Beyond 2020 – Futures for the oil and downstream industry

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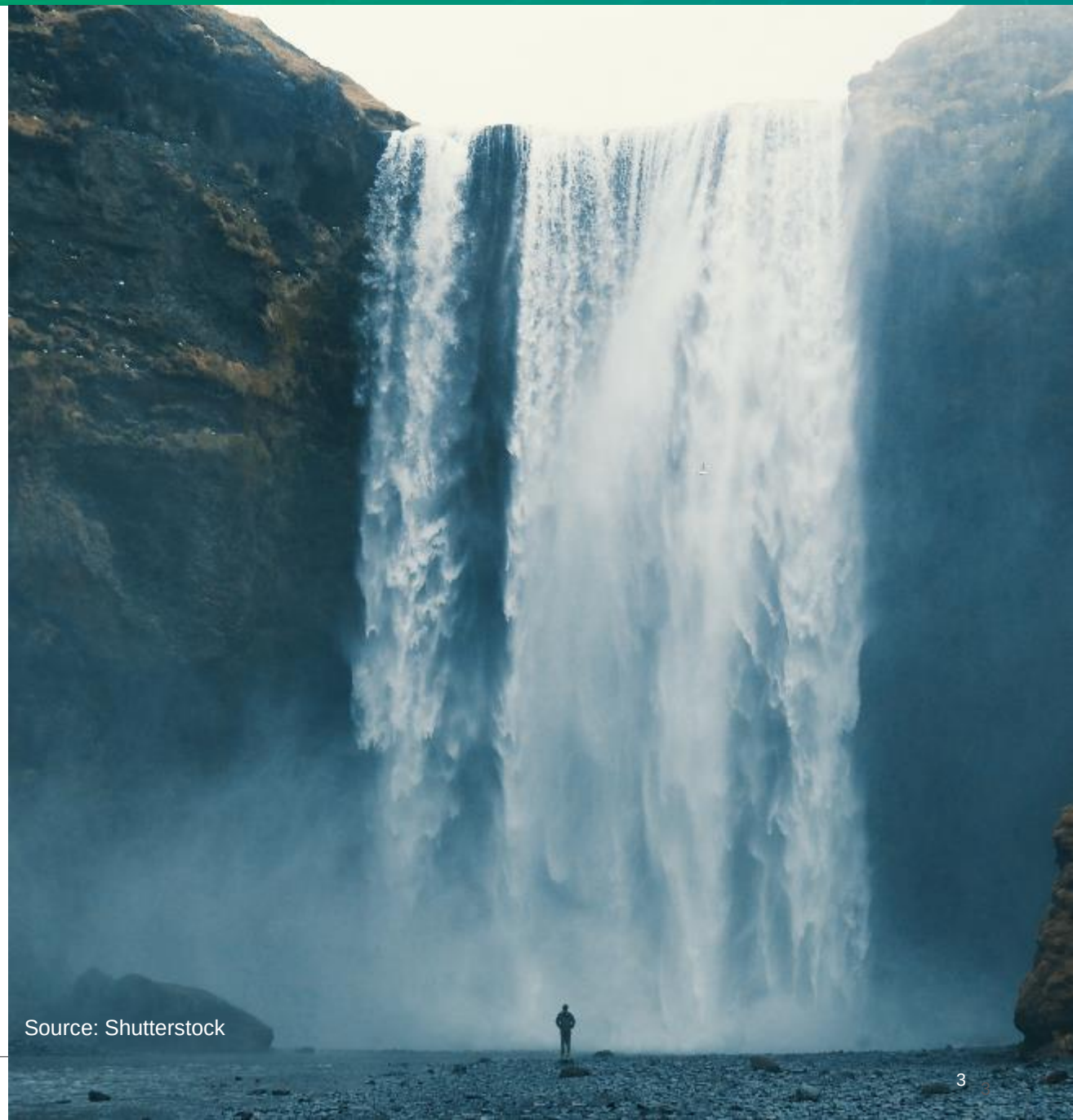
Agenda

- Energy transition
- Refined product demand transition
- Downstream response

The Energy Transition is a process of moving to a lower carbon world

- Moving towards a lower carbon future will impact demand and supply of fuel types in fundamental ways
- Decarbonization of energy and non-energy sources is a priority for many stakeholders
- The pace and path of an energy transition are both highly uncertain
- Four sets of actors will shape the policies, pressures and actions that create an energy transition
  - Governments
  - Companies
  - Financial institutions
  - NGOs/Stakeholders
- How are these actors responding to the pandemic crisis?

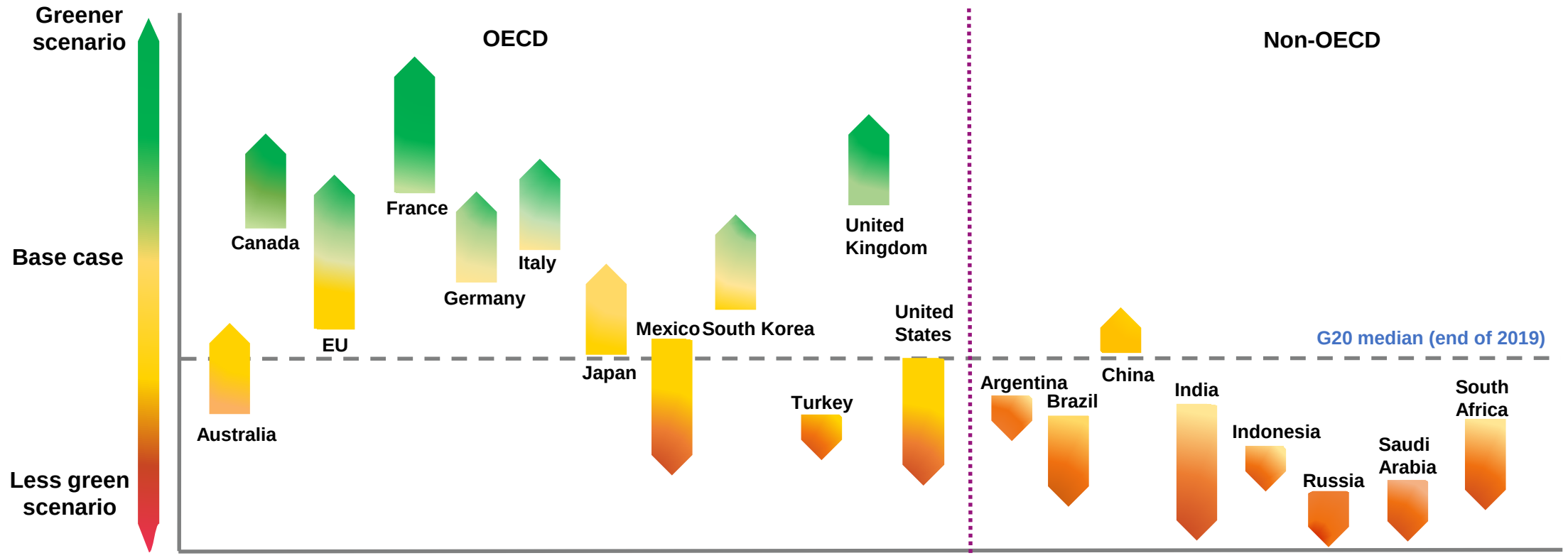


Source: Shutterstock

Governments: Calibrated assessment of stimulus package implications

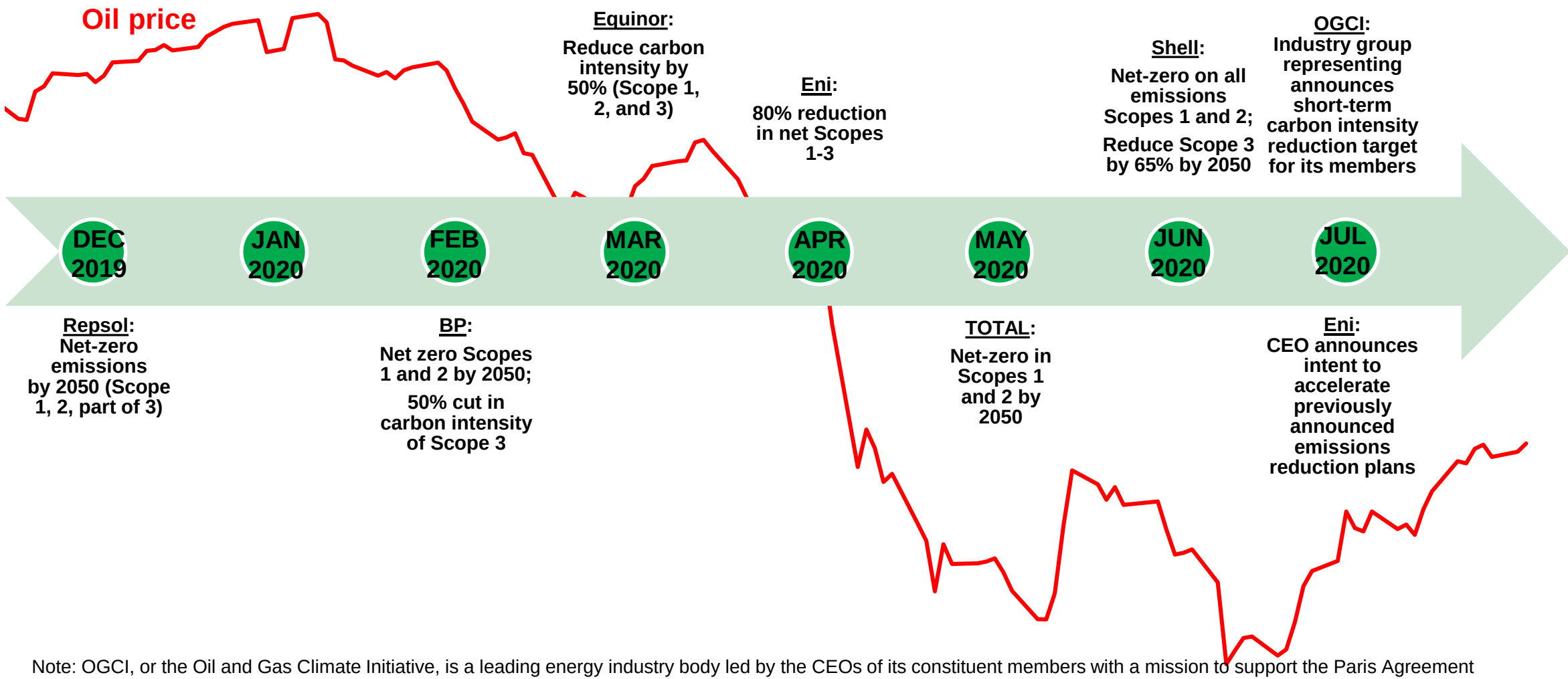
Green ties to stimulus funds is counterbalanced by many countries with no strings

COVID-19 G20 stimulus and recovery responses: Helping with the energy transition?



G20 median is the median value of the G20 “composite national climate policy assessment” scores.
Source: IHS Markit

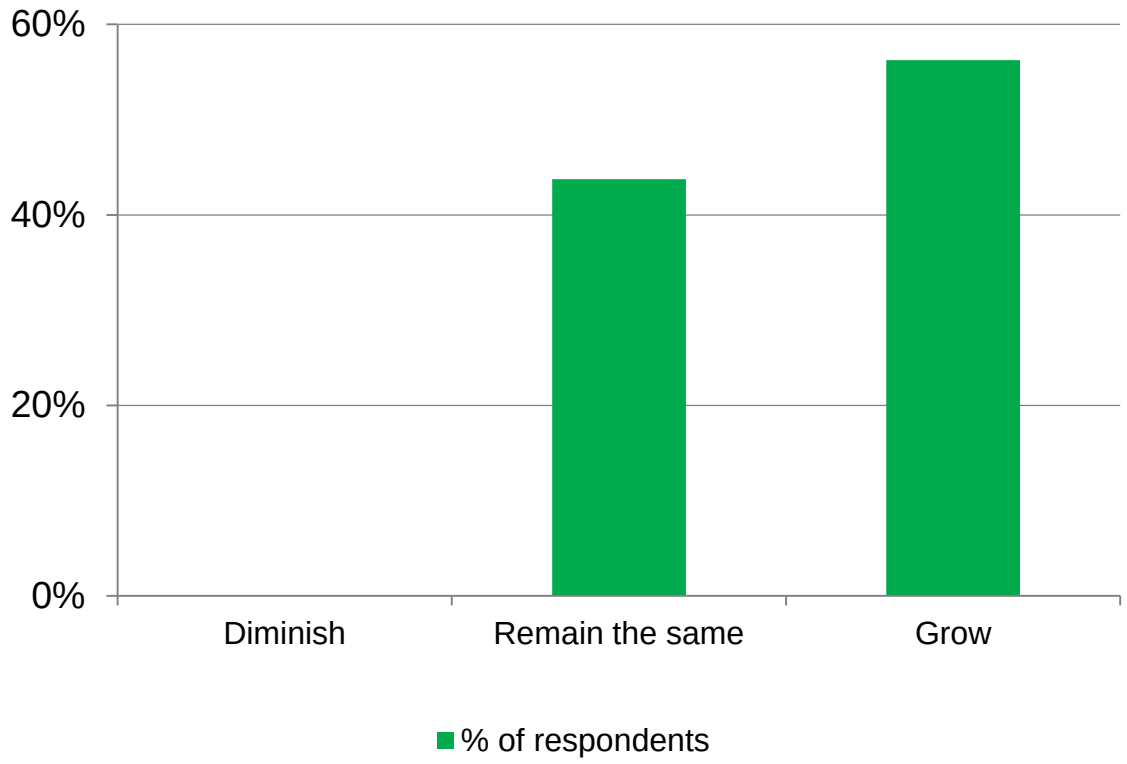
Companies: Certain IOCs remain committed to ambitious emissions targets; some seek ways to speed up the transition



Note: OGCI, or the Oil and Gas Climate Initiative, is a leading energy industry body led by the CEOs of its constituent members with a mission to support the Paris Agreement and to work collectively to accelerate the transition to a low-carbon economy.

Financials: Investor concerns about climate change are expected to persist and grow according to a just-released IHS Markit investor survey

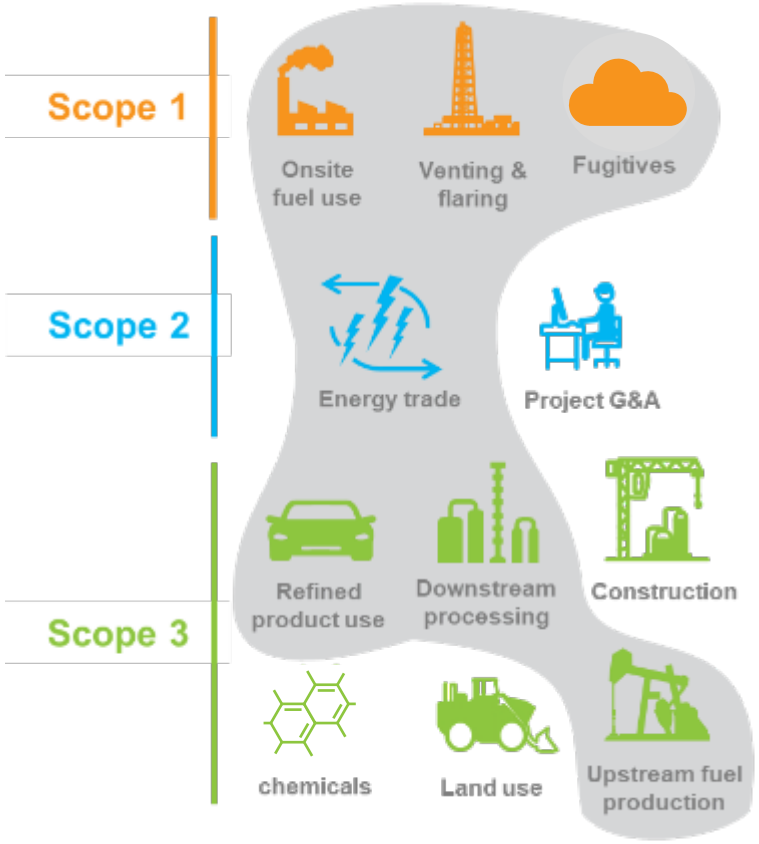
Do you anticipate that investor concerns over climate change in relation to the energy sector will diminish or grow in the post-pandemic period?



Source: IHS Markit, Investor Perception survey May 2020

- The investment community's focus on climate change will continue to grow in the post-pandemic period and most investors do not believe that the recent health crisis has diminished investor concerns in any way.
- The shift toward low carbon is viewed as a long-term concern impacting investment decisions, one that existed pre-pandemic and will continue to accelerate after.
- Over half of the investors interviewed are either maintaining their exposure to energy or buying deeply discounted companies with prudent balance sheets and return-based strategies that can weather the near-term tailwinds.
- Nevertheless, nearly half of the investors have lower risk appetite. In the short term, they foresee that the sector will remain out of favor as impairments to global demand (e.g. less air travel) will persist into 2022 or 2023.
- Over the longer term, some believe that the recent disruptions reveal how fragile and structurally challenged the energy industry has become, foreshadowing continued troubles as the world moves toward decarbonization. Investors are less willing to devote time and capital to a sector that they believe faces an existential crisis.

Companies & Financials: Pressure is increasing for greater transparency on carbon/GHG disclosure and understanding of the risks of energy transition

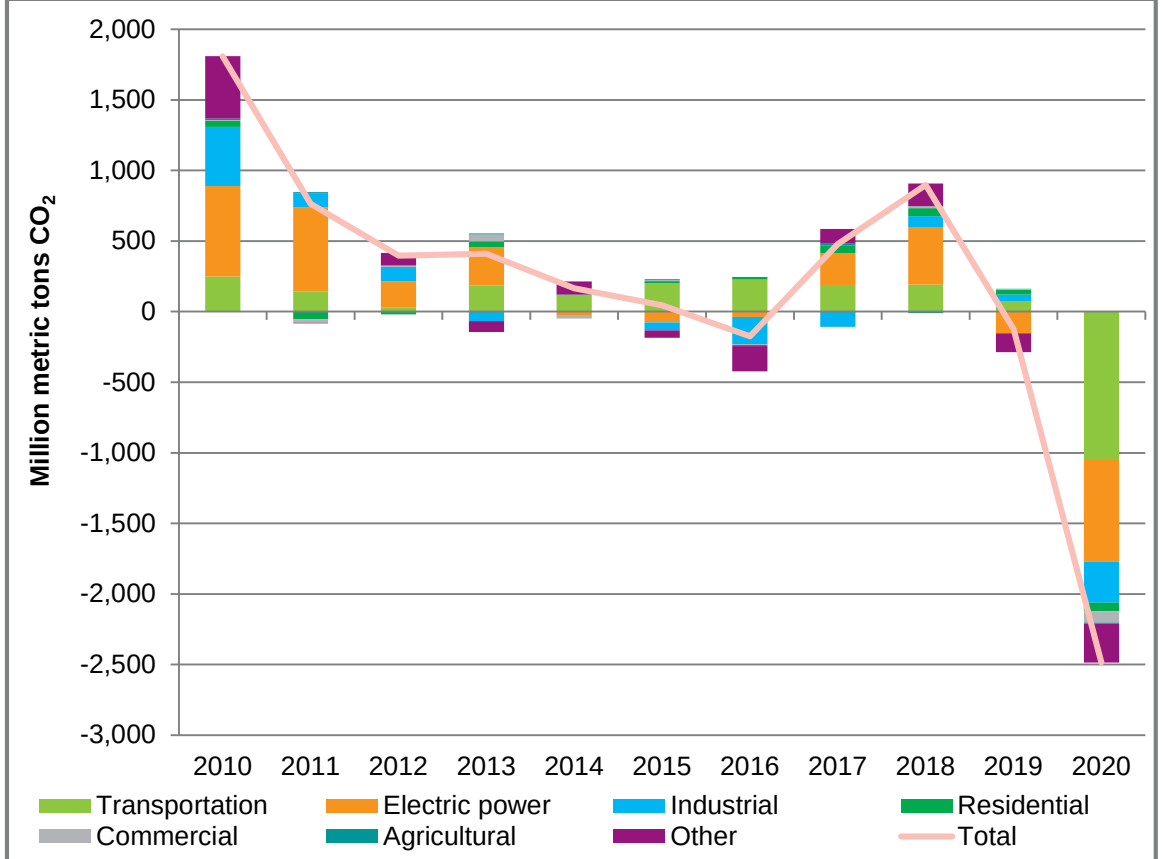


- ***GHG intensity estimates are being generated to rank***, regulate and price and/or decarbonize transportation fuels and petrochemicals.
- ***Estimates are not necessarily consistent*** and are often based on limited or asymmetric data, differing scopes of emissions, and varying degrees of transparency with some maximizing differences.
- Understanding energy transition for oil and gas companies requires ***understanding GHG emissions over entire life-cycle*** of the fuel/feedstock.

With industry, financial and stakeholders, IHS Markit is undertaking a study to develop best practices to generate credible estimates using our deep data and industry expertise.

NGOs: activists and citizens have seen clear skies over the world's most polluted cities as emissions plummet to 2011 levels

Annual change in global energy-related CO2 emissions by sector



Notes: Energy-related GHG emissions include only CO2 emissions from energy production and use. *Other includes heat sector, own
Source: IHS Markit
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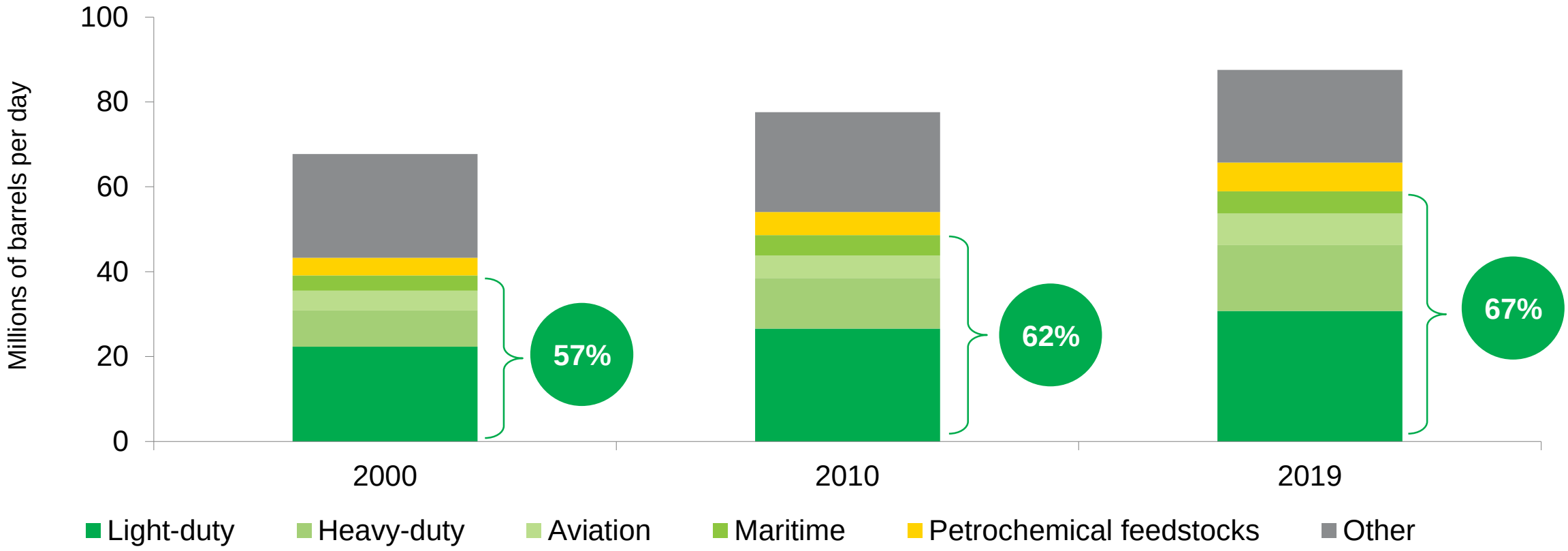
Refined product demand transition

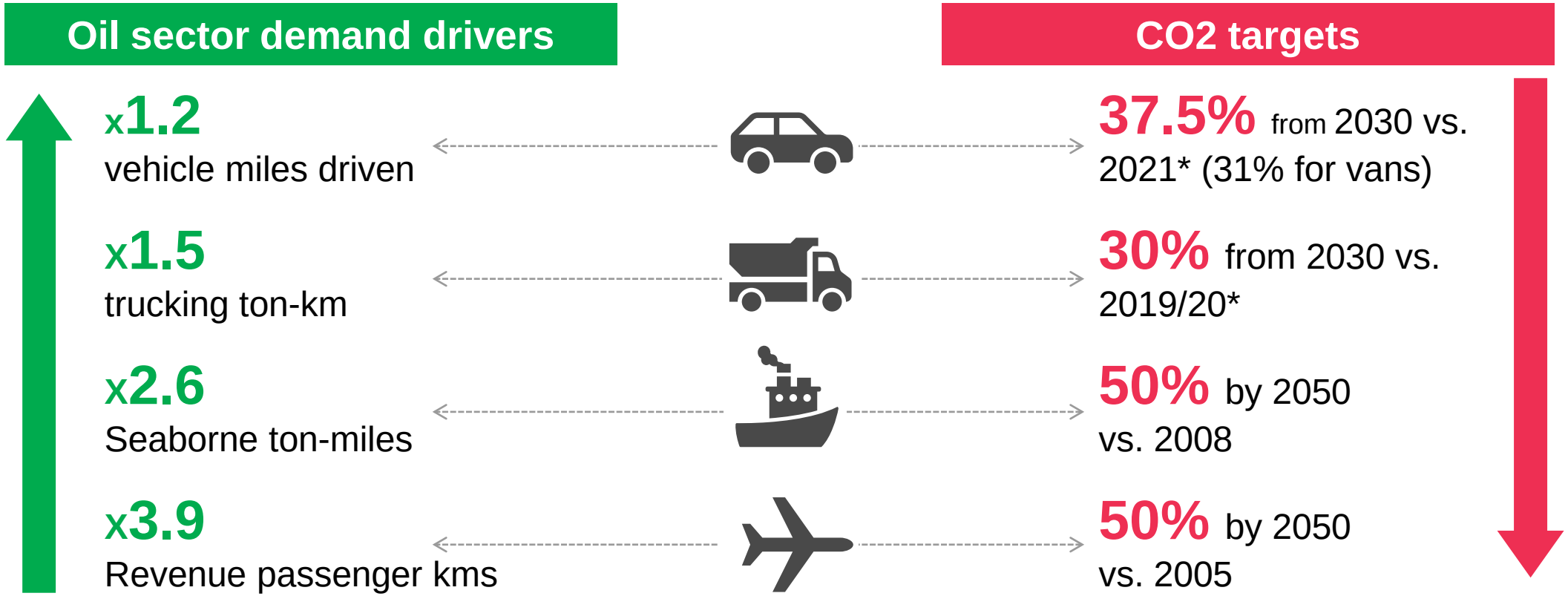
Tackling emissions from the transportation sector is at the center of the energy transition

Global refined product demand by sector



Source: IHS Markit

The transportation sector is facing a sustainable growth challenge



Notes: Light-duty sector oil demand driver is miles driven. IHS Markit expects total miles driven to increase by 23% by 2030 versus 2021 in its Rivalry scenario and by 22% in its Autonomy scenario. The EU has agreed a goal to reduce the fleet-wide average CO2 emissions of new passenger cars by 37.5% from 2030 compared to 2021 levels. A lower target of 31% will apply to vans. Heavy-duty sector oil demand driver is trucking ton-km. IHS Markit expects trucking ton-km to increase by 54% by 2030 versus 2019 in its Rivalry scenario and by 55% in its Autonomy scenario. The EU is considering regulation to reduce the fleet-wide average CO2 emissions of new lorries by 30% from 2030 compared to 2019 levels. Shipping sector oil demand driver is seaborne ton-miles. IHS Markit expects seaborne ton-mile to increase by 258% by 2050 versus 2008 in its Rivalry scenario and by 274% in its Autonomy scenario. The IMO has agreed a goal to reduce the nominal CO2 emissions from international shipping by 50% in 2050 relative to 20018 levels. Aviation oil sector demand driver is international revenue passenger kilometers (RPKs). IHS Markit expects international RPKs to increase by 390% by 2050 versus 2005 in its Rivalry scenario and by 416% in its Autonomy scenario. The International Air Transport Association has set an aspirational goal to halve CO2 emissions from international aviation by 2050 relative to 2005 levels.

Each end-use sector has been scrutinizing the same menu of options

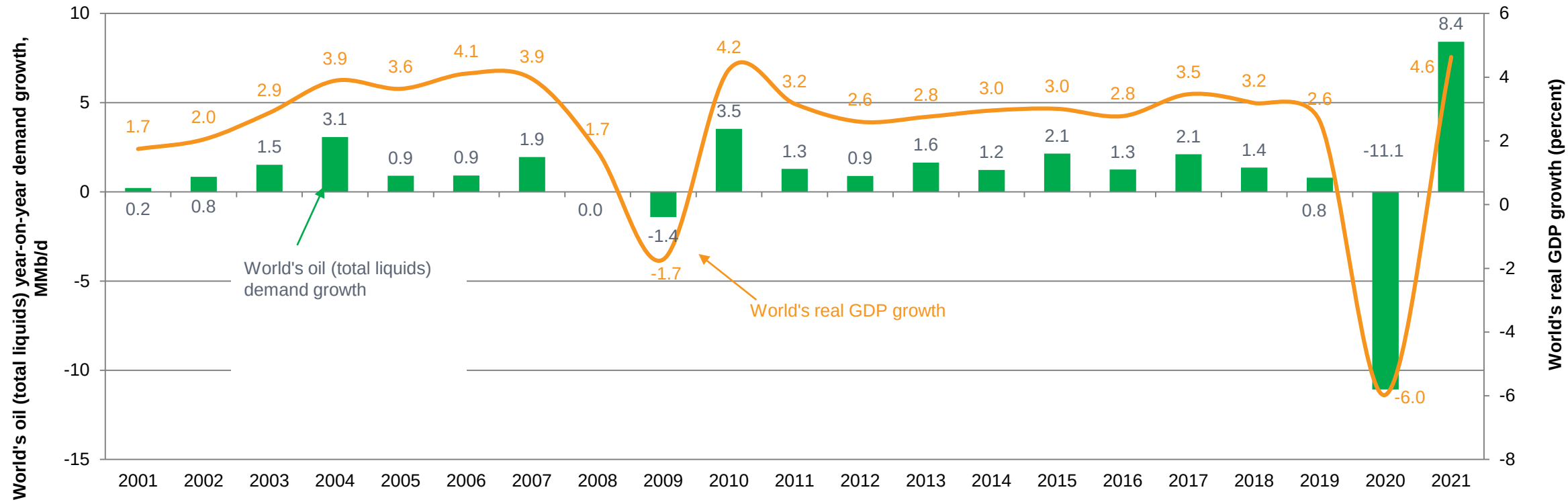
1. Improved operational efficiency
2. Better fuel economy
3. New propulsion systems
4. New fuels
5. Offsetting

The world of oil has been radically altered since the beginning of March

- Greatest demand decline in world oil history: -22 MMb/d in second quarter 2020
- Greatest volume of production cuts in world oil history: -14 MMb/d in second quarter 2020
- President Trump orchestrates global oil supply management deal: Overturns decades of US policy
- Negative crude oil price: -$37/bbl WTI on 20 April
- Halt to international travel: Vast majority of international passenger flights cancelled
- Global economy projected to shrink 5% in 2020: Most severe outcome since World War II
- **But the worst may be over. April appears to have been the bottom of the demand decline.**

Demand is set to bounce back…but not to 2019 levels anytime soon

World oil (total liquids) year-on-year demand growth versus world's real GDP growth



Note: Data for 2020 and 2021 are forecasts.

Source: IHS Markit

The post-Covid-19 recovery path is unclear and could have major ramifications for the energy transition

Current situation

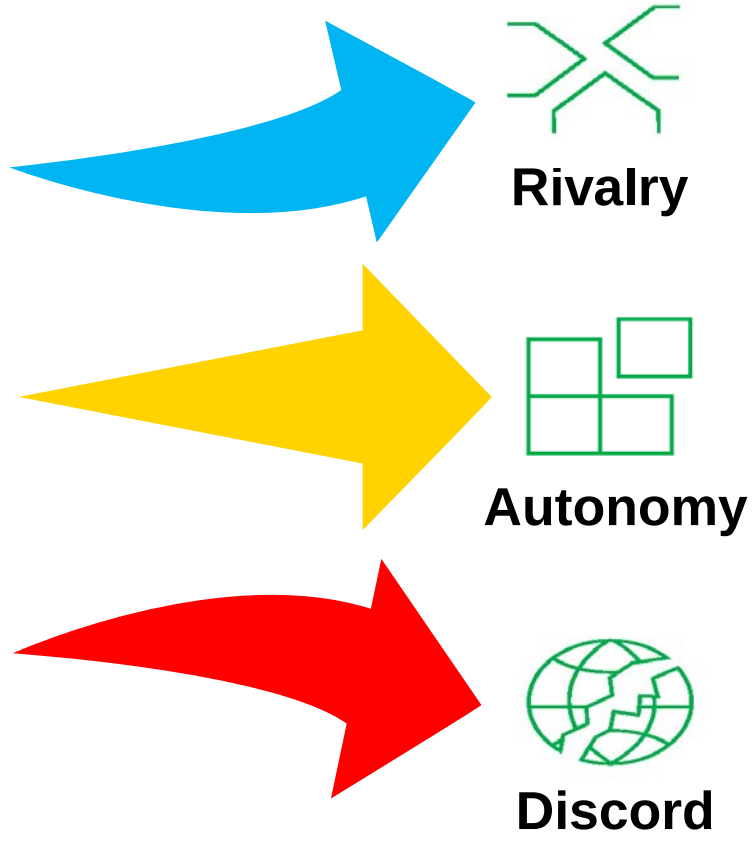
- Severe global recession
- Sharp, sustained oil price drop
- Shift in business operations
- Shift in consumer behavior
- Fear factor / political impact

Key questions

How durable will behavioural changes be?

How will policy priorities change?

Scenario results



What future for oil?

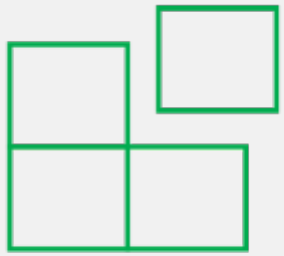
Market reset: Shocked into a new oil balance

RIVALRY
"IHS Markit Planning Case"

Despite fairly limited behavioral changes, **demand is reset at a structurally lower level.**

Globalization progresses; economic, political, and energy market competition intensifies.

The peak no one noticed—or expected



AUTONOMY

Significant changes in consumer behavior and political priorities help **accelerate the energy transition**.

Technology, changing consumer behavior, and stronger regulations alter energy market dynamics, accelerating the energy transition away from fossil fuels.

The virus that killed globalization and the energy transition

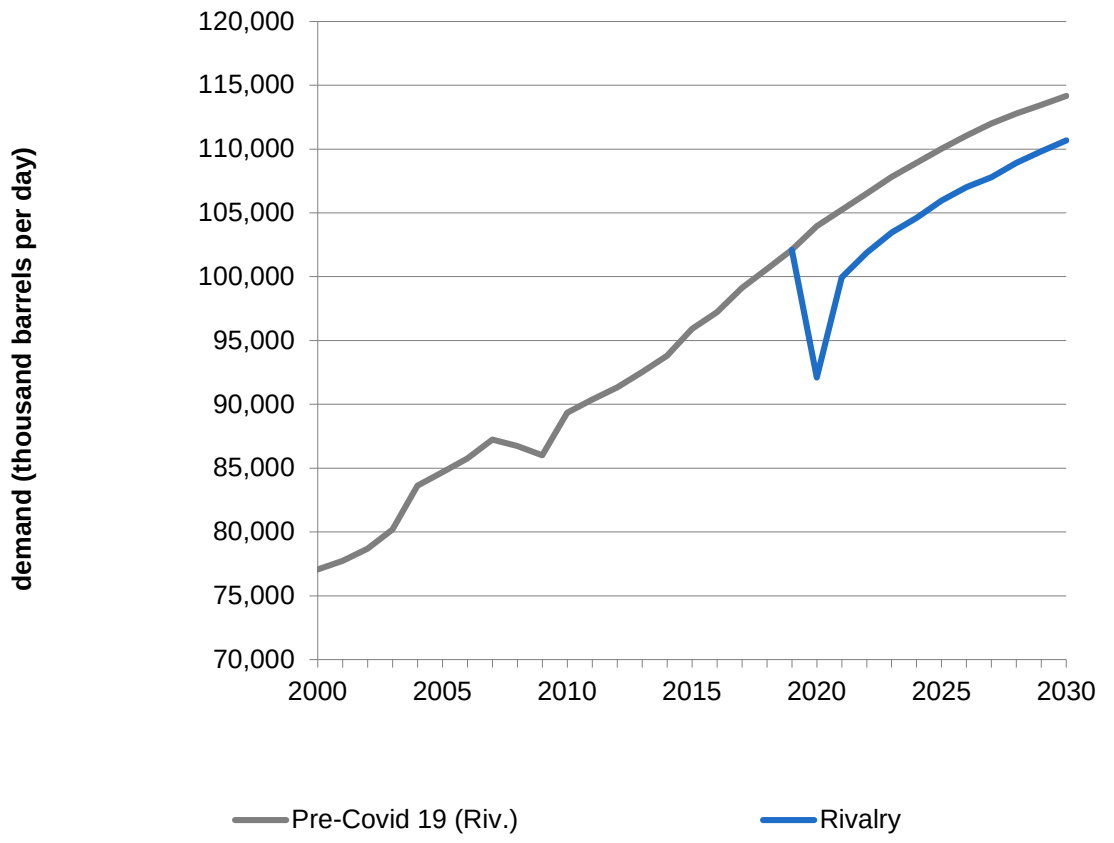
DISCORD

Politics shifts inward and focus moves to short-term domestic issues. Efficiency slows and global climate agreements fail.

Economic and geopolitical fragmentation drives uncertainty and long-term period of market weakness.

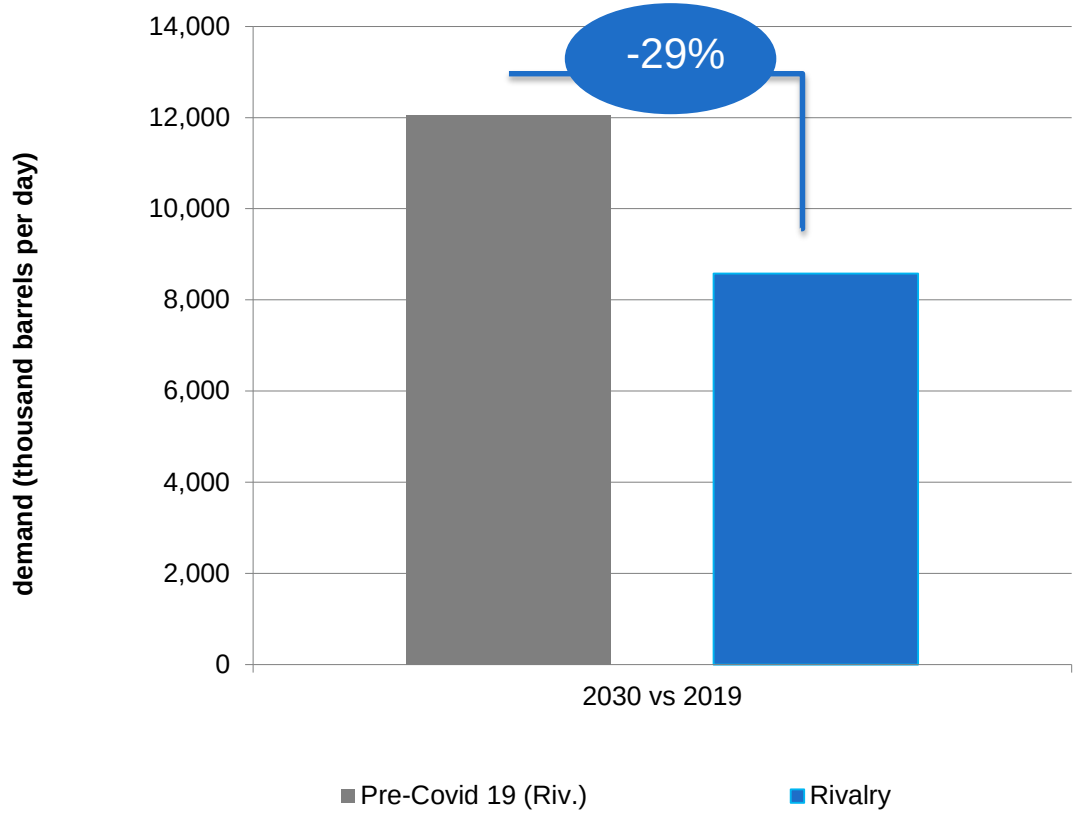
In the base (Rivalry) case, demand is reset at a lower level, significantly curbing future growth

Global total liquids demand 2000-2030



Source: IHS Markit

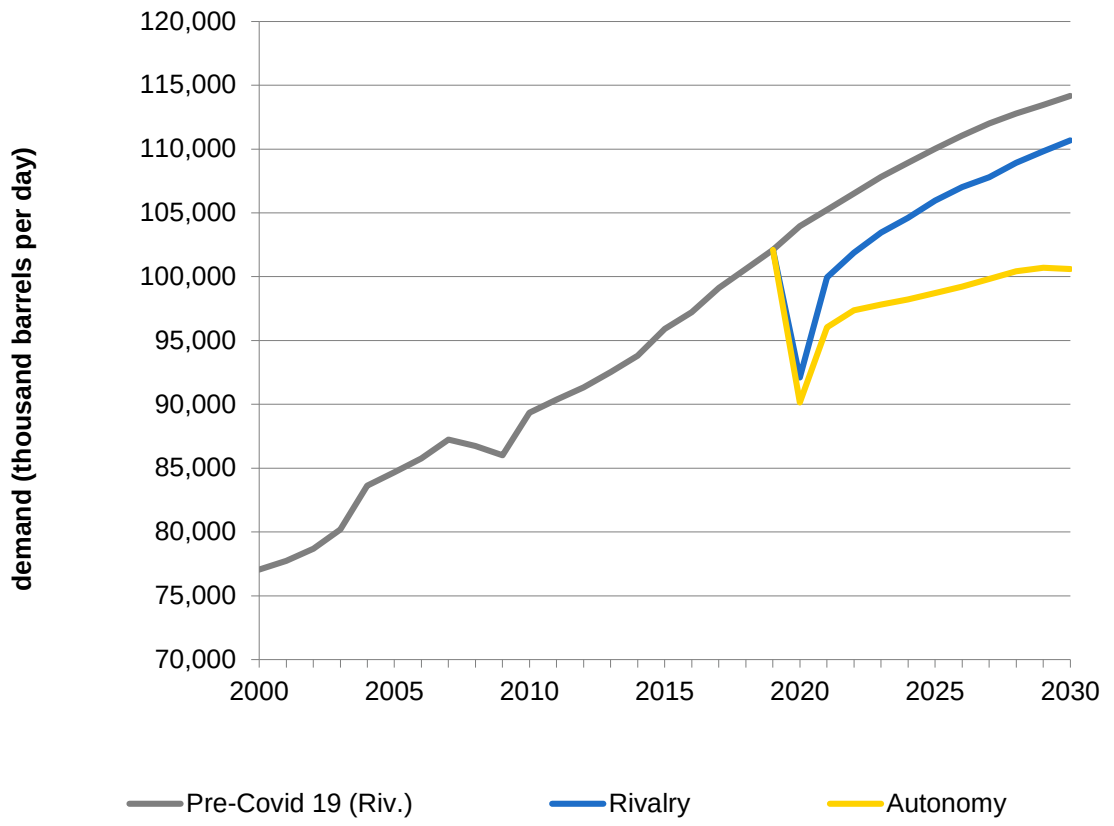
Global total liquids demand growth 2019-2030



Source: IHS Markit

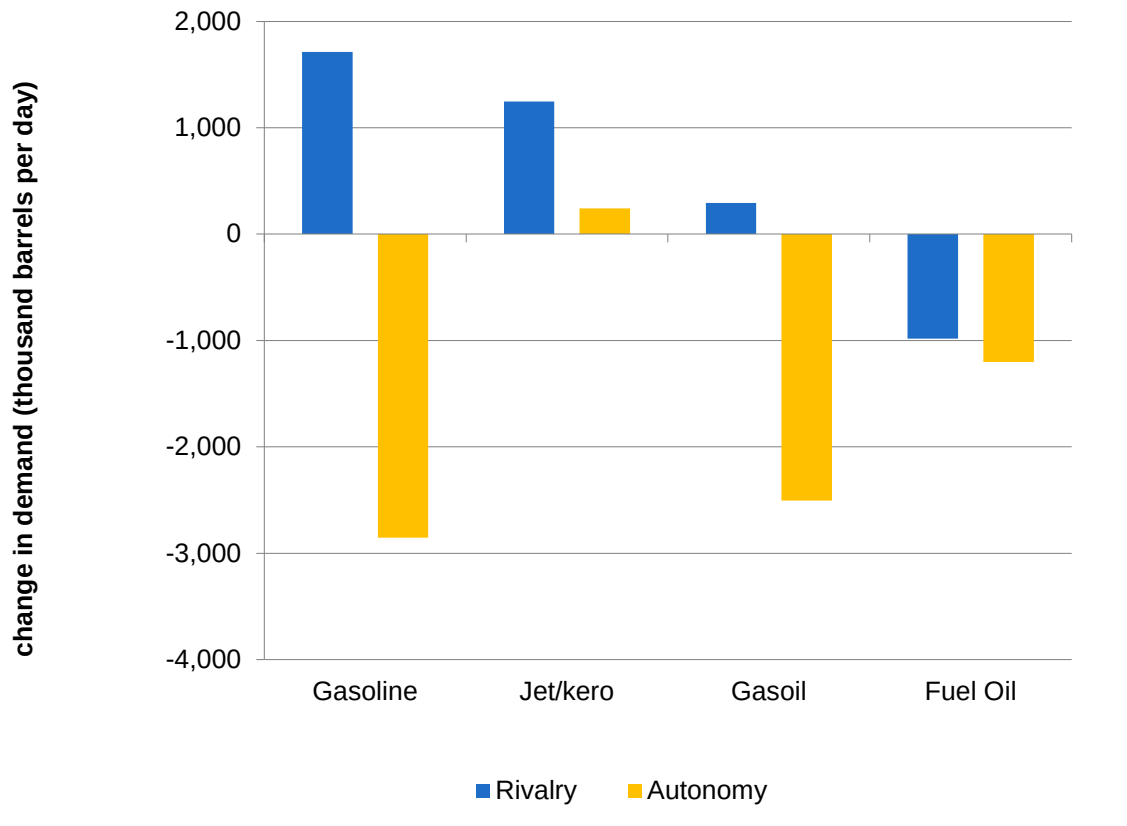
In the Autonomy scenario, demand for most refined products will be well below 2019-levels by the end of the decade

Global total liquids demand 2000-2030



Source: IHS Markit

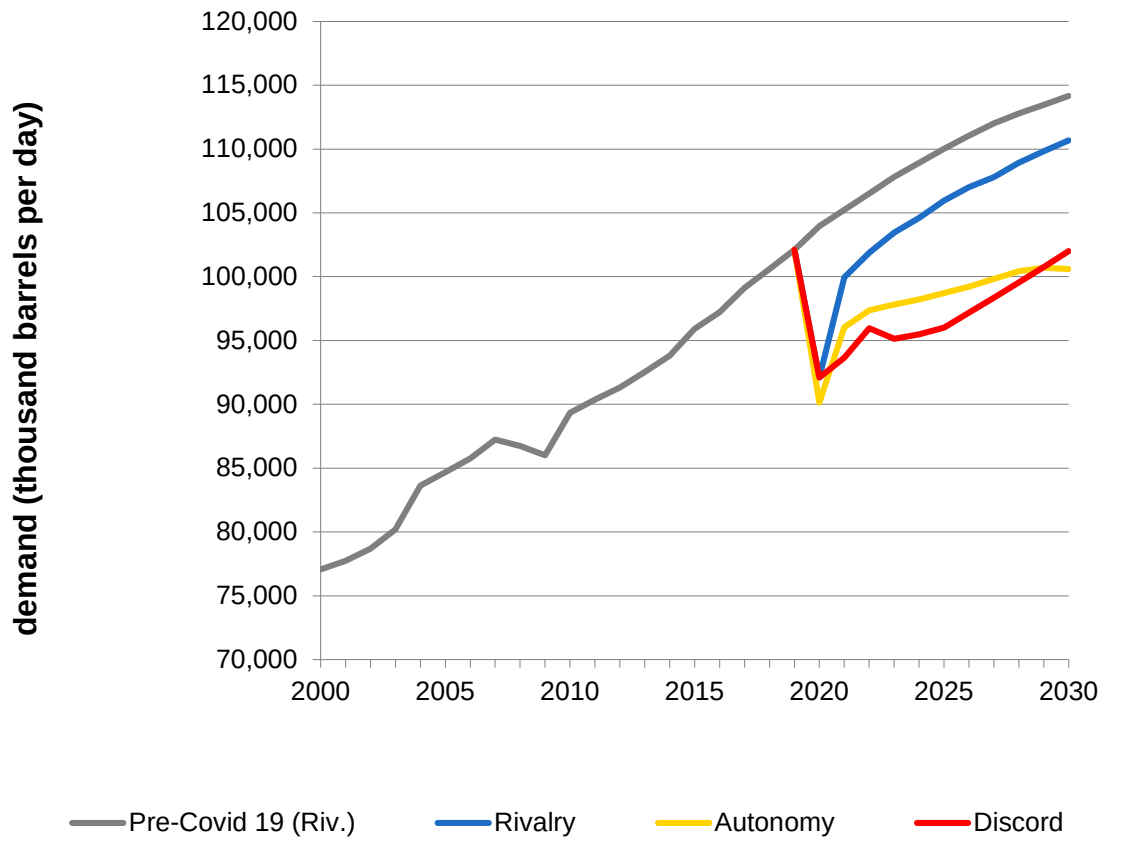
Global change in refined product demand 2019-2030



Source: IHS Markit

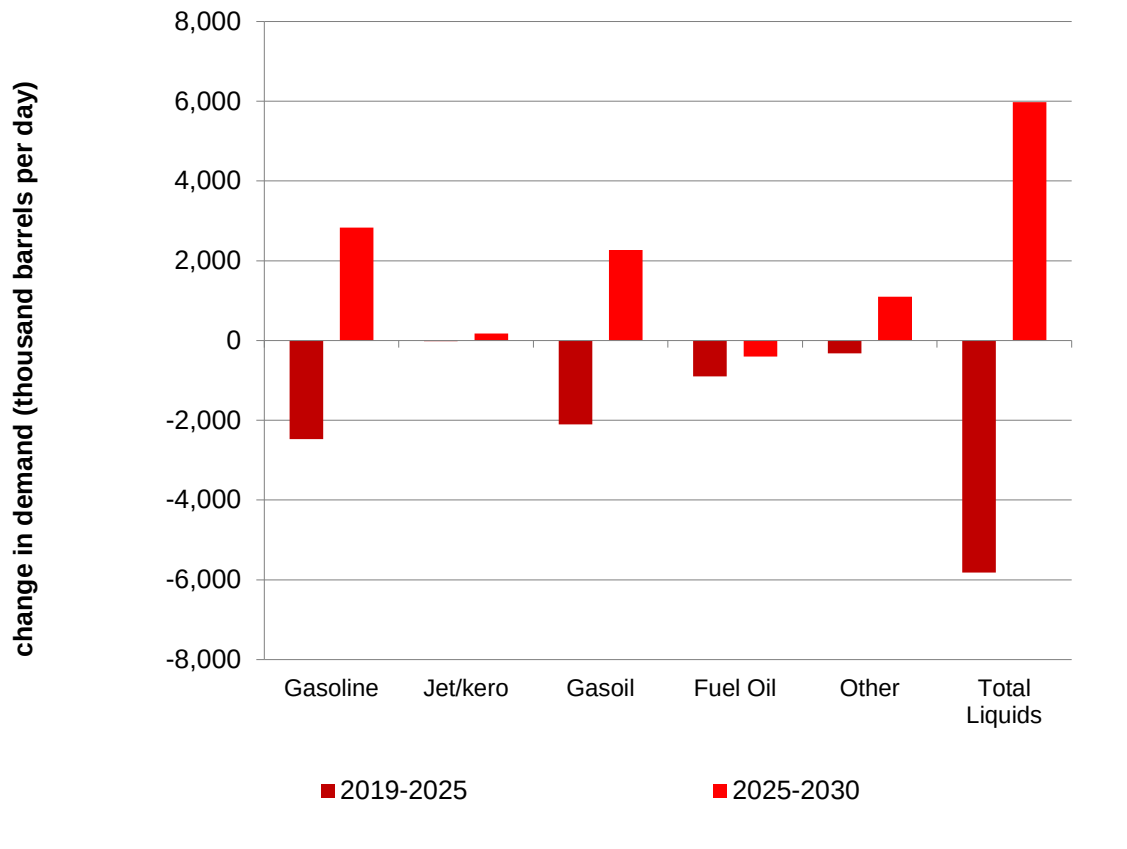
In the Discord scenario, the energy transition takes a back seat as economies recover

Global total liquids demand 2000-2030



Source: IHS Markit

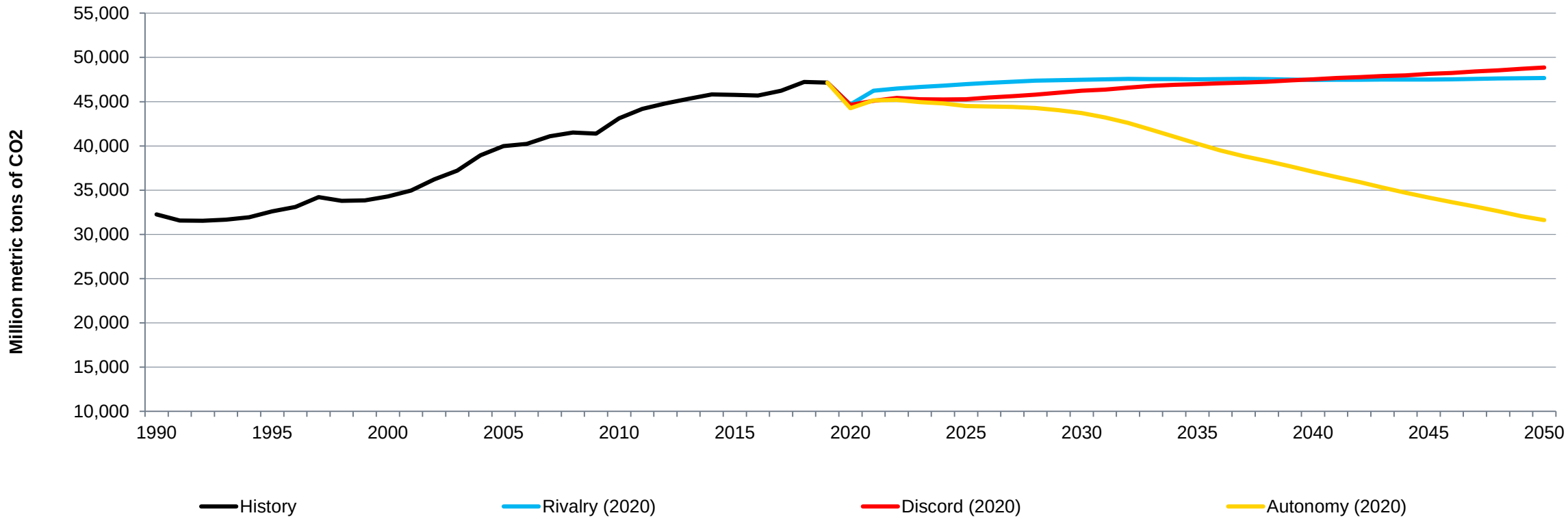
Global change in demand 2019-2030 (Discord)



Source: IHS Markit

An Autonomy scenario can bring us close to the Paris climate agreement goals

Total GHG emissions by scenario, 1990–2050



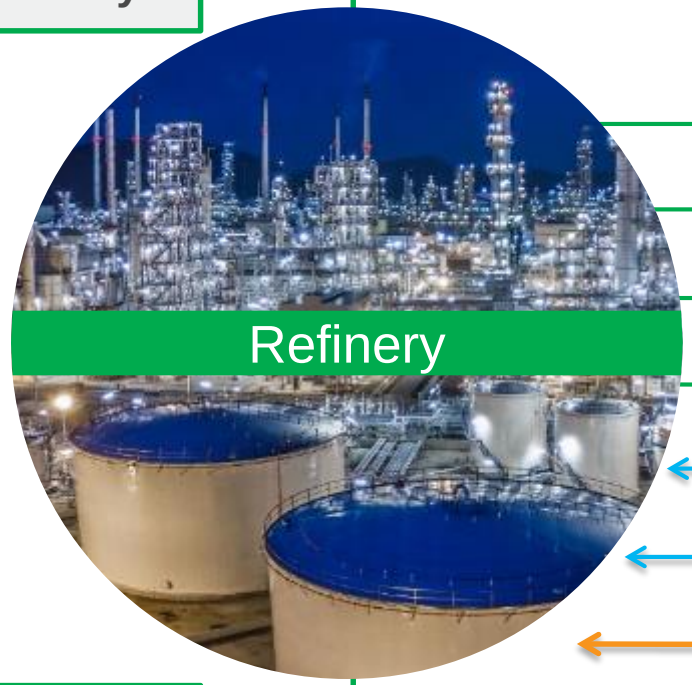
Note: Includes energy- and nonenergy-related emissions; energy-related emissions include all carbon dioxide (CO_2) emissions from energy production and use but do not include methane emissions related to oil and gas production and distribution. Nonenergy-related emissions are mainly methane and nitrogen oxide (NO_x) emissions from agriculture, waste, and industrial processes.

Source: IHS Markit

Downstream response

Refinery and petrochemical plant integration discussions have returned

Crude flexibility



Naphtha →

Reformate →

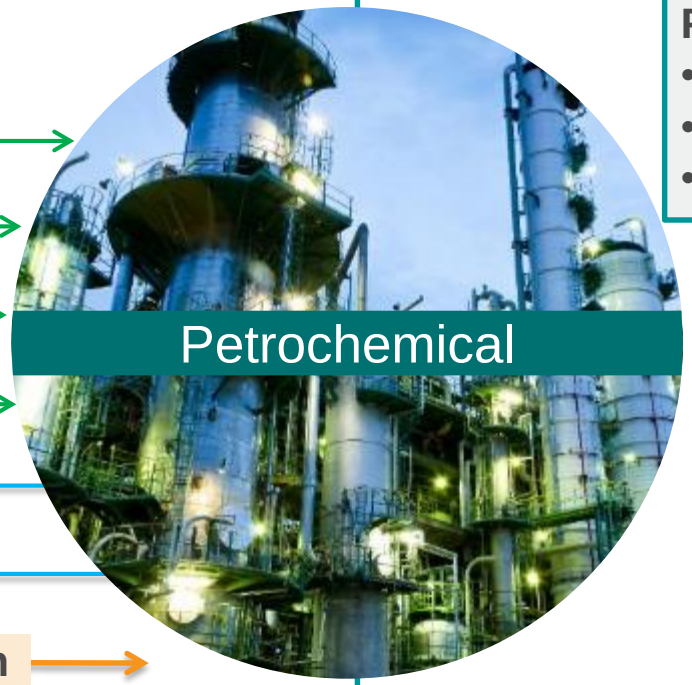
Propylene →

C2 & LPG Gas →

← Hydrogen

← C_4

= Energy integration



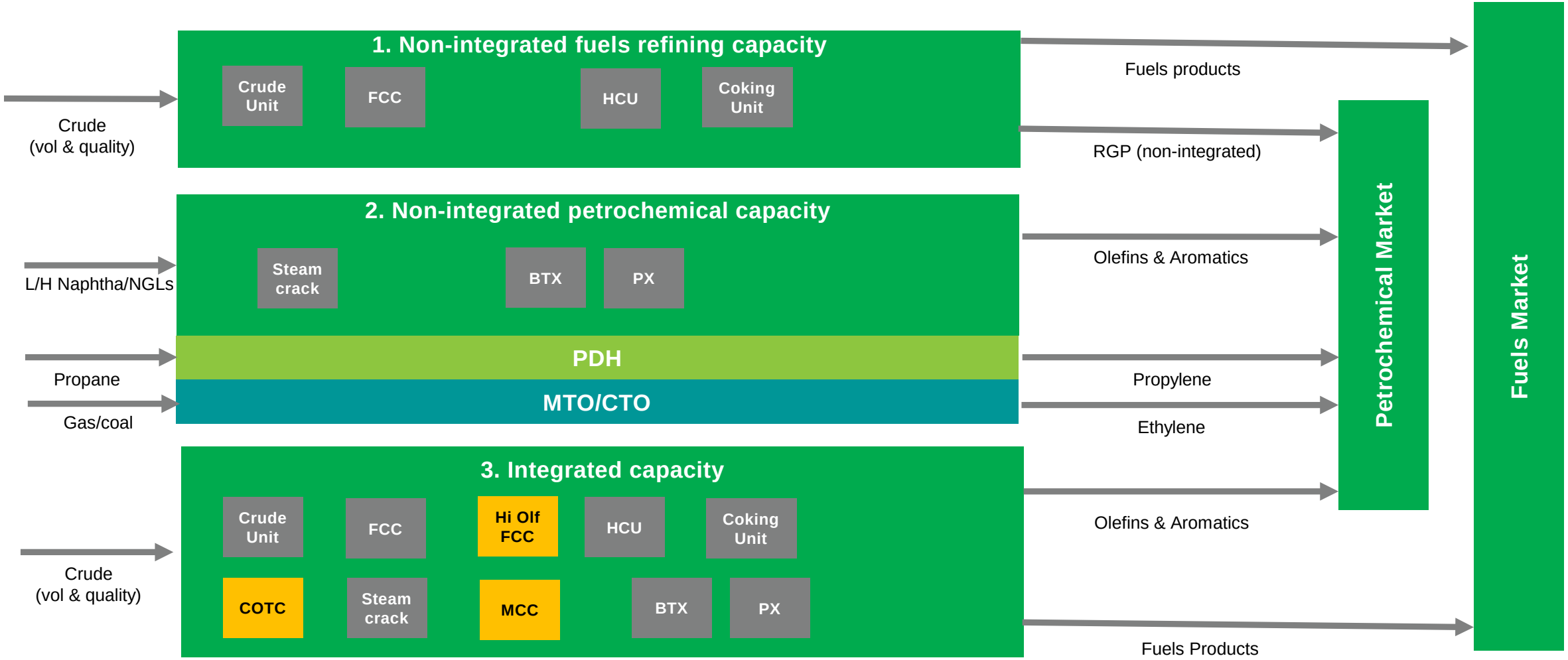
Feed flexibility
- Ethane
- LPG
- Condensate splits

Fuels
Lube base oil

General operations and support (G&A) for joint site operations

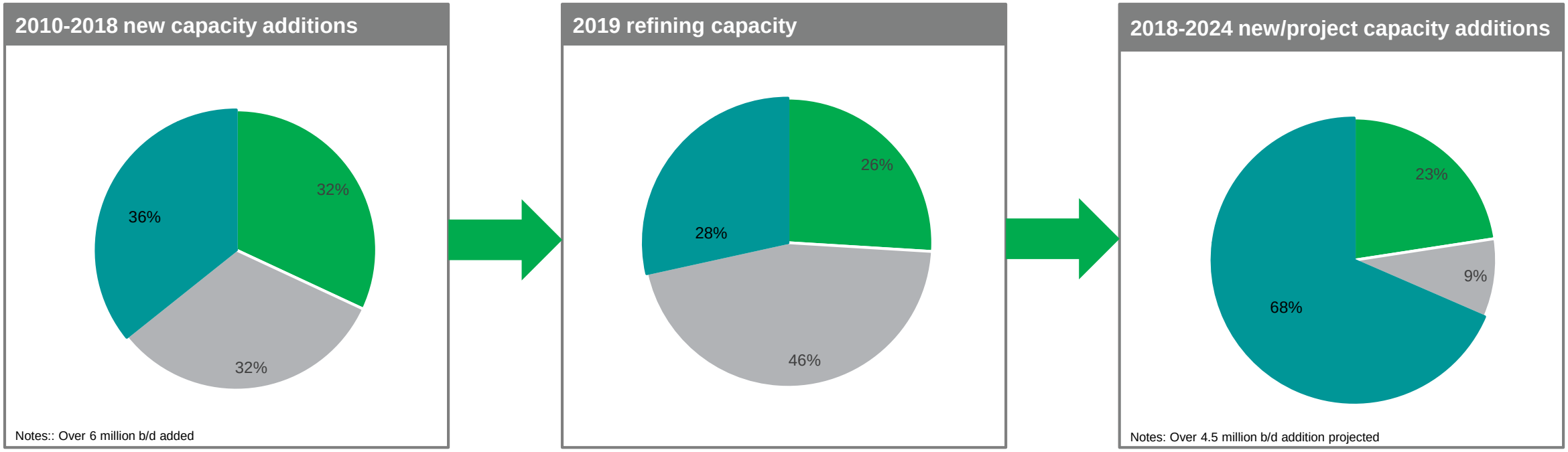
Petrochemicals

Historically, companies built non-integrated refining for fuels growth…and produced low-cost by-products feedstocks for petrochemicals…but that will change



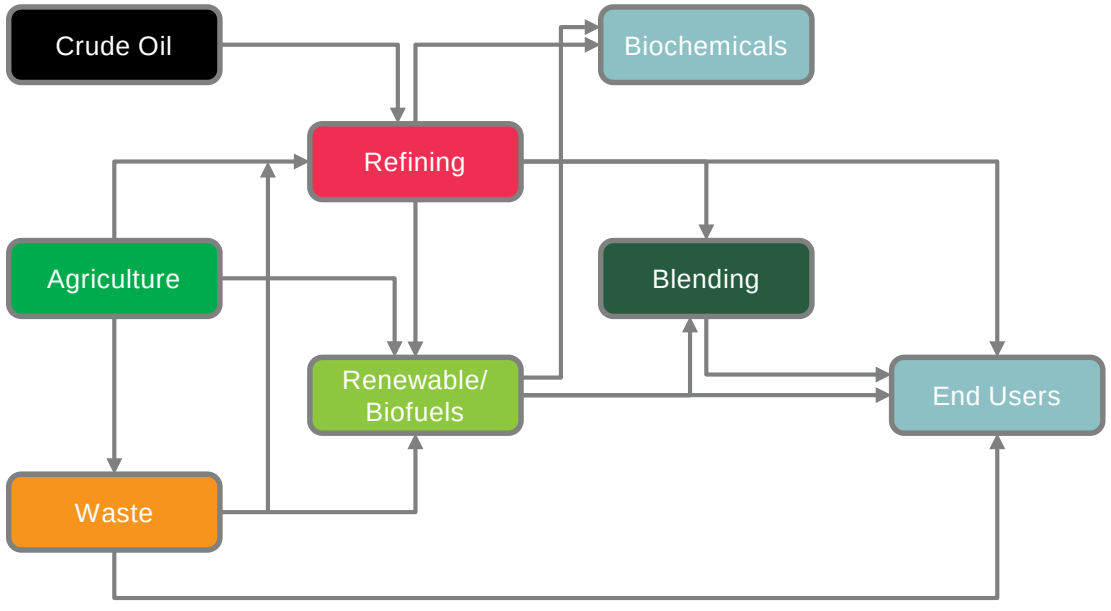
IHS Markit is undertaking a study to address the "when", "where" and "how much" industry downstream integration

The portion of the barrel of oil converted to petrochemical feedstocks has been, and continues to increase for the major refiners



Downstream oil and biofuels supply chains are merging from the consumer to processing in order to capture supply chain synergies

Generalized biofuels supply chain: Field and waste to wheels



Source: IHS Markit

- **Globally, about 90% of renewable diesel and jet by 2025 will be refining company owned**
- **In the United States, over 20% of ethanol production is owned by refining companies**
- The downstream oil and biofuels supply chains are merging:
  - Supply chain and customer overlap
  - Access to capital
  - Surplus processing capacity
  - Regulatory and economic necessity
- EVs are a common strategic threat
- Major investors/producers cut across the biofuels supply chain:
  - Major oil companies—Brazil ethanol
  - Refiners, ethanol majors, small independents—ethanol US
  - Small independents—US and EU ethanol and biodiesel
  - Refiners and majors—renewable diesel
  - Agri-business—ethanol and biodiesel
- Investment interest is increasing from refiners, agribusiness, independents

Conclusions

We are shifting from a world where carbon is free to one where it bears a cost…and it's **happening now**!

Covid-19 could be an inflection point for the energy transition but the way in which it plays out may vary across regions

Downstream company planning should test **defensive and offensive strategies** under different market scenarios

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