



RYSTAD ENERGY

ENERGY TRANSITION AND THE IMPACT ON OIL

AUGUST 17, 2021

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Meet the speaker



Claudio Galimberti

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Claudio Galimberti is a Senior Vice President of Analysis at Rystad Energy with an expertise in oil demand forecasting, both short- and long-term, Energy Transition and oil price modeling. An economist by training, he has worked in the oil industry for 20 years. He started his career with Shell Trading and Supply in Europe and has held a variety of senior Strategy, Commercial and Analytics roles out of the US over the past decade. He was at Shell for more than 15 years and gave a decisive contribution to the development of Shell Energy Transition Scenarios.

Prior to joining Rystad, he was with S&P Global Platts as Global Head of Demand, Refining, Agriculture & Risk in the Analytics organization, and subsequently as Senior Director of Platts Analytics Content Transformation. He was also at Trafigura as Global Head of Product Analysis. Claudio holds a Laurea Degree in Economics from Bocconi University in Milan, a Master of Finance from Tulane University and has been working on his Finance PhD from EDHEC.

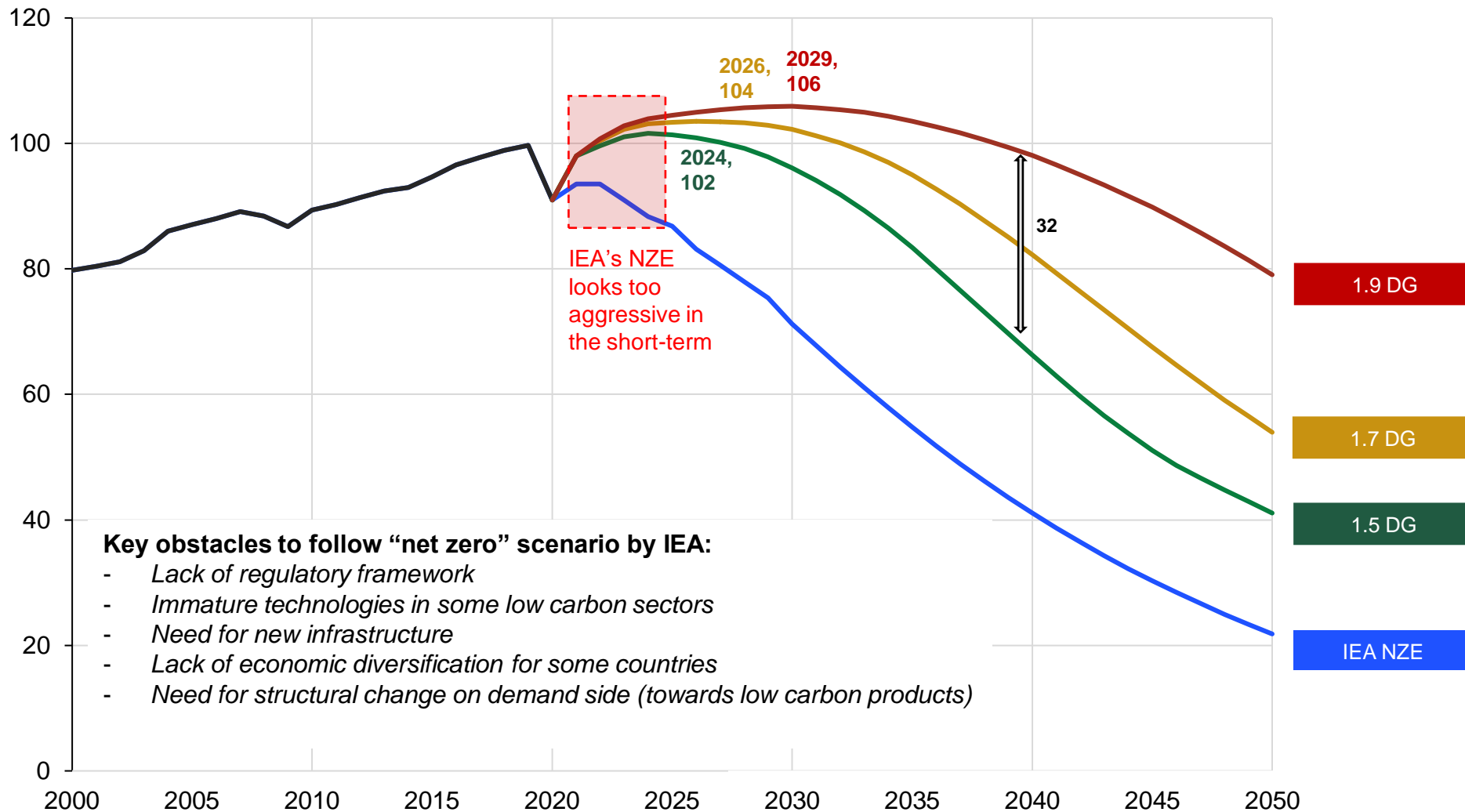
Topics

- Oil Demand in Rystad's **Three Energy Transition Scenarios**
- Oil Supply, **Call on Sanctioning** and **Oil Price** projections under the Three Scenarios
- Global Energy System: **Rystad's latest 1.5 DG Scenario**
- **Signposts**: which trajectories is the Energy Transition likelier to follow?

Rystad oil demand scenarios and IEA's Net Zero Emissions: key characteristics and differences

Long-term oil demand scenario

Million barrels per day

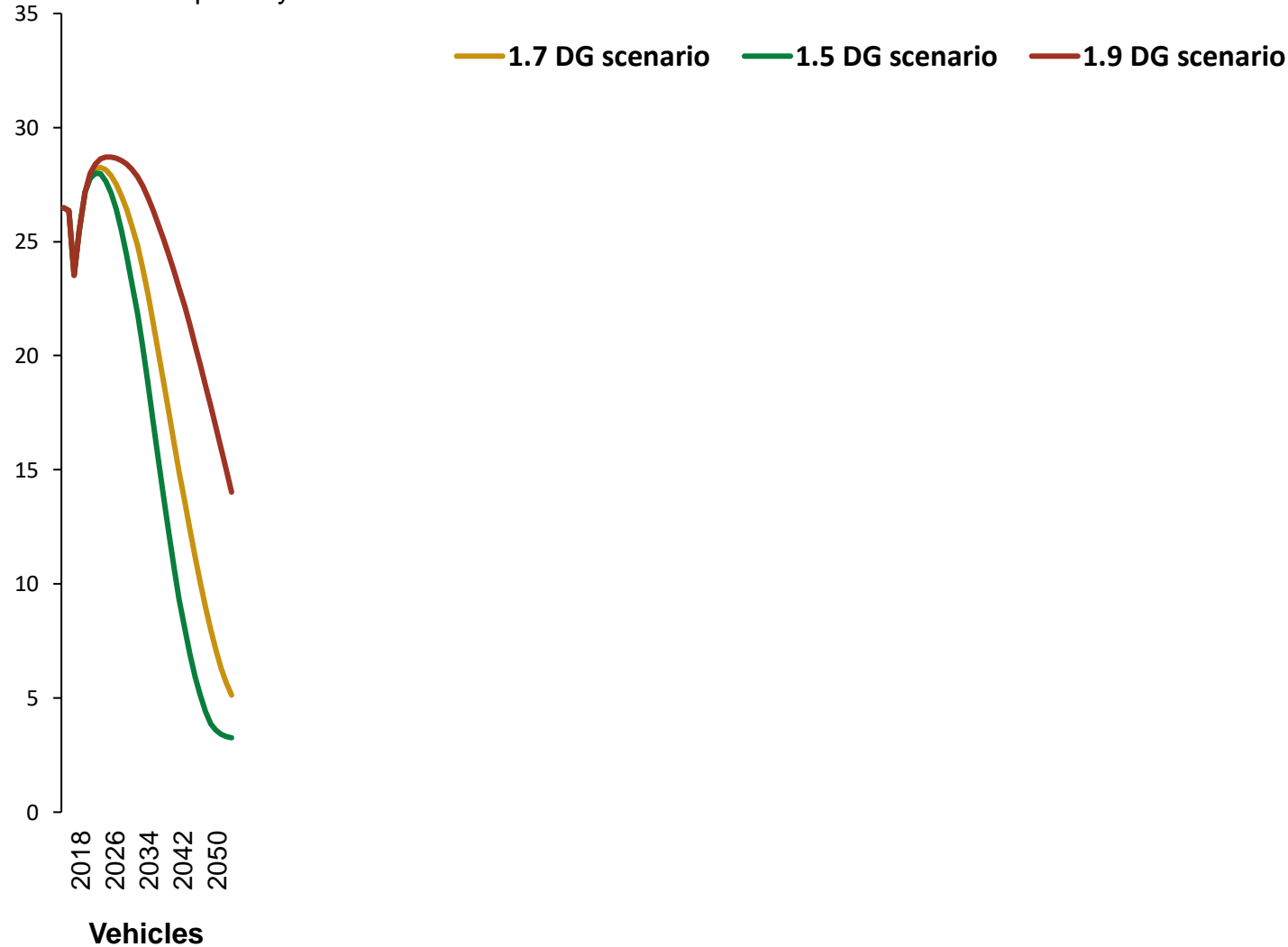


Source: Rystad Energy research and analysis, OilMarketCube, August 2021

Passenger road transport oil demand will undergo a profound shift in all three scenarios due to the fast-growing fleet of non-ICE powertrains

Long-term oil demand scenario revisions

Million barrels per day

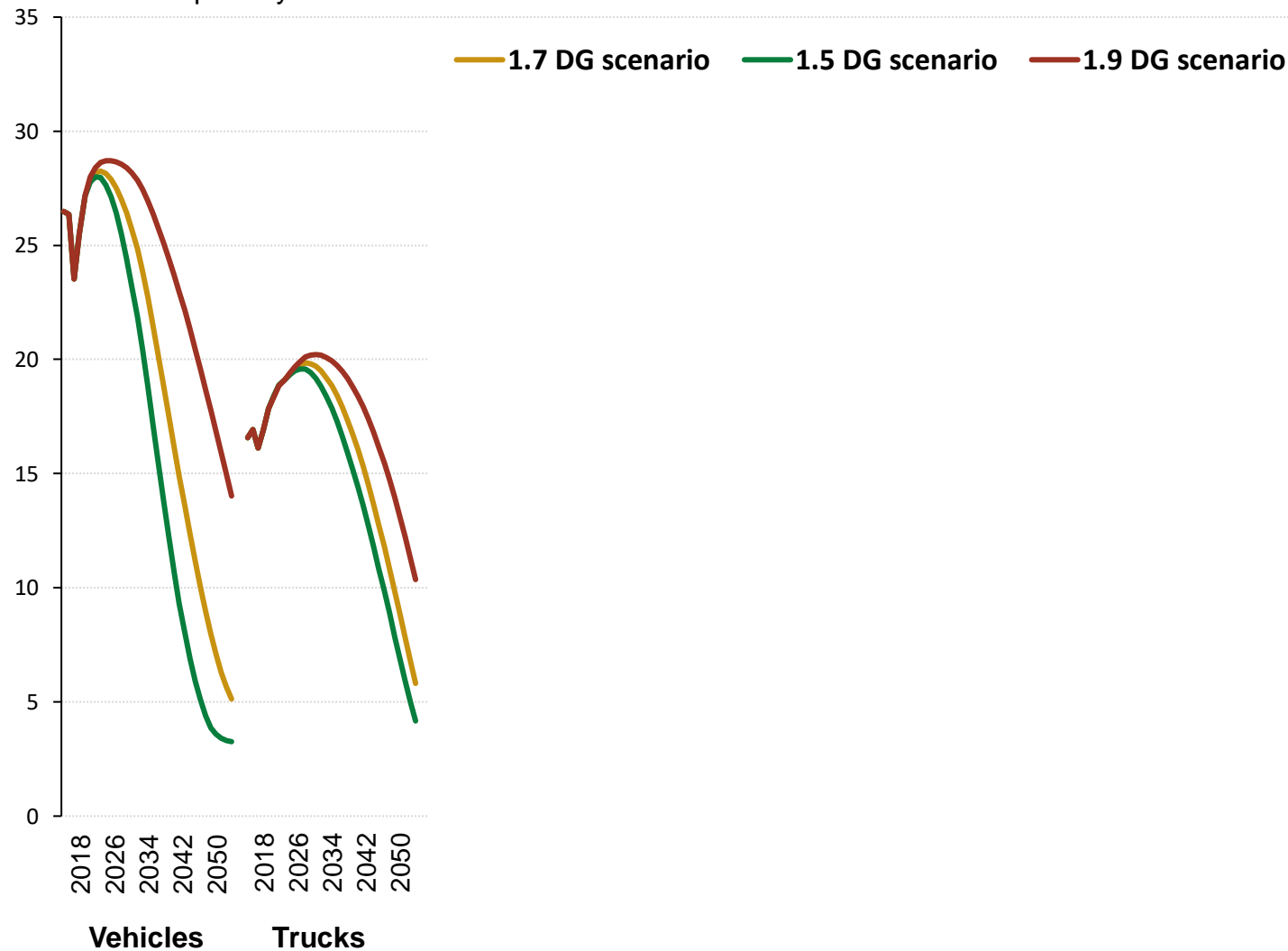


Source: Rystad Energy research and analysis, OilMarketCube, August 2021

Commercial road transport oil demand will be affected to a lesser degree, at least in the short-medium term, due to heavy duty vehicles' reliance on diesel

Long-term oil demand scenario revisions

Million barrels per day

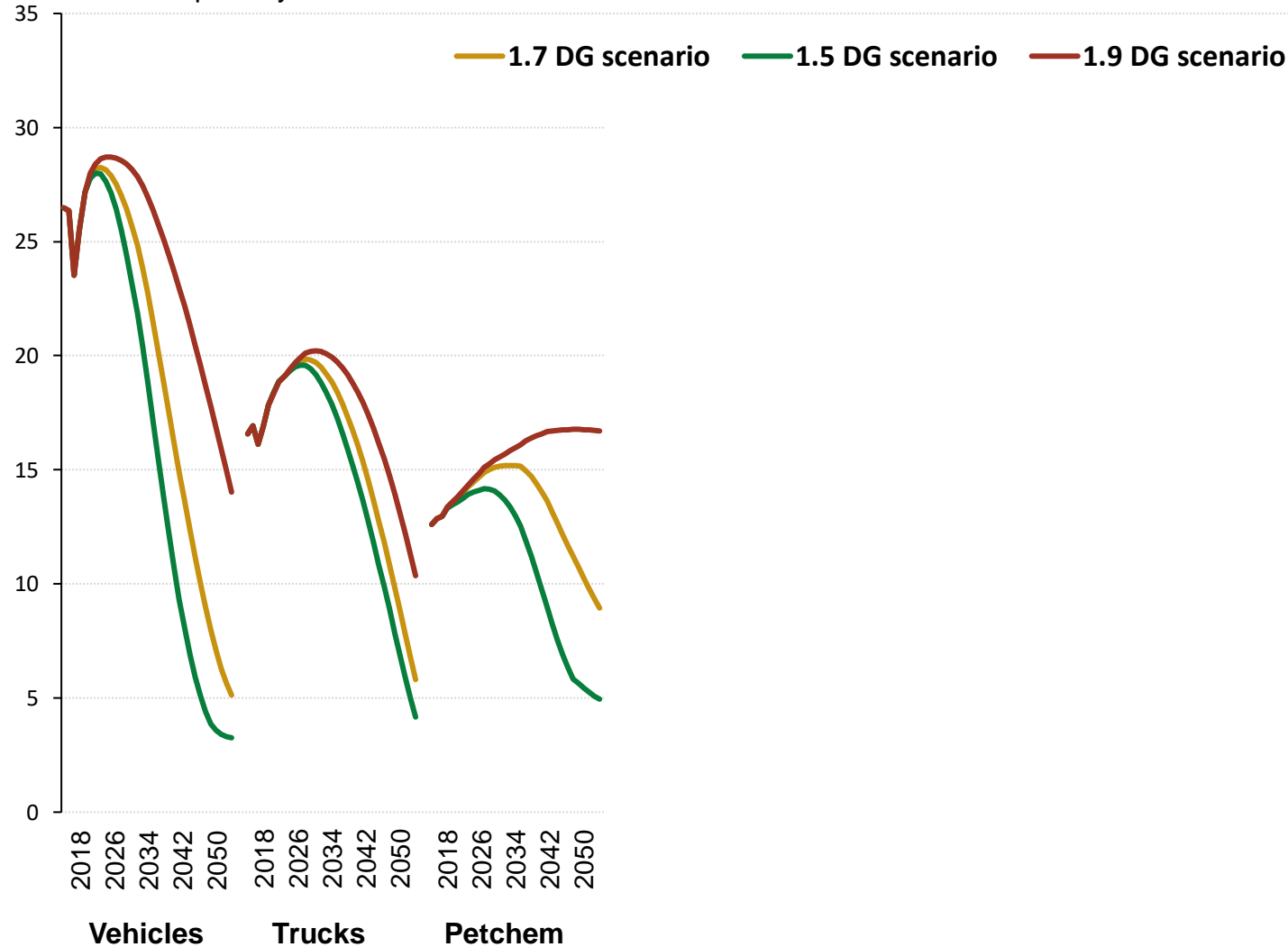


Source: Rystad Energy research and analysis, OilMarketCube, August 2021

Petrochemical could follow very different trajectories in the three scenarios based on regulatory/behavioral variables (plastic bans & recycling) & potential for fuel substitution

Long-term oil demand scenario revisions

Million barrels per day

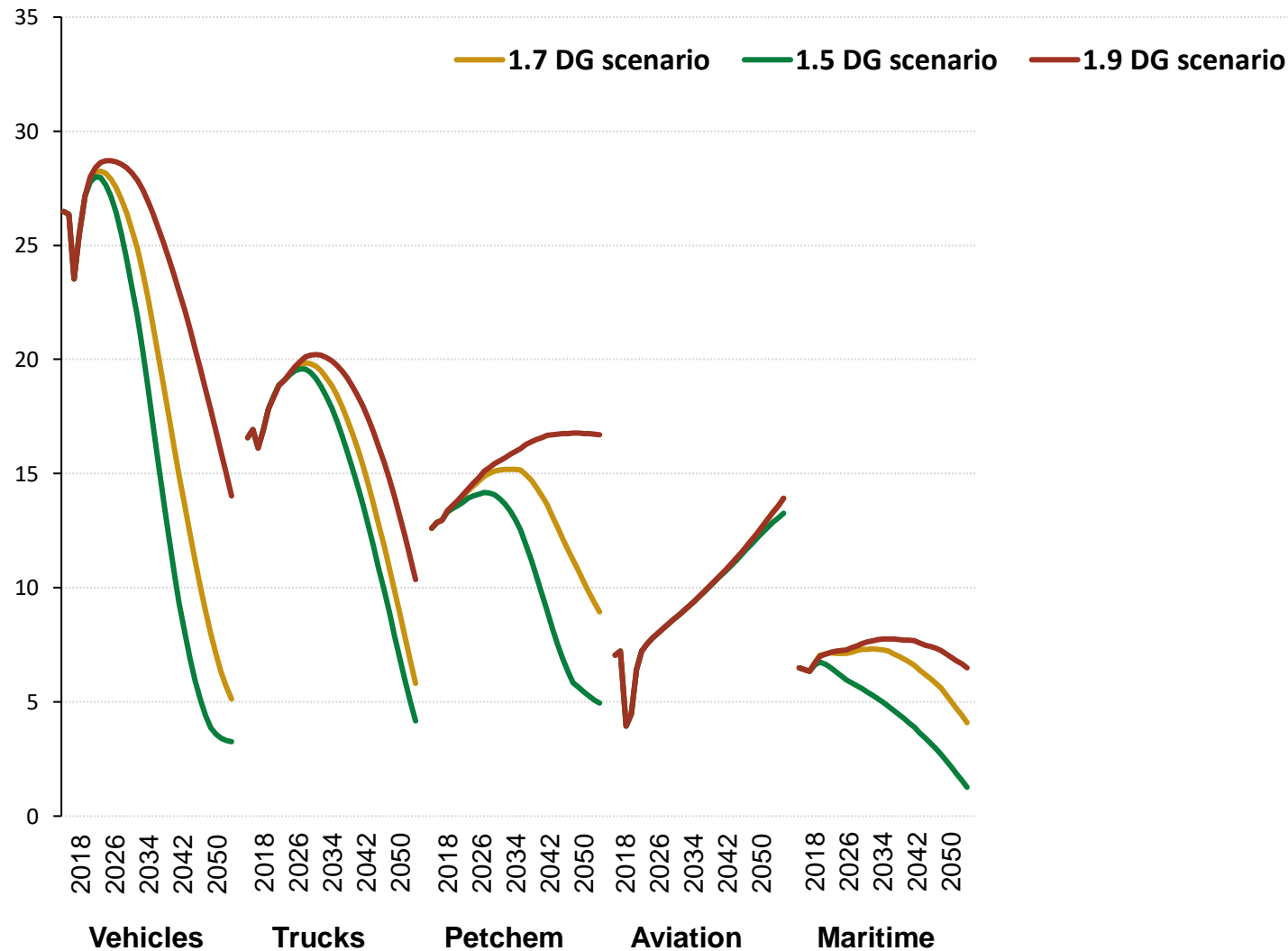


Source: Rystad Energy research and analysis, OilMarketCube, August 2021

Electrification is unlikely to affect aviation over the horizon considered but bio-jet could play an increasingly key role. In Maritime, LNG & H₂/ammonia could displace fuel oil

Long-term oil demand scenario revisions

Million barrels per day



Source: Rystad Energy research and analysis, OilMarketCube, August 2021

Stationary sectors' oil demand will continue to decline at varying speeds - with potential exception of Ags - following historical trends and the regulatory push to decarbonize.

Long-term oil demand scenario revisions

Million barrels per day

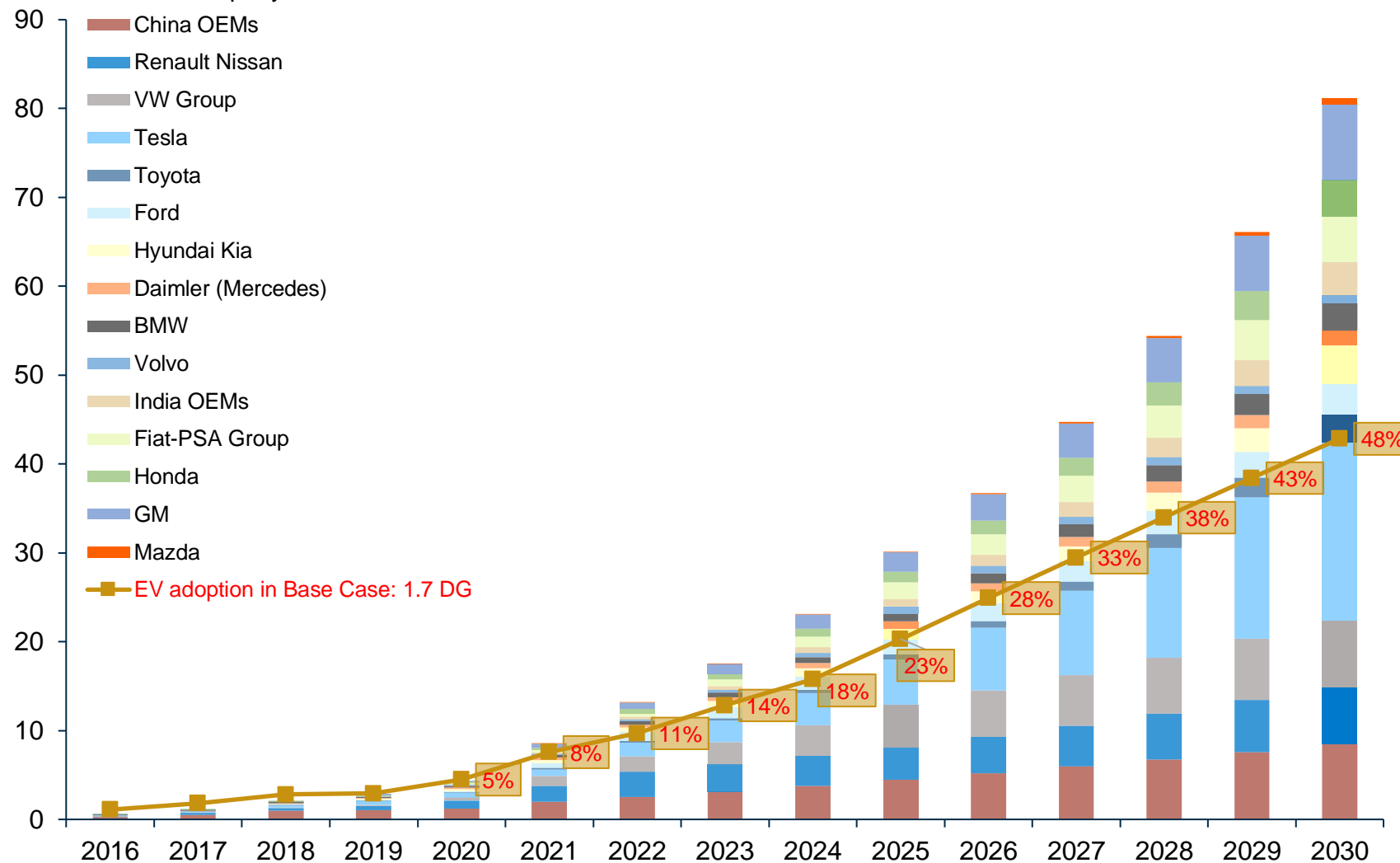


Source: Rystad Energy research and analysis, OilMarketCube, August 2021

Auto manufacturers have proposed ambitious long-term EV sales targets, which are aligned with our 1.5 DG scenario. Yet, we taper them down in our 1.7 DG mean scenario

Manufacturers' targets (identified targets shown in shaded columns; remaining targets interpolated)

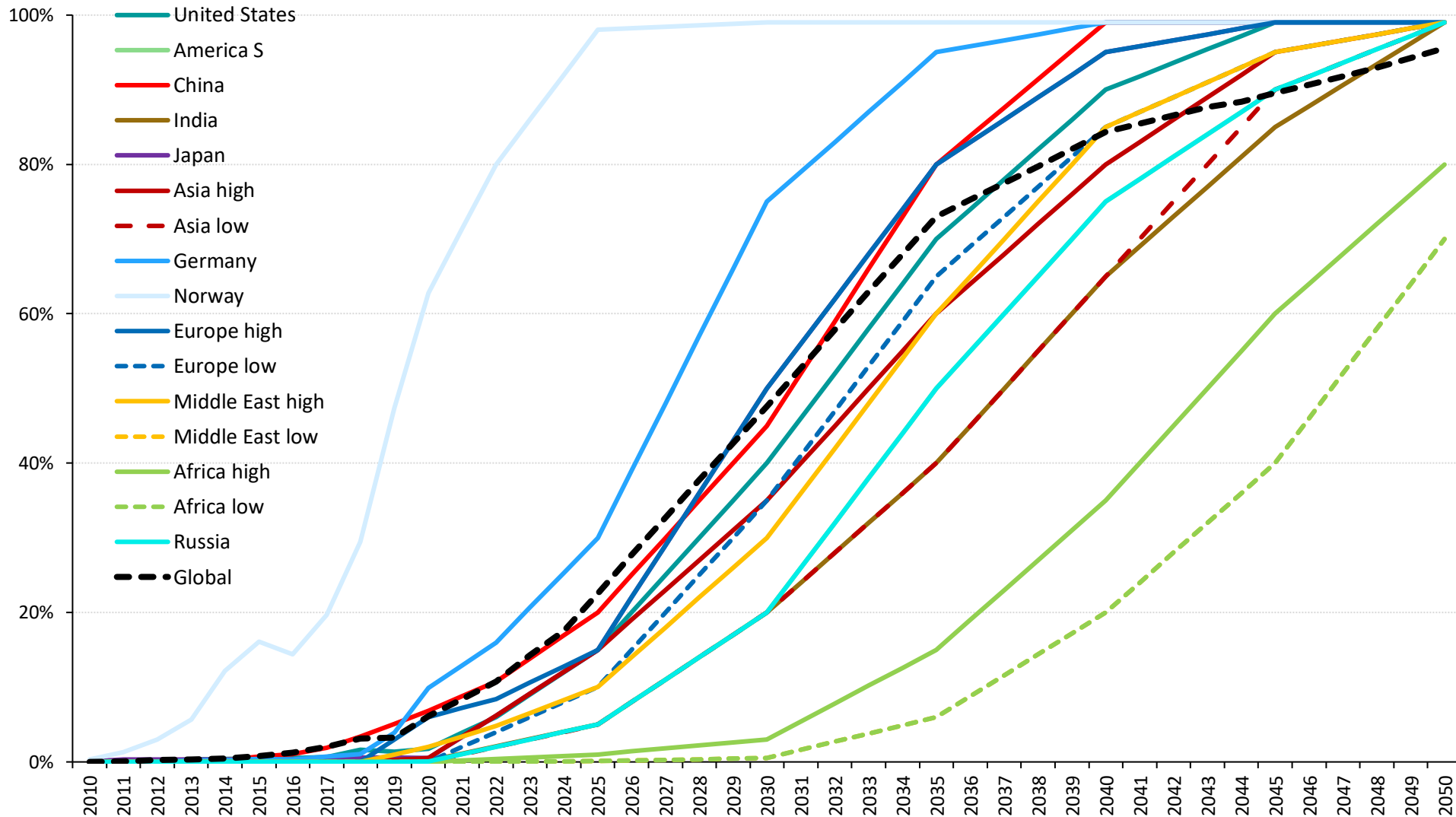
Million vehicle sales per year



By EV – electric vehicles we define BEV, FCEV and PHEV. BEV- battery electric vehicles, PHEV – plug-in hybrid electric vehicle, HEV – hybrid electric vehicle, FCEV – fuel-cell electric vehicle.
Source: Rystad Energy research and analysis, August 2021

EVs sales pick up speed and market share after 2025 as technology is rapidly adopted worldwide, although we will still witness vast regional differences.

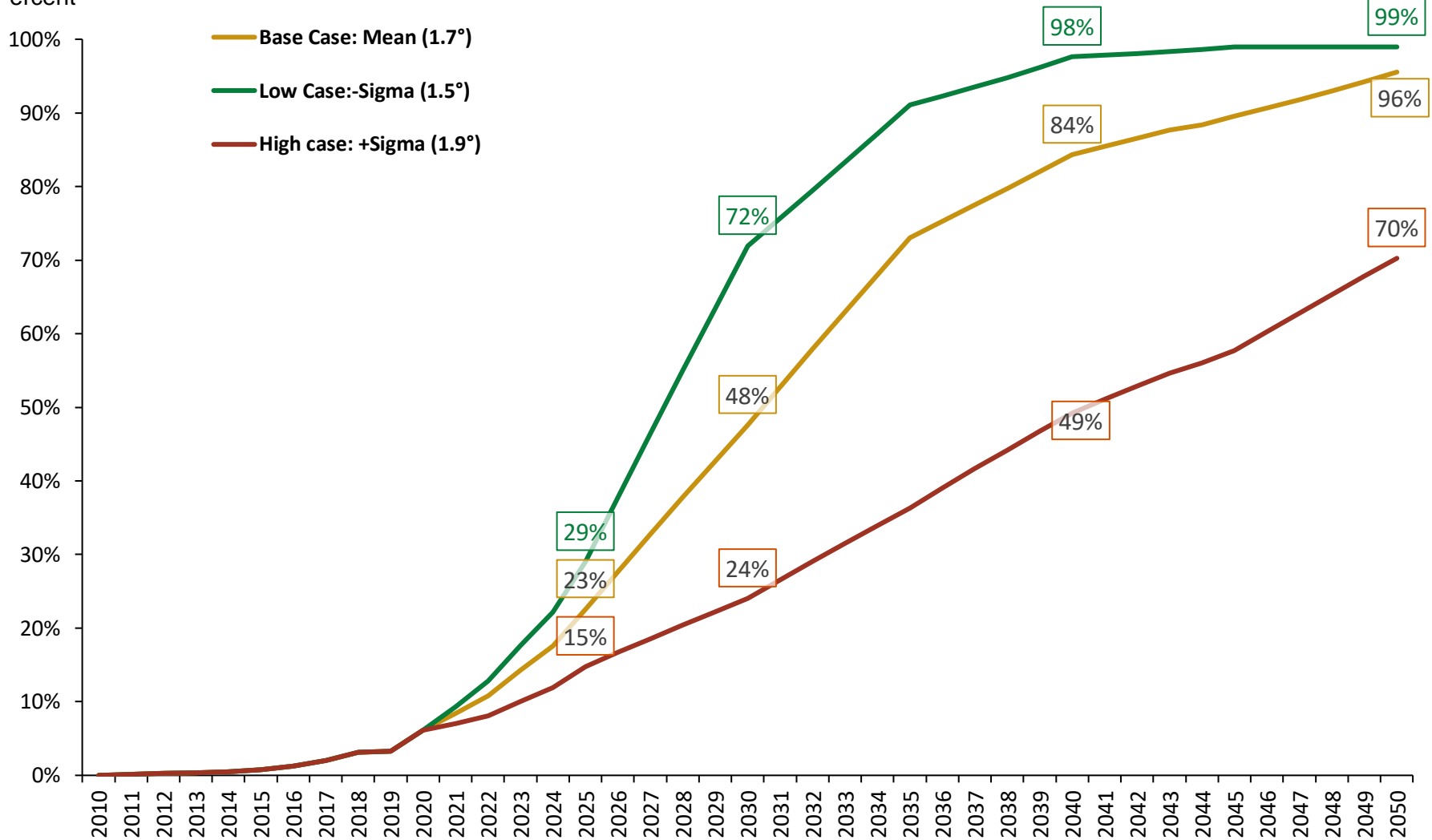
EV adoption rates (EV sales / Total passenger vehicle sales) by region



Source: Rystad Energy research and analysis, August 2021

Large variability in EV penetration in the three scenarios, depending on key regulatory and technology assumptions, with the 1.7 DG scenario as the most likely trajectory

EV share in total passenger vehicle sales by scenario
Percent

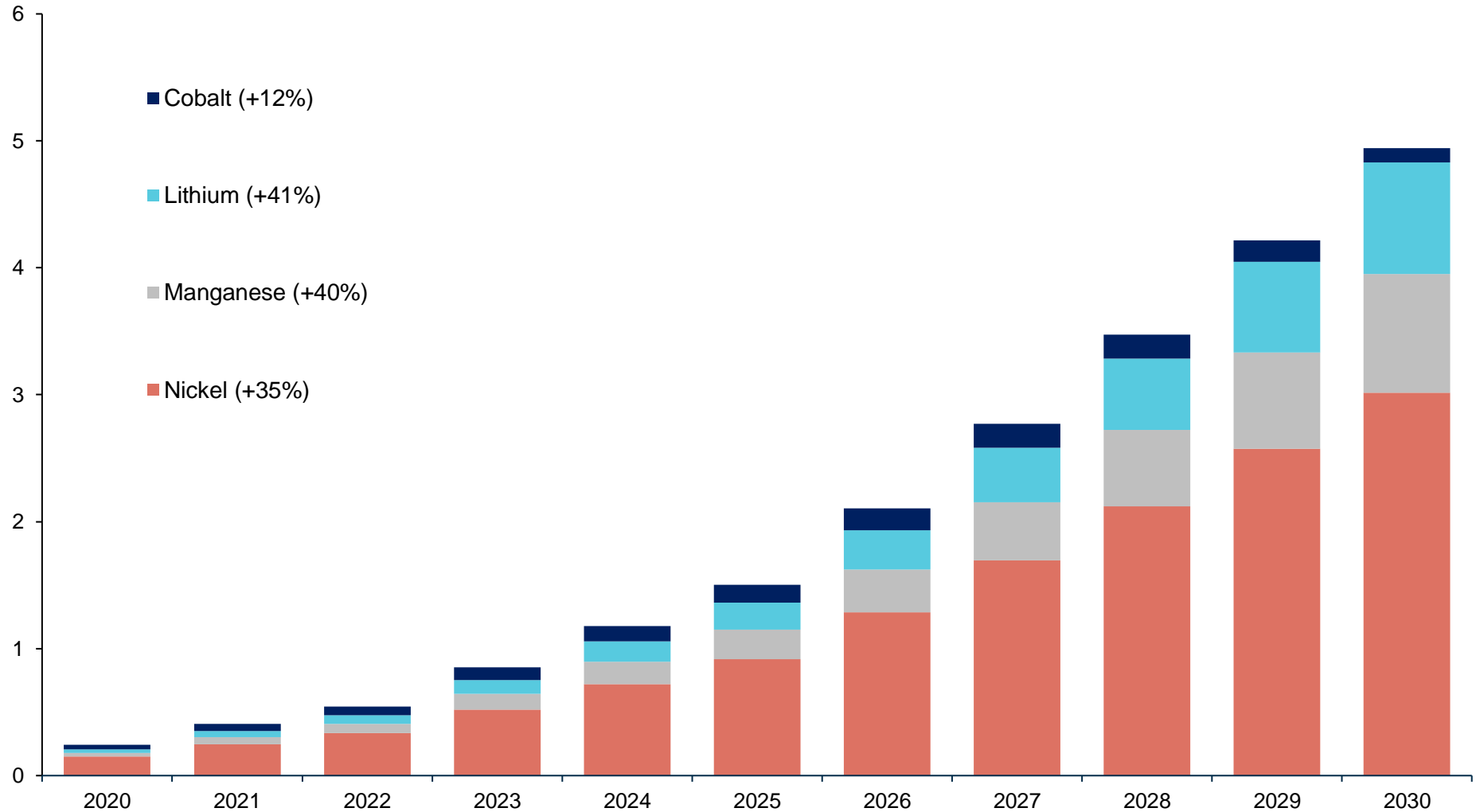


BEV – battery electric vehicles, PHEV – plug-in hybrid electric vehicle, HEV – hybrid electric vehicle, FCEV – fuel-cell electric vehicle. By EV – electric vehicles we define BEV, FCEV and PHEV.
Source: Rystad Energy research and analysis, August 2021

Demand of raw materials for EV batteries – potential bottleneck?

Total materials demand for key battery raw materials

Million tonnes

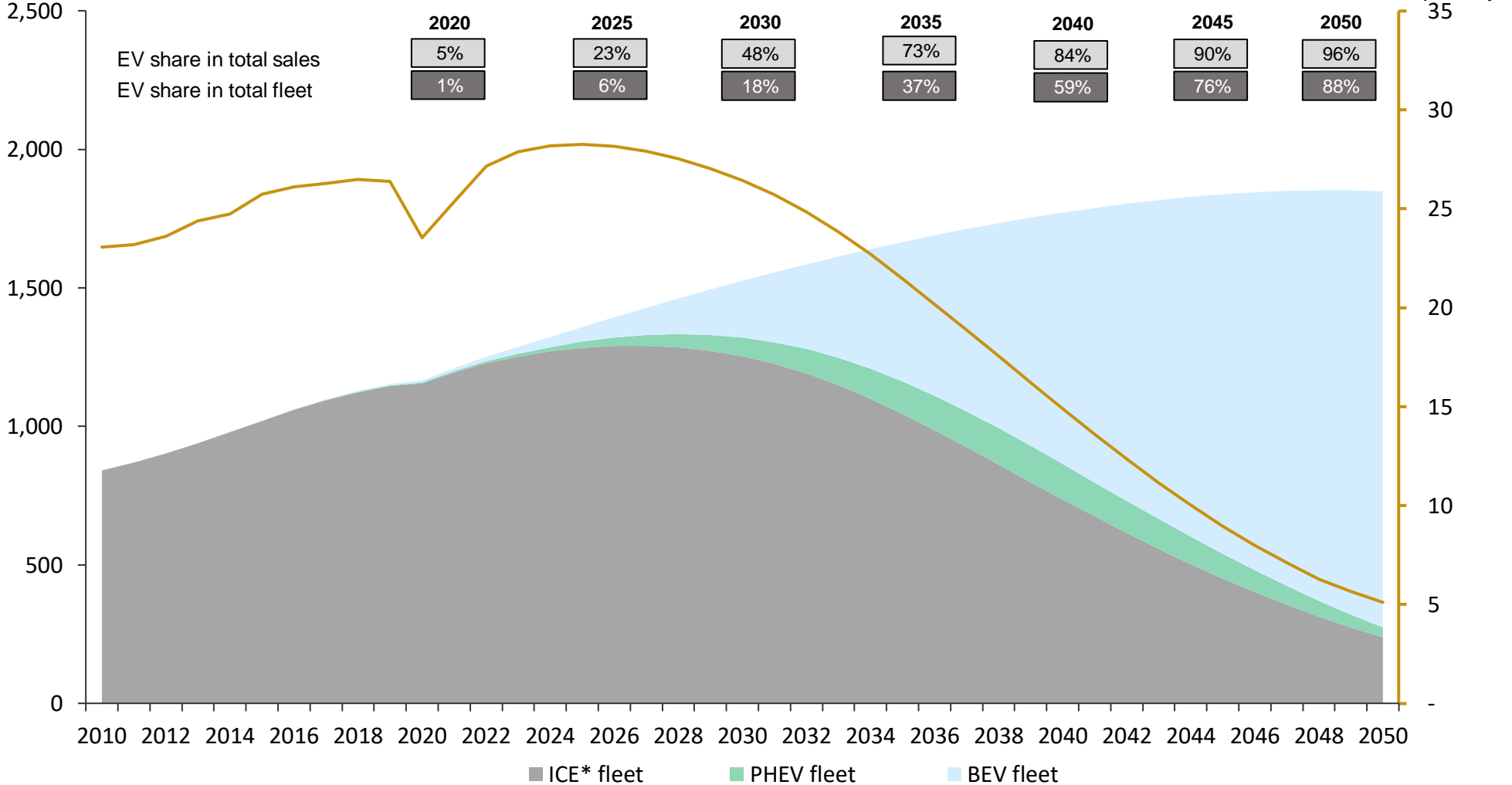


Source: Rystad Energy research and analysis, August 2021

Global EV fleet reaches 18% of total LDVs by 2030, while passenger road transport oil demand remains high through the end of this decade

Global passenger vehicle fleet

Million vehicles

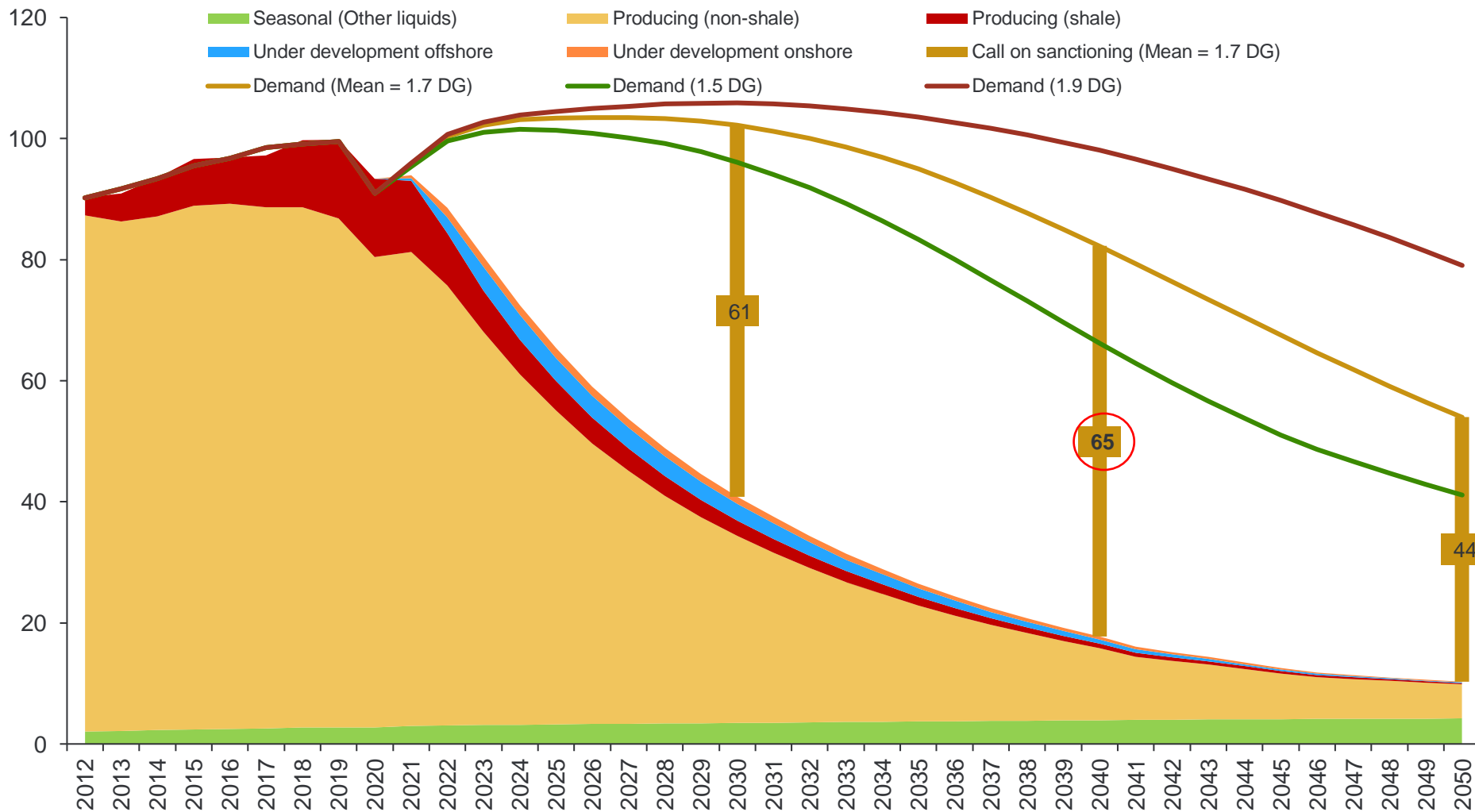


ICE – internal combustion engine vehicles; BEV – battery electric vehicles; PHEV – plug-in hybrid electric vehicle
 Source: Rystad Energy research and analysis, OICA, IEA EV Outlook 2020, August 2021

Mean demand scenario (1.7 DG) requires 61 million bpd of supply from new wells by 2030 and 65 million bpd by 2040.

Liquids supply from producing wells and developments* vs total liquids demand

Million barrels per day



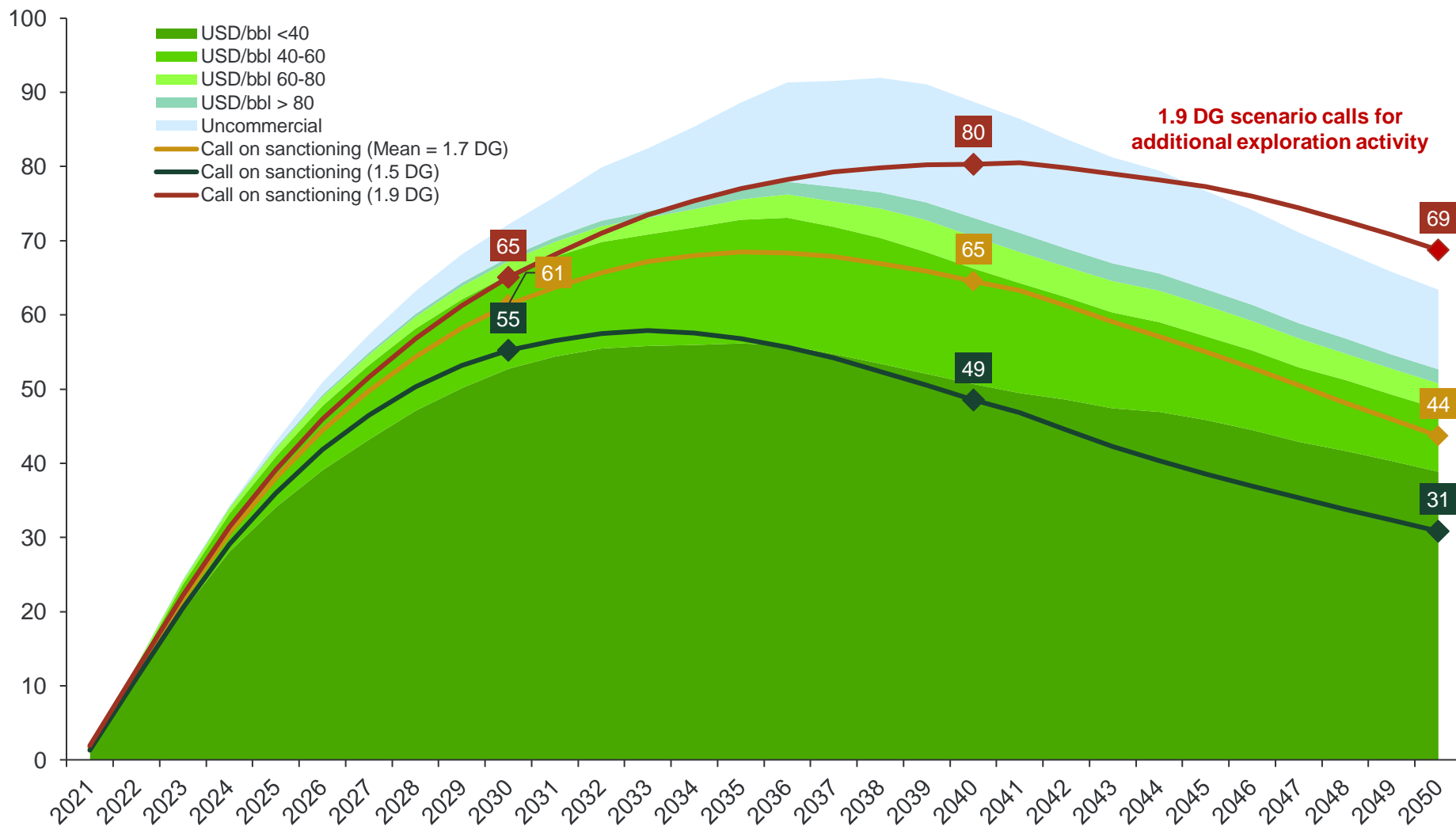
* Under development does not include drilled but uncompleted (DUC) shale/LTO wells as a significant share of the investment decision lies ahead
 Source: Rystad Energy research and analysis, OilMarketCube, Ucube, August 2021

Call on sanctioning

Sanctioning is much needed in all three scenarios although existing stock of global discoveries is sufficient to meet demand, at least until mid-2030s.

Liquids supply from pre-FID wells* and call on sanctioning

Million barrels per day



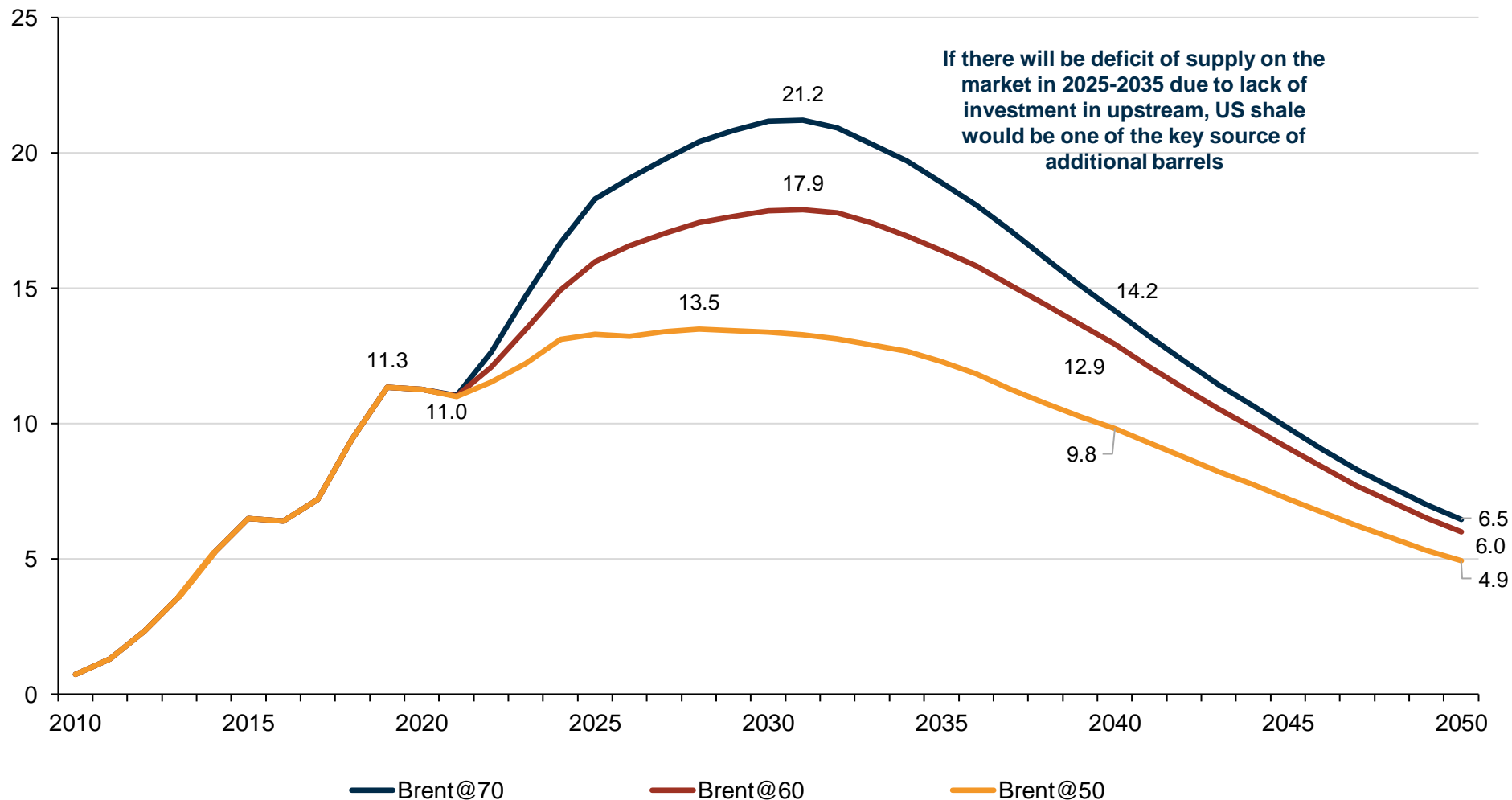
* Volumes include drilled but uncompleted (DUC) shale / LTO wells
 Source: Rystad Energy research and analysis, OilMarketCube, Ucube, August 2021

Vast uncertainty for US Shale liquids production in 2025-2035 and convergence in 2040s.

US shale should be able to fill supply gaps via adequate price signals over next 15 years.

US shale/LTO oil production* long-term outlook

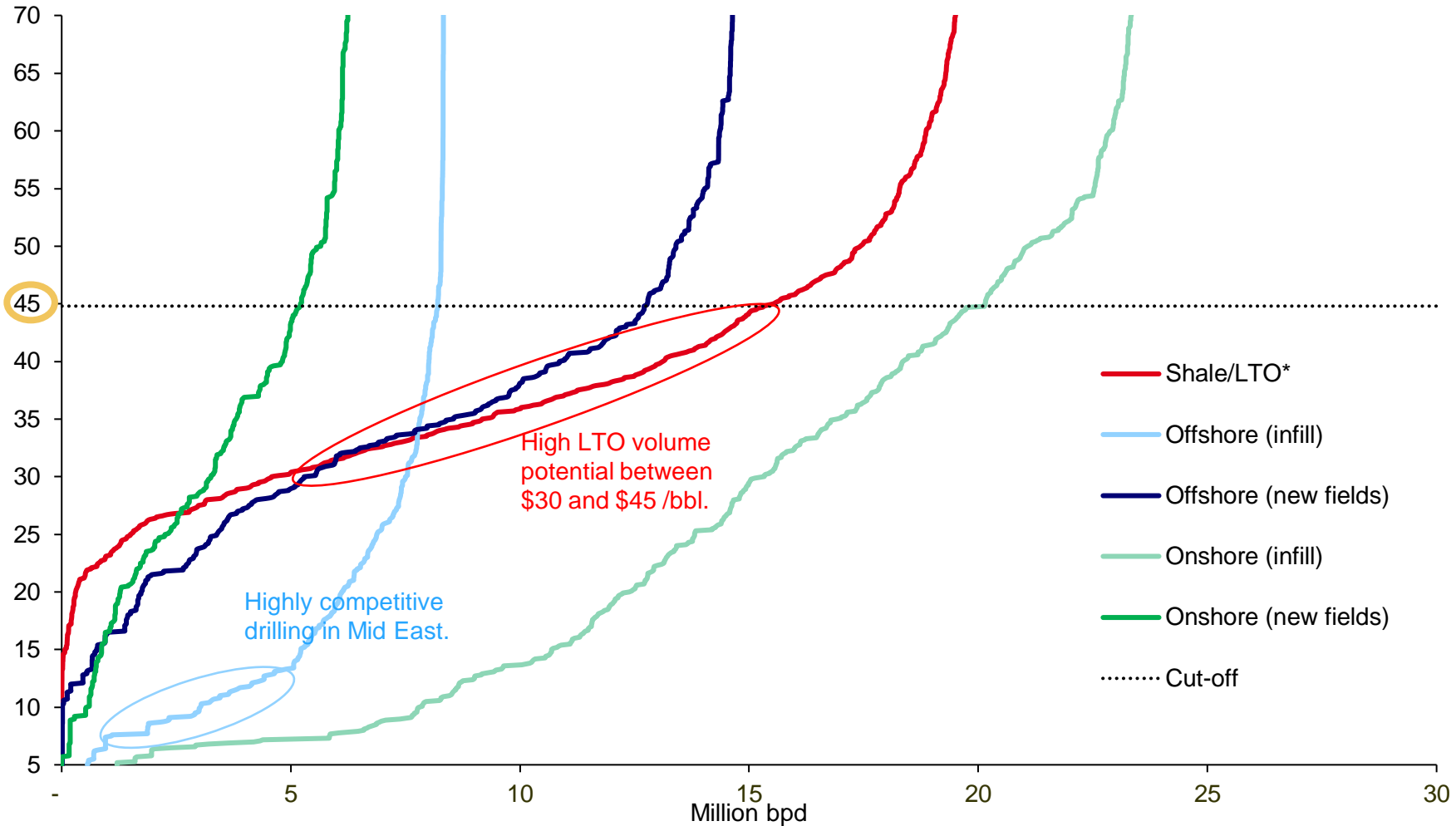
Million barrels per day



*Includes crude oil, lease condensate and NGLs extracted at gas processing plants.
Source: Rystad Energy research and analysis, OilMarketCube, Ucube, August 2021

Equilibrium price at \$45/bbl should satisfy 2030 call on sanctioning, with onshore infill generating one third of the 61 million bpd needed.

Cost of liquids supply curve for pre-FID wells* for 2030 by supply segment type
USD per barrel (real), Brent-equivalent

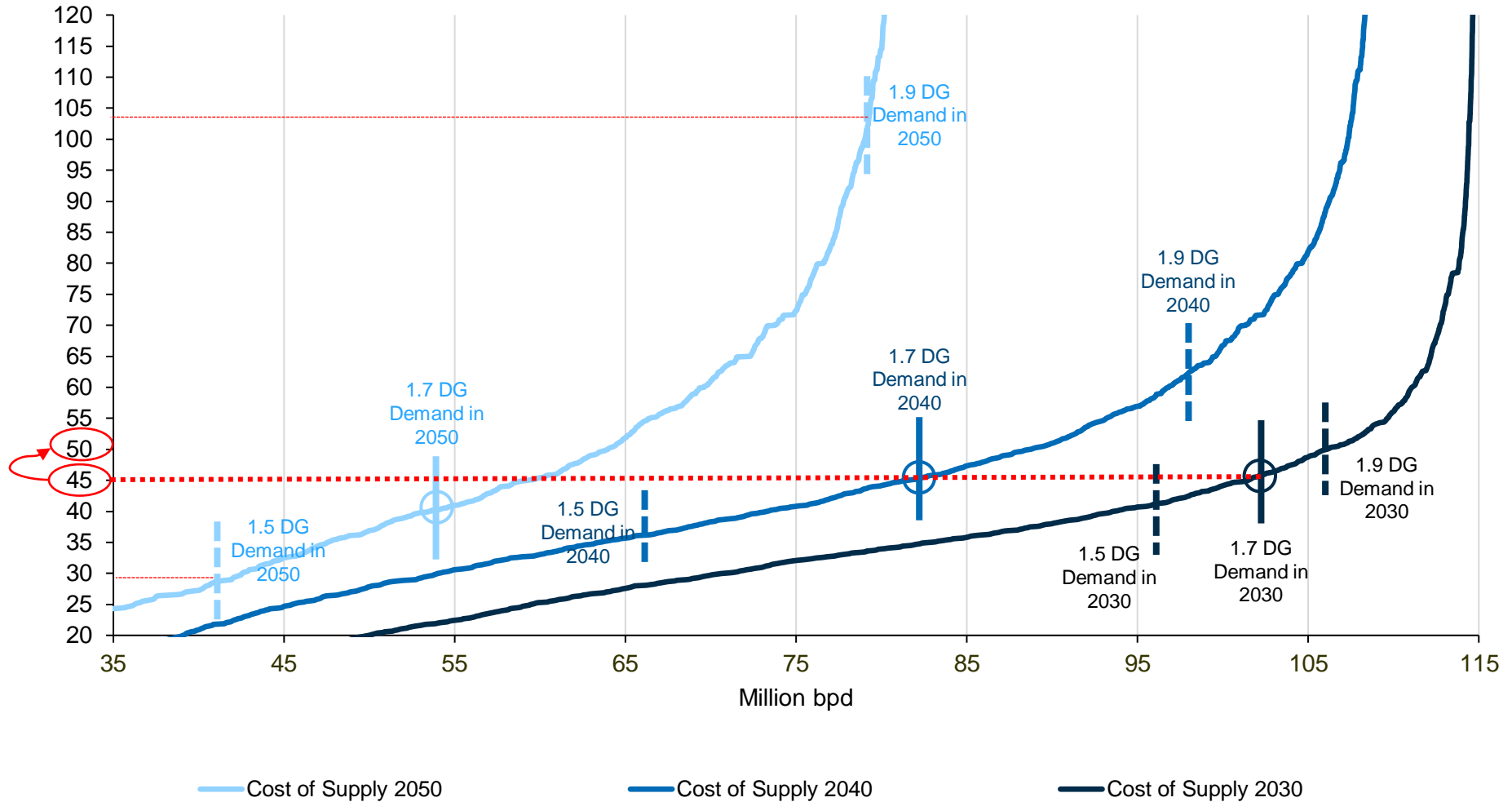


* Shale/LTO volumes include drilled but uncompleted (DUC) wells. All supply segments include uncommercial discoveries and undiscovered projects.
Source: Rystad Energy research and analysis, OilMarketCube, Ucube, August 2021

We maintain our base case of \$50 Brent (real) in 1.7 DG Energy Transition scenario.

Cost of liquids supply curve for 2030, 2040 and 2050 against range of demand scenarios

USD per barrel (real), Brent-equivalent

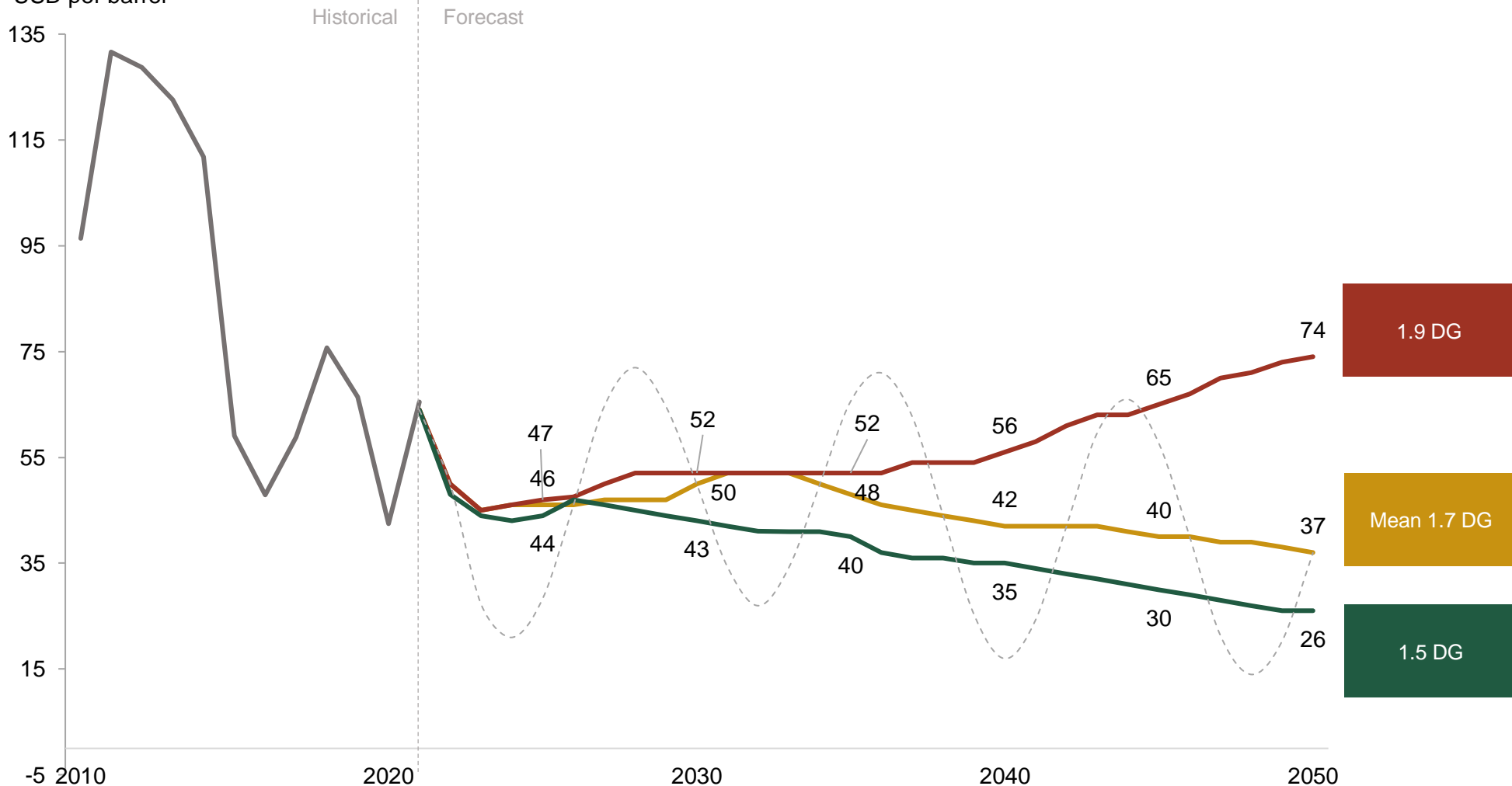


* Shale/LTO volumes include drilled but uncompleted (DUC) wells. All supply segments include uncommercial discoveries and undiscovered projects.
Source: Rystad Energy research and analysis, OilMarketCube, Ucube, August 2021

Rystad Dynamic Oil Price Model shows how equilibrium prices could play out in the three Energy Transition scenarios

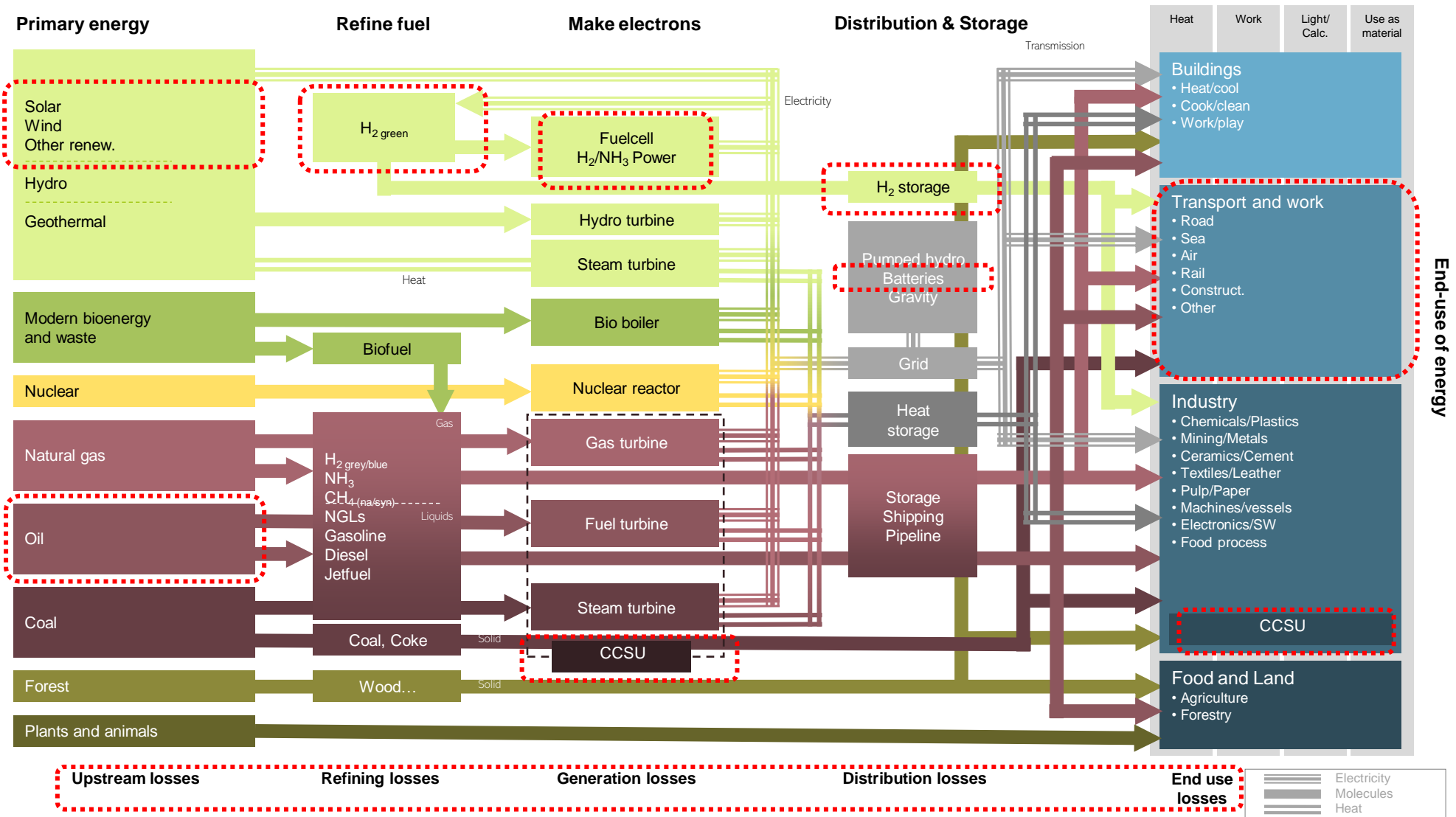
Brent oil price (real 2021-terms) in the three demand scenarios

USD per barrel



* Nominal price using a 2.5% annualized inflation rate on the real (2021-dollar) price assumption.
 Source: Rystad Energy research and analysis, Ucube, August 2021

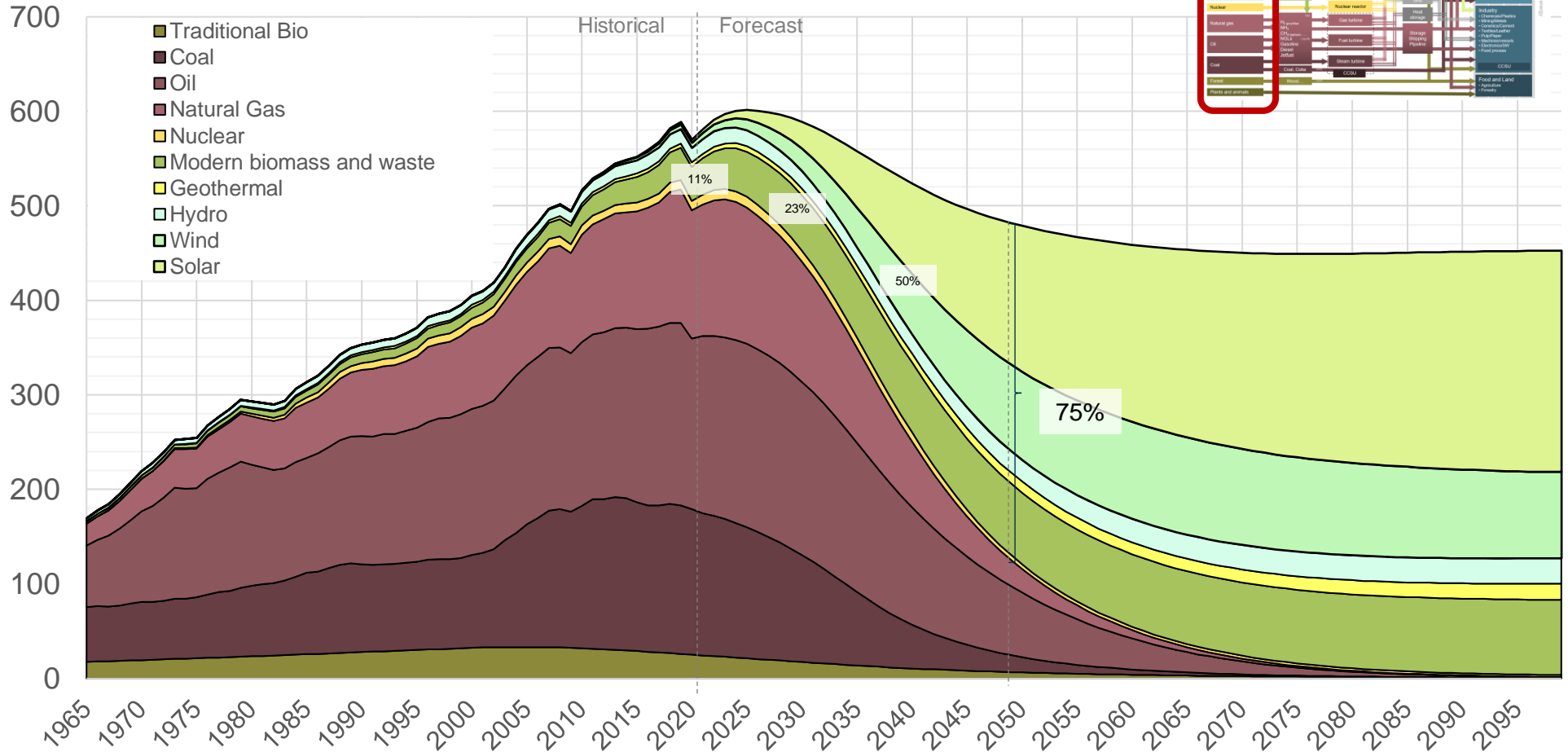
The global energy system – real testing of case with disruptive technologies and recent policy statements



Source: Rystad Energy global energy system model; World Cube Pilot, August 2021

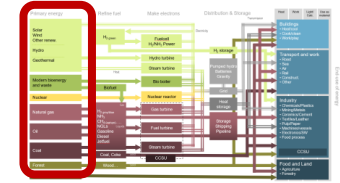
Global primary energy mix will see a rapid shift towards Renewables under Rystad 1.5 DG scenario

Total primary energy EJ

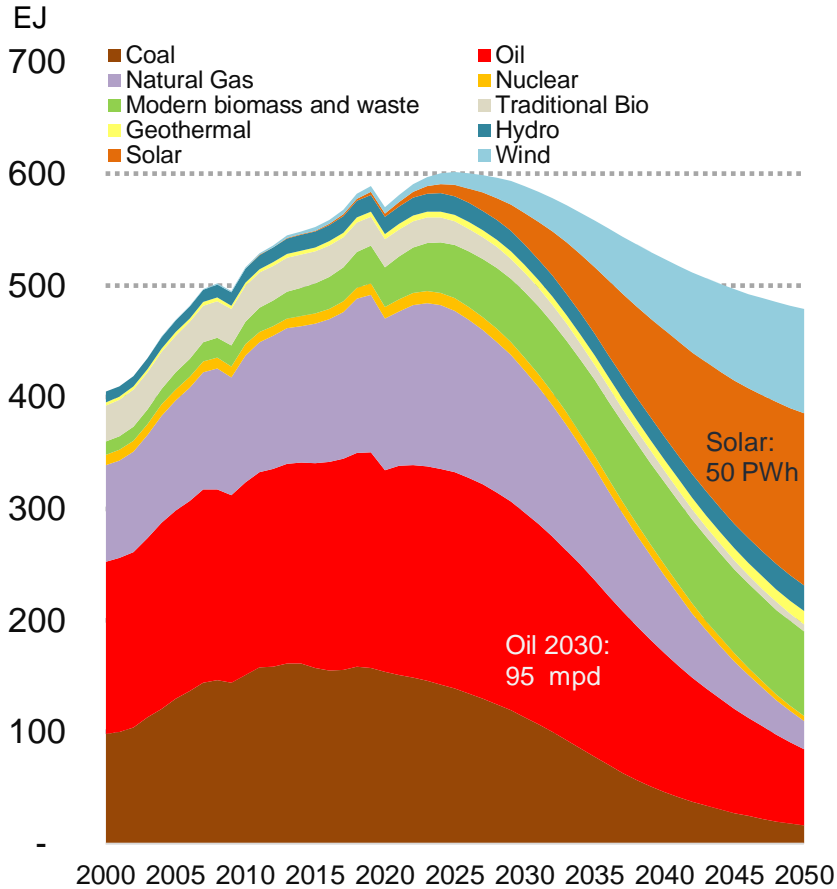


Source: Rystad Energy Energy Scenario Cube – 1.5 DG scenario, August 2021

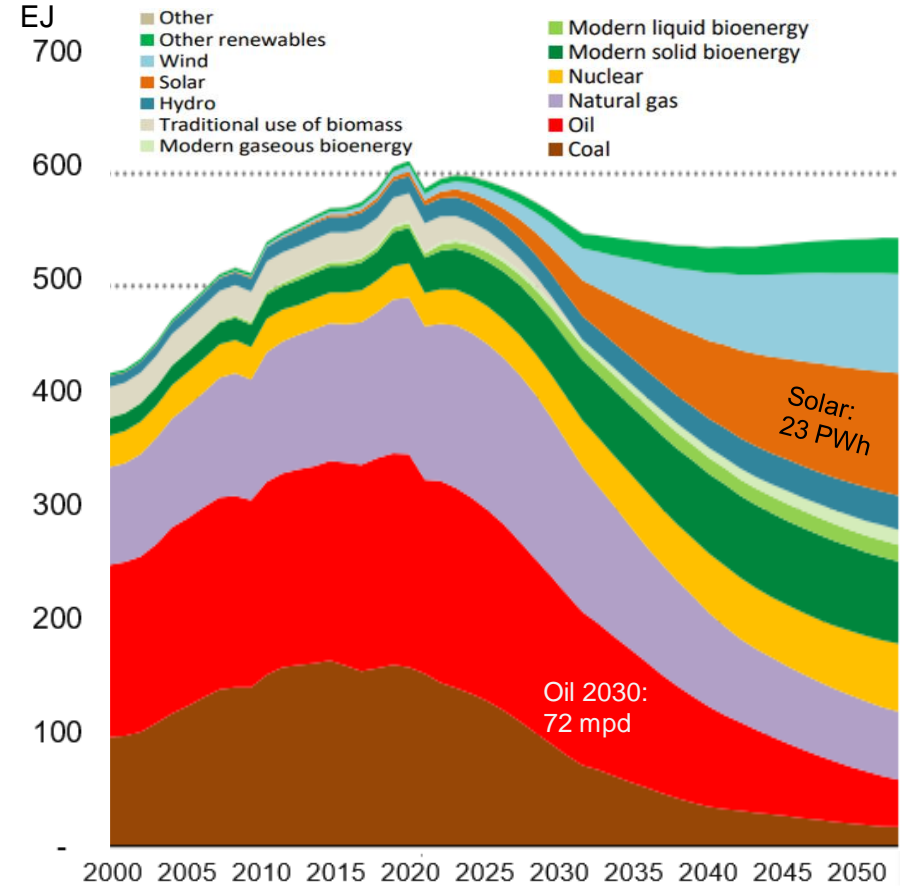
Rystad Energy's 1.5 DG Scenario vs. IEA's NZE: more solar and more oil, less bioenergy and nuclear in Rystad's.



Total primary energy – Rystad Energy, 1.5 DG August 2021

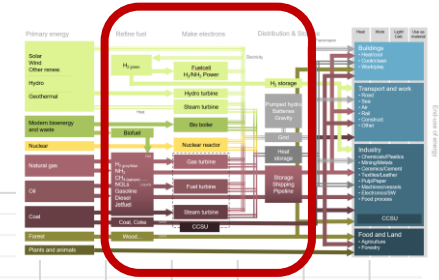


Total primary energy – IEA NZE May 2021

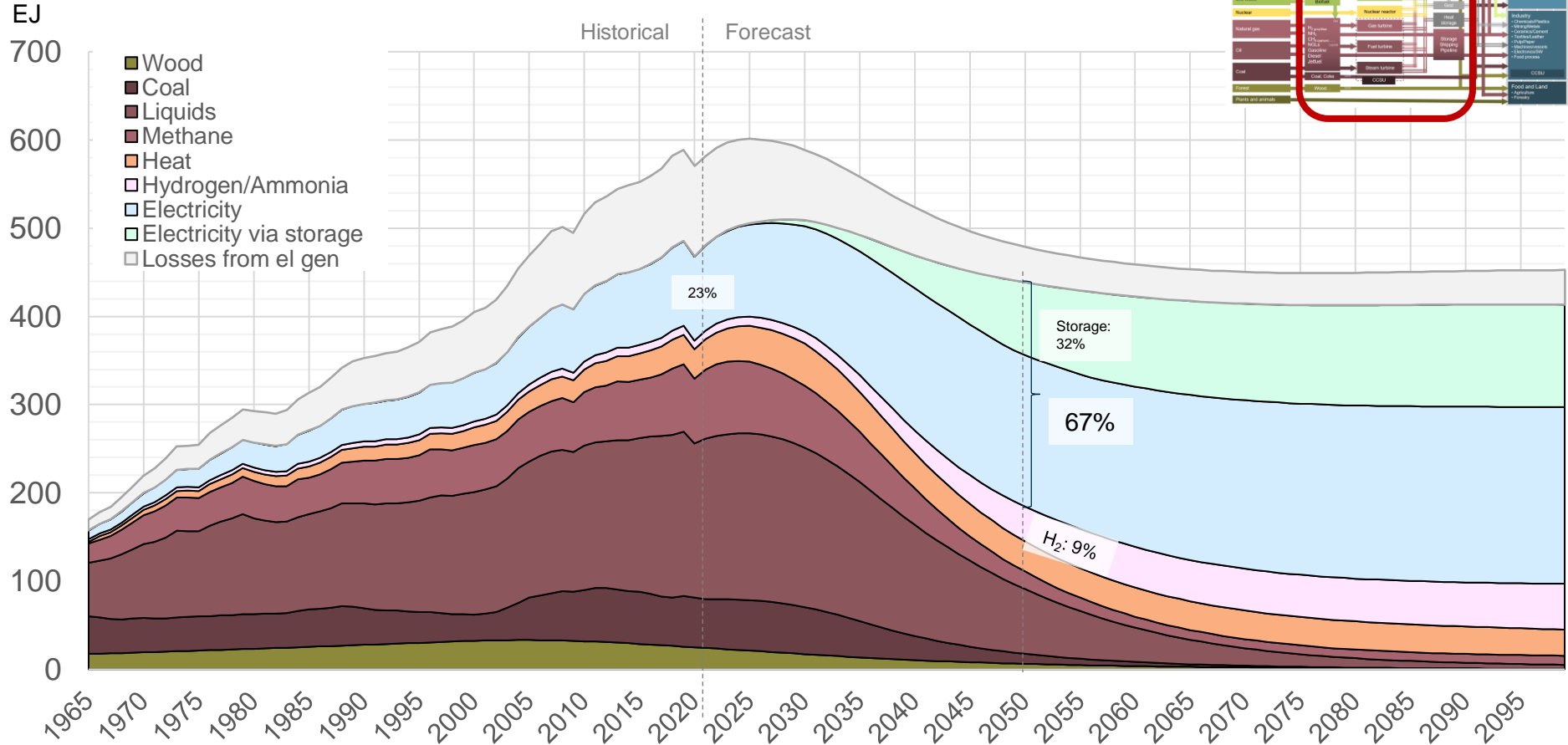


Source: Rystad Energy WorldCube – 1.5 DG scenario, August 2021

Electrification – crucially accompanied by power storage - will play an increasingly dominant role in the 1.5 DG scenario



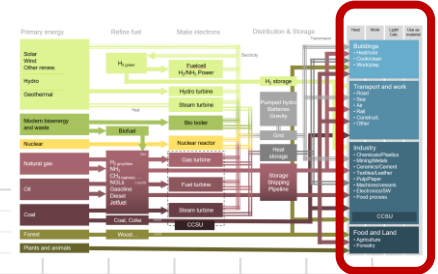
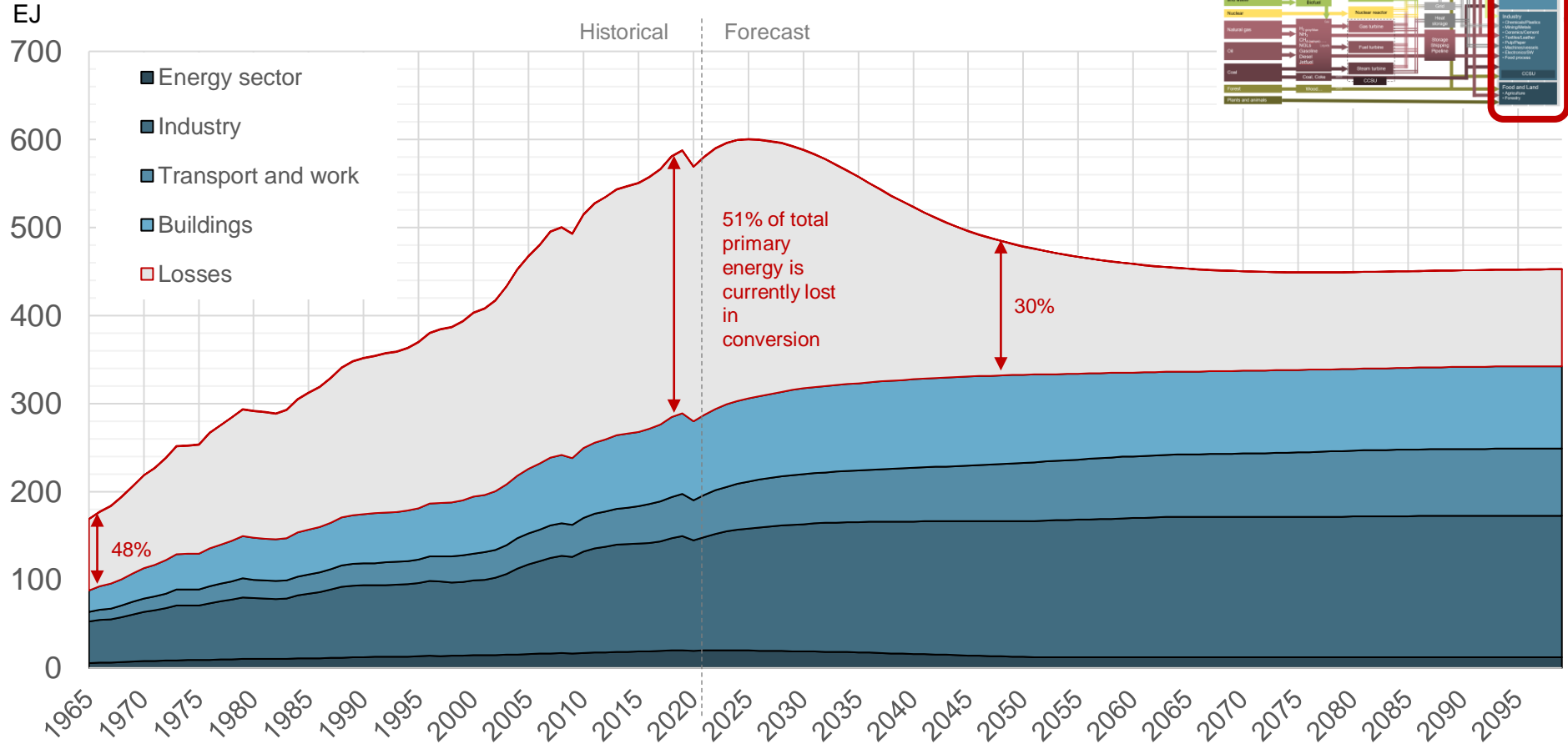
Total primary energy



Source: Rystad Energy Energy Scenario Cube – 1.5 DG scenario, August 2021

From the end-user perspective and the economy, the 1.5 DG scenario will represent a massive efficiency gain!

Total primary energy



Source: Rystad Energy, Energy Scenario Cube – 1.5 DG scenario, August 2021

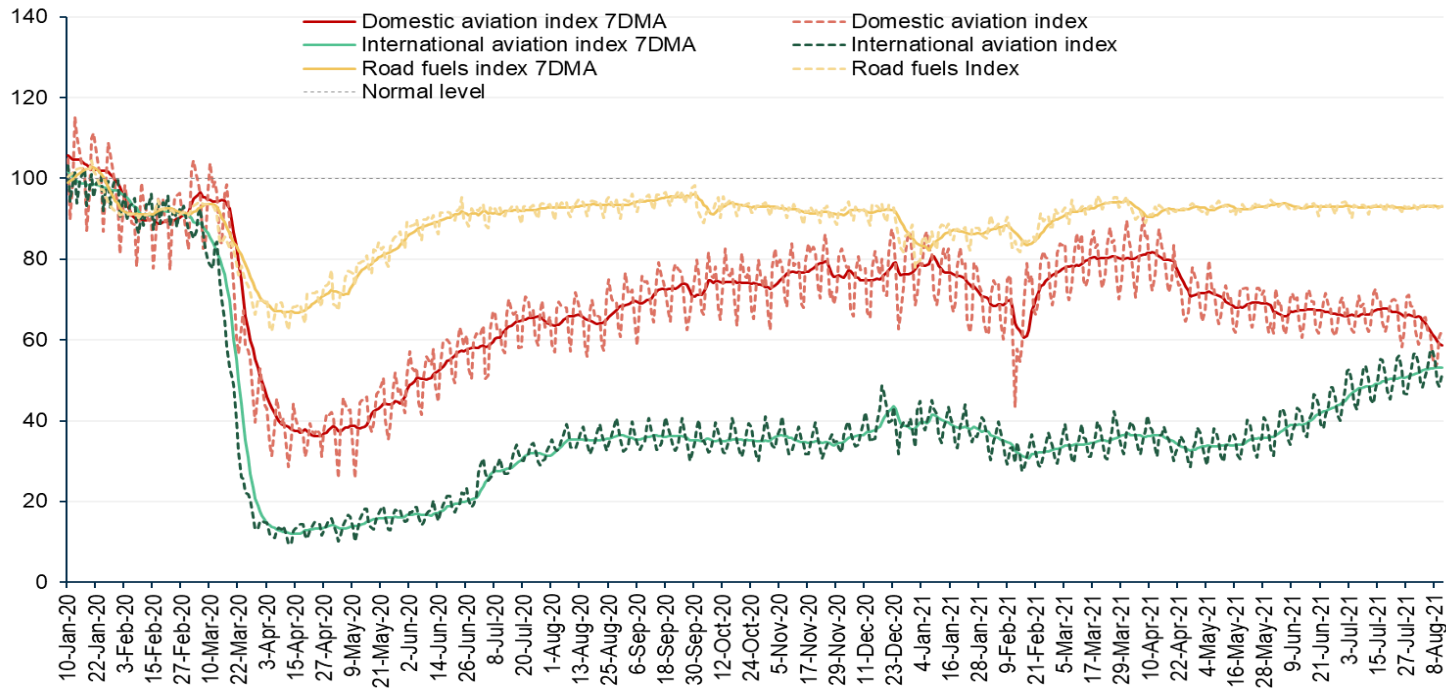
Signposts: Regulatory environment, economic signals and technology changes.



- Updated NDCs
- Compliance

Global daily aviation and road traffic index (active fleet this year/active fleet in 2019)

Percent

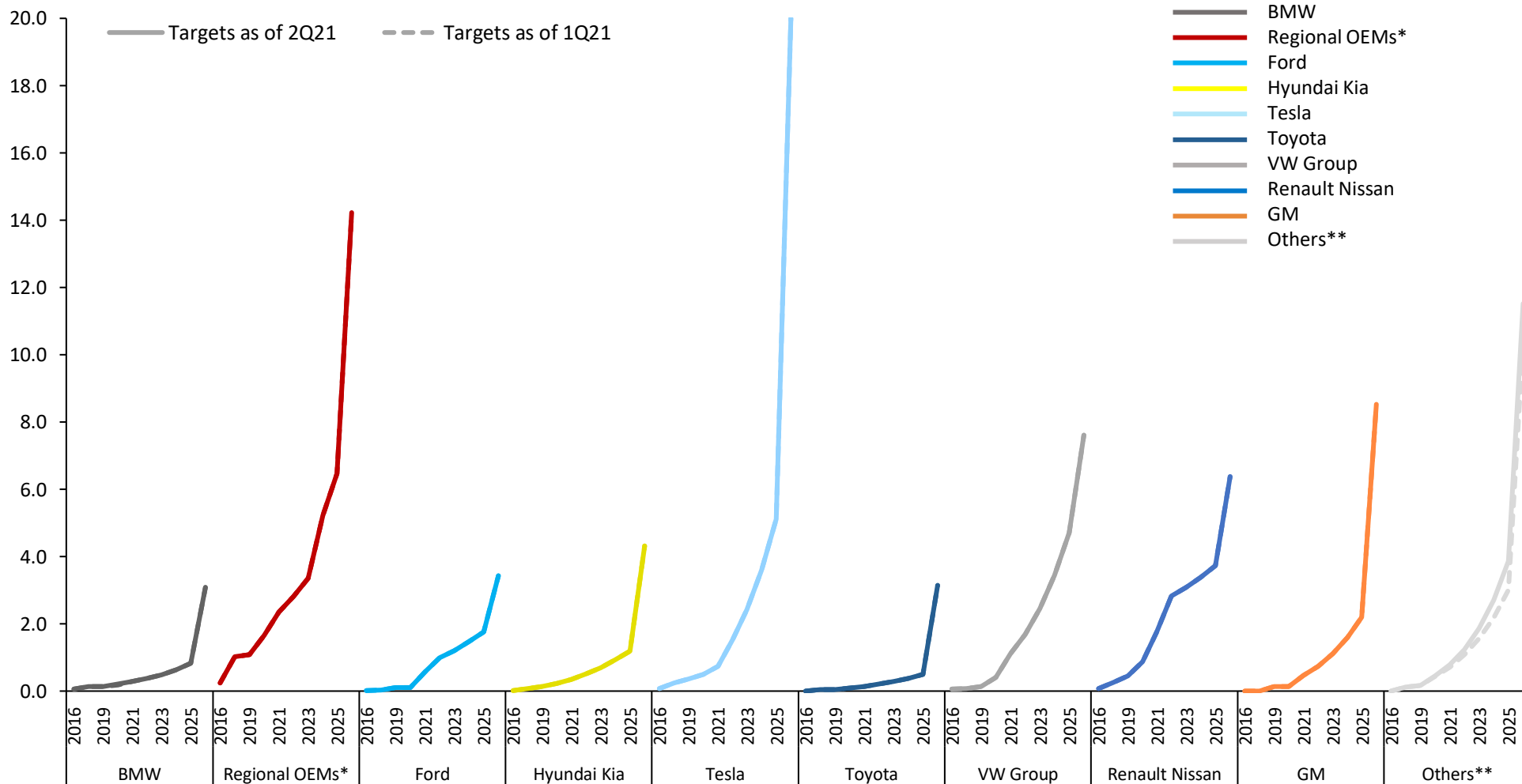


Source: Rystad Energy research and analysis, August 2021

Investments in energy transition technology by producers, adoption rates by consumers and regulatory environment will ultimately determine the Energy Transition pace

Electric vehicle manufacturers' targets: Recent reporting vs reporting as of Oct-20 (previous)

Million vehicle sales



Source: Rystad Energy research and analysis

*Regional OEMs include vehicle Manufacturers in China and India ** Others include Fiat PSA group, Daimler, Mazda and Honda, August 2021

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