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INSTITUTE OF THE AMERICAS

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Curtain-Raiser Webinar

Covid-19, Climate Change, and Their Implications for LNG Trade and Natural Gas in South America

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1 | *Market Impacts of Covid-19*

COVID-19 Compounded Natural Gas and LNG Surpluses

Already oversupplied, US and global oil and gas demand have been deeply damaged by the pandemic and shutdowns, leading to near term market collapse

- In the US, most producers are maintaining output from existing wells, leading to sustained high gas production over the coming few years.
- The pandemic-induced recession has reduced gas and LNG demand in Asia and Europe moderately. Ample supply and sustained low prices for gas and LNG will support demand recovery from the pandemic crisis.
- As a marginal source of global LNG supply, US LNG exports have decreased significantly in 2020, although a measure of recovery is already underway.
- There are several indications of the delay or cancellation of investment and financing activity in LNG production until investors become confident about when the market will rebalance. Market downturn has resulted in a variety of significant FID delays for LNG infrastructure.
- Despite these near term impacts, the gas and LNG sectors are anticipated to recover more quickly and completely than oil consuming industries such as ground, air, and marine transportation.

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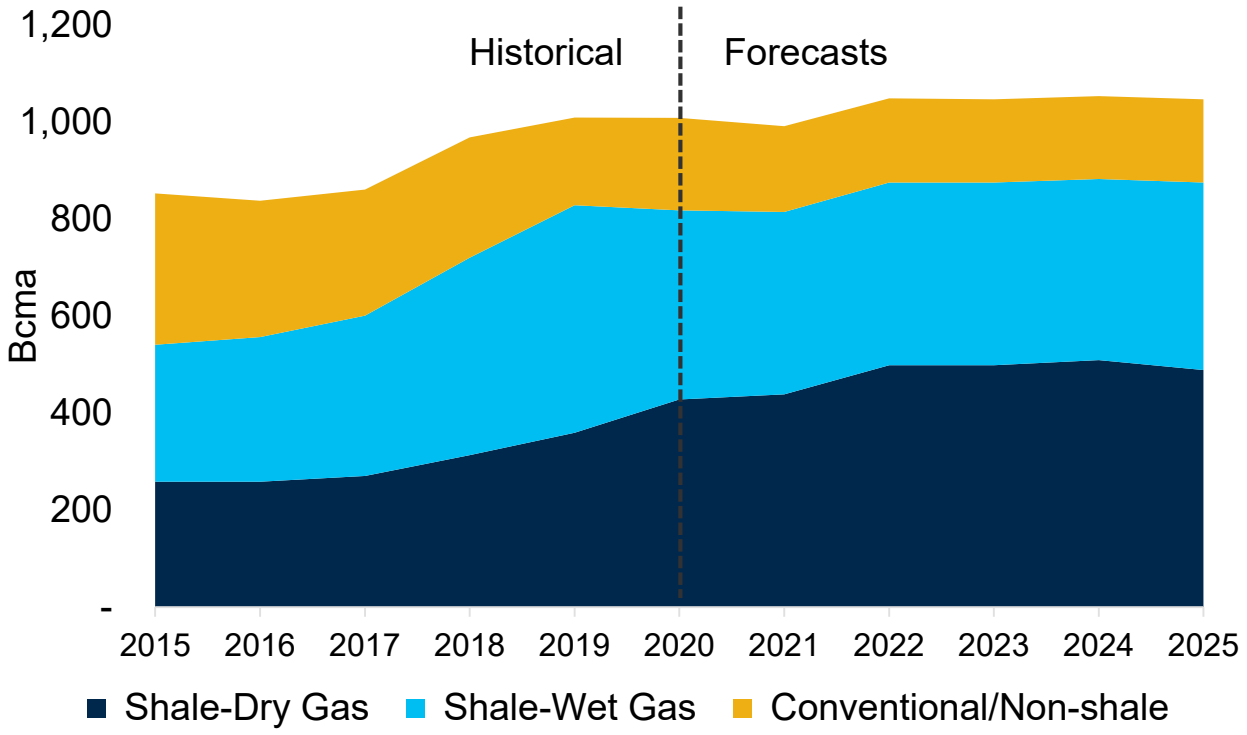
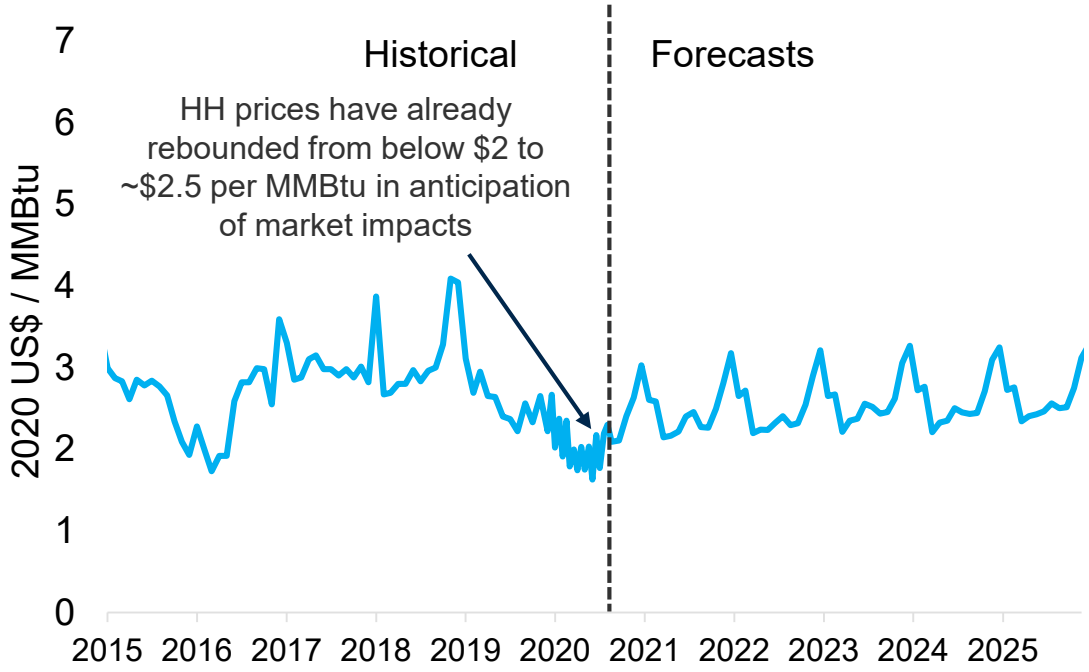
U.S. Gas Production Trends and Implications

In our new Base Case, U.S. associated gas production will decline due to lower oil/NGL prices and shale gas production and production will shift from wet toward dry gas. The U.S. gas production recovery and shift to dry gas will yield only moderate increases in HH given the vast dry gas resources available for production at only moderately higher costs.

US Natural Gas Production



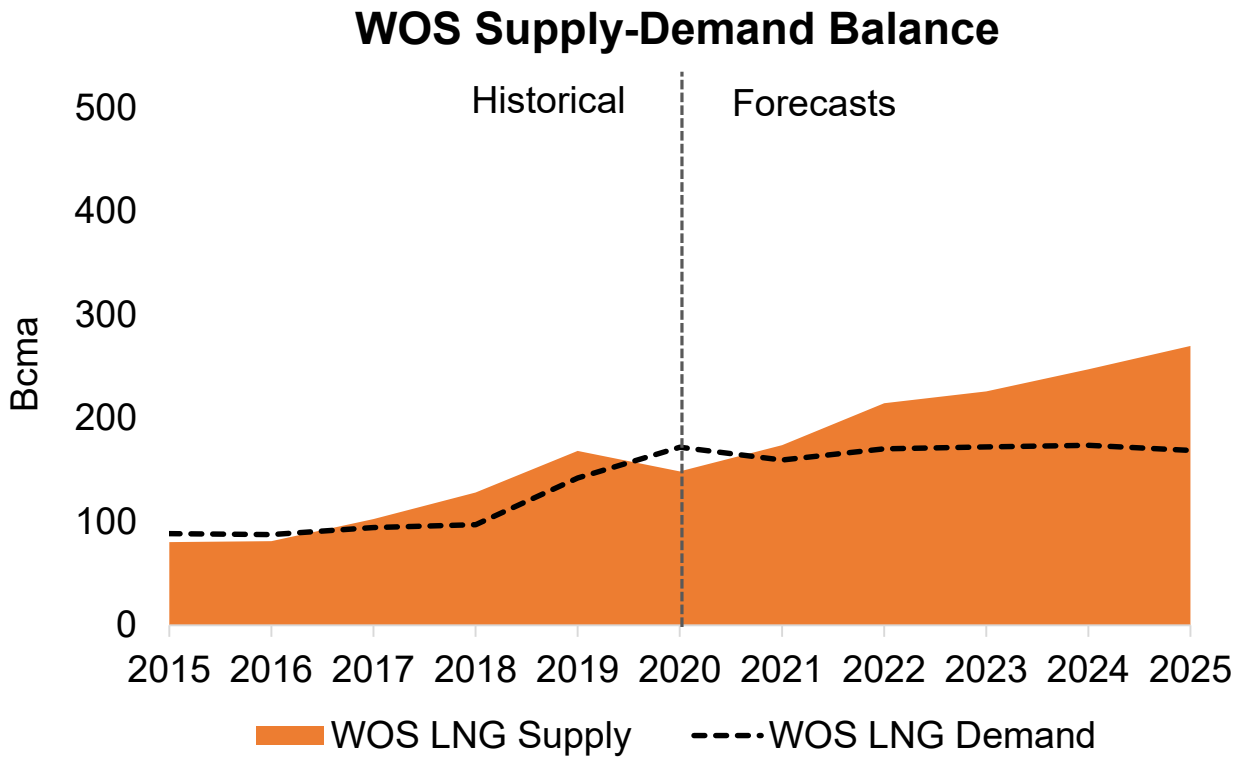
Henry Hub Prices

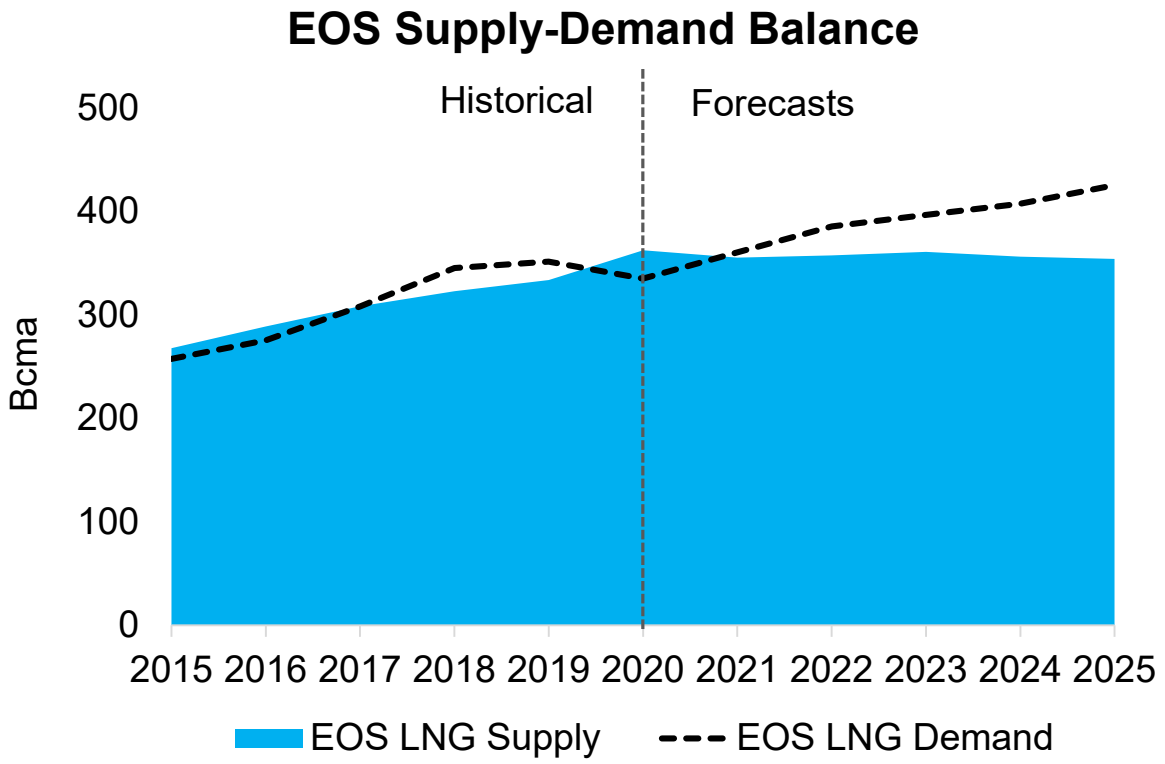


Sources: BRG analysis based on LNG Horizon model forecast, EIA, Bloomberg.

Regional Supply-Demand Balances

Before 2020, modest WOS surpluses fed modest EOS deficits, but looking ahead from 2021 the WOS surpluses and EOS deficits will become more substantial and inter-regional LNG trade will increase.





Sources: BRG analysis based on LNG Horizon model forecast, Kpler.

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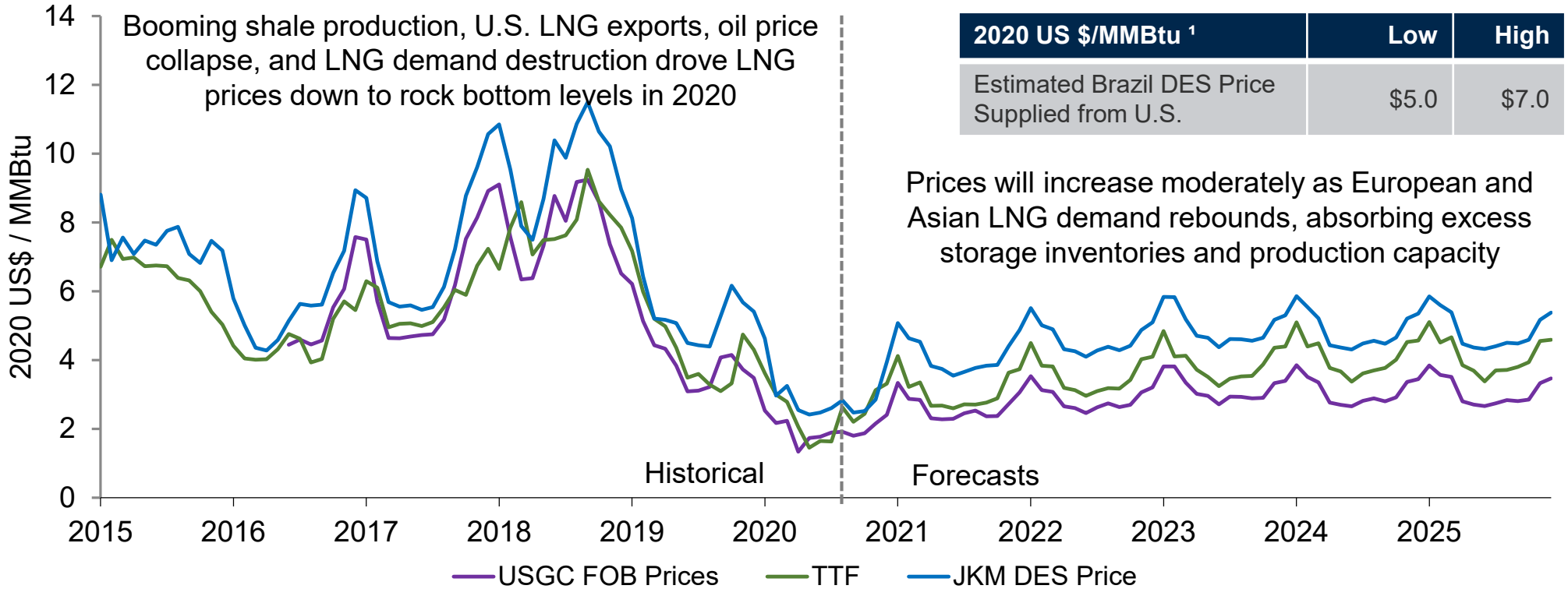
Natural Gas and LNG Price Impacts

Relentless production growth, decelerating demand (and recent pandemic impacts) have plunged natural gas and LNG prices to a rock bottom. Looking forward, the delay and destruction of new liquefaction projects and a gradual demand recovery will yield moderate price improvement toward viable, competitive price levels. As a result, U.S. LNG deliveries to Brazil might cost from $5 to $7 MMBtu, but traded market values will reflect seasonal market and competitive conditions.

Global Prices for Natural Gas and LNG



2020 US $/MMBtu [1]	Low	High
Estimated Brazil DES Price Supplied from U.S.	$5.0	$7.0

Sources: BRG analysis based on LNG Horizon model forecast, Bloomberg, Platts.
Note: [1] Brazil DES price from U.S. supply equals 115%*HH plus capacity fee, ~$2.5 per MMBtu, plus shipping costs.

2 | *US Carbon Tax Scenario*

U.S. Carbon Tax Scenario Assumptions

Assuming a Biden victory and/or a substantial shift of power in the U.S. Senate, one policy scenario would feature the implementation of a carbon tax to mitigate climate change.

- Among other proposals, the Energy Innovation and Carbon Dividend Act has gained traction amongst policymakers in recent years.
- On this basis, we assume that a carbon tax will be implemented in 2022, starting at $25 per metric ton, increasing by $10 per year, reaching $55 per metric ton by 2025, and eventually climbing to $100 per metric ton.

Energy Innovation and Carbon Dividend Act, most stringent tax and likely to be implemented according to this analysis				
Year	**2022**	**2023**	**2024**	**2025**
Carbon tax $/metric ton	25	35	45	55

Source: Electricity and Gas Market Surveillance Commission (EGC); IEEJ Sept 2018

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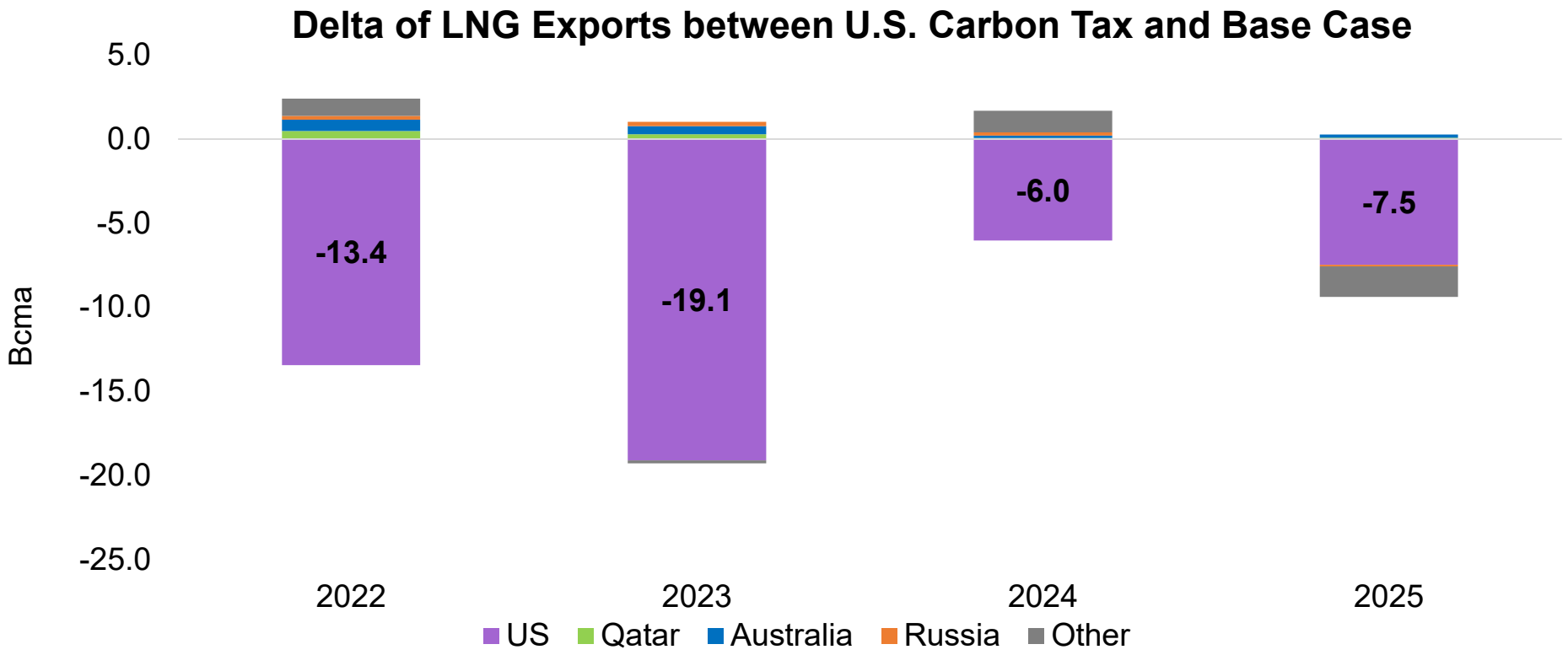
Carbon Tax Impacts on LNG Exports

In a carbon tax scenario, U.S. LNG exports will decline by 13-19 Bcma during the first two years of policy implementation because the carbon tax is more detrimental to coal-fired generation and therefore boosts gas-fired generation and gas prices. The higher gas prices make LNG exports less economic in the near term, but these impacts moderate as renewable energy catches up to lighten the demand pressure on natural gas prices.



Sources: BRG analysis based on LNG Horizon model forecast.

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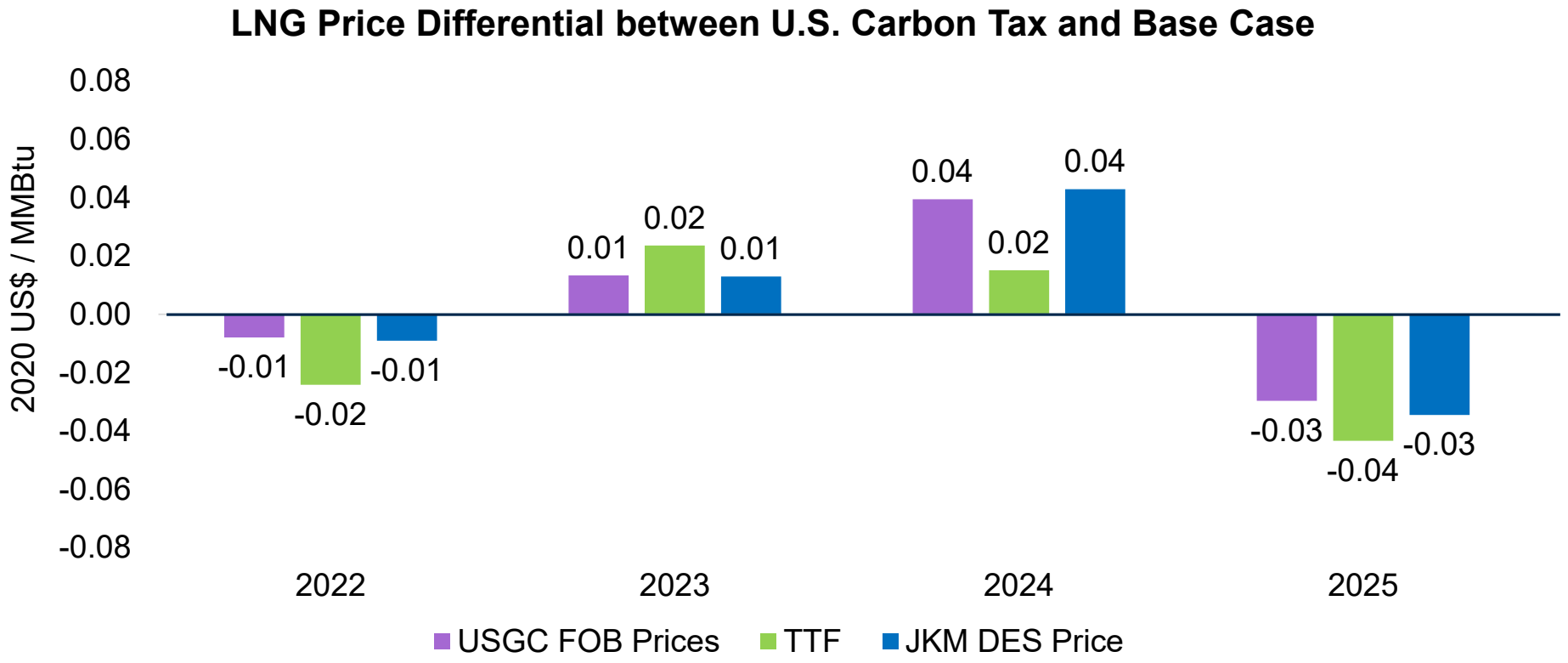
Carbon Tax Impacts on LNG Prices

A U.S. carbon tax scenario will have only minimal near term impacts on LNG prices due to the substantial LNG supply surplus. In the initial years, USGC FOB prices will increase slightly due to the increased U.S. domestic gas demand, resulting in lower U.S. LNG exports and slightly higher global LNG prices. However, the impacts reverse longer term as renewable energy penetration increases and displaces U.S. gas-fired generation, resulting in lower gas prices and higher U.S. LNG exports.



Sources: BRG analysis based on LNG Horizon model forecast.

3 | *Implications for South America*

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Just 20 years ago LNG trade in South America was limited to exports from Peru and Trinidad & Tobago

2000s

Flow | Idle Route | Possible Flow | Liquefaction Terminal | Regas Terminal

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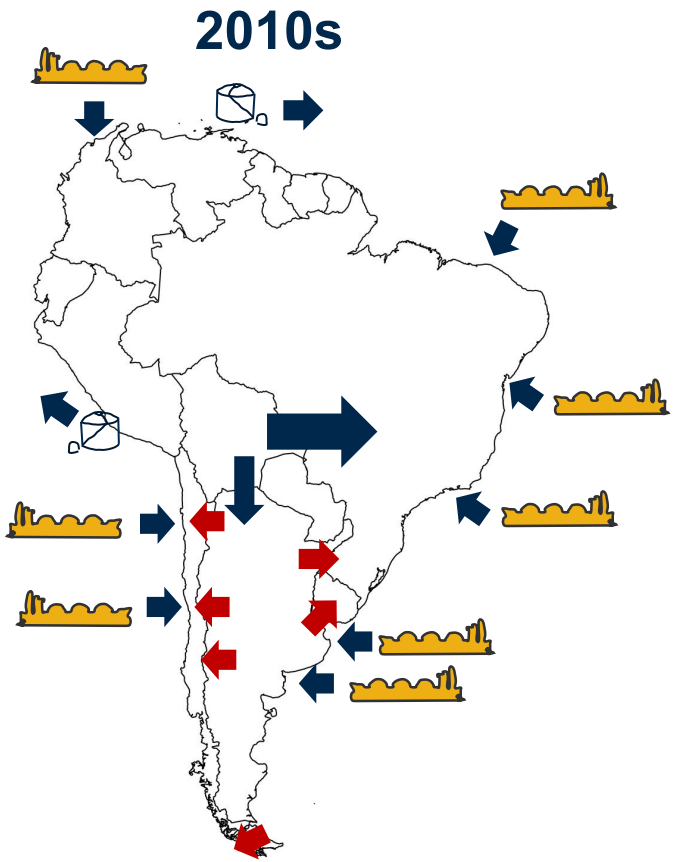
Then, eight regas terminals helped bridge the gap between growing demand and flagging supplies



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Going forward, the region is on track to exceed 12 terminals and flexible cross border pipeline trade

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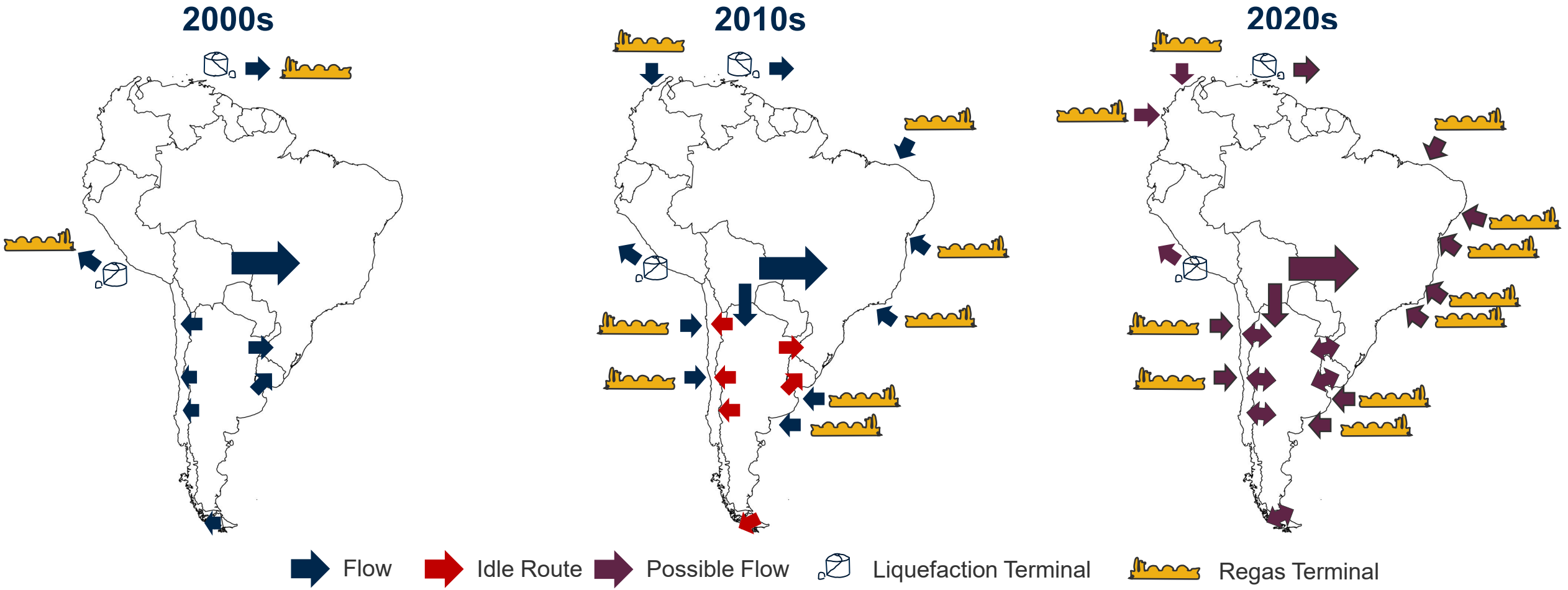
However, the need for more LNG import capacity is waning in all countries except Brazil and Colombia



4 | *A Closer Look at Brazil*

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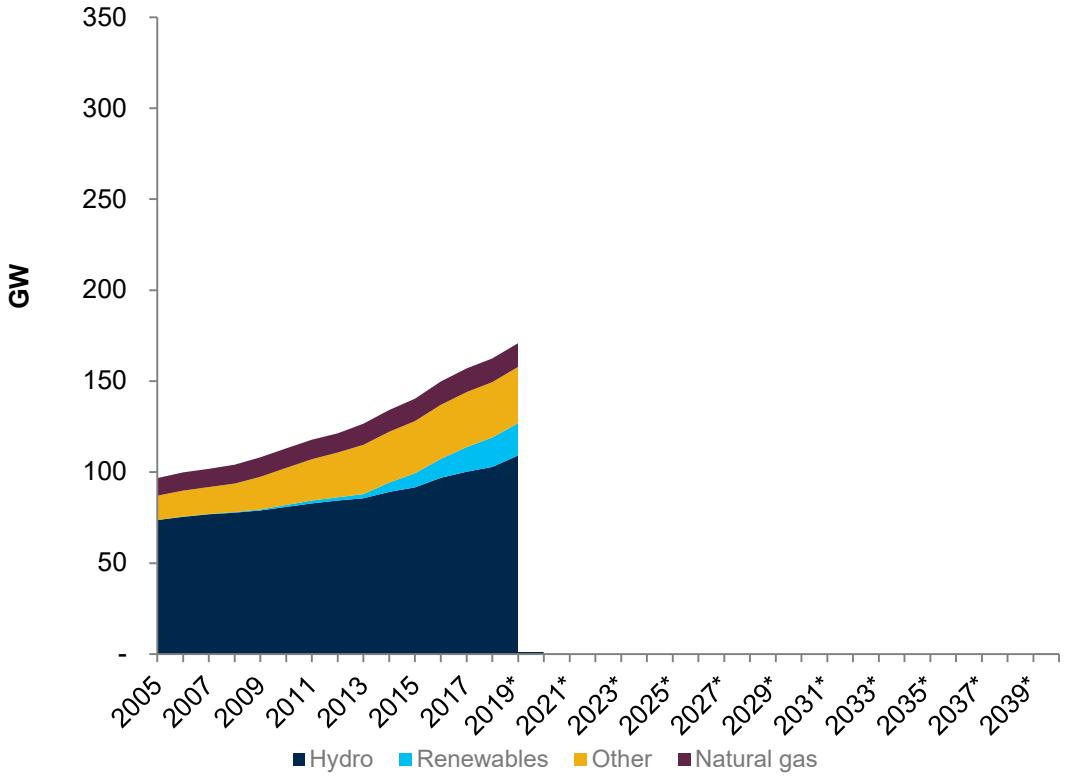
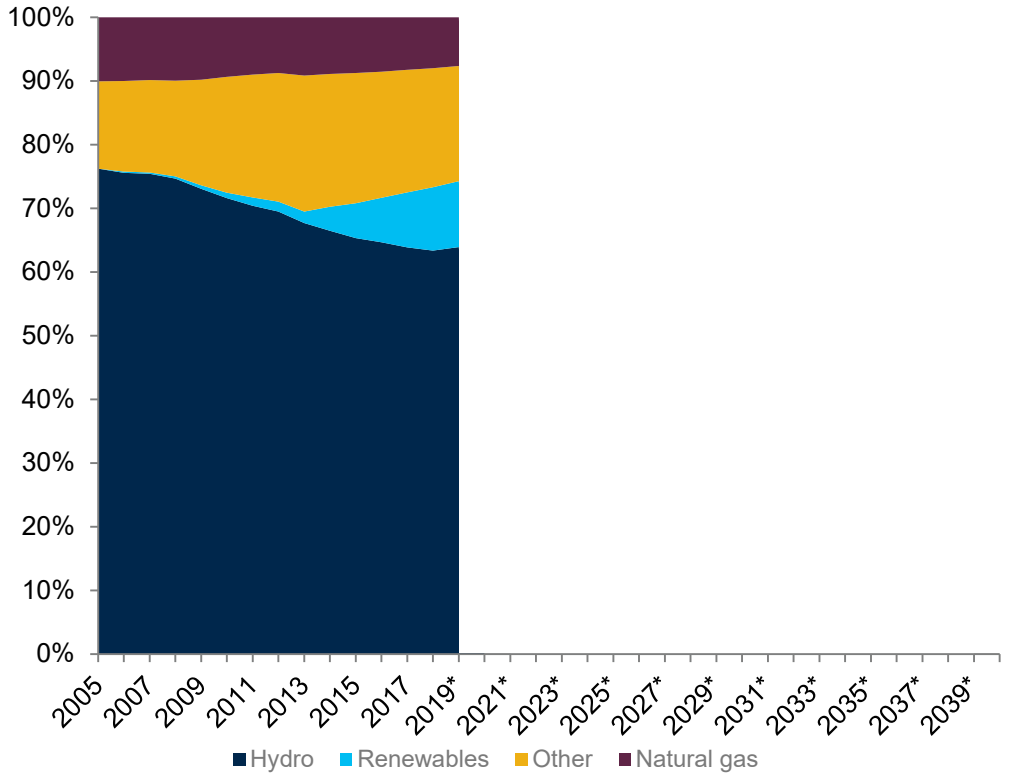
Brazil's power mix has seen increasing additions of natural gas and renewables sources in the 2010s



Source: EPE



Source: EPE

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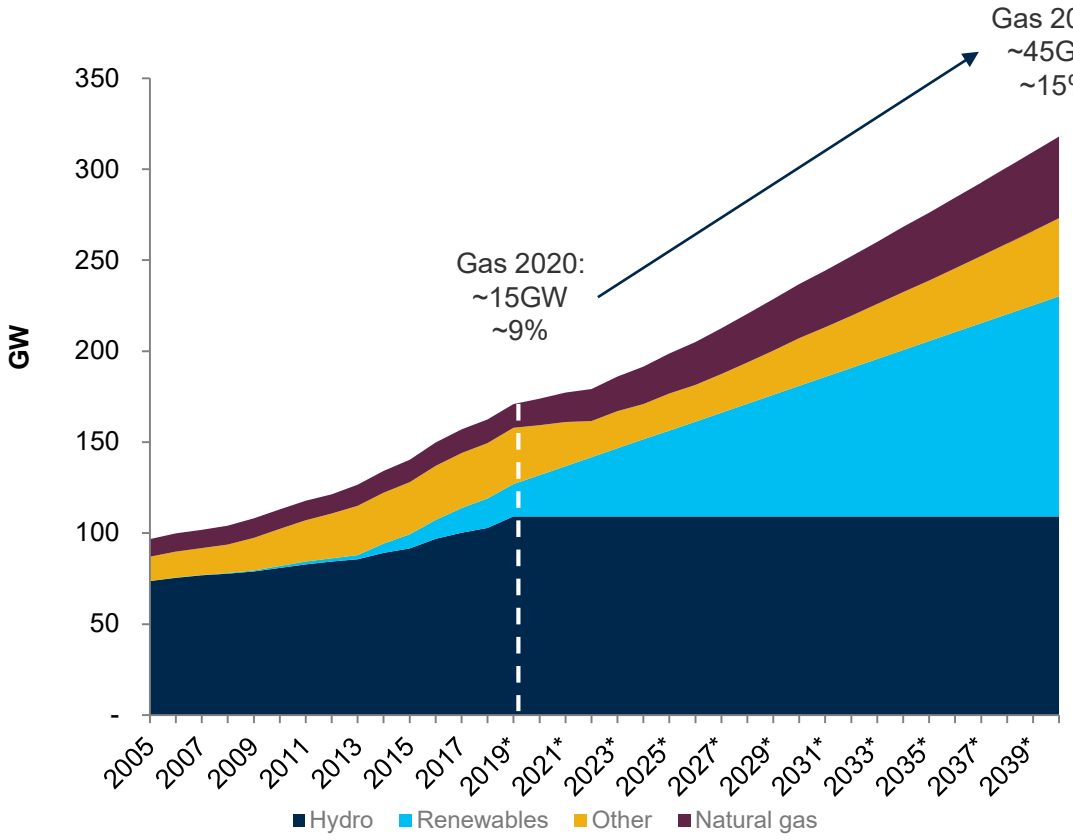
Going forward, more CCGT additions are still needed to enable greater renewable penetration

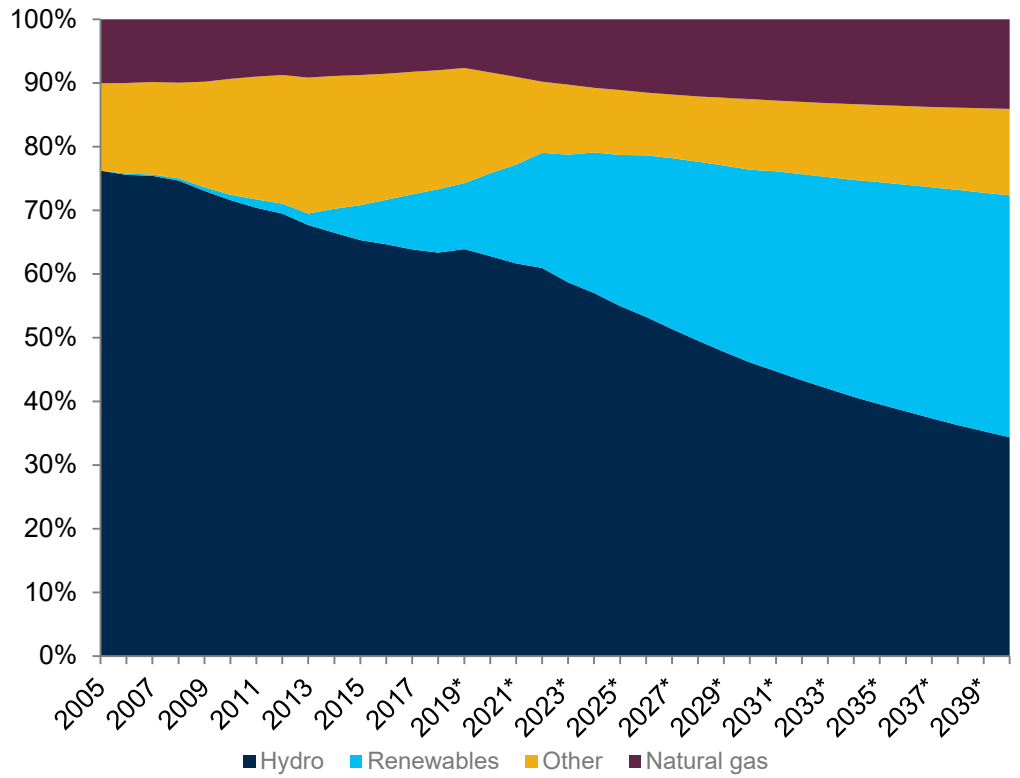


- Natural gas additions take place as needed to provide backup capacity to the intermittency of wind and solar sources
- Nuclear, coal, oil and biomass grow more slowly than gas
- Renewables replace hydro as the main source of capacity additions
- Stagnating hydro capacity due to few large prominent sites remaining

By increasing from a 9% to a 15% share of the mix, Brazil would add up to 20 GW in new CCGTs by 2040

The share of non-renewable technologies would continue to average 25%, with a relative gain from natural gas, which would gain share over coal and oil-fired power plants

Combined, hydro, wind and solar would sustain an average share of 75% of the Brazilian power generation capacity mix



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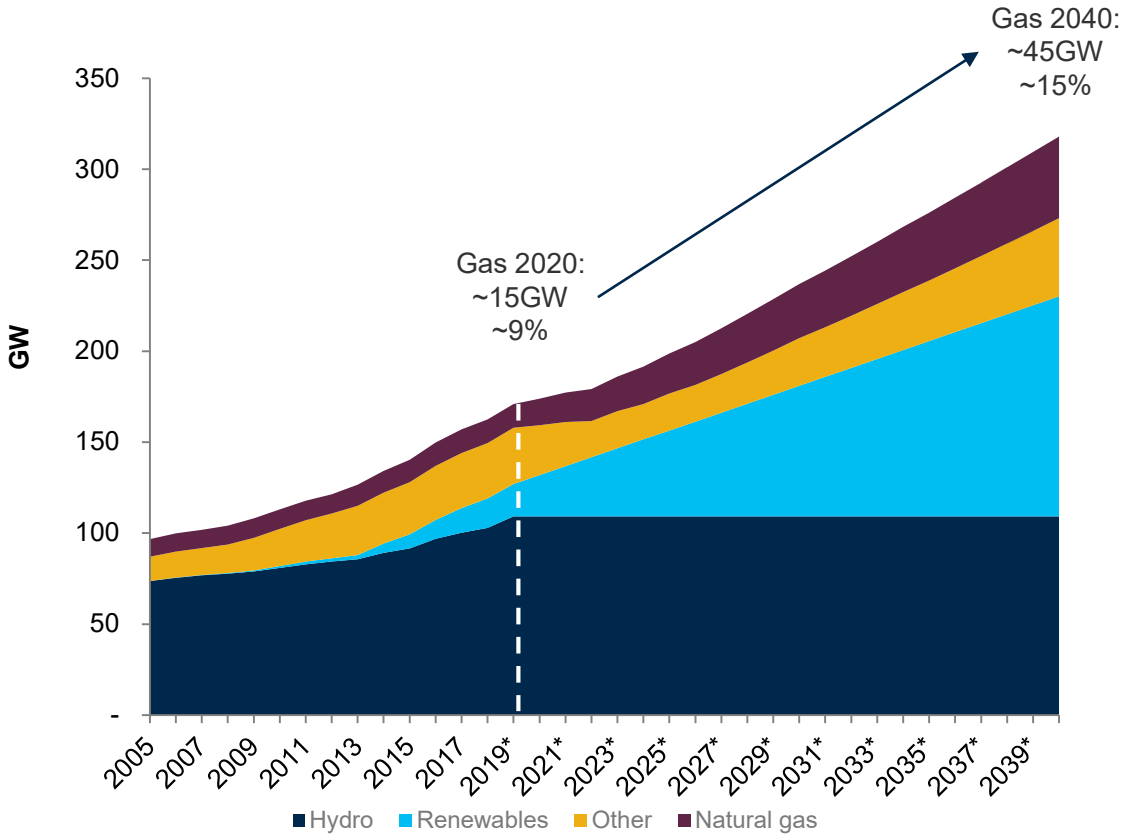
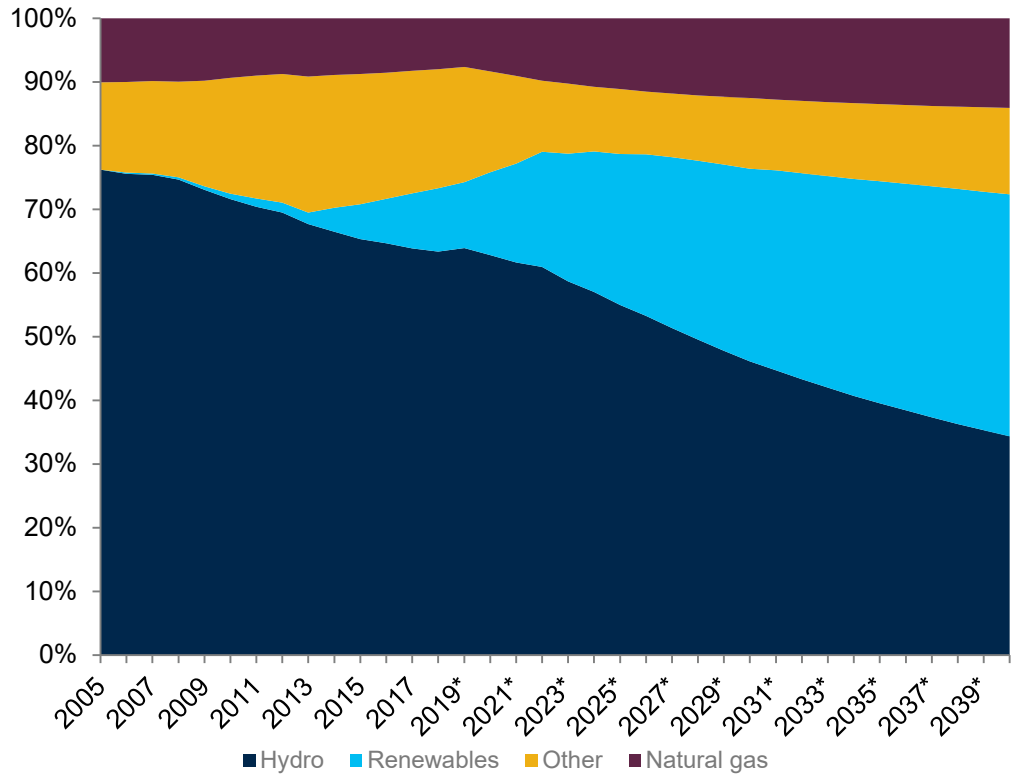
LNG is the cheapest source of flexible supplies for a growing need of backup gas-fired power plants



Source: EPE, BRG



Source: EPE, BRG

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Thank you!

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