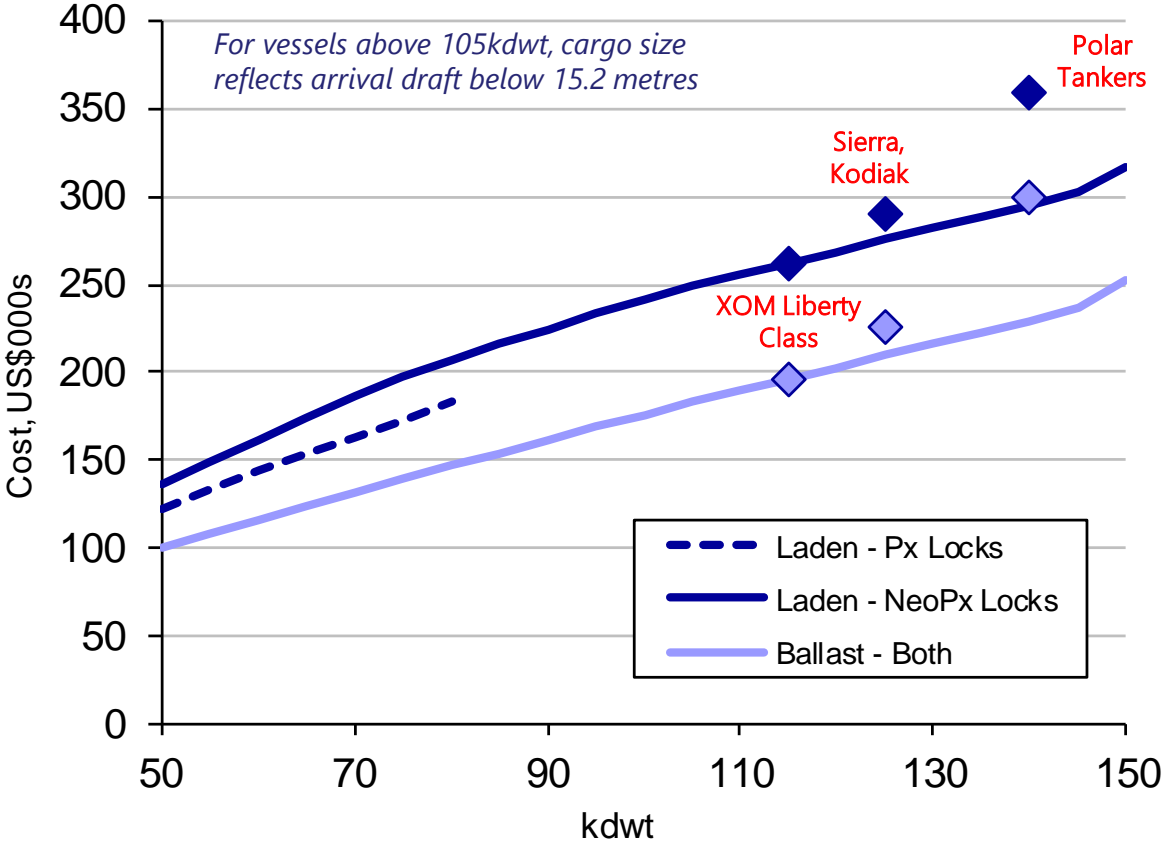
| Vessel Name | dwt | Deliv Year | Deliv Mo | Age Yrs | Shipyard | LOA m | Beam m | Draft m | Owner | Trade |
|------------------------|---------|------------|----------|---------|-------------------|--------|--------|---------|---------------------------------|--------------|
| ALASKAN EXPLORER | 193,049 | 2005 | 3 | 9.9 | NASSCO | 287.25 | 50.00 | 18.75 | Alaska Tanker (OSG/Keystone/BP) | AK/USWC |
| ALASKAN FRONTIER | 193,049 | 2004 | 8 | 10.5 | NASSCO | 287.25 | 50.00 | 18.75 | Alaska Tanker (OSG/Keystone/BP) | AK/USWC |
| ALASKAN LEGEND | 193,048 | 2006 | 8 | 8.5 | NASSCO | 287.25 | 50.00 | 18.75 | Alaska Tanker (OSG/Keystone/BP) | AK/USWC |
| ALASKAN NAVIGATOR | 193,048 | 2005 | 11 | 9.2 | NASSCO | 287.25 | 50.00 | 18.75 | Alaska Tanker (OSG/Keystone/BP) | AK/USWC |
| POLAR ADVENTURE | 141,740 | 2004 | 9 | 10.4 | Avondale | 272.70 | 46.20 | 17.52 | Polar (ConocoPhillips) | AK/USWC |
| POLAR DISCOVERY | 141,740 | 2003 | 9 | 11.4 | Avondale | 272.69 | 46.20 | 17.52 | Polar (ConocoPhillips) | AK/USWC |
| POLAR ENDEAVOUR | 141,740 | 2001 | 4 | 13.8 | Avondale | 272.69 | 46.20 | 17.52 | Polar (ConocoPhillips) | AK/USWC |
| POLAR ENTERPRISE | 141,740 | 2006 | 1 | 9.0 | Avondale | 272.70 | 46.20 | 17.52 | Polar (ConocoPhillips) | AK/USWC |
| POLAR RESOLUTION | 141,740 | 2002 | 5 | 12.7 | Avondale | 272.69 | 46.15 | 17.52 | Polar (ConocoPhillips) | AK/USWC |
| EAGLE FORD (ex-KODIAK) | 124,644 | 1978 | 5 | 36.7 | Sun Shipbuilding | 264.88 | 41.46 | 16.77 | Seacor/Access (ex-XOM) | USG |
| SIERRA | 125,133 | 1979 | 1 | 36.0 | Sun Shipbuilding | 264.88 | 41.46 | 16.76 | Keystone (ex-XOM) | AK/USWC →USG |
| LIBERTY BAY | 115,000 | 2014 | 6 | 0.6 | Aker Philadelphia | 251.10 | 43.80 | 15.00 | ExxonMobil | AK/USWC |
| EAGLE BAY | 115,000 | 2015 | 1 | 0.0 | Aker Philadelphia | 251.10 | 43.80 | 15.00 | ExxonMobil | AK/USWC |

Sources: SeaWeb, Alaska Tanker, ConocoPhillips



Higher vessel volume for larger Jones Act vessels would boost canal costs versus typical fleet dimensions

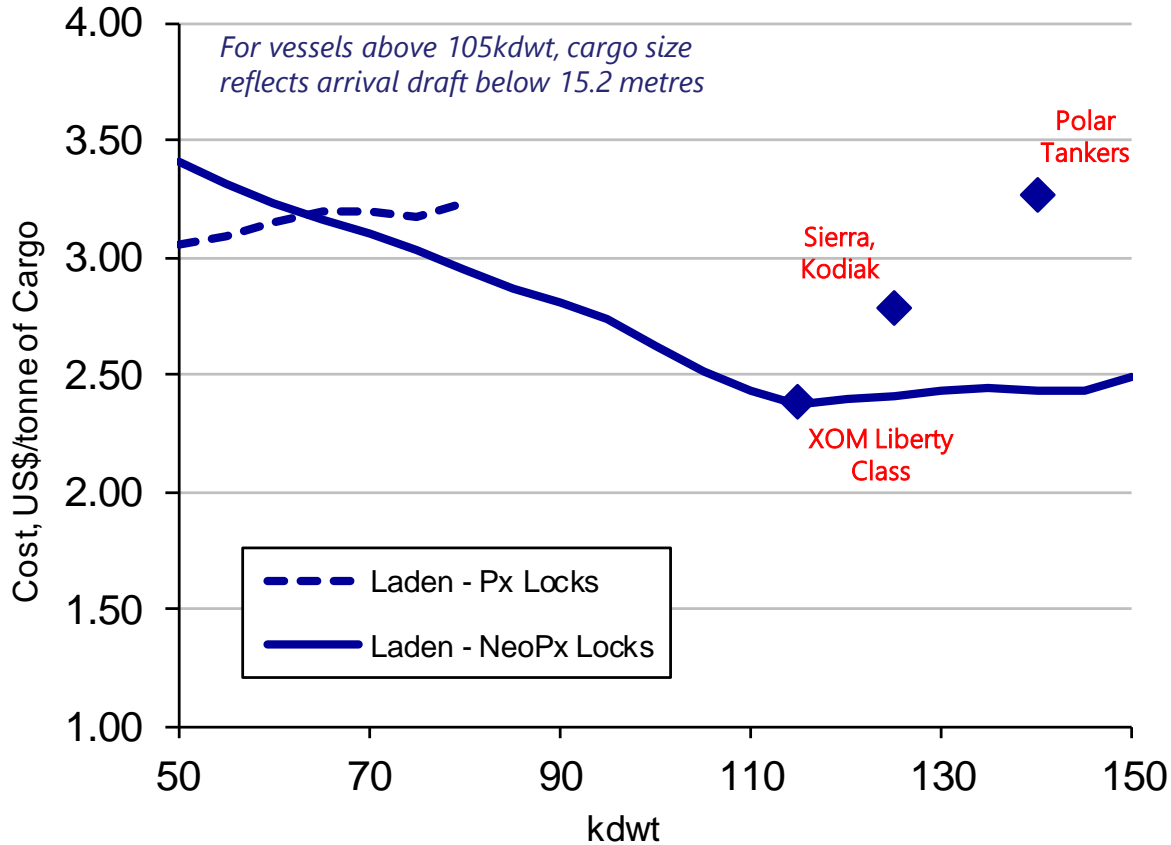
Proposed Panama Canal Tolls by Vessel Size



Sources: ACP, Makai

Combined with higher canal capacity charges, deadfreight producing substantial unit costs for Jones Act vessels

Proposed Panama Canal Tolls by Vessel Size, US\$/tonne



Sources: ACP, Makai

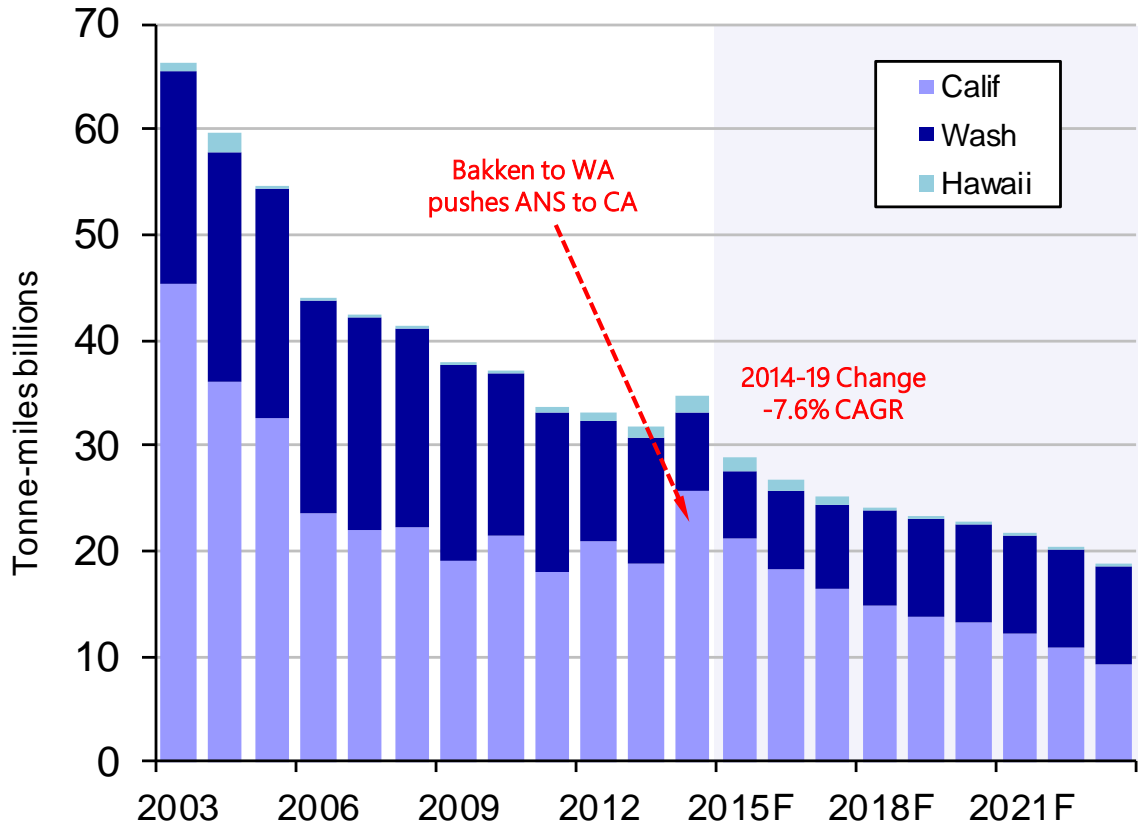


Opportunity: Potential for USG crude movement to USWC



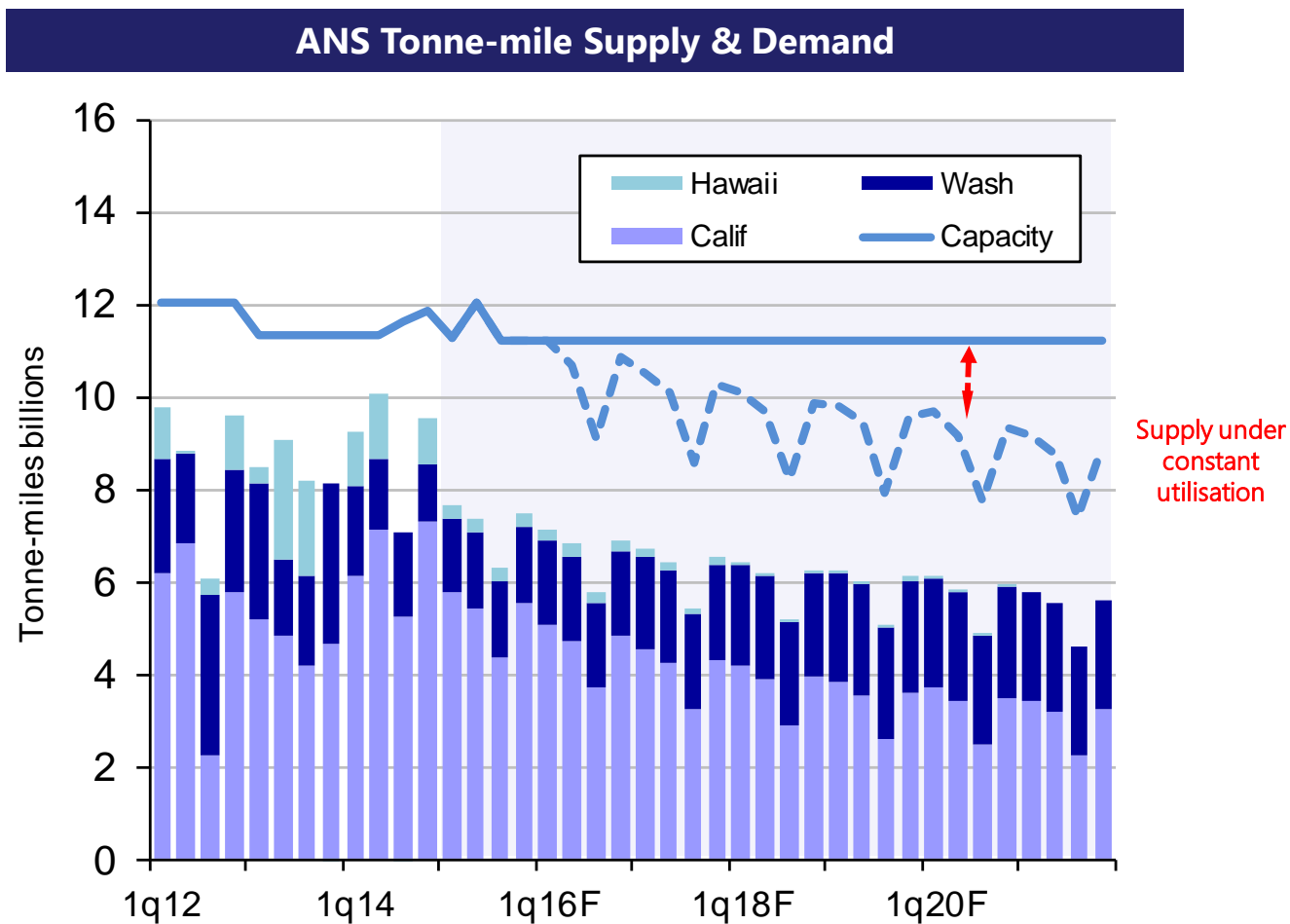
Declining ANS production and distribution to USWC refineries to provide 33% drop in tonne-mile demand for Alaska fleet by 2019

ANS Tonne-mile Demand, by Destination



Sources: EIA, CA Energy Commission, Company Reports, Makai

Sliding ANS tonne-mile demand would allow release of 300 kdwt from the Alaska fleet by 2021, under constant utilisation

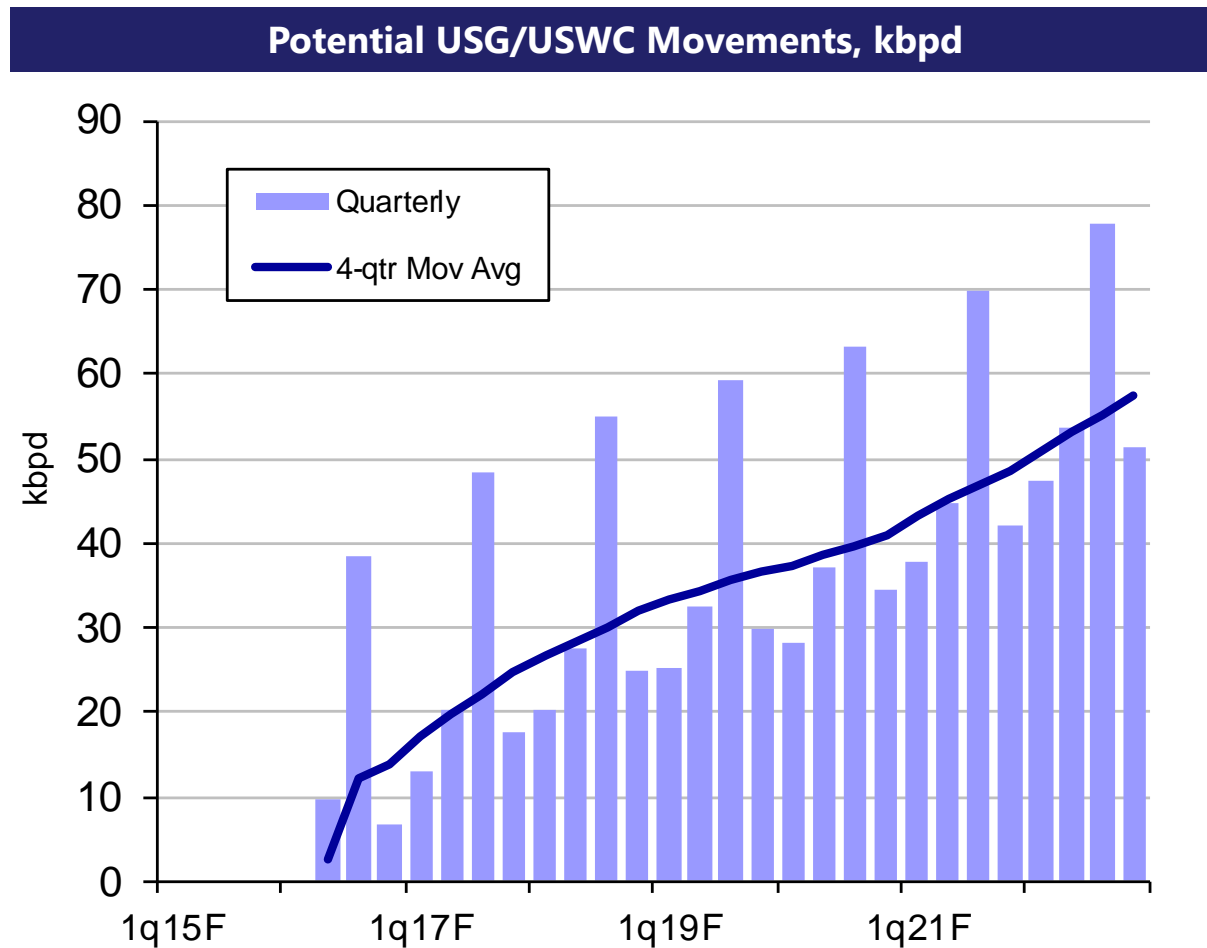


Sources: EIA, CA Energy Commission, Company Reports, Makai

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Surplus tonnage on Alaska/USWC trade could potentially move 40-50 kbpd of USG crude to West Coast refiners



Sources: Makai

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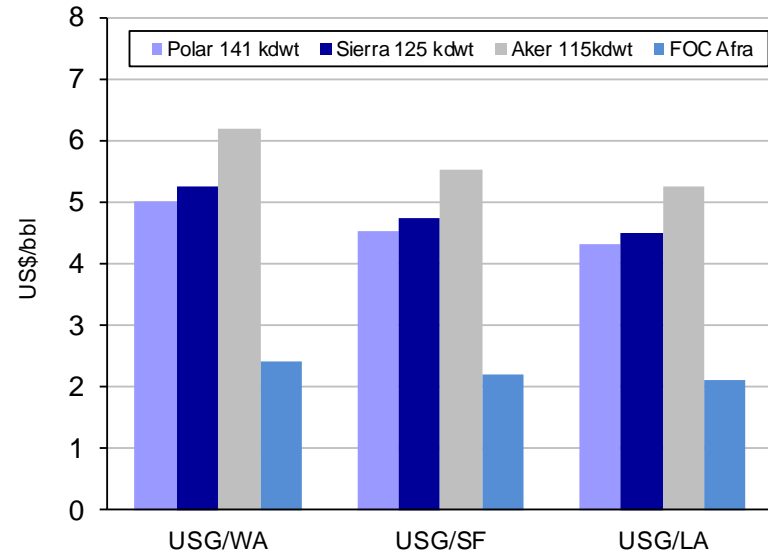
Jones Act tonnage could deliver USG crude and condensate to USWC refiners for \$5/bbl

Valuation & Cost Assumptions

| | Polar | Sierra | XOM Aker |
|------------------------------------|---------------|---------------|---------------|
| Age, years | 11.5 | 30.5 | 0.5 |
| FOC Vessel Value, US\$ millions | 38.0 | N/A | 57.0 |
| Vessel Value, \$US millions | 133.0 | 33.3 | 200.0 |
| Scrap Age, years | 35 | 40 | 35 |
| ROIC | 9.00% | 9.00% | 9.00% |
| Current Opex, US\$/day | 32,200 | 40,300 | 28,500 |
| Breakeven TCE, US\$/day | 76,000 | 72,000 | 90,800 |

Source: Makai

Indicative Freight Costs, US\$/bbl

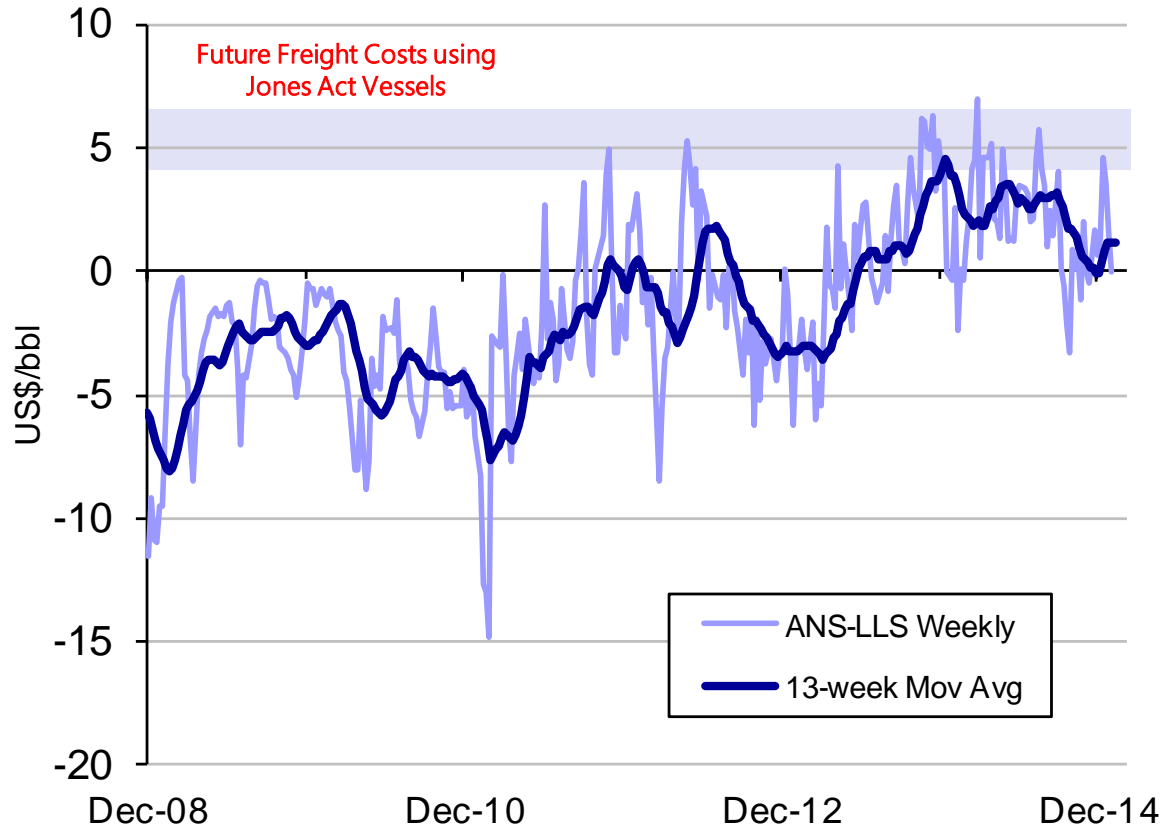


Source: Makai



Jones Act freight costs for USG/USWC crude trade would exceed typical spreads between ANS and USG light marker grades

ANS Premium/(Discount) to LLS St. James, Weekly

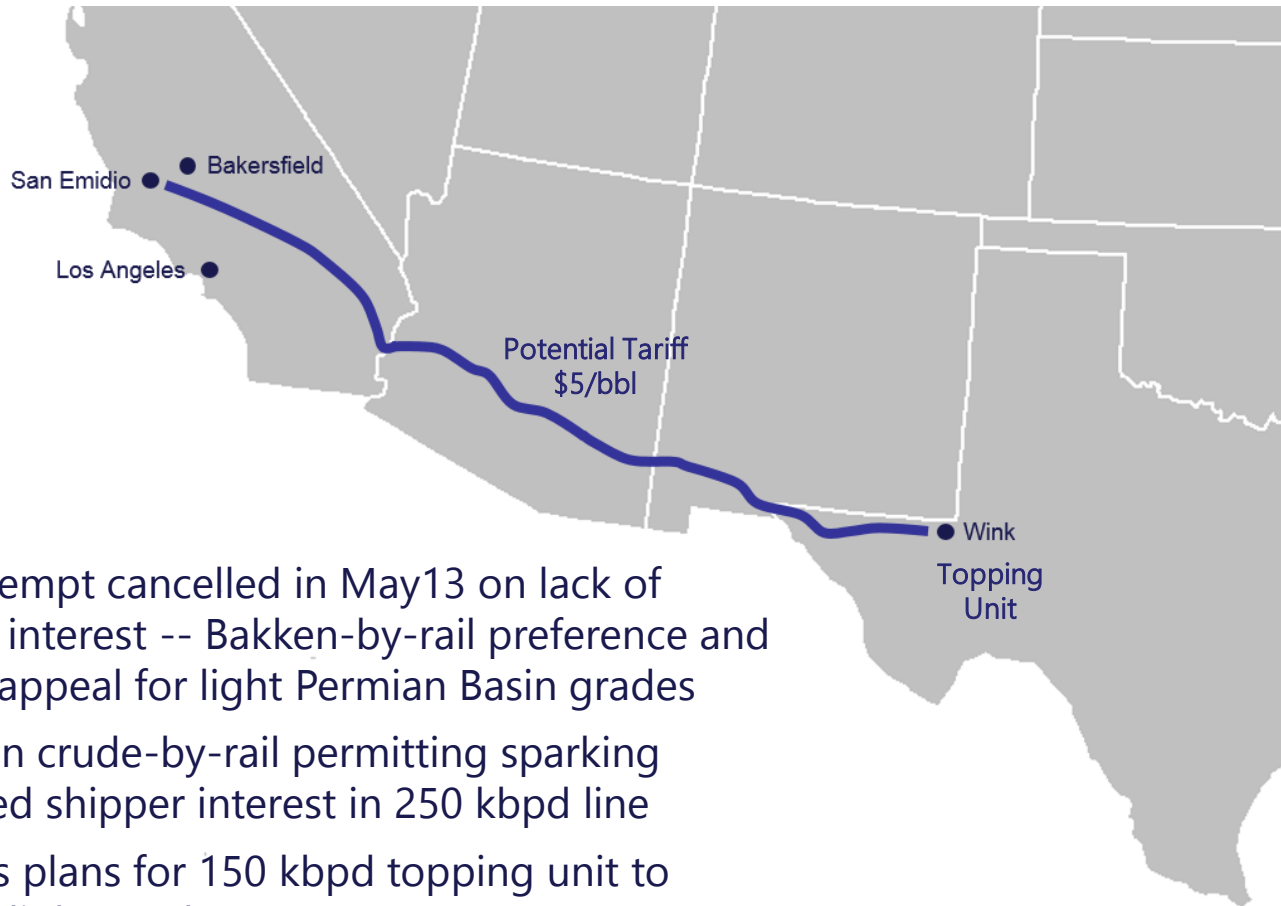


Sources: Bloomberg, Platts, Argus, Makai

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Kinder Morgan resurrecting Freedom Pipeline, with new focus on delivering ANS-like crude mix preferred by USWC refiners



- First attempt cancelled in May13 on lack of shipper interest -- Bakken-by-rail preference and limited appeal for light Permian Basin grades
- Delays in crude-by-rail permitting sparking increased shipper interest in 250 kbpd line
- Includes plans for 150 kbpd topping unit to remove lights ends
- 200 kbpd blended crude mimicking ANS
- 100 kbpd condensate for export

Source: Kinder Makai



Conclusions

- USWC refiners need replacements for declining ANS and California heavy crude
- USG light crude and condensates not their first choice
- Panama Canal expansion will allow Suezmaxes to transit with deadfreight, but Aframax becomes optimal size for new locks
- Nine of larger Jones Act vessels could transit the new Panama Canal locks, but most would face significant deadfreight
 - ExxonMobil's new Aframaxes would be optimal, but unclear if any surplus capacity
 - High vessel volumes relative to typical dimensions, boosts Panama Canal costs for larger Jones Act candidates
- Demand for Alaska/USWC fleet would drop 33% by 2019, potentially releasing 300 kdwt, that could move 40-50 kbpd from USG to USWC
- Jones Act cost structure and higher Panama Canal costs would make it difficult for USG/USWC movements to overcome ANS/LLS differentials



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