

The Transition to Low Sulfur Bunker Fuel

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2020 Bunker Fuel Requirements

- ❖ Upcoming shift to low sulfur bunker fuel in 2020 will present challenges for ship owners and refiners.
 - New regulations initiated by the International Maritime Organization (IMO)
 - IMO has been given jurisdiction by the UN over shipping safety and environmental issues in international waters
 - In January of 2020, bunker sulfur levels will decline from 3.5% to only 0.5% - Annex VI
 - Will effect shipping in all international waters

The Path to Low Sulfur Bunkers

❖ Consultant study

- To determine the availability of low sulfur bunker fuel in 2020
- IMO had authority to defer implementation to 2025
- Study was presented to IMO in October 2016 and 2020 date was confirmed

❖ The IMO provided two paths to compliance

- Vessel scrubbers
- Refining production of low sulfur bunker fuel

Where Are We Now

- ❖ Two year, eight months, 19 days away from transition date
- ❖ Refining – little progress
 - Implementation date stalled refining efforts
 - Currently too late for new projects to be completed by 1/1/20
- ❖ Vessels – little progress
 - Very few vessel scrubber additions
 - Surveys indicate higher rate intended for 2019
 - Up to two years to plan, design, construct, and install
 - Limited number of fabrication shops
 - Scrubber penetration expected to be low, ~15-20%
- ❖ Limited use of LNG

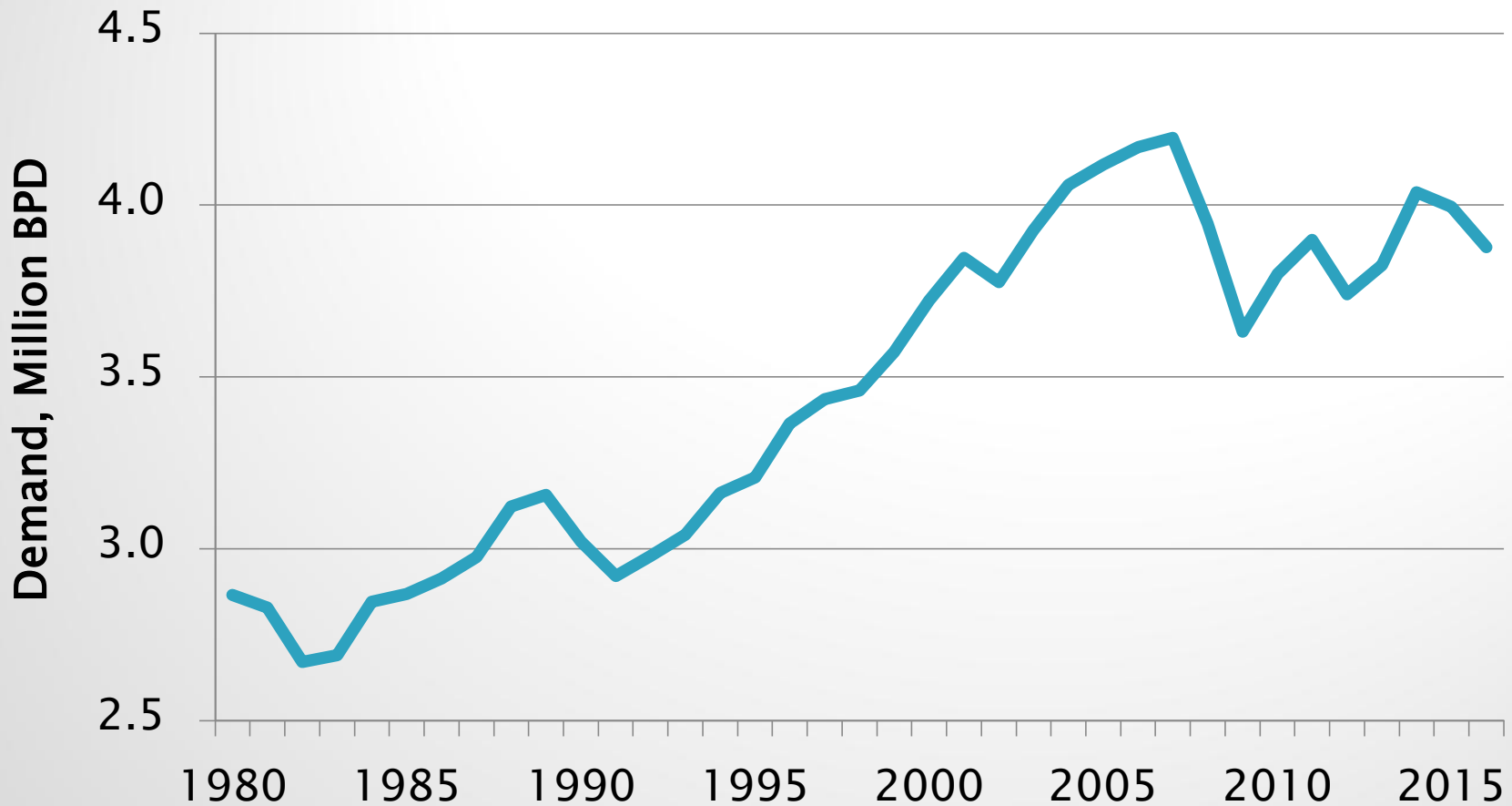
Balancing the Bunker Market

- ❖ Low sulfur bunker fuel can be produced from three sources
 - Low sulfur resids
 - Gas Oils
 - Distillates
- ❖ Most low sulfur crudes are not segregated when processed
- ❖ Degree of crude segregation in 2020 is uncertain
- ❖ IEA estimates two million BPD of distillates to be diverted into bunker pool in 2020

Global Distillate Shortfall

- ❖ TM&C estimates global distillate demand at ~37 million BPD in 2020
- ❖ Global distillate demand increases at 500 MBPD per year
- ❖ Two million BPD spike is equivalent to four years of global demand growth
- ❖ Global refineries cannot react to product this volume
- ❖ Inventories will decline and prices will rise

U.S. Distillate Demand Growth



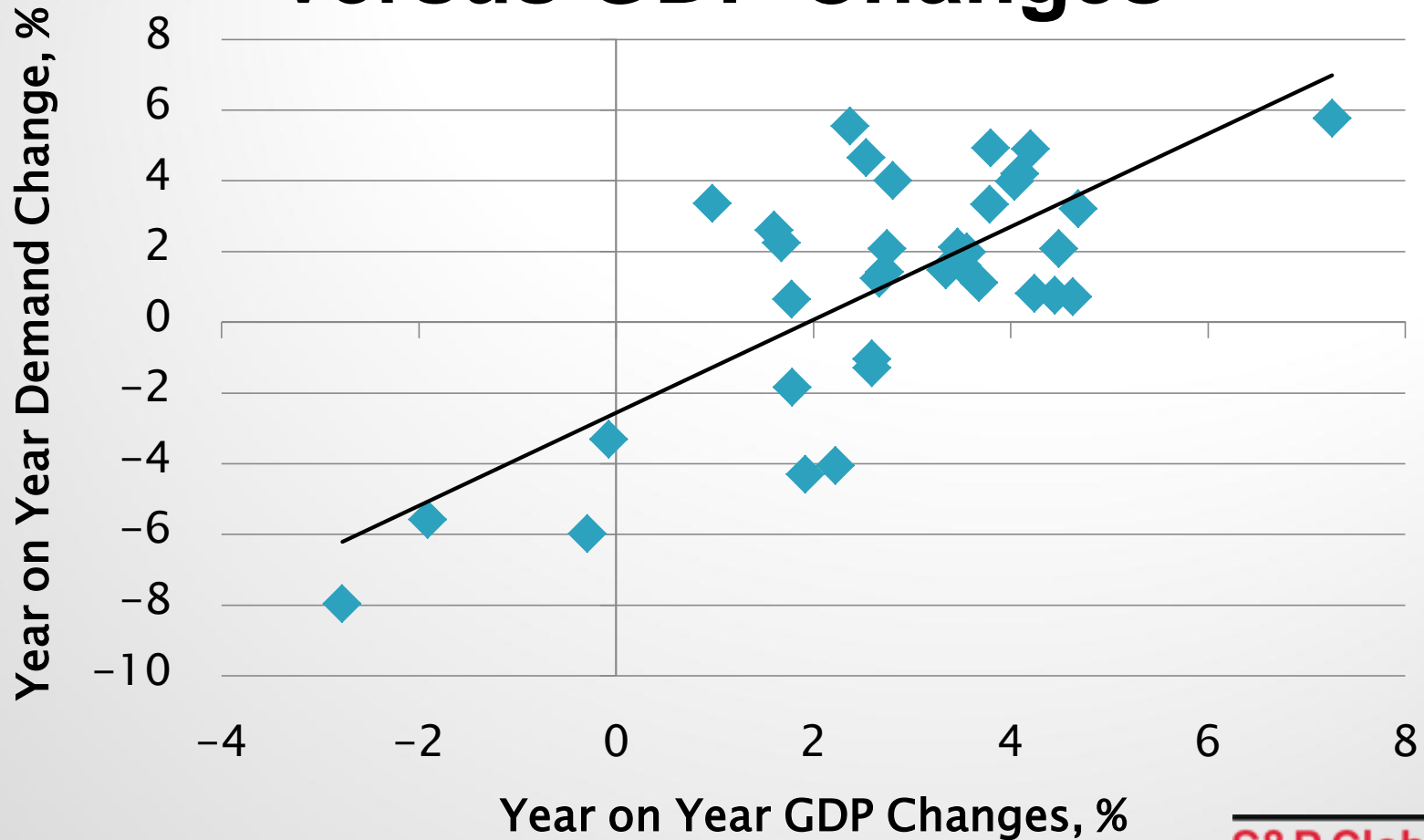
Source: EIA

S&P Global
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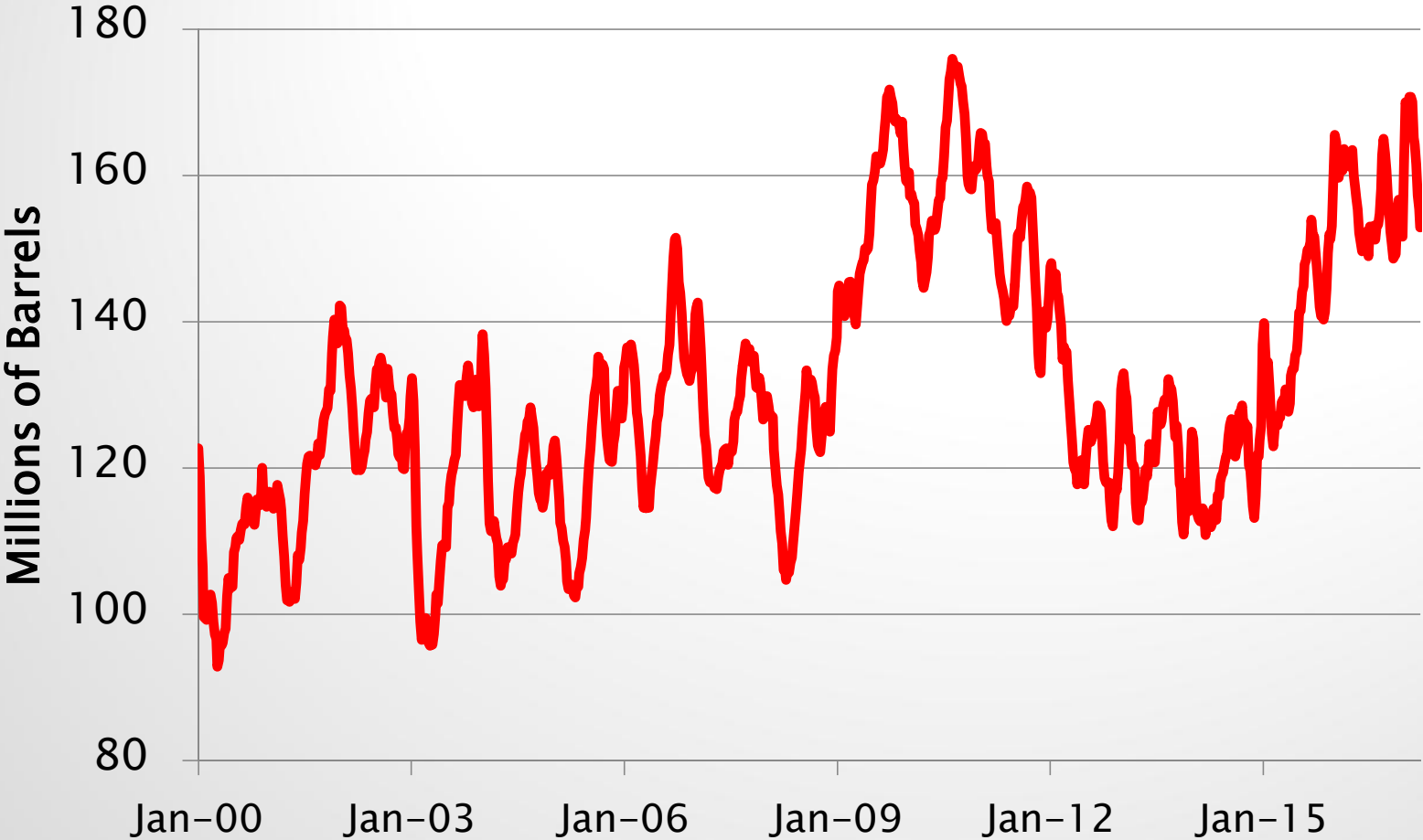
U.S. Distillate Demand versus Price Changes



U.S. Distillate Demand versus GDP Changes



U.S. Distillate Inventories



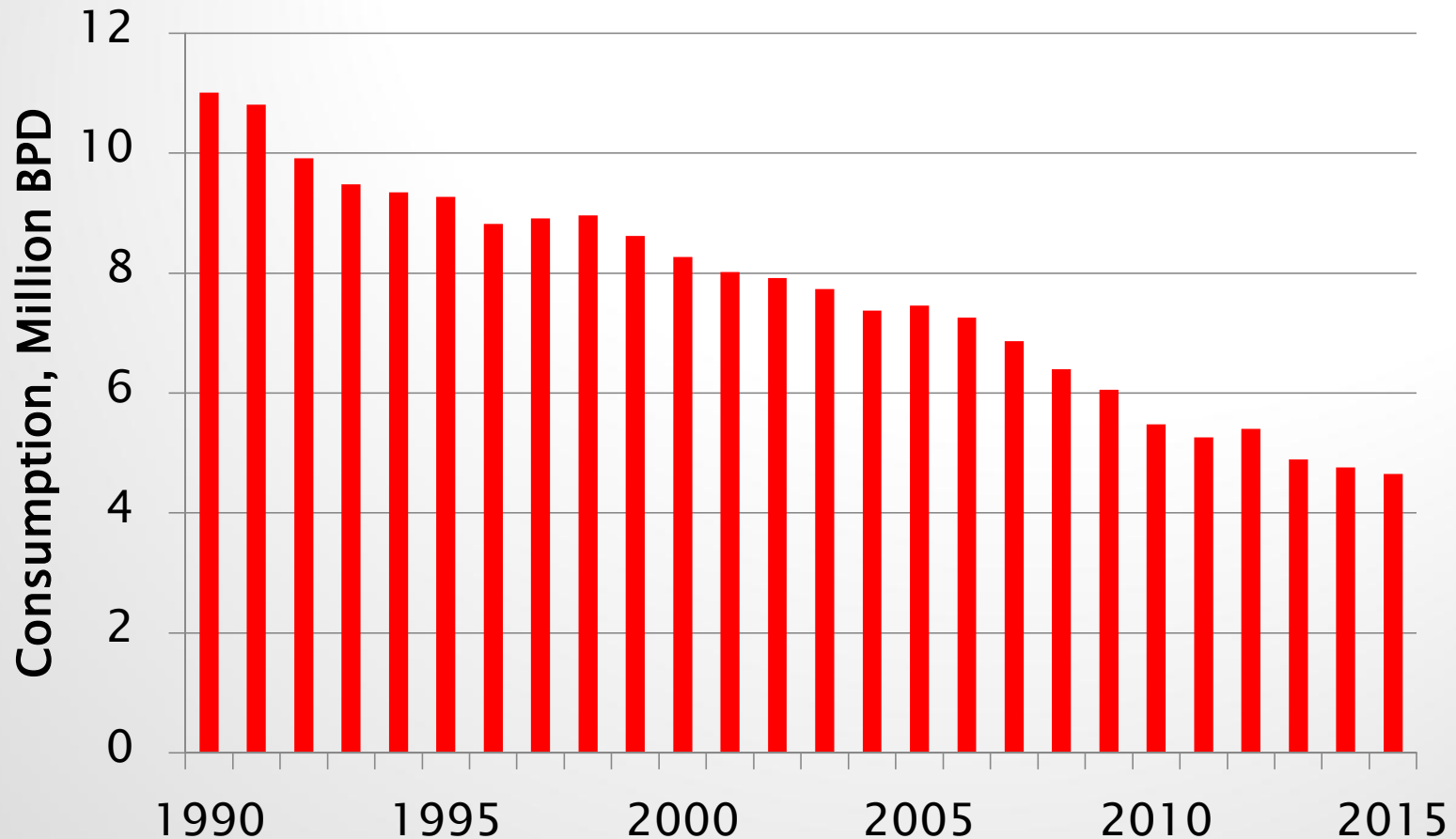
Source: EIA

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Residual Fuel Surplus

- ❖ Diversion of 2 million BPD of distillates will back out 1.8 million BPD of high sulfur fuel oil
- ❖ EIA estimates global residual oil market at ~7.8 million BPD of which 3.2 million BPD is in bunker pool
- ❖ Non-bunker fuel oil market is only 4.6 million BPD and is declining

Global Non-Bunker Resid Demand



Source: EIA

S&P Global
Platts

Global Coking Unit Construction

- ❖ Coking units process residual fuel and produce substantive volumes of distillates
- ❖ TM&C has been monitoring global refining projects for over 10 years
- ❖ 23 coking projects likely between 2017 and 2019 with capacity increase of 764 MBPD
- ❖ Global product demand to increase by 3.0 million BPD between 2017 and 2020
- ❖ Planned coke capacity increases at lowest level this decade

Low Sulfur Bunker Production

- ❖ Fuel oil refineries likely to attempt to increase processing of lighter and sweeter crudes
- ❖ No global surplus of light, sweet crude at current prices
- ❖ Increased demand will increase light crude prices
- ❖ Higher light crude prices may negate benefits of distillate price increase
- ❖ Light/heavy differential will widen

Crude Blending Option

- ❖ Increase of non-bunker fuel oil market by 1.8 million BPD is not realistic
- ❖ Price of high sulfur fuel oil must decline to induce new demand sources
- ❖ What will be the likely floor price?
- ❖ Potential option in synthetic crude blending:
The blending of high sulfur fuel oil with lighter crude grades to produce a blended heavy crude grade

Synthetic Maya Blends

<u>Component</u>	<u>Gravity</u> <u>°API</u>	<u>Sulfur</u> <u>wt. %</u>
Resid	7.6	3.3
LLS	36.2	0.3
Mars	28.9	2.1
Maya	20.5	3.3
40% Resid/60% Mars	20.5	2.8
55% Resid/45% LLS	20.5	2.3

Heavy Crude Sales

- ❖ Synthetic heavy grades likely to be sold to coking refineries
- ❖ 1.8 million BPD of fuel oil would yield ~3.5-4.5 million BPD of heavy crude
- ❖ TM&C estimates global heavy crude production ~15 million BPD in 2020
- ❖ Crude blending converts surplus fuel oil into surplus heavy crude
- ❖ Significant volumes may be blended internally

Crude Blending Challenges

- ❖ Substantial lead time necessary
 - Contract for tankage
 - Optimize blends
 - Market new grades
- ❖ Crude compatibility issues
- ❖ Developing customer base
- ❖ Blending will depress heavy crude prices

Memorandum of Understanding between EPA and Coast Guard

“On June 27, 2011 the EPA and USCG entered into a Memorandum of Understanding (MOU) to enforce Annex VI MARPOL. The Annex VI MOU provides that EPA and USCG will jointly and cooperatively enforce the provisions of Annex VI. . .”

“The efforts to ensure compliance with Annex VI and APPS include oversight of marine fueling facilities, on board compliance inspections, and record reviews.”

Refining Winners and Losers

- ❖ Coking refineries – no exposure to fuel oil prices and will benefit from distillate price spike and depressed heavy crude prices
- ❖ Asphalt refineries – same as coking but with risk of new entries into market
- ❖ Low sulfur fuel oil refineries - can make low sulfur bunkers if crudes can be segregated
- ❖ High sulfur fuel oil refineries – need to develop new markets and quickly

Refineries with Greatest Risk

- ❖ Largest concentration of coking refineries are in U.S., India and China
- ❖ Refineries owned by national oil companies will be protected
- ❖ Free-market based fuel oil refineries have greatest margin risk
- ❖ Largest concentration of these refineries are in Europe

Conclusions

- ❖ LS bunker fuel implementation is now firmly set at January of 2020
- ❖ Transition will create surplus fuel oil and a shortfall of distillate
- ❖ Distillate prices will rise and high sulfur fuel oil prices will decline
- ❖ LS bunker fuel to be largely distillate and prices tied to distillate prices
- ❖ Coking/asphalt refineries will benefit while fuel oil refineries at greatest risk

Conclusions

- ❖ New environment will create opportunities
- ❖ Blending of low sulfur bunker fuel
- ❖ Crude blending may absorb significant volume of surplus high sulfur resid
- ❖ Opportunities require advance planning – the early bird gets the worm
- ❖ Improved coking margins in 2020 will stimulate spate of new construction projects with completion around 2025

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