

North American Natural Gas

Challenges and Opportunities

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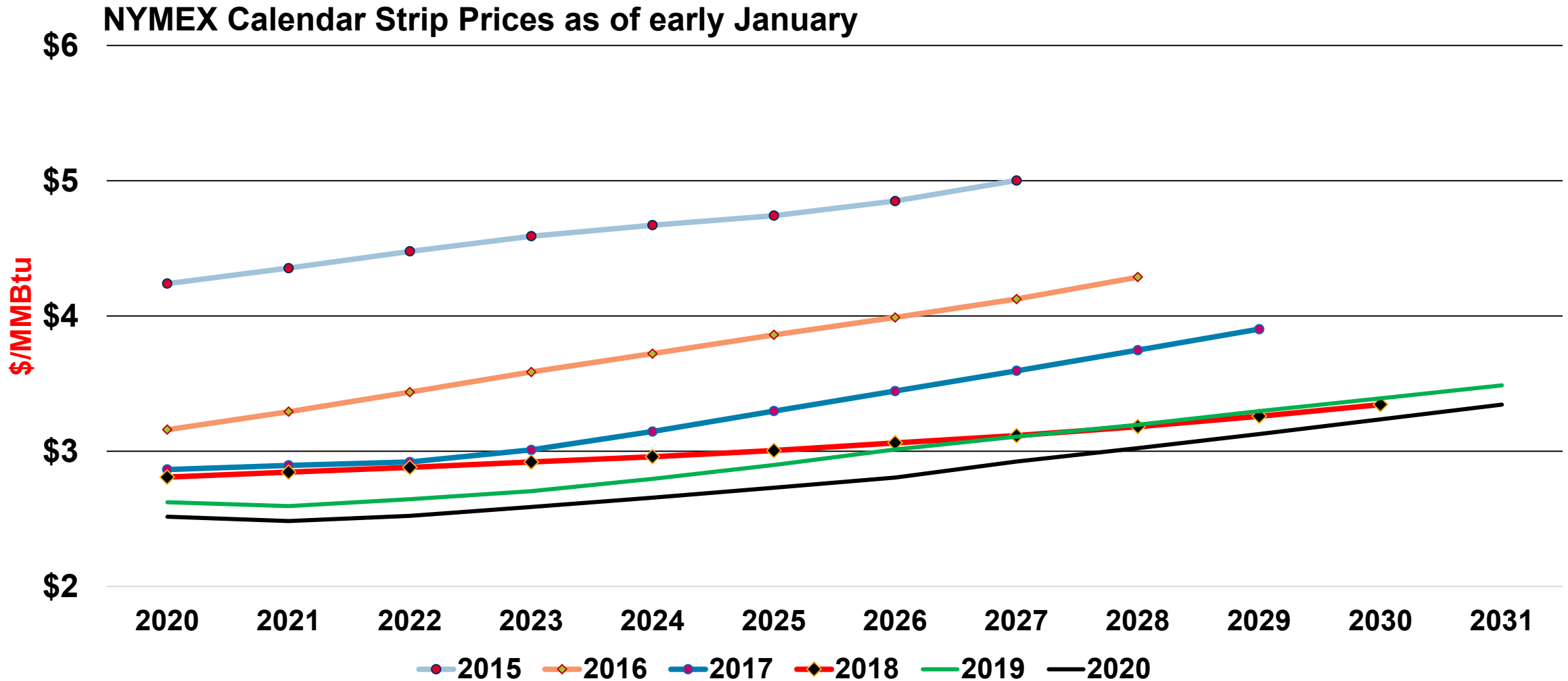
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S&P Global
Platts

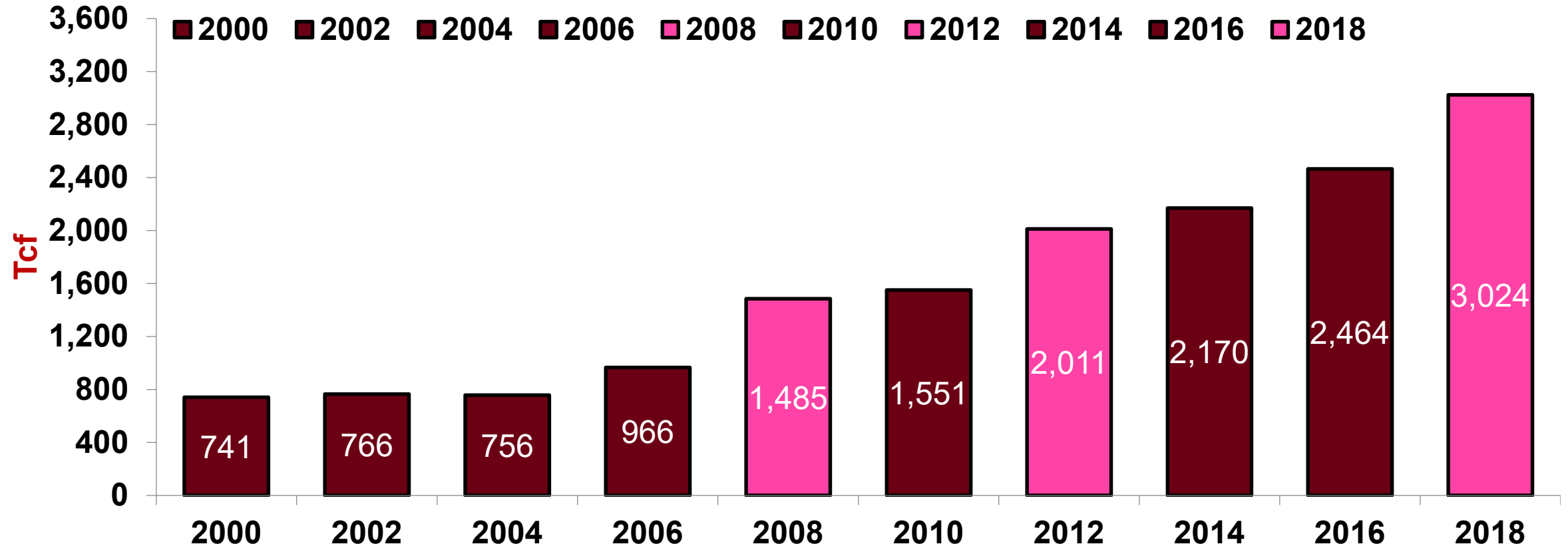
Key issues in play beyond short-term developments that will determine Henry Hub and regional price formation:

- **Composition of US supply; availability of wet gas, and related need of higher cost dry gas**
 - Supply curve is not flat, but domestic and international demand growth may not be enough
- **US demand growth**
 - Domestic demand opportunities limited to power and industrial sectors
 - Already at a point of saturation in both of the major markets — for now
 - Exports already assuming greater importance
 - Mexico is not China, while upside for LNG to face greater global competition
- **Political risk on the rise — even in North America**
 - Perceptions of fossil fuels already changing; at federal and state/provincial — and public — levels
 - Policy changes; rejected pipeline projects, new customer moratoriums, and/or outright gas appliance bans
 - Resistance to gas-fired electric generation, energy-intensive manufacturing facilities, and LNG export terminals

Perceptions of abundant low-cost US gas supply partly behind extended NYMEX futures downtrend — from ~\$5 to ~\$3/MMBtu



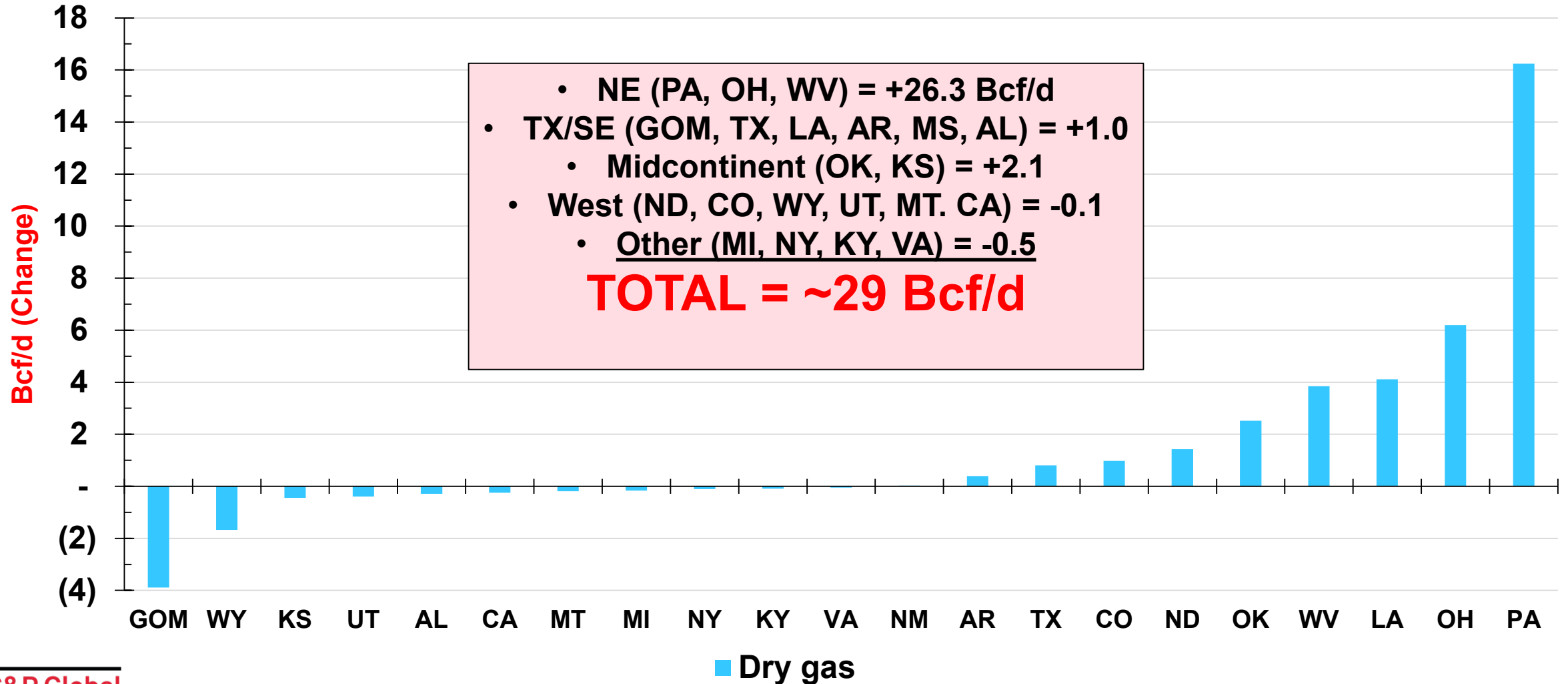
Still rising TRR* estimates underscore lower 48 gas production upside potential



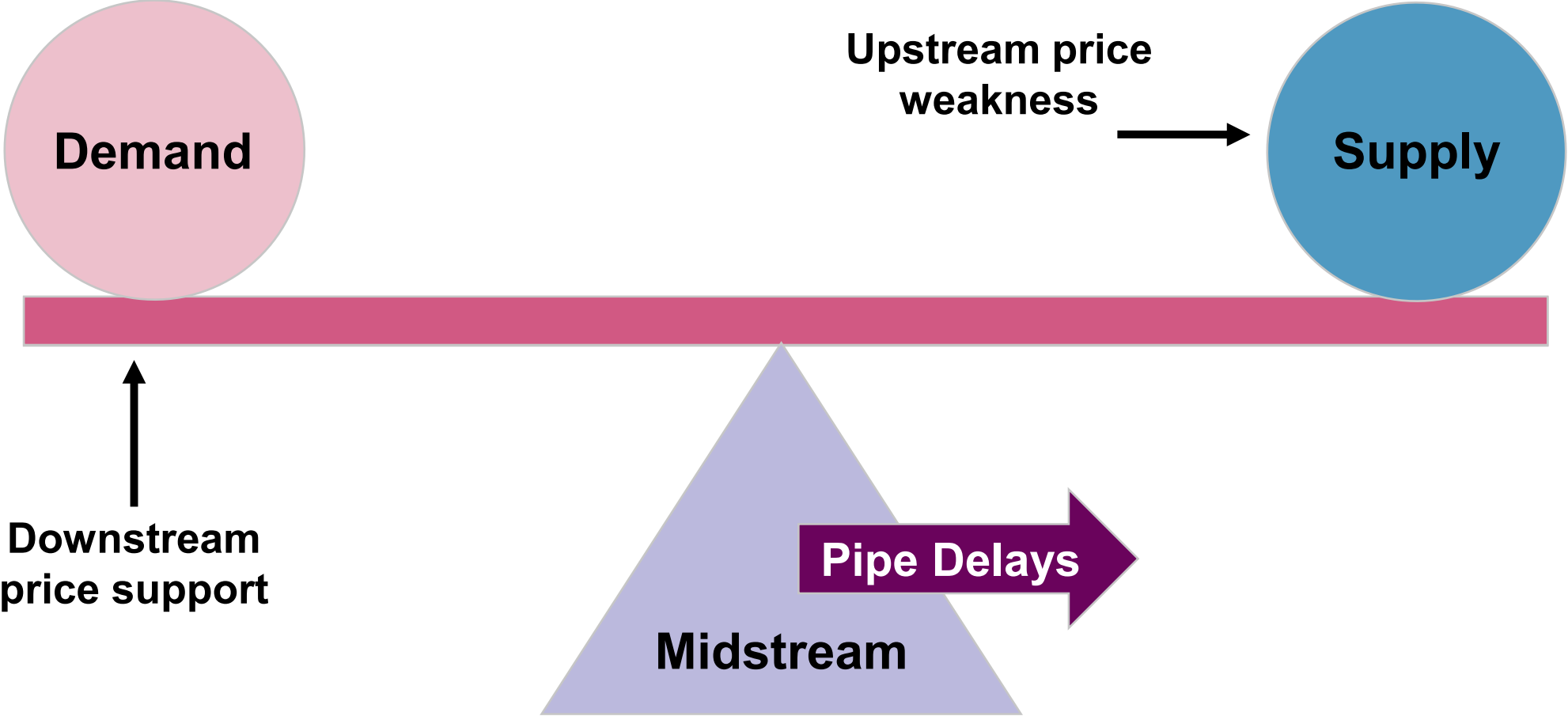
** TRR (technically recoverable resources), excluding lower 48 proven reserves, which reached 432 Tcf at year-end 2017.

Lower 48 dry gas production growth even more regionally concentrated

Lower 48 Dry Gas Production Growth: 2018 vs 2008



Midstream constraints shift traditional balancing point toward supply; limiting downstream impact and fallout on Henry Hub



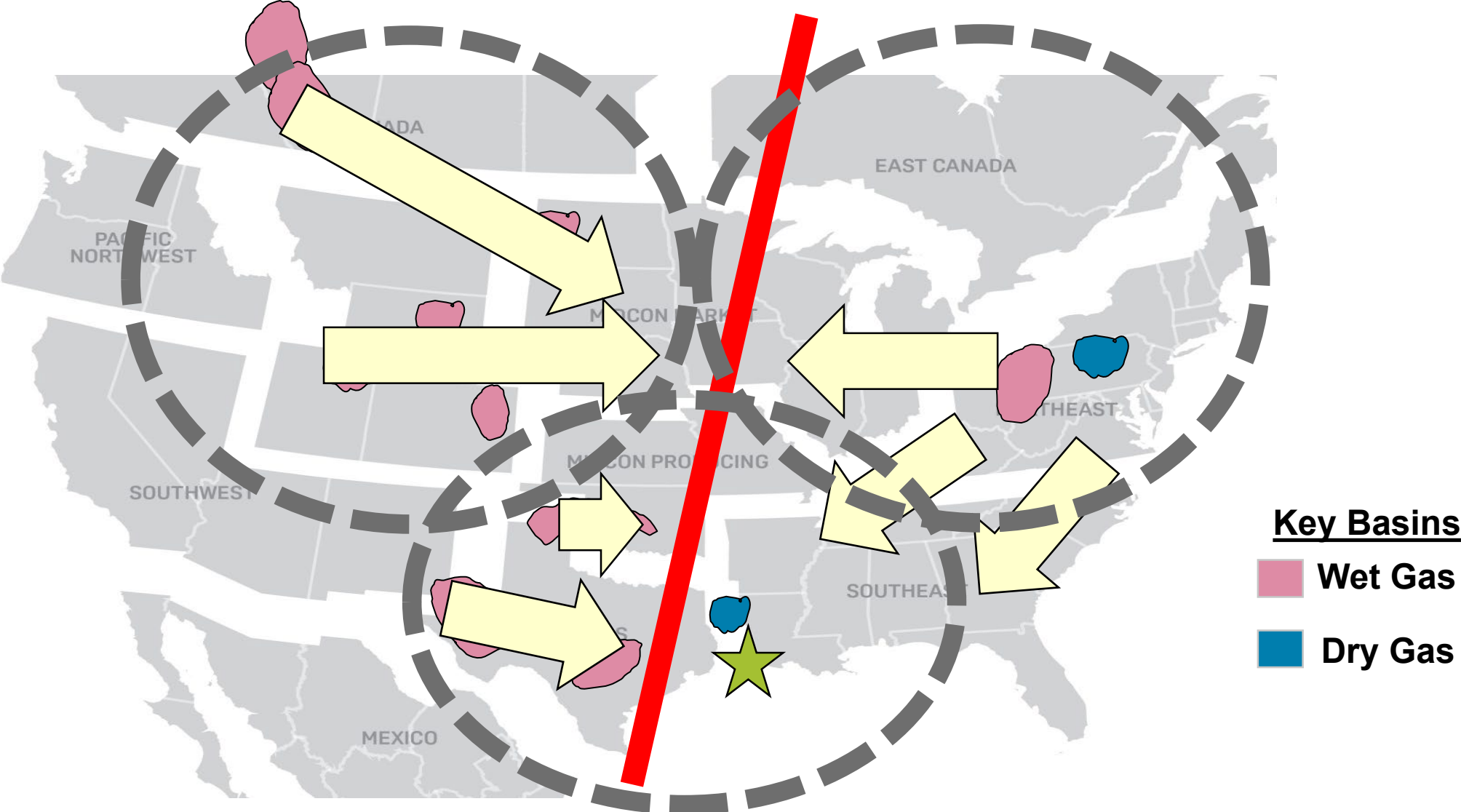
US supply ready and able to satisfy domestic and international demand growth — but more pipe will be needed

Bcf/d	Region/Play	2018 vs. 2008 (Actual)	2030 vs. 2018 (Forecast)
	Marcellus/Utica	+26.6	+13.4
	Permian Basin	+4.7	+8.1
	Haynesville	+5.1	+6.7
	Eagle Ford	+3.7	+1.3
	SCOOP/STACK	+2.2	+0.4
	Niobrara	+1.2	+1.3
	Bakken	+1.4	+0.5
	Sub-total	44.9	31.7
	Other	-16.6	-3.0
	US Total	+28.3	+28.7
	WCSB	-0.1	+4.4

NYMEX 12-month strip rivaling depths probed during first quarter of 2016, with forwards suggesting little in way of recovery

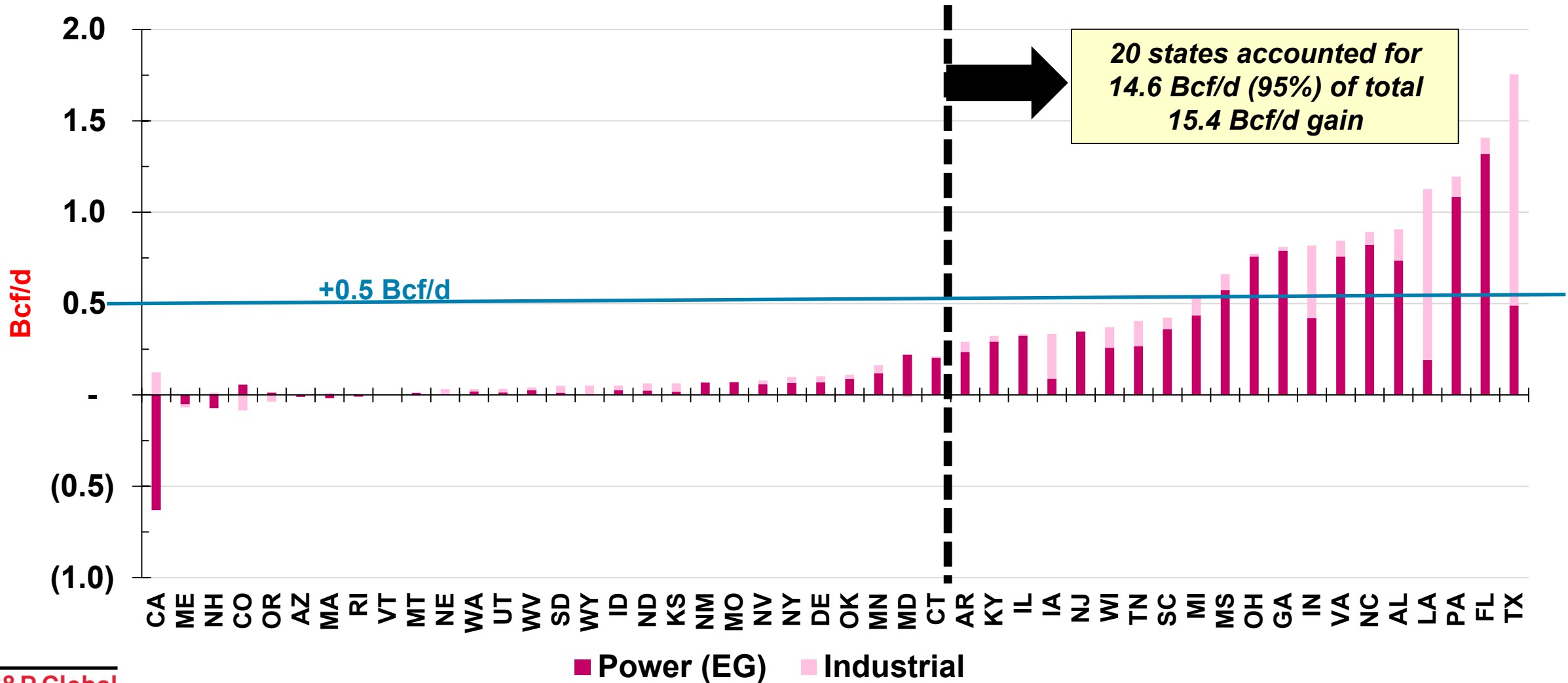


Needed pipeline capacity to support US supply gains face growing threats — raising risk of more gas-on-gas competition

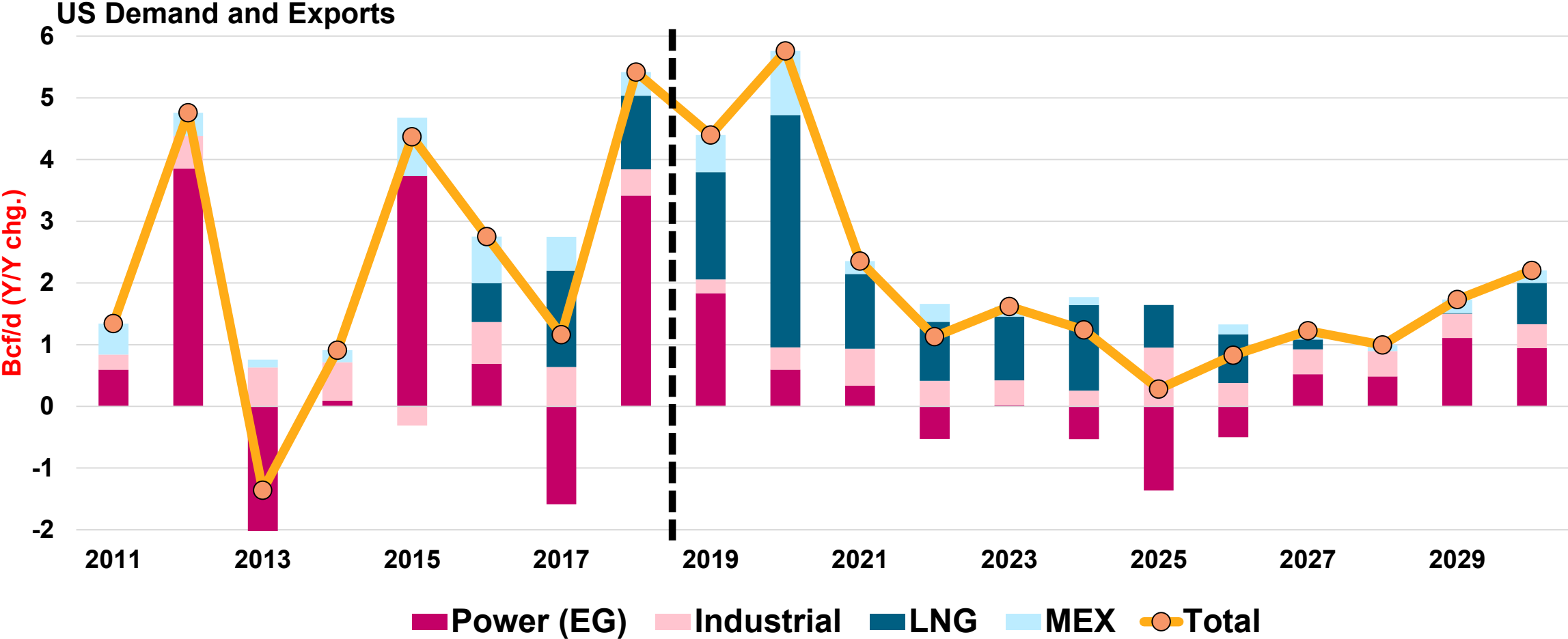


US Demand gains from power and industrial sectors in shale era far from diffuse – less than a dozen grew by 0.5 Bcf/d, or more

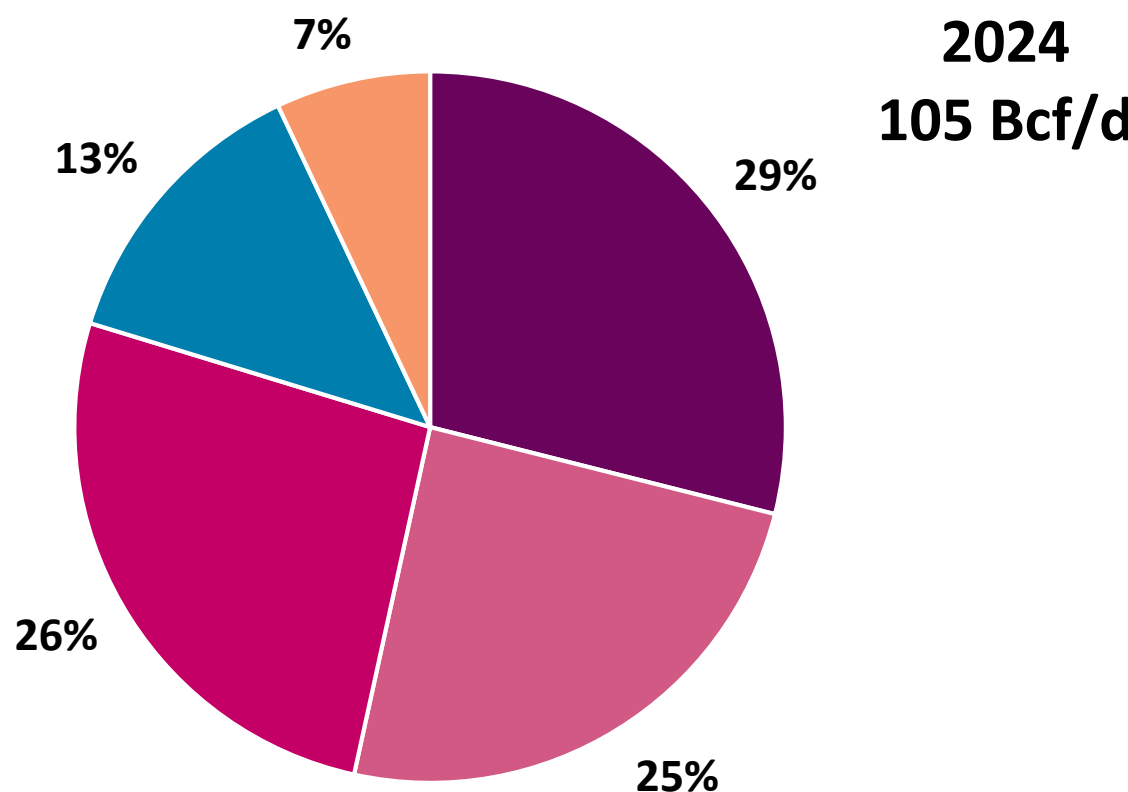
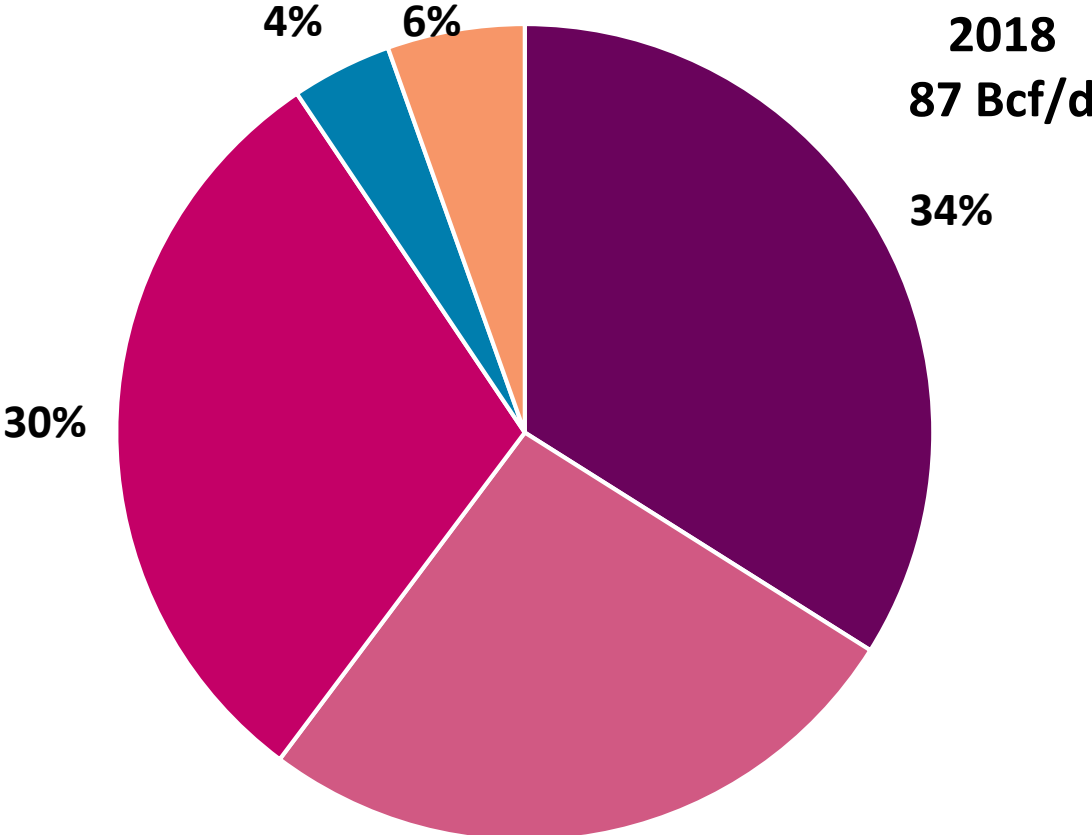
US Power + Industrial Demand Growth: 2018 vs 2008



Extent of next wave of LNG and EG pivotal to sustained HH price support that now is deferred into mid-2020s



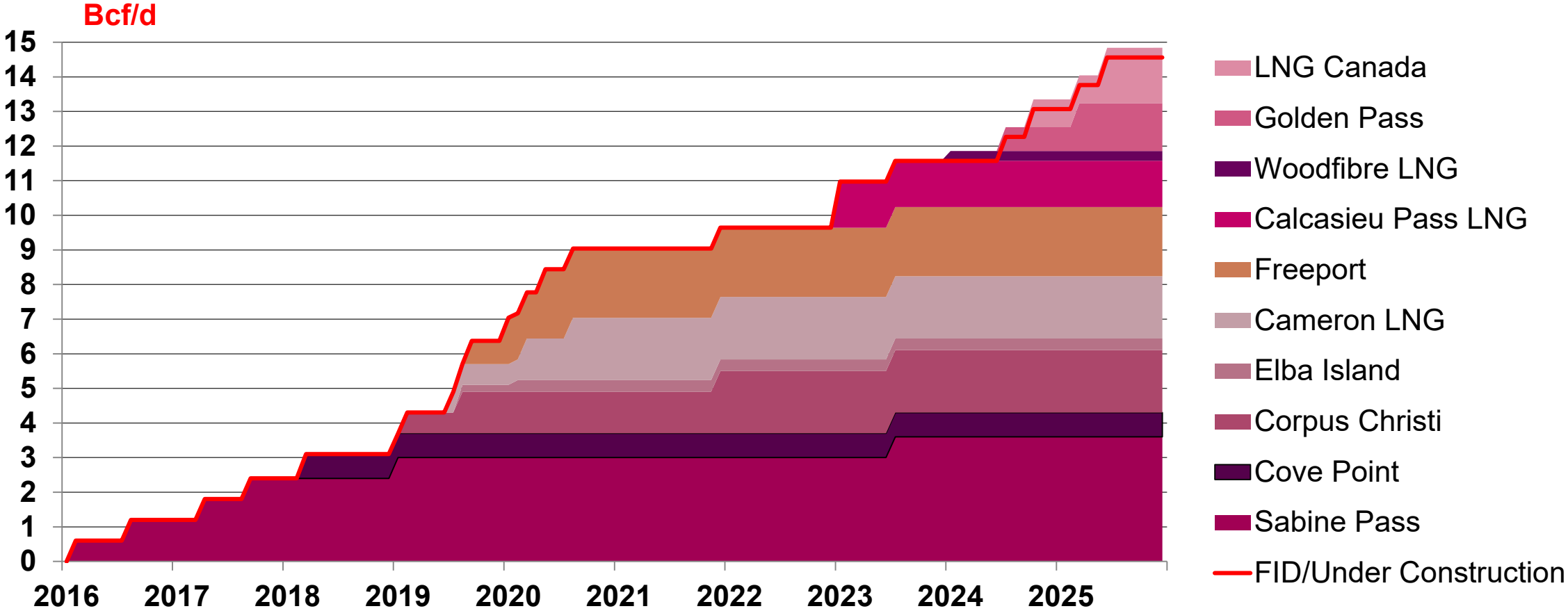
Gas exports account for 75% of US demand growth over next five years; lifting overall market share from 10% to 20%



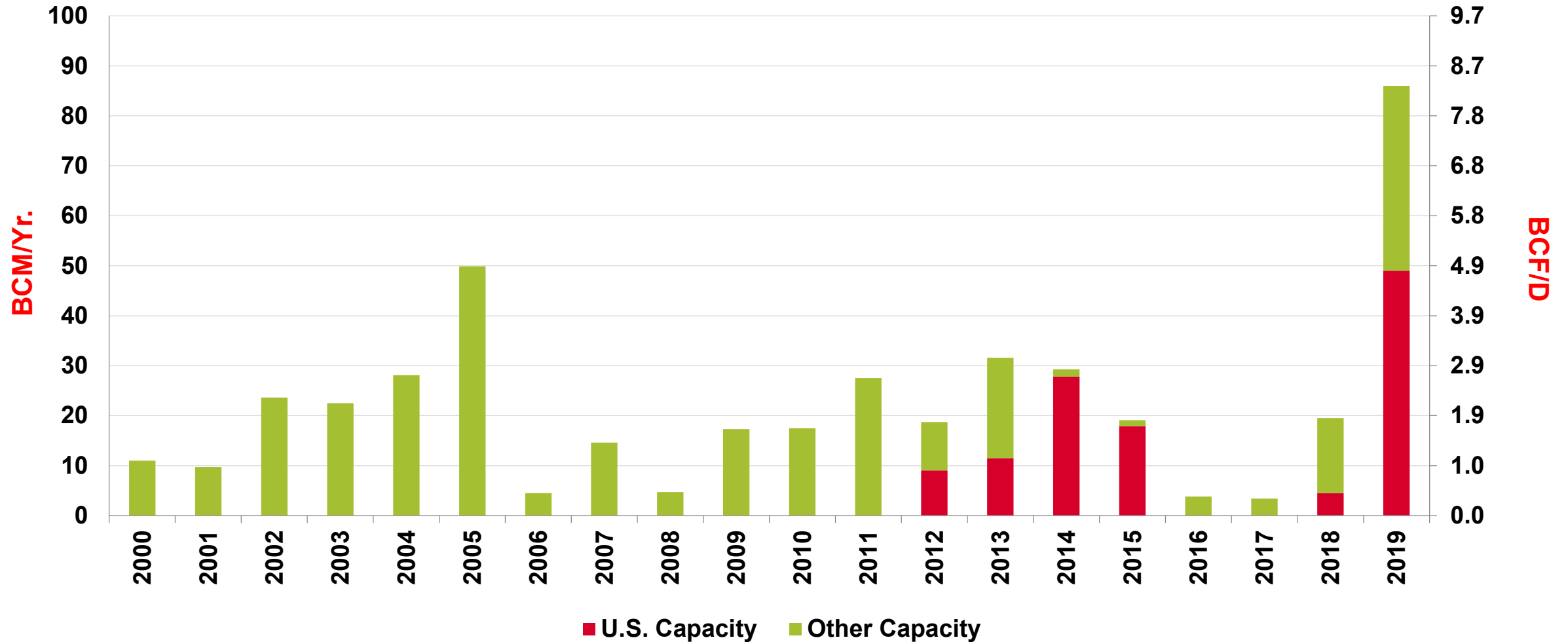
■ Power Burn ■ Industrial ■ ResComm ■ LNG Feedgas ■ Exports to Mexico

North American LNG export capacity expected to reach 14.6 Bcf/d by 2025; 98% of that capacity is already under construction

NORTH AMERICAN LNG EXPORT CAPACITY

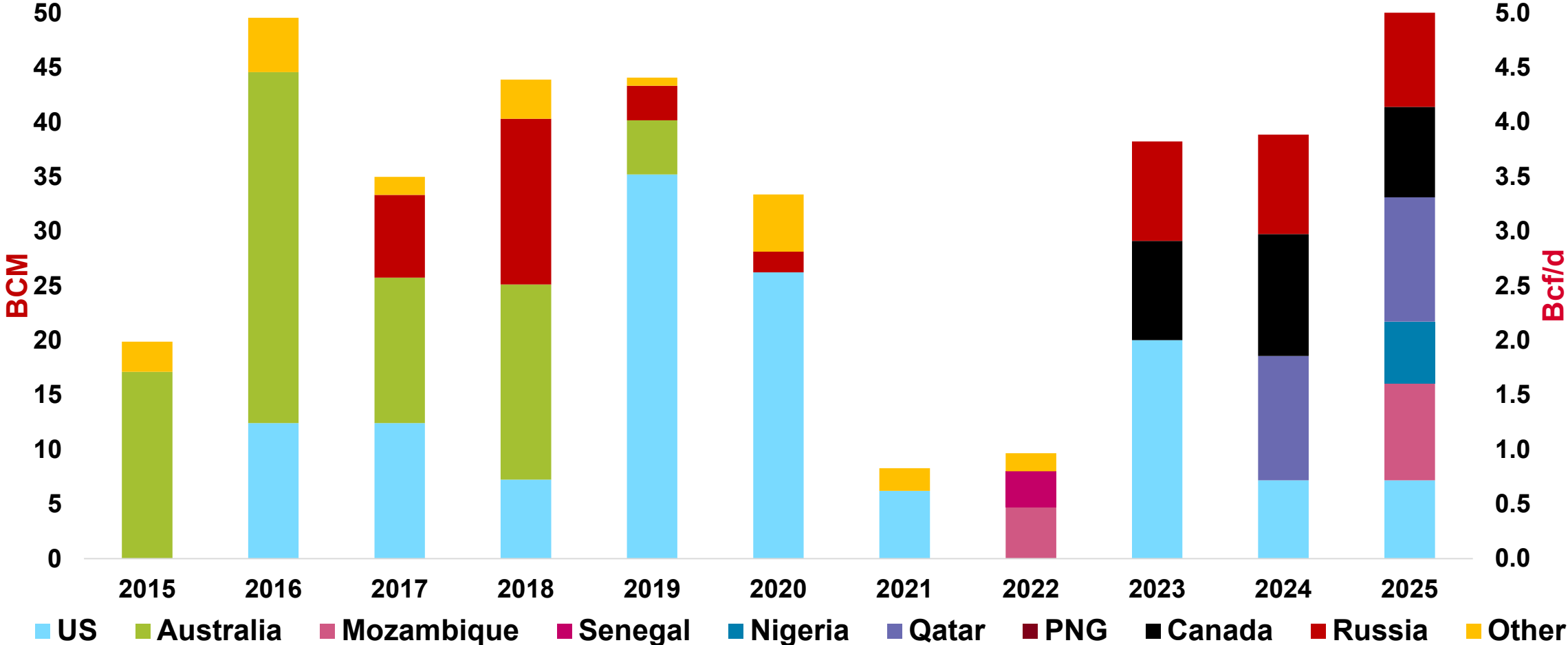


Panic or pragmatism? FIDs in 2019 chase post-2023 demand window; more FIDs to come -- with or without LT contracts

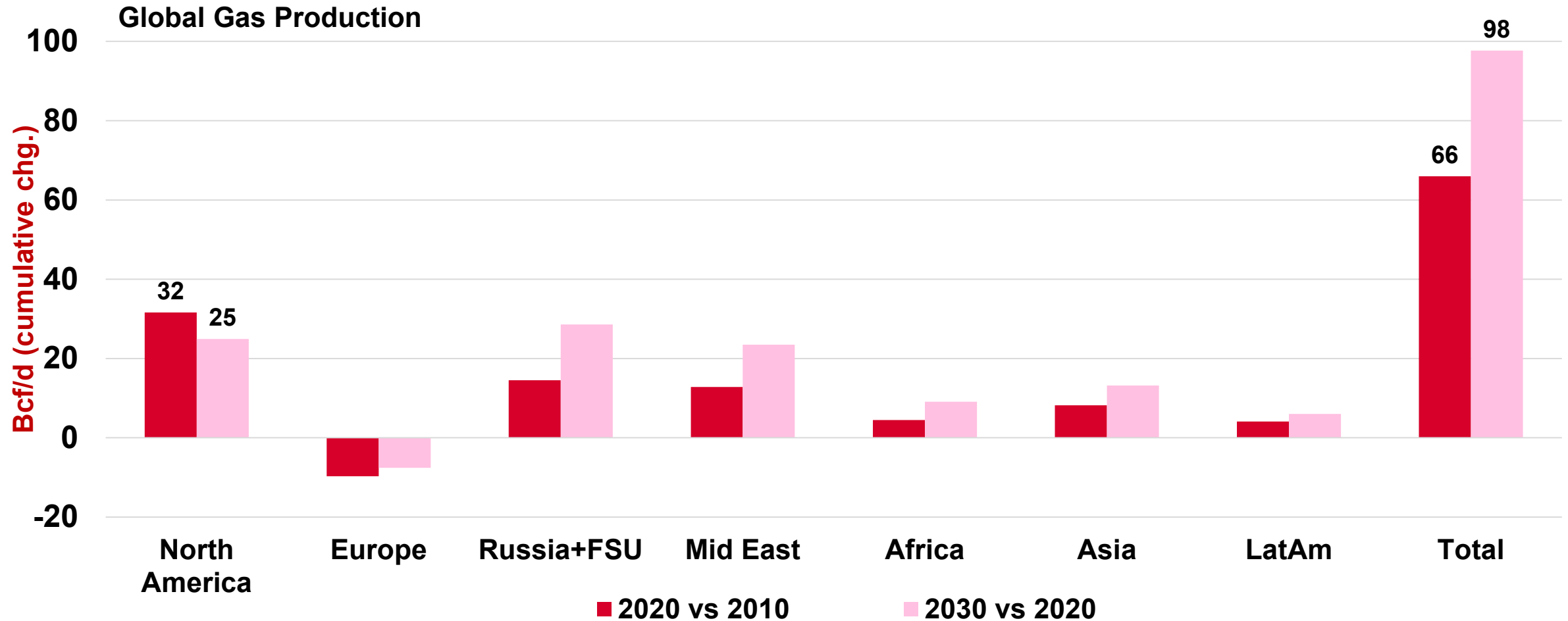


Additional new projects on top of actual FIDs YTD highlight risk even more intensive competition in global market returns

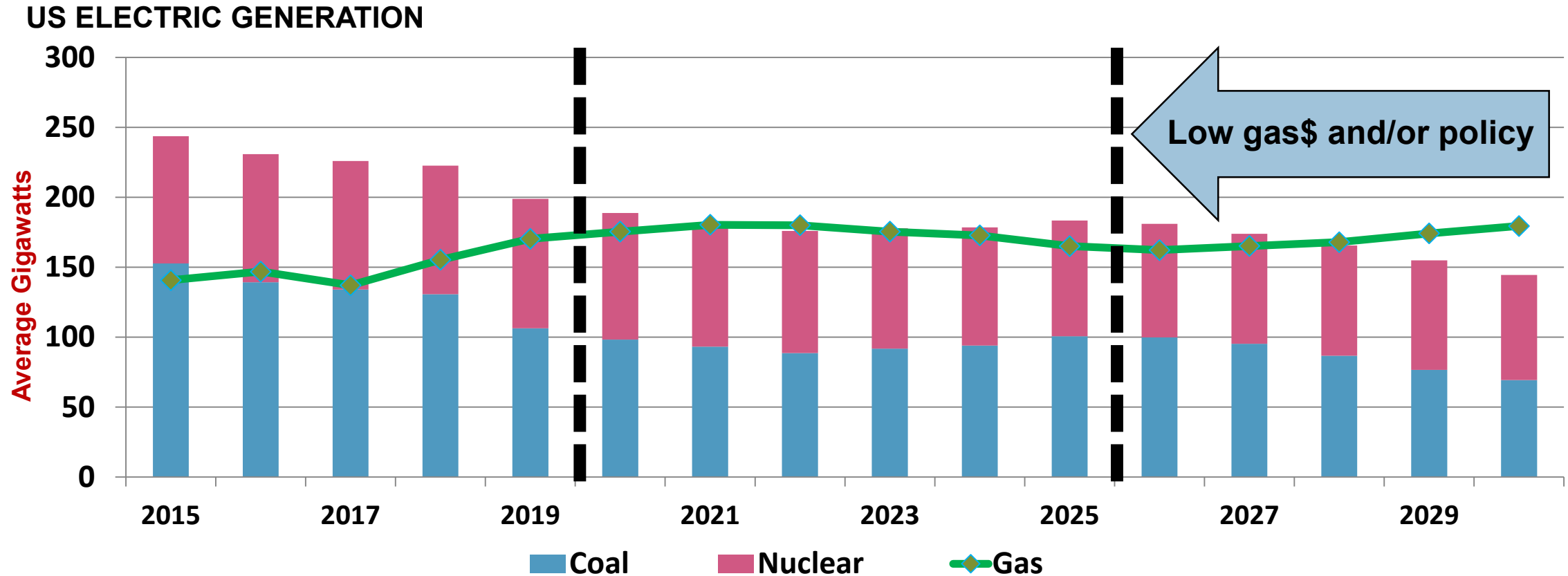
New LNG Supply



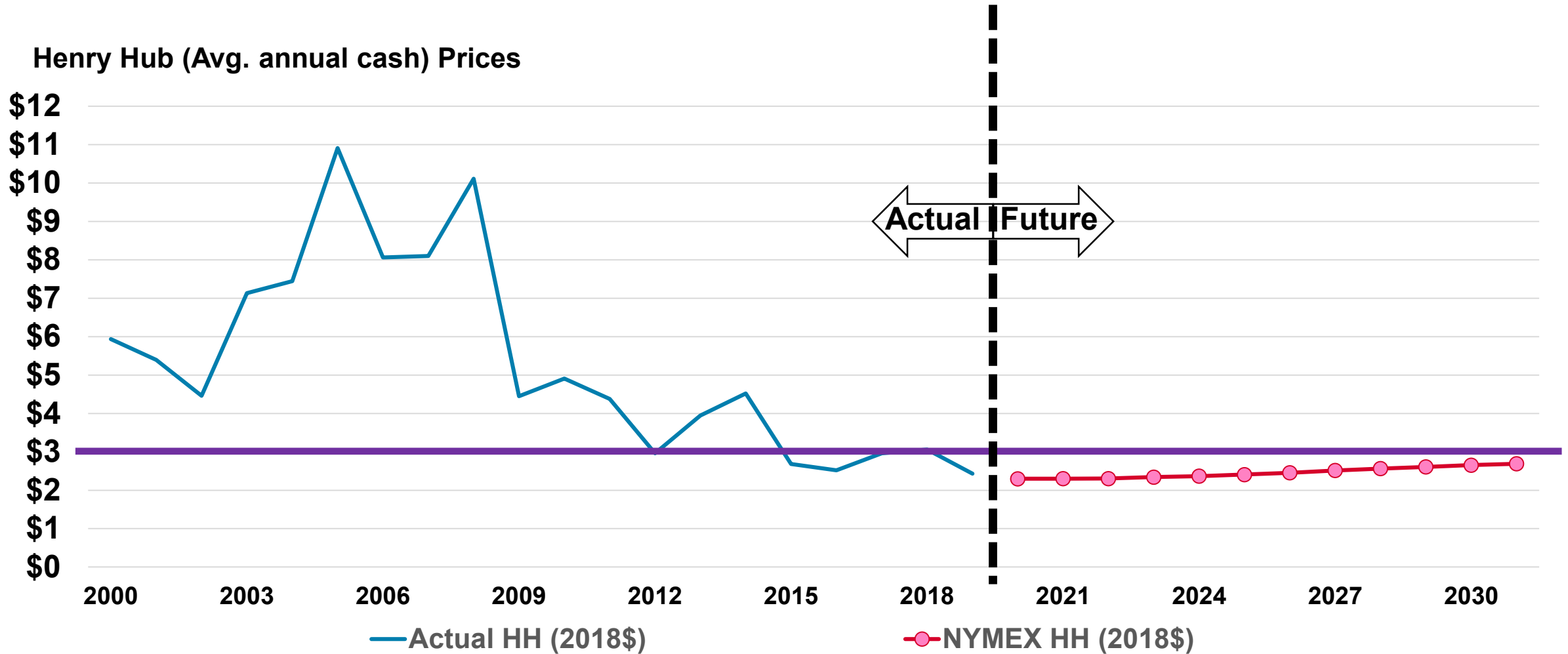
After leading the world higher, North America's share of global gas production will decline do to increasing competition



Following massive expansion of US gas-fired EG at expense of coal/nuclear output, timing of further growth influx



High hurdle for US balances to tighten enough to support sustained \$3+ Henry Hub prices as per NYMEX futures



Key issues in play that will drive price formation:

- **US electric generation and related role of gas in primary energy mix**
 - Regardless of policy, US coal-fired (and nuclear) plants are not getting younger
 - What role, if any, does natural gas play?
- **US/NA LNG feedgas — signs suggesting next wave may be even stronger**
 - Capacity does not assure full utilization; elasticity of LNG exports never truly test (yet)
- **Available pipeline capacity needed to support growth — supply and demand**
 - New capacity needed in US and Canada to support growth, but needed build out in doubt
 - Gas-on-gas competition — regional price weakness — the end result of supply congestion within key pipeline corridors

Is Platts NA/US LNG (or US EG/INDU) outlook too conservative?