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Webinar, Sezione
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Energy Industry Global Markets Forecast 2020



Baker Hughes 



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Agenda

Market Context

Outlook on Investments

Top10 Trends in Supply Chain

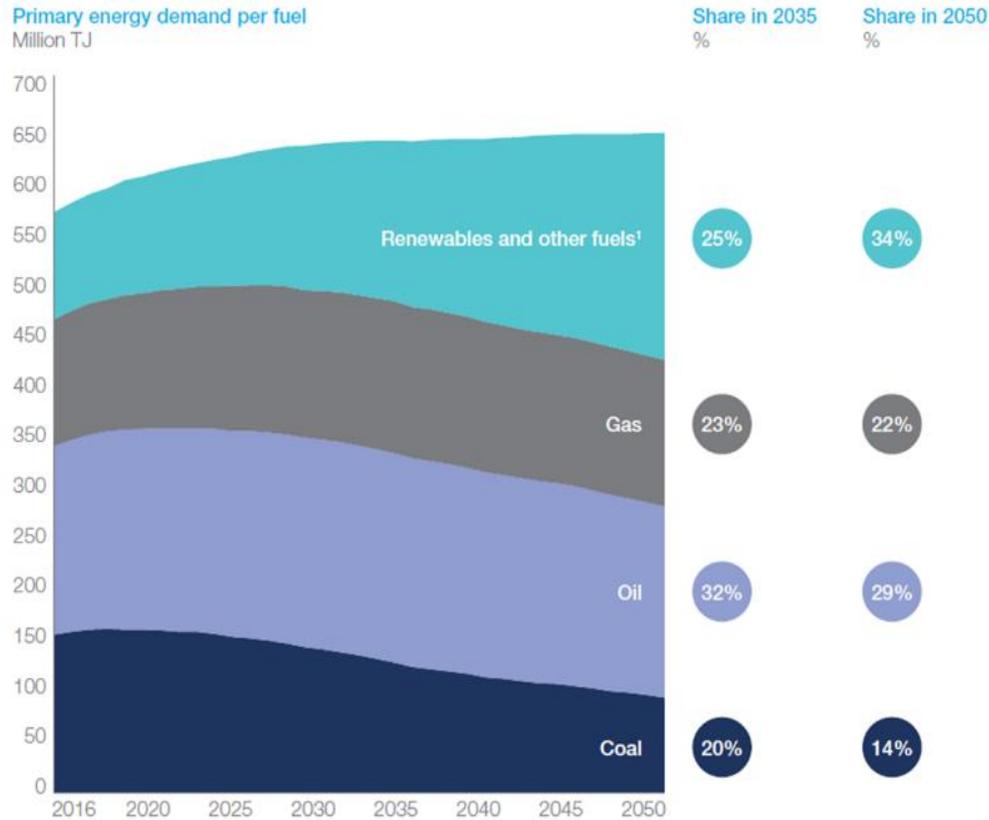
Last year we forecast:

*“In the medium term, we will be facing major **energy transition** turning points, but major **uncertainties** remain on transition breath and speed”*



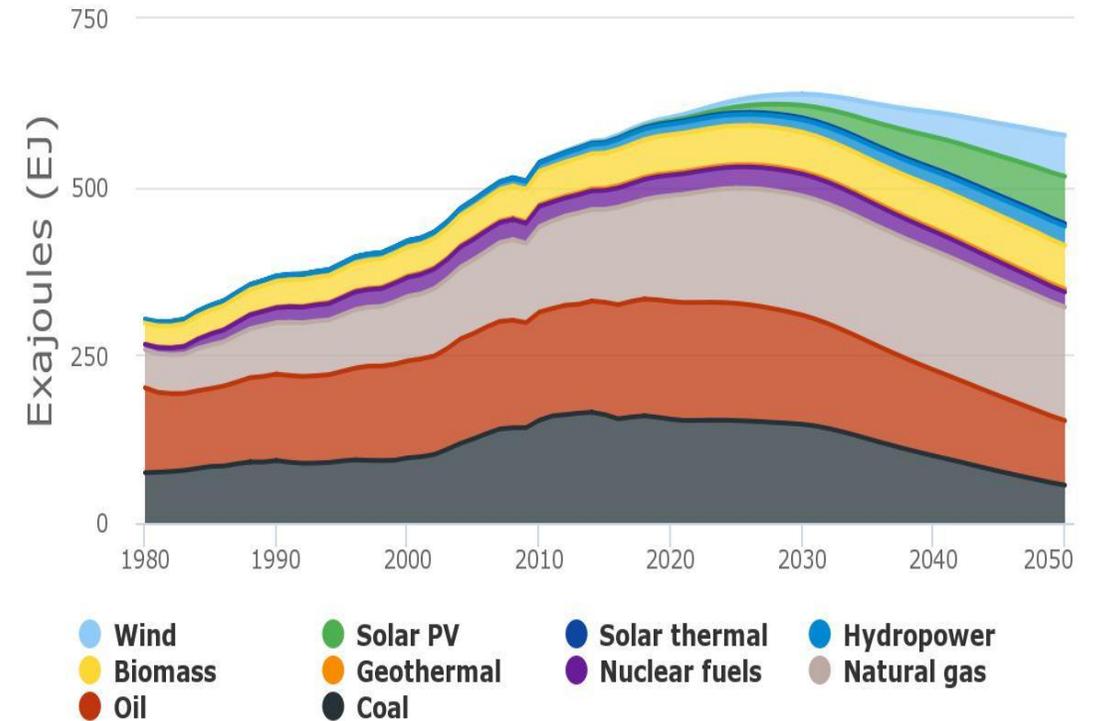
Some forecasters expected the Primary Energy Demand to plateau around 2030 - and perhaps fall, thereafter

McKinsey Global Energy Outlook 2019



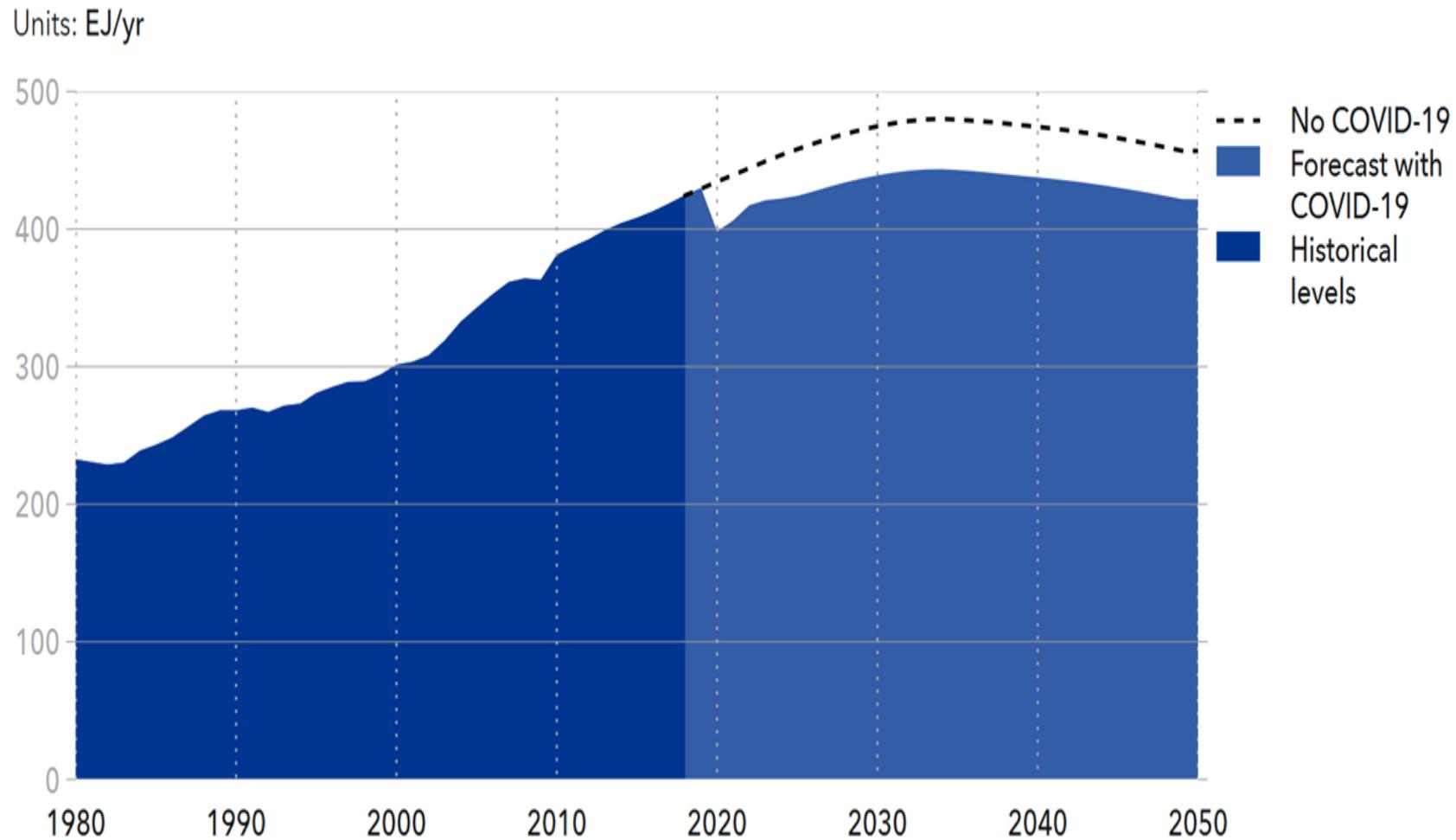
World primary energy supply by source

DNV GL Energy Transition Outlook 2019

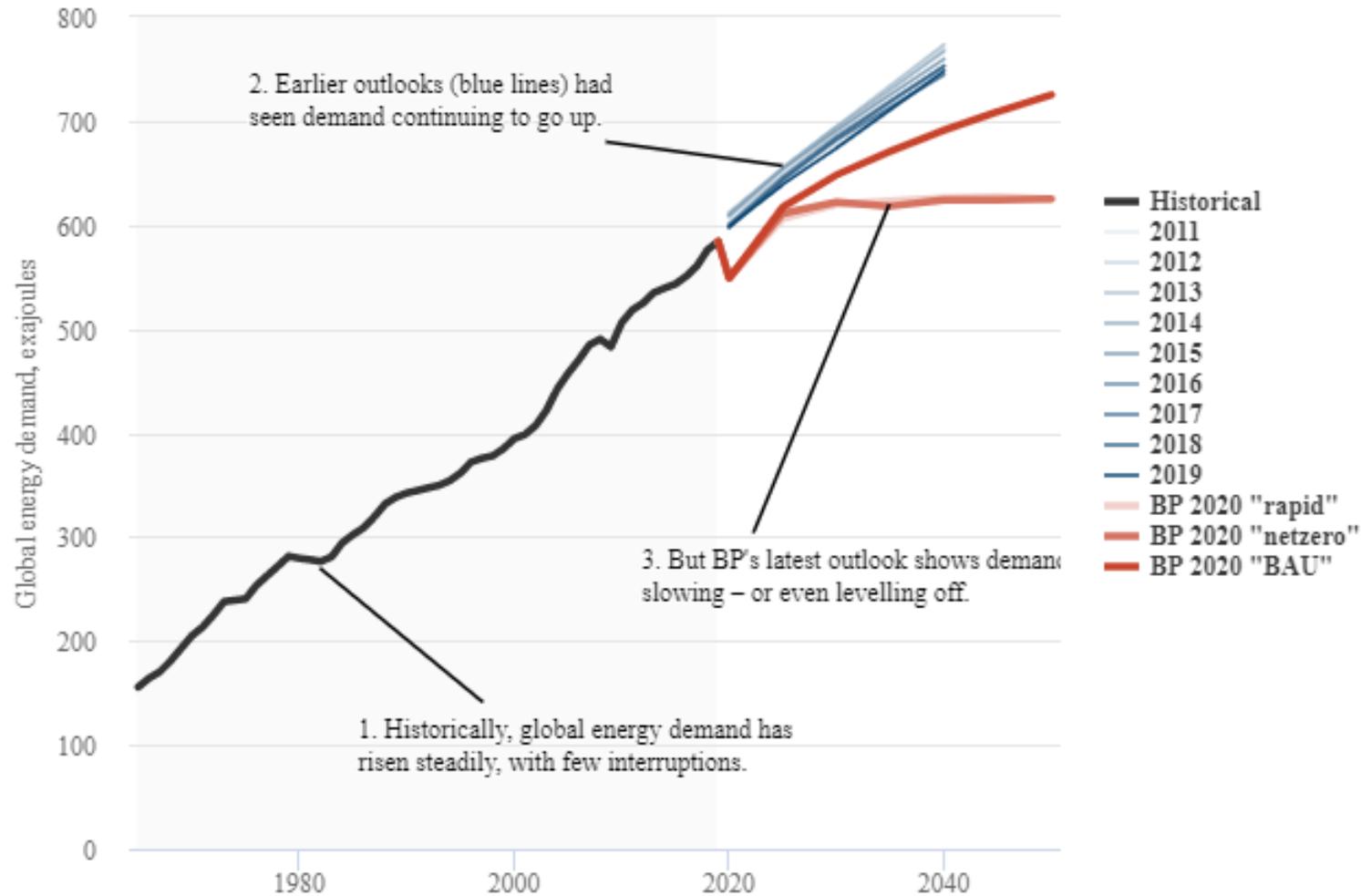


DNV GL - ETO 2019

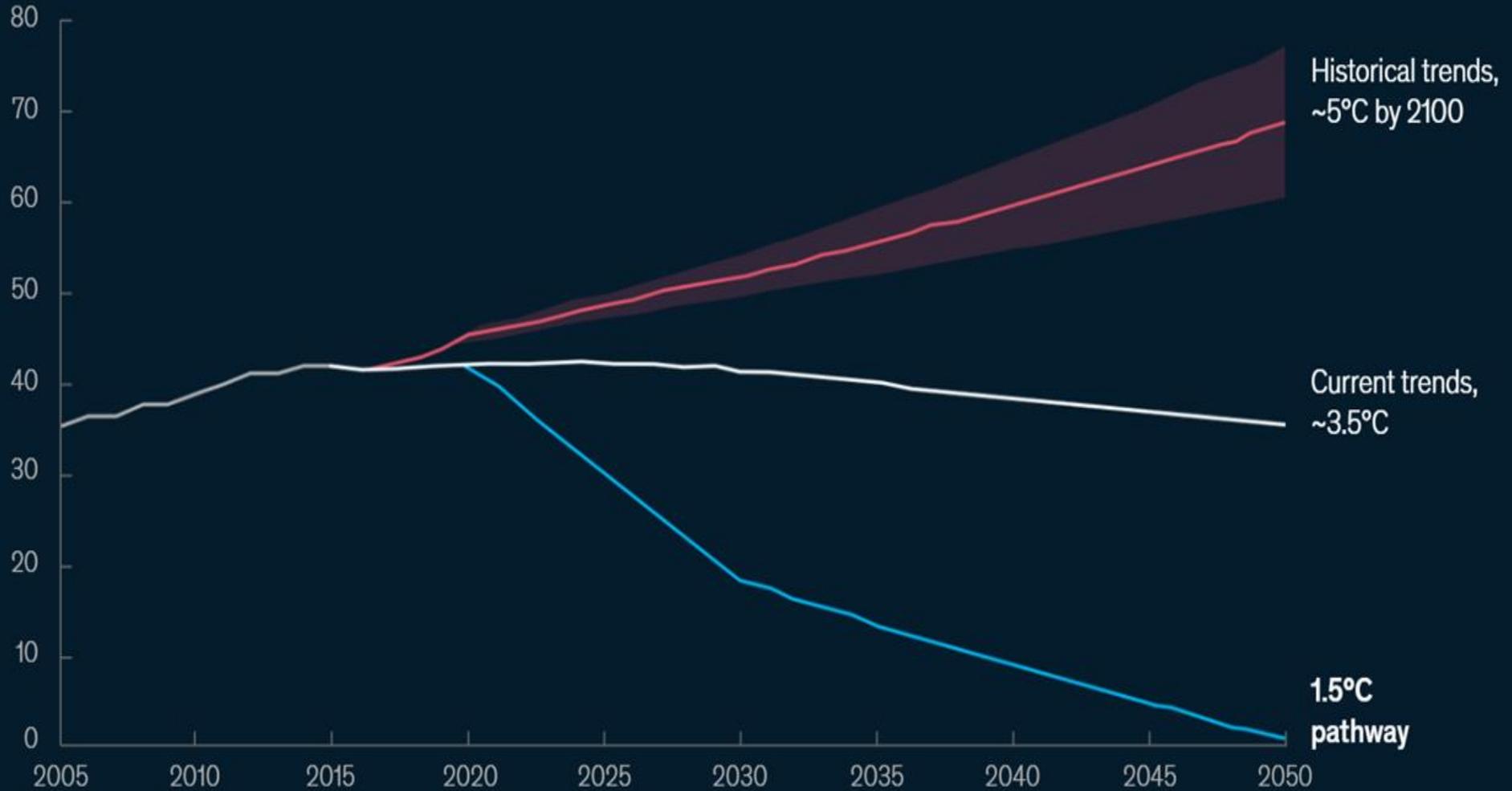
Today, under many scenarios, many believe that in a post-COVID world, global energy demand growth *could* slow down.....and even start levelling off



Today, BP and several other energy majors also say the same ...



Projected global CO₂ emissions,
billion metric tons of carbon dioxide (GtCO₂) per year

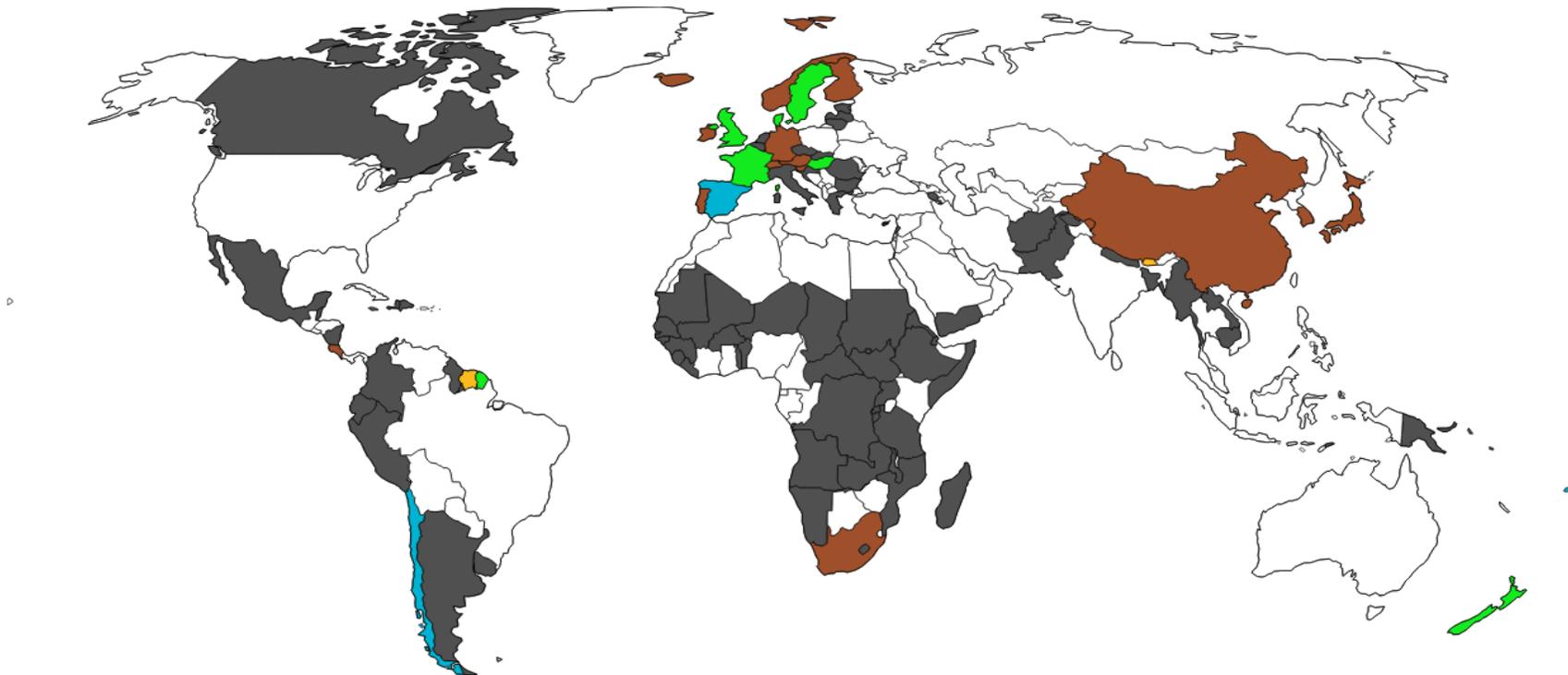


Most recently there is growing optimism that full decarbonization could be on the agenda

Net-Zero Targets

The 126 countries that have set full decarbonization goals contribute 51% of global emissions

- Target Under Discussion
- In Policy Document
- Achieved
- Proposed Legislation
- In Law

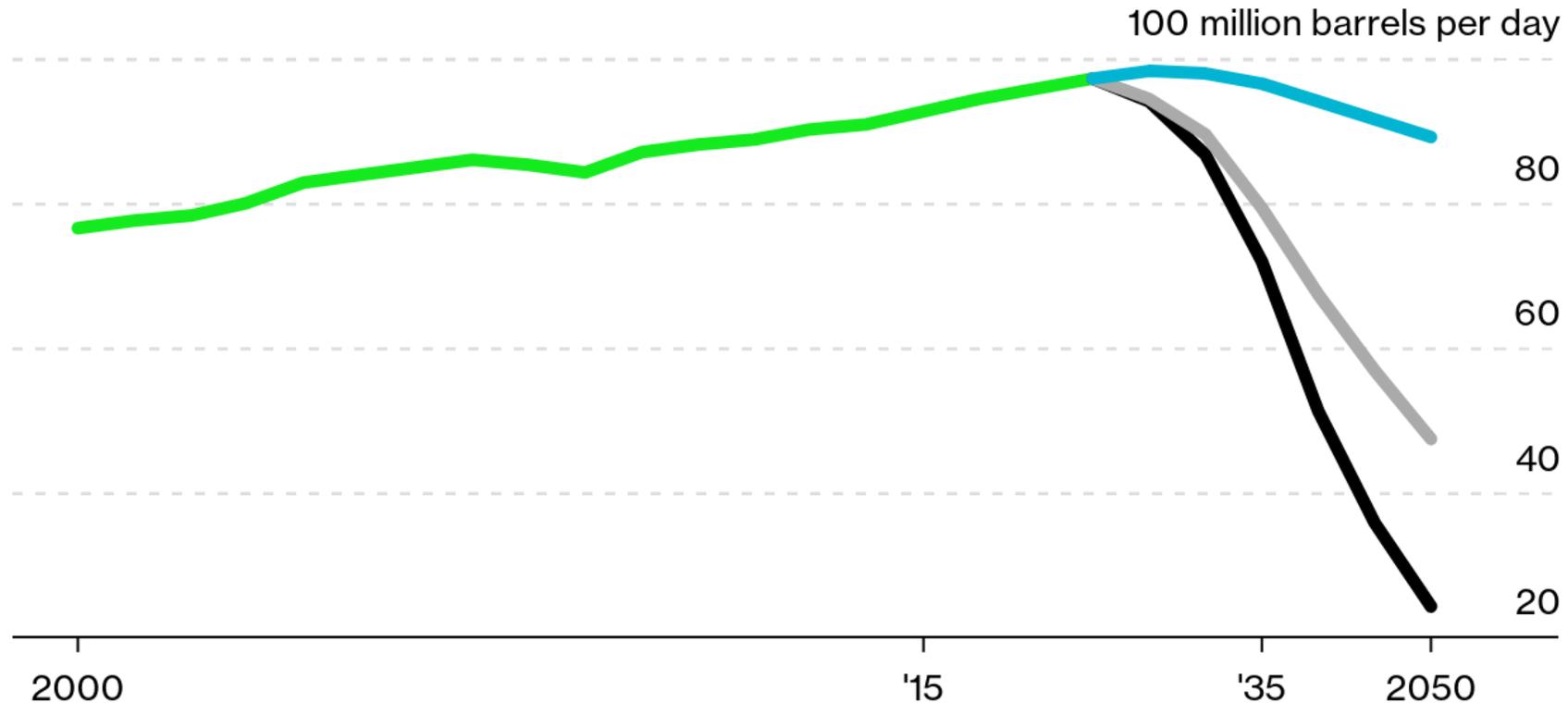


Significantly, BP and several other oil majors concede that oil demand is at the peak ... and could plummet

Calling the Top

Global oil demand in three scenarios

Historical Net Zero Rapid Business-as-usual

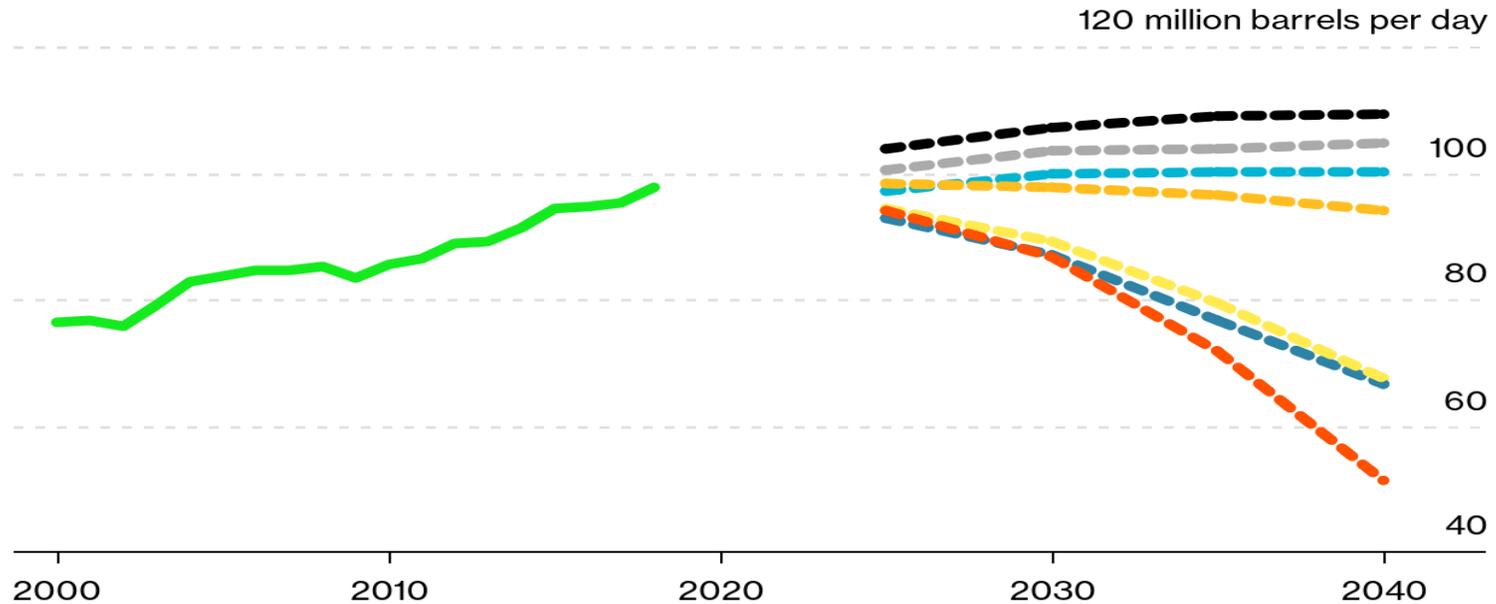


With the exception of OPEC, most other opinion makers agree with this view -
But future emissions policies are key

Divergent Futures

Oil demand forecasts

- █ Historical
- █ OPEC
- █ IEA - STEPS
- █ IEA - DRS
- █ IEA - SDS
- █ BP - Business-as-Usual
- █ BP - Rapid
- █ BP - Net Zero



Sources: OPEC, IEA, BP Plc, Total SA

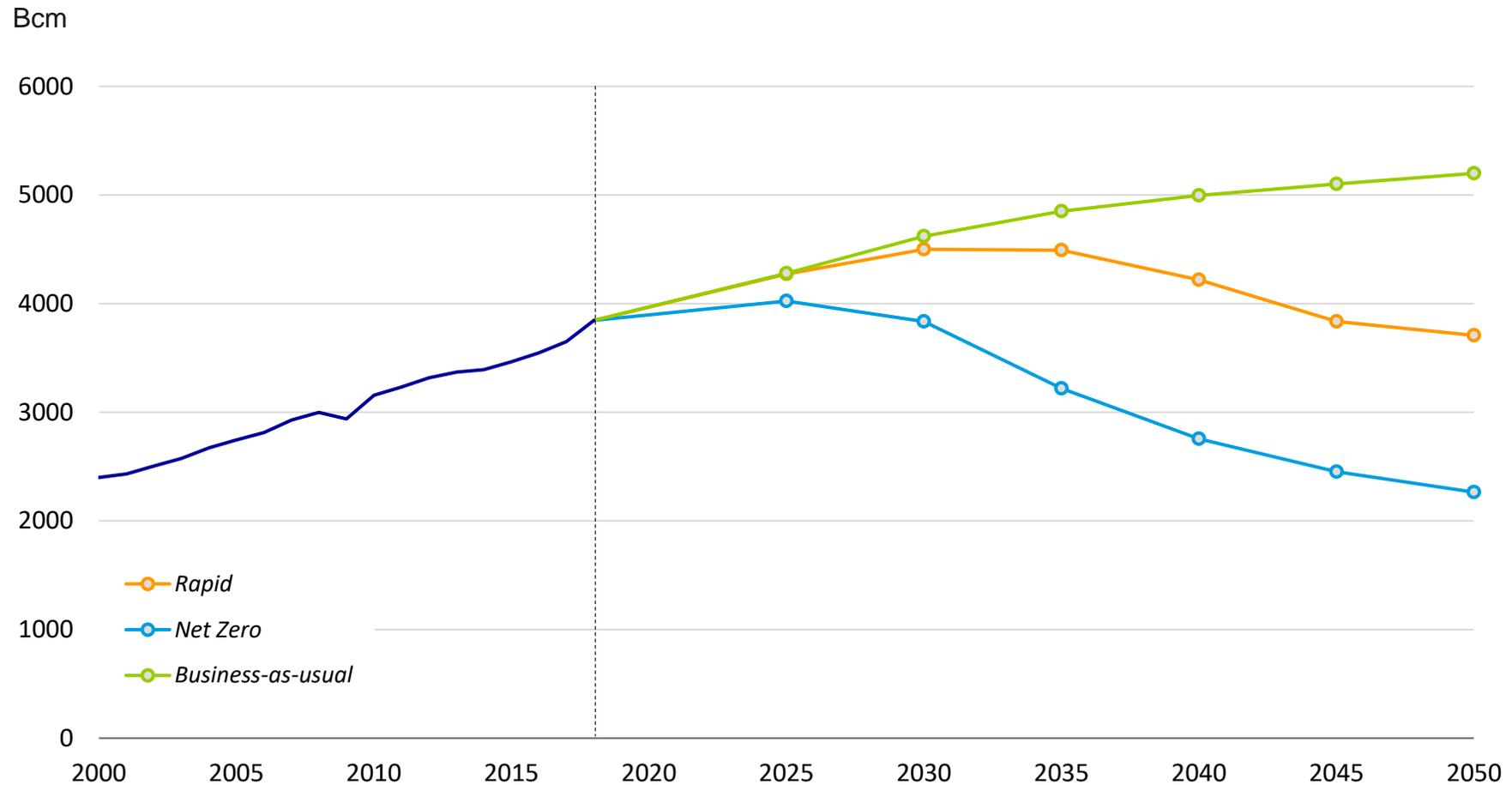
Note: "IEA - STEPS" is the organization's Stated Policies Scenario. "IEA - DRS" is the organization's Delayed Recovery Scenario. "IEA - SDS" is the organization's Sustainable Development Scenario.

Bloomberg Green

Oil production and refining are starting to be managed as a 'mature industry'

Outlook for natural gas - a much longer time-horizon

Natural gas consumption

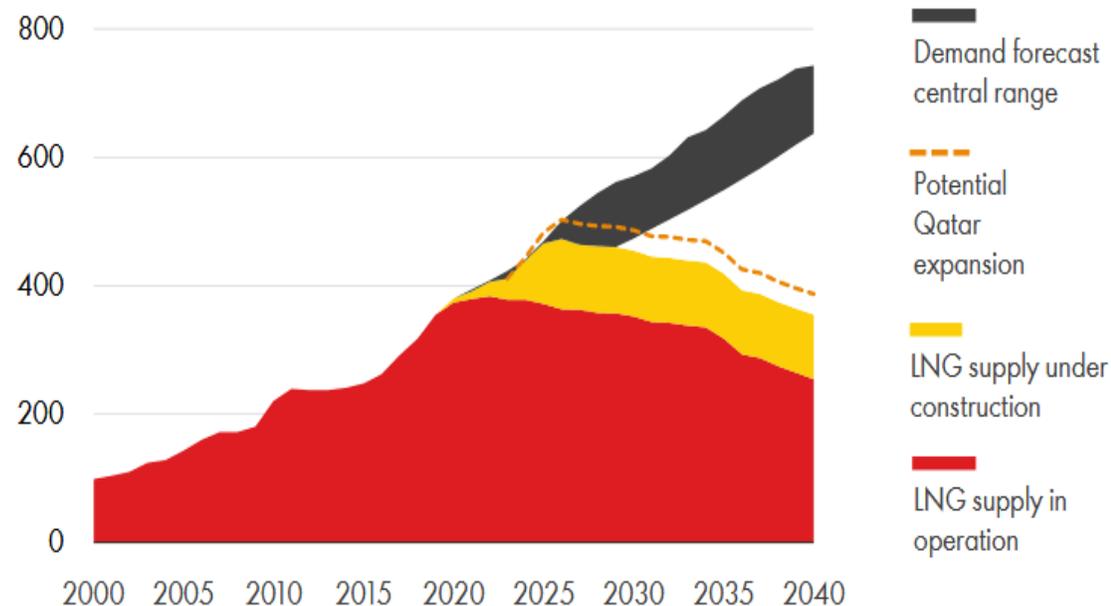


LNG demand to continue its growth path

But it all depends on Asian choices

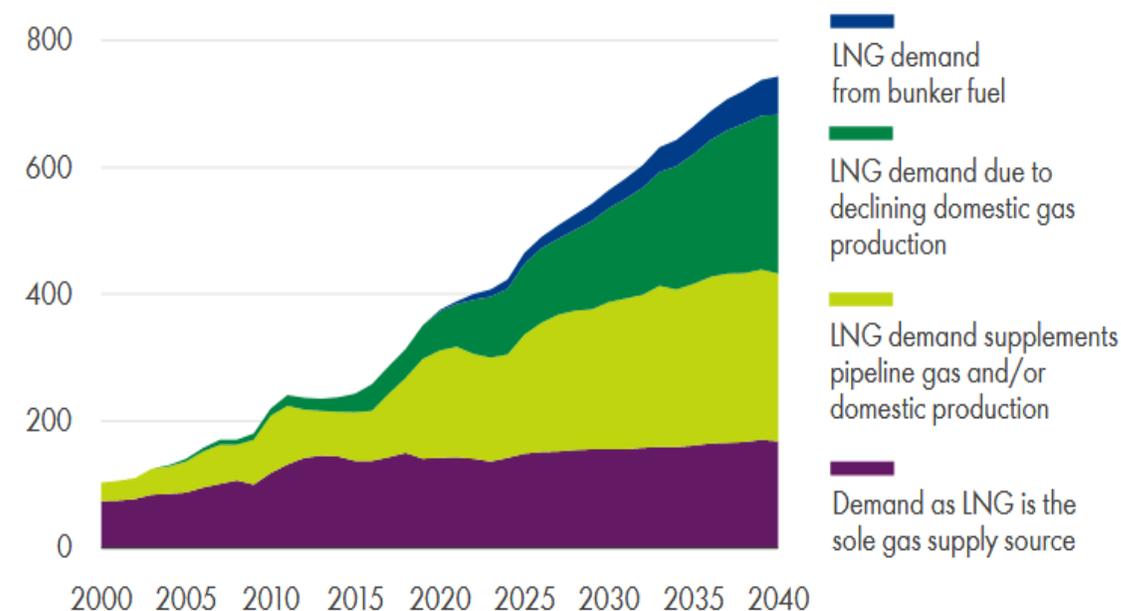
Emerging LNG supply-demand gap

MTPA



Demand drivers for LNG

MTPA



Source: Shell interpretation of IHS Markit, Wood Mackenzie, FGE and Poten & Partners Q4 2019 data



Source: Wood Mackenzie Aug20

LNG applications continue to broaden

Costa Smeralda first bunkering with LNG



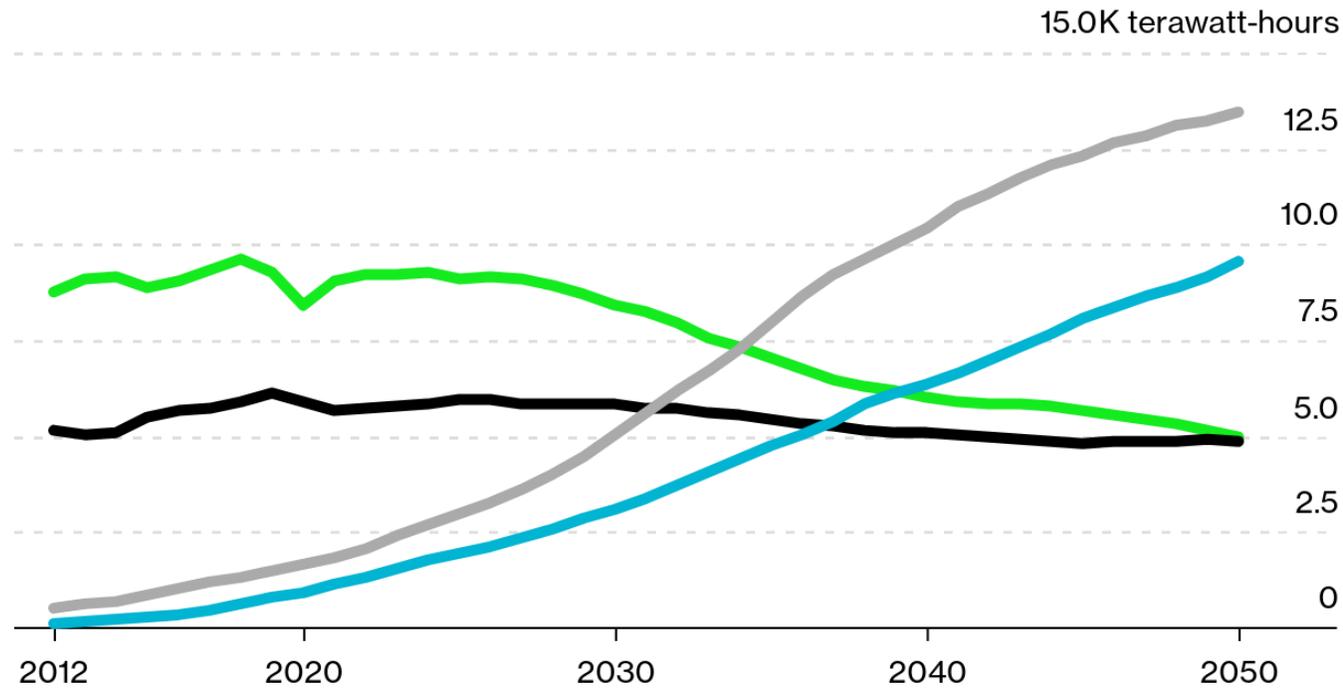
Rapid electrification to continue, all growth and some coal replacement coming from renewables

Gas to continue as a transition fuel

Converging and Diverging

Global coal- and gas-fired power generation*

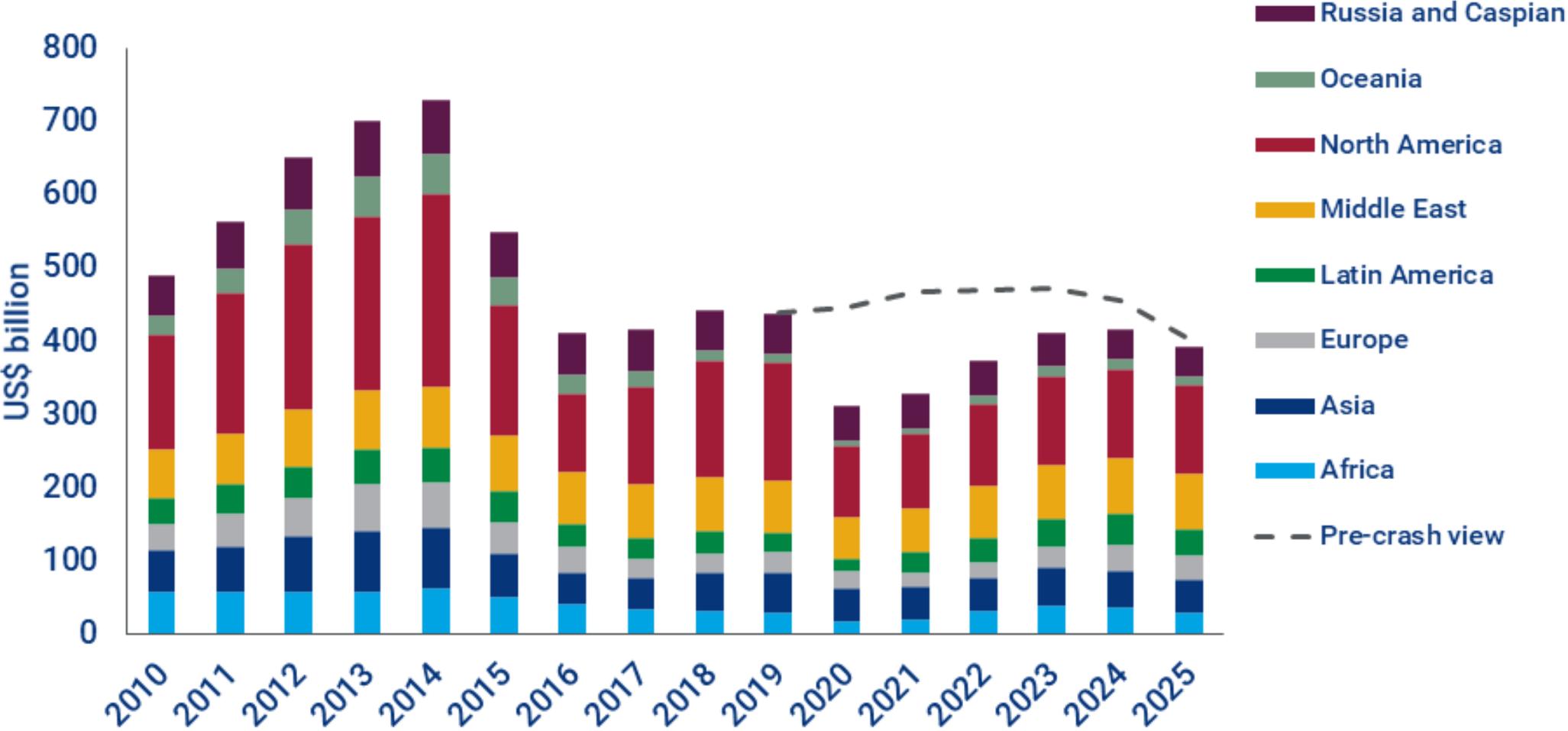
Coal Gas Wind Solar



*Data after 2018 represent projections
Source: BloombergNEF New Energy Outlook 2020

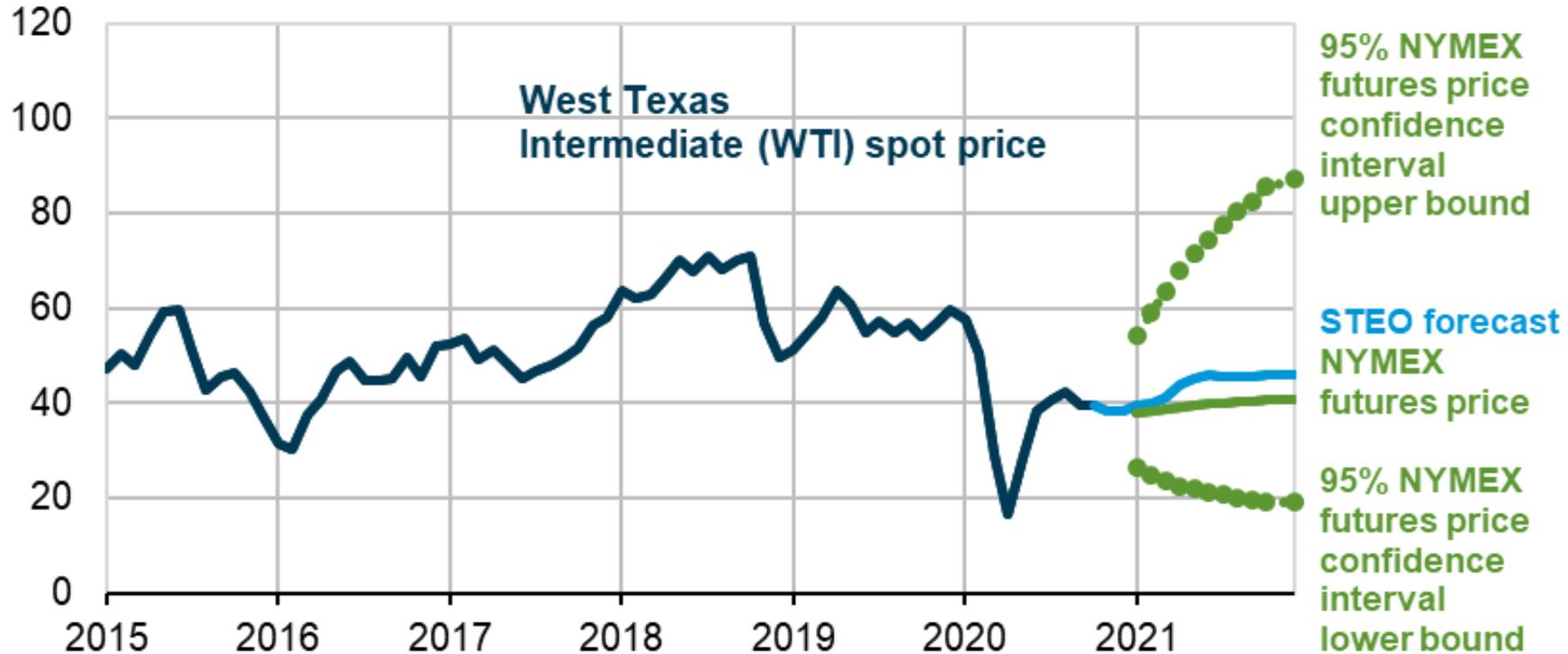
Bloomberg Green

CAPEX investments in Upstream projects should resume over the next years – but then plateau in the medium-term



Flat oil pricing in the near future

West Texas Intermediate (WTI) crude oil price and NYMEX confidence intervals
dollars per barrel



Note: Confidence interval derived from options market information for the five trading days ending Nov 5, 2020. Intervals not calculated for months with sparse trading in near-the-money options contracts.

Sources: U.S. Energy Information Administration, Short-Term Energy Outlook, November 2020, CME Group, and Bloomberg, L.P.

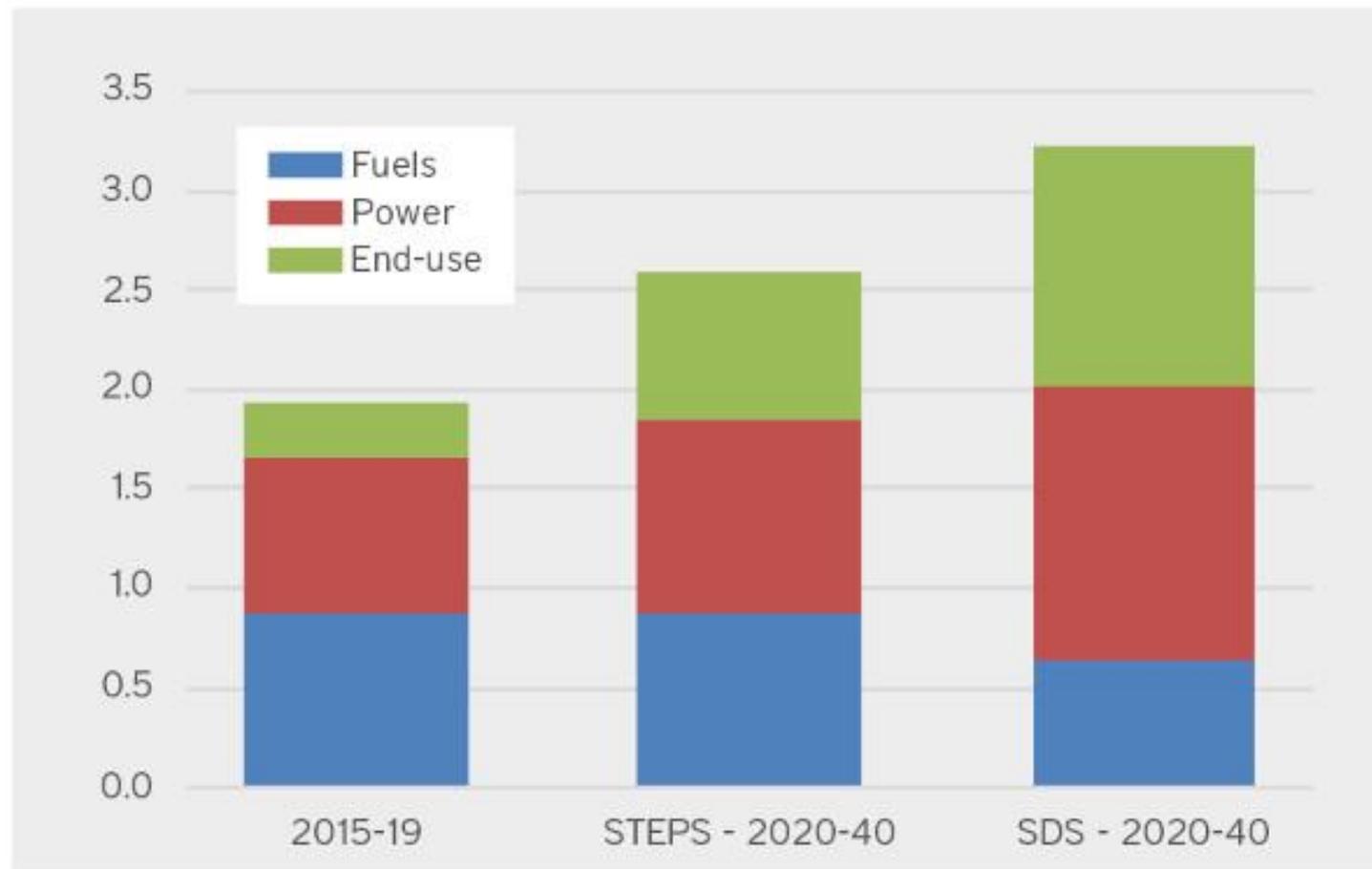


But longer term, **new technologies** related to the **energy transition** will win the day

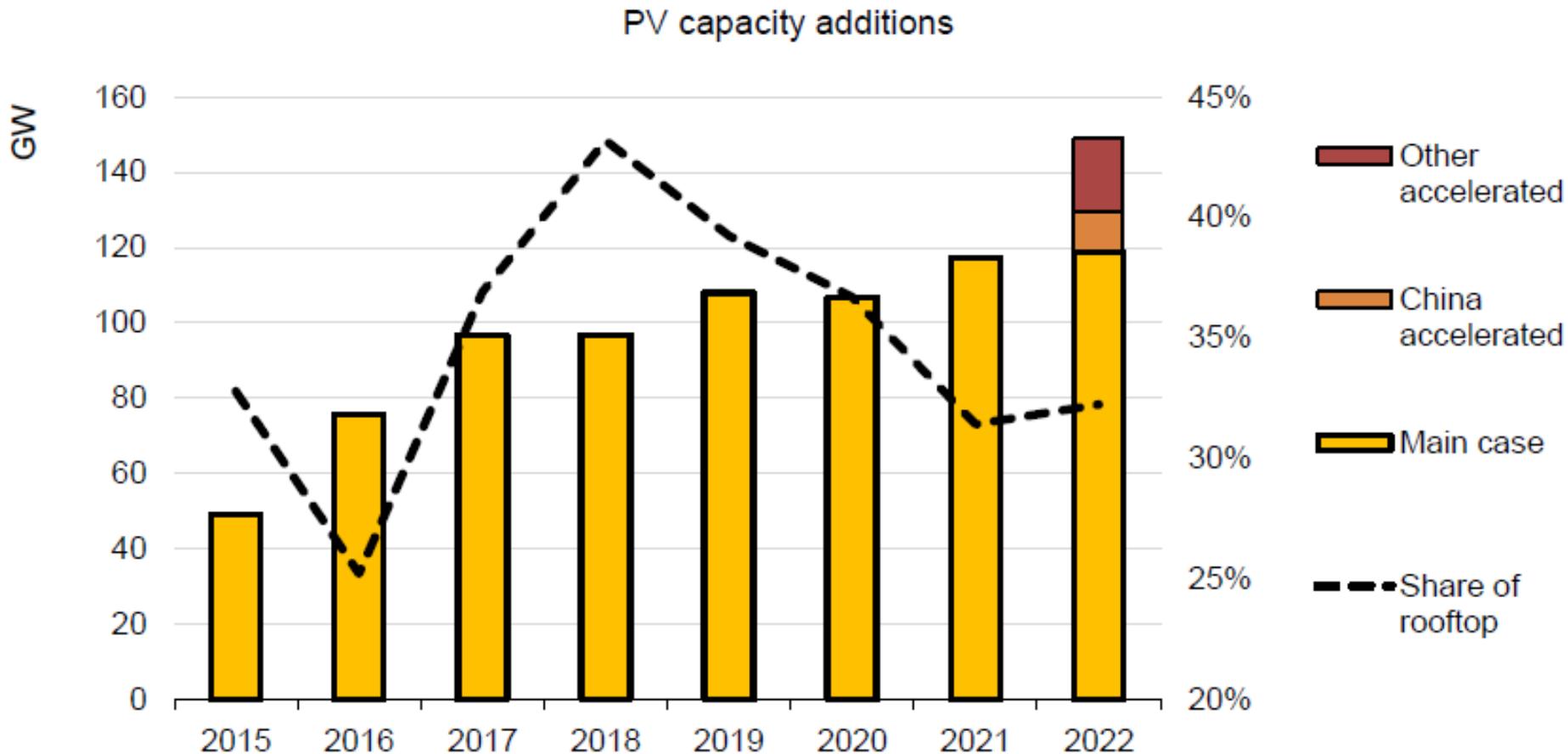


Overall global energy investments should increase under any scenario
- Big danger of underinvestment

Global energy investment (\$tn)



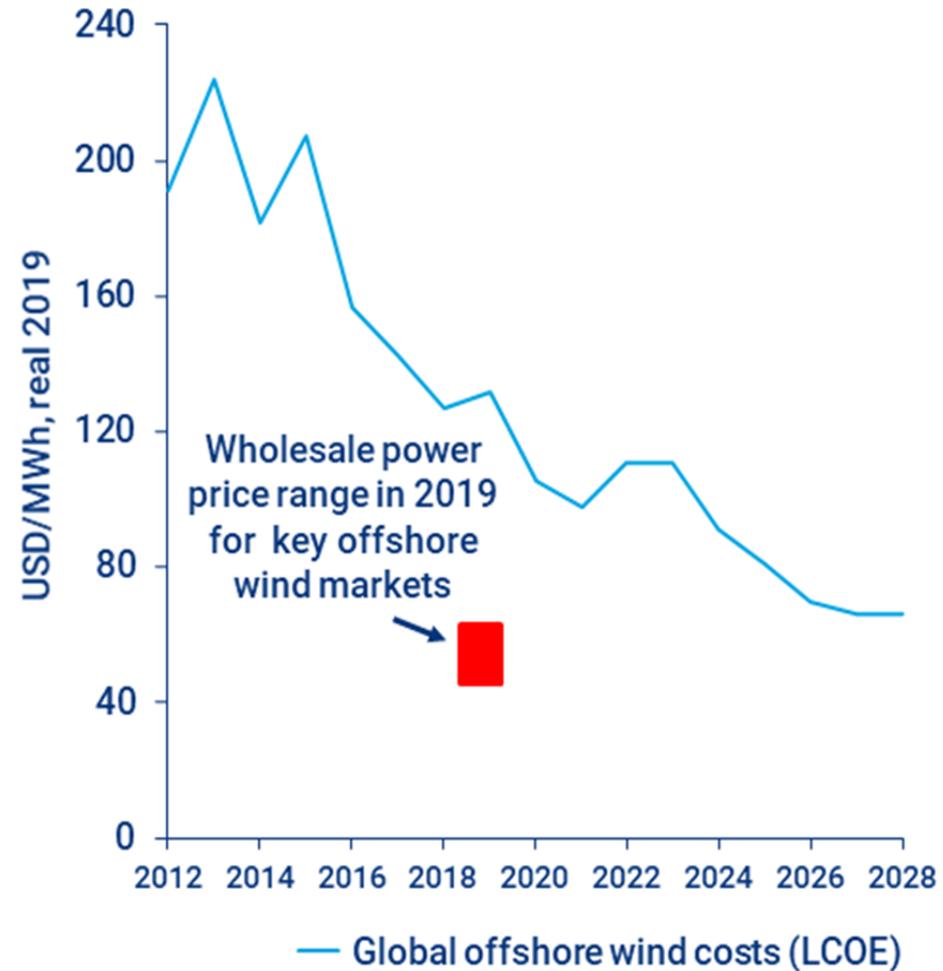
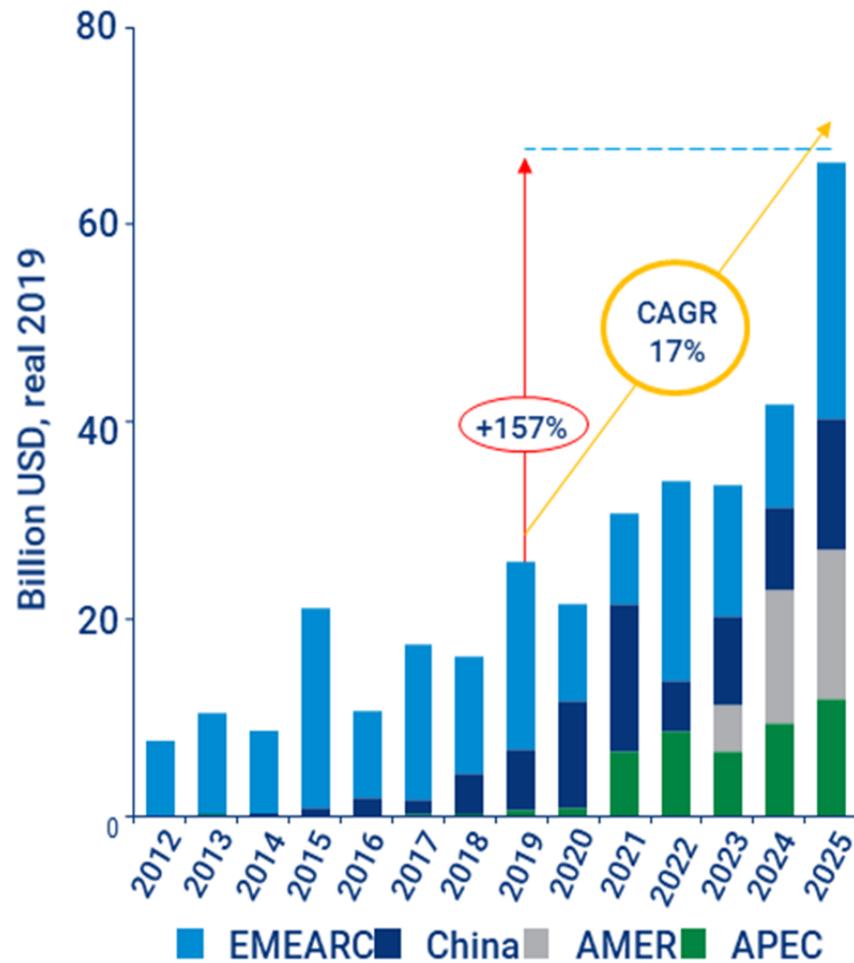
Photovoltaic systems to continue their growth



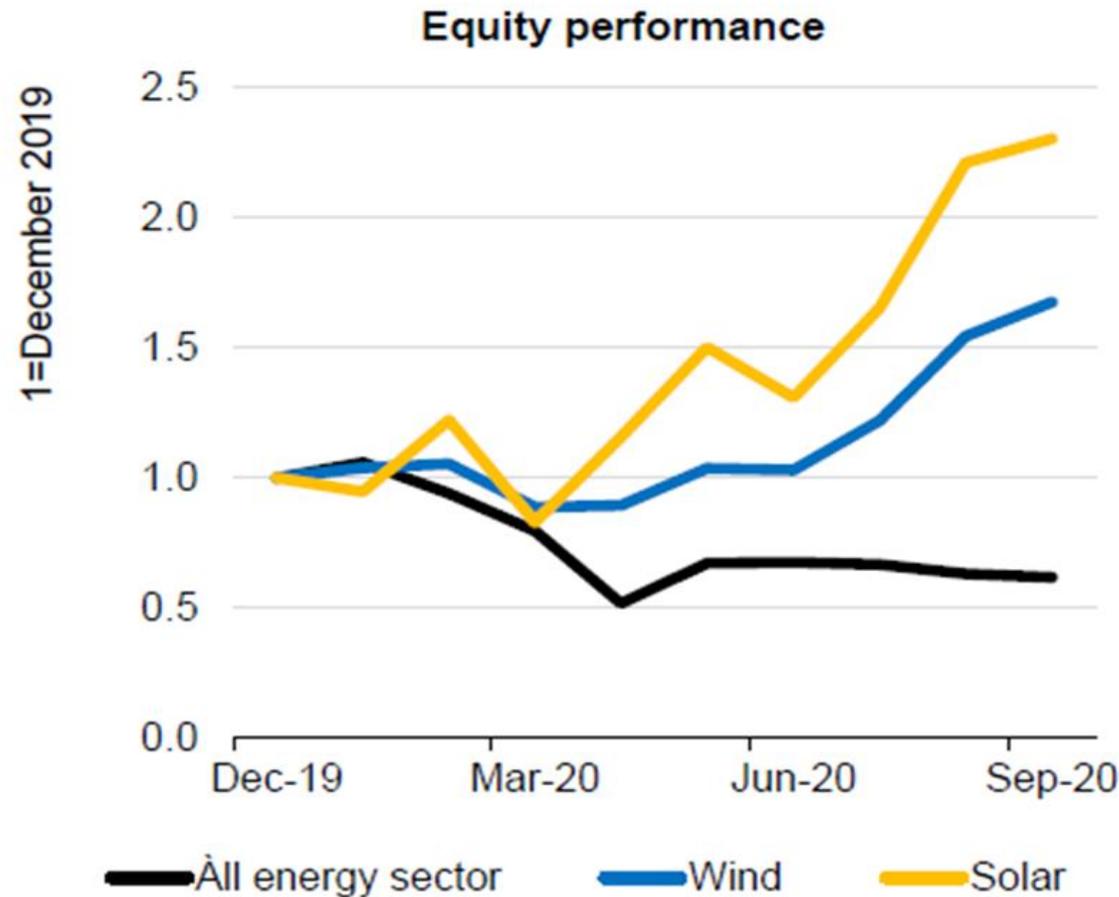
Faster expansion of solar PV is within reach if governments tackle policy uncertainties, provide additional support to rooftop PV, reduce financing costs and address grid integration challenges.

CAPEX investments in Wind Offshore

Global offshore wind capex is set to triple (LHS) while costs are rapidly becoming competitive



Today the financial performance of new energy companies is better than that of traditional ones ...

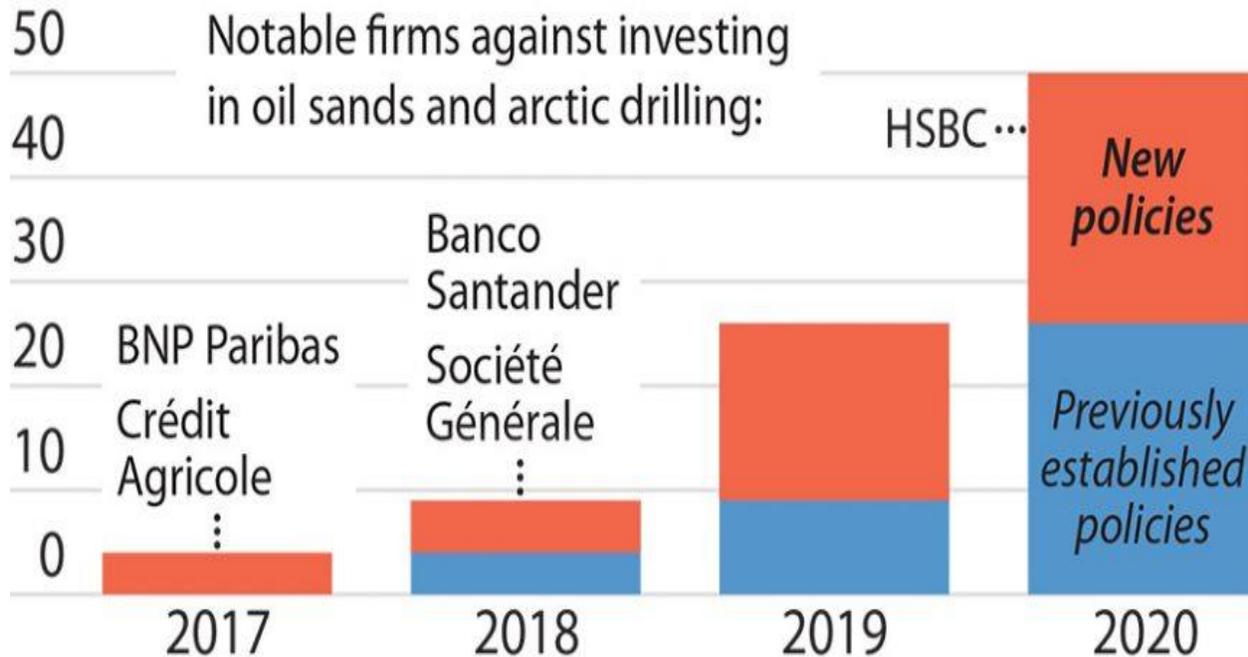


Publicly traded wind and solar companies continued to attract investors and have outperformed the overall energy sector. Countries worldwide have auctioned record levels of capacity, led by China, India and Europe.

... and they are better liked by the financial institutions

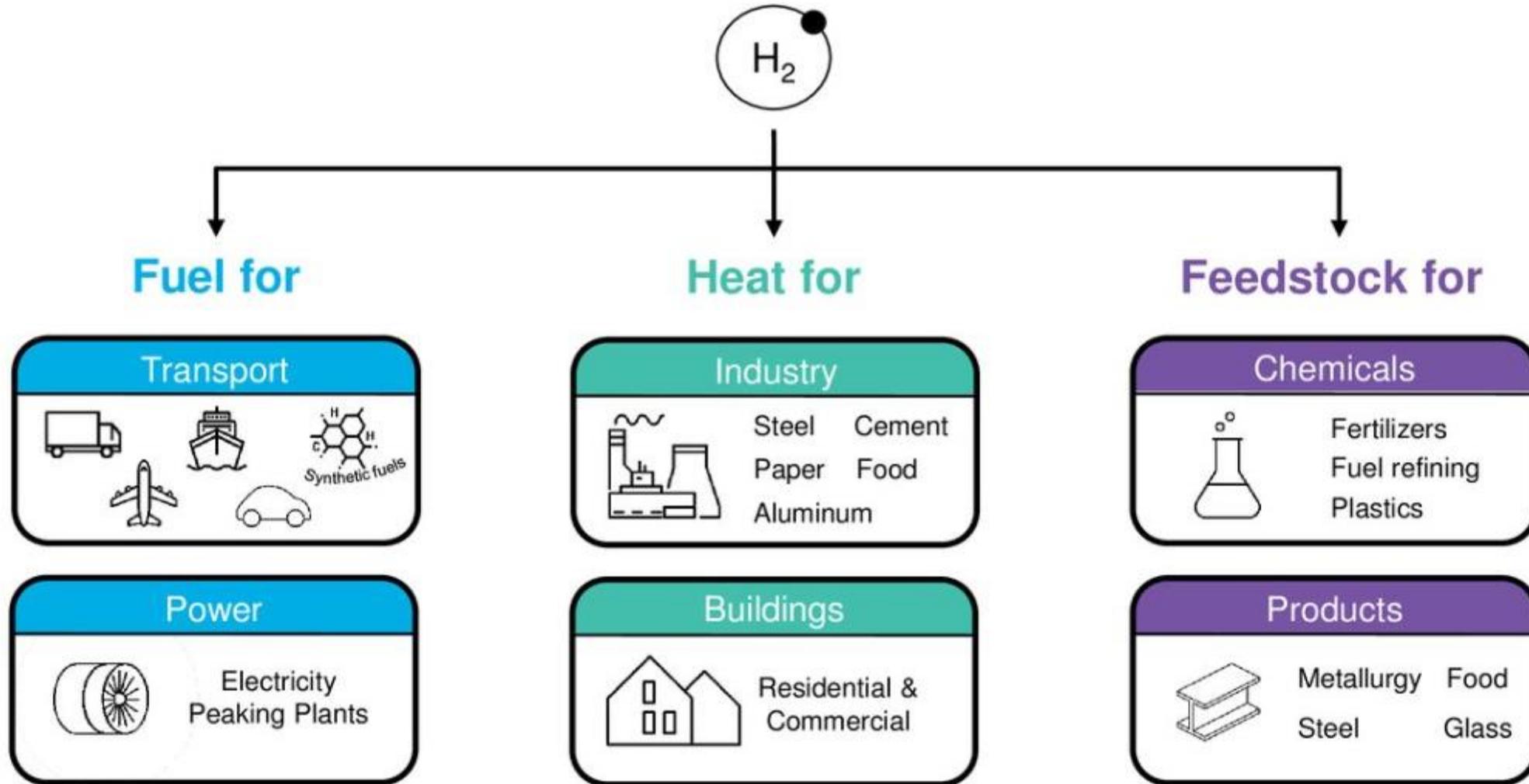
Financial Firms Spurning Oil and Gas

At least 50 financial institutions have adopted policies against making investments in oil and gas.



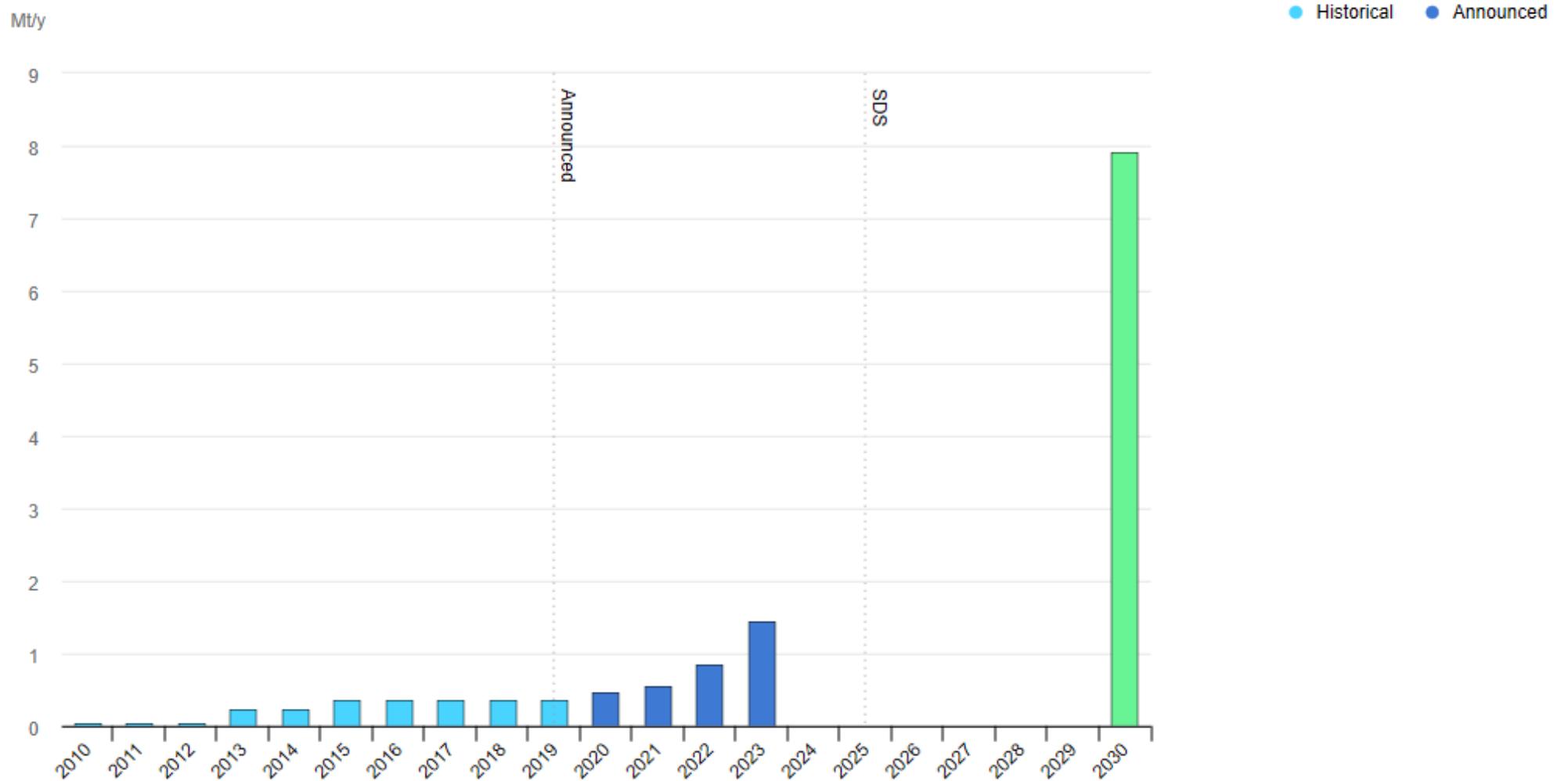
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Beyond solar and wind: Hydrogen

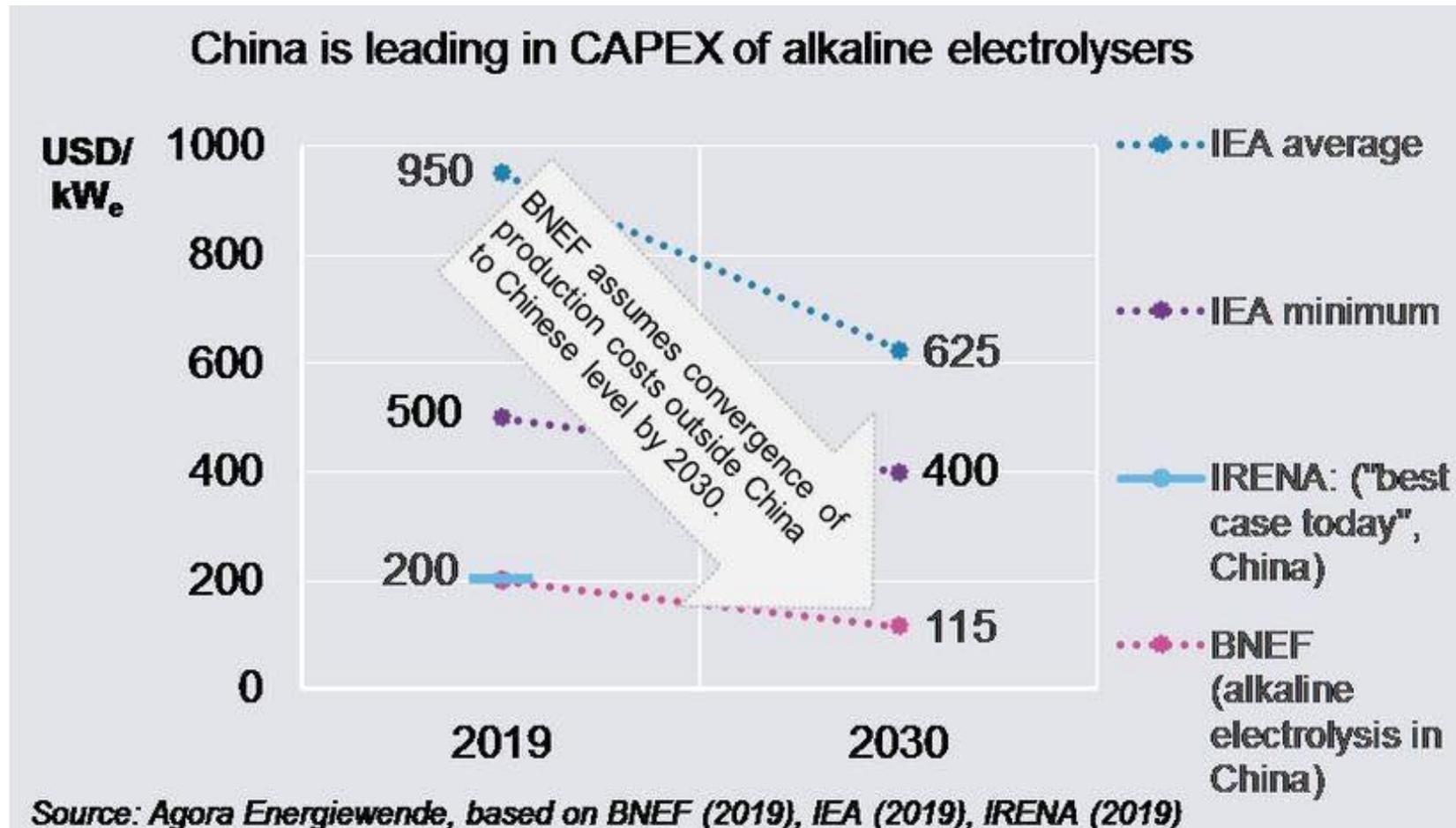


The utilization of hydrogen is expected to grow greatly (vs. today's levels)

“Low-carbon hydrogen production, 2010-2030, historical, announced....”



The future of hydrogen rests on **cost reduction** ...



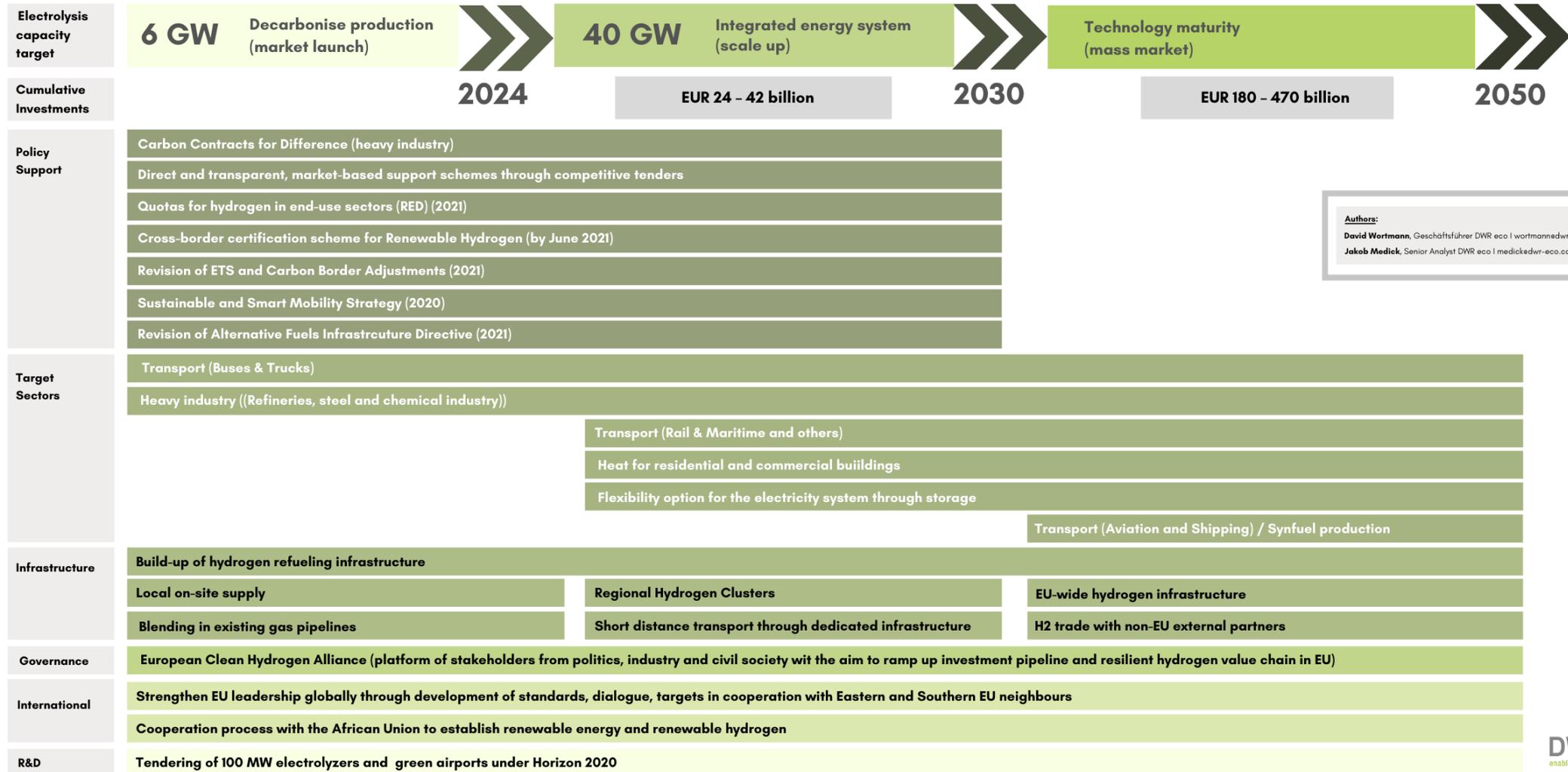
... and **system safety** assurances

Numerous H2 support policies are under development and implementation worldwide

EU Hydrogen Strategy

10th July, 2020

AT A GLANCE



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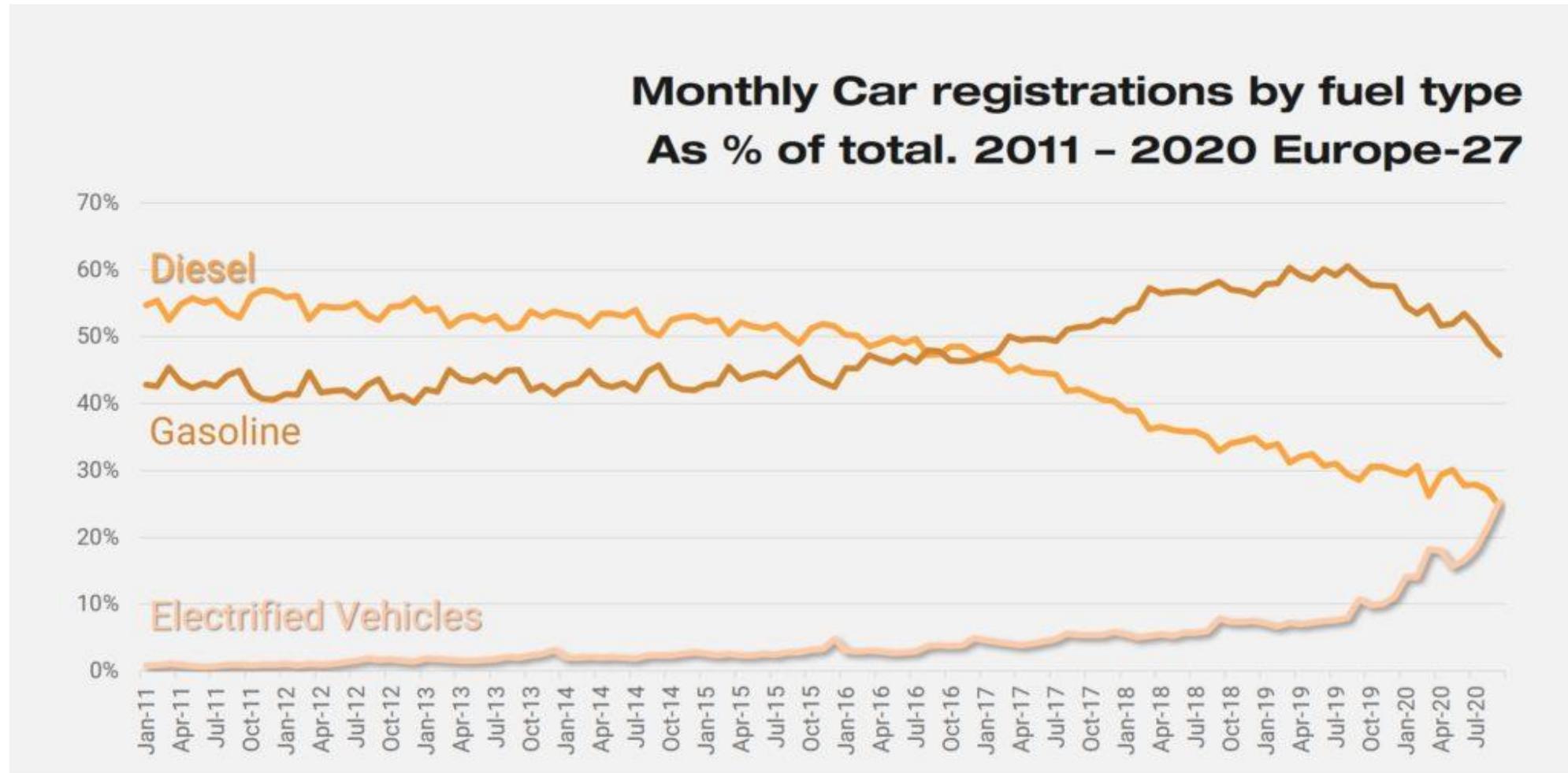
One of many examples: BP Orsted 50 MW demo power plant based on green hydrogen



H2: Perhaps also in the most 'unexpected' applications

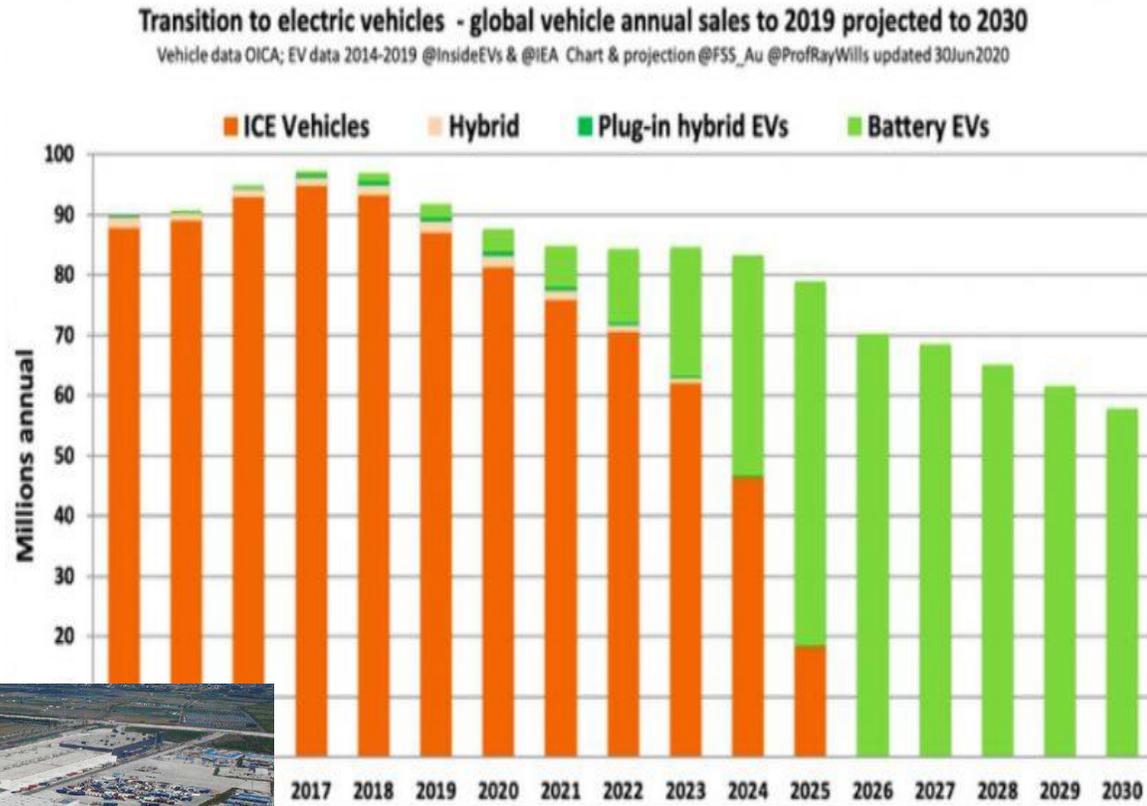


In Europe, EVs are substituting diesel vehicles



The days of internal combustion engines *could* be over ...

TESLA Y factory in Shanghai
Source: *The Driven*, Nov, 2020

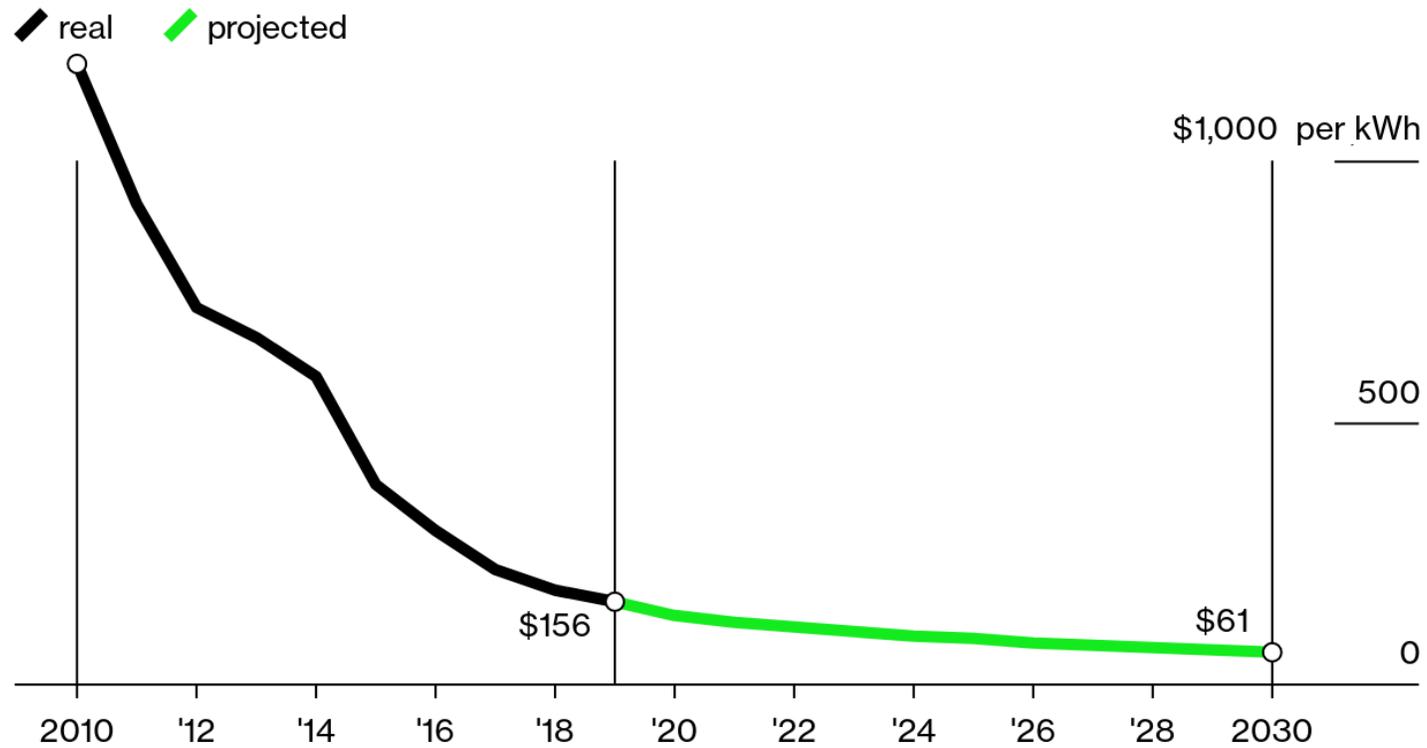


Source: *RenewEnergy* July 2020

... thanks to major technology breakthroughs in batteries and IT - also for stationary applications

Charging Ahead

Lithium-ion batteries continue to get cheaper each year



Source: BloombergNEF
Note: 2019 USD prices

Bloomberg Green

Conclusions on Market Context



- **Traditional** investments into the Oil&Gas industry should resume after COVID, but then plateau
- **The energy transition is a reality**, but with major uncertainties regarding:
 - Timing
 - Exact direction
 - Quantification



- **Most medium-term opportunities** to be in **new market applications**
- **Key factors** will remain:
 - Governments and policies
 - Technology development
 - Public opinion

Varied portfolios, active search for technology breakthroughs, spread-the-bets approaches ... could all be the keys to success

Agenda

Market Context

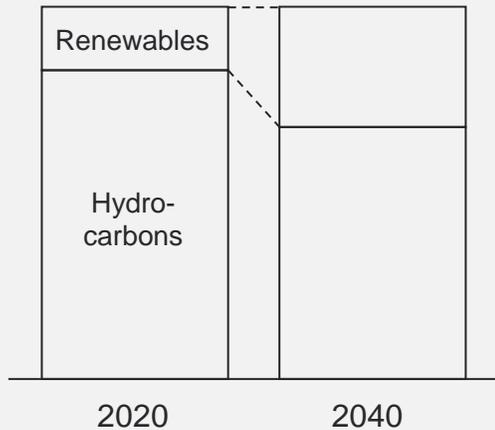
Outlook on Investments

Top10 Trends in Supply Chain

A resilient Oil&Gas industry

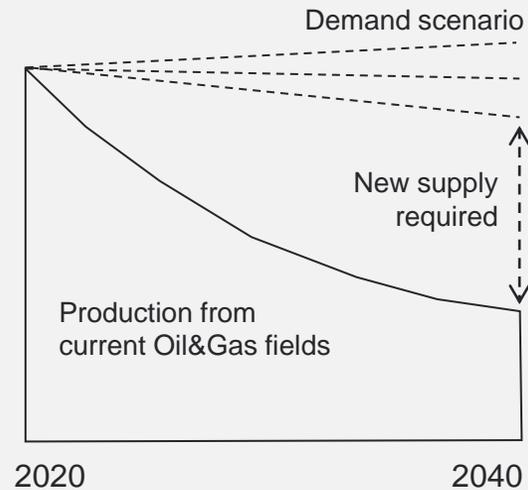
Decarbonization requires significant shifts towards renewables

In transition scenarios, renewables to continue to grow rapidly but there is **still a role for hydrocarbons, albeit diminished.**



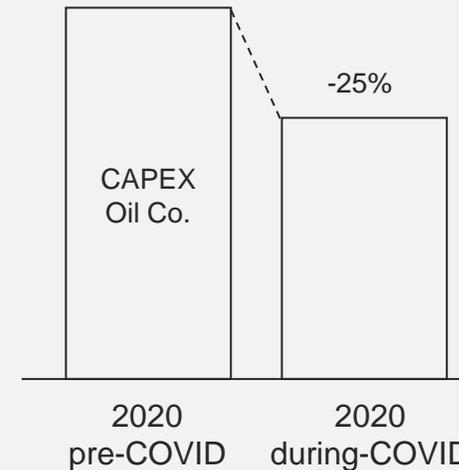
CAPEX in Oil&Gas is still needed to meet energy demand

Need to continuously replace the **depletion** of the already operating fields (on average 6% per annum).



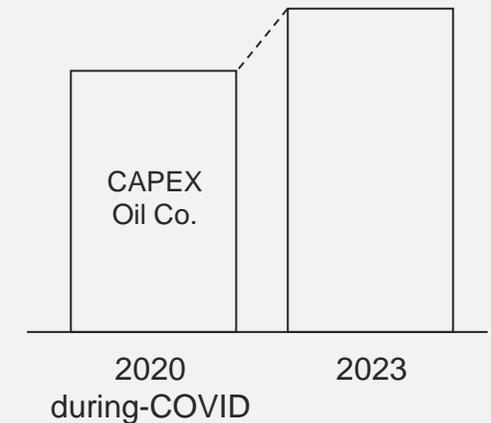
Oil&Gas Co. have enacted survival measures to COVID-19

The economic activity lockdown and block of mobility in 1Q-2Q are triggering an **unprecedented oil demand drop** with a consequent **oil price crash.**



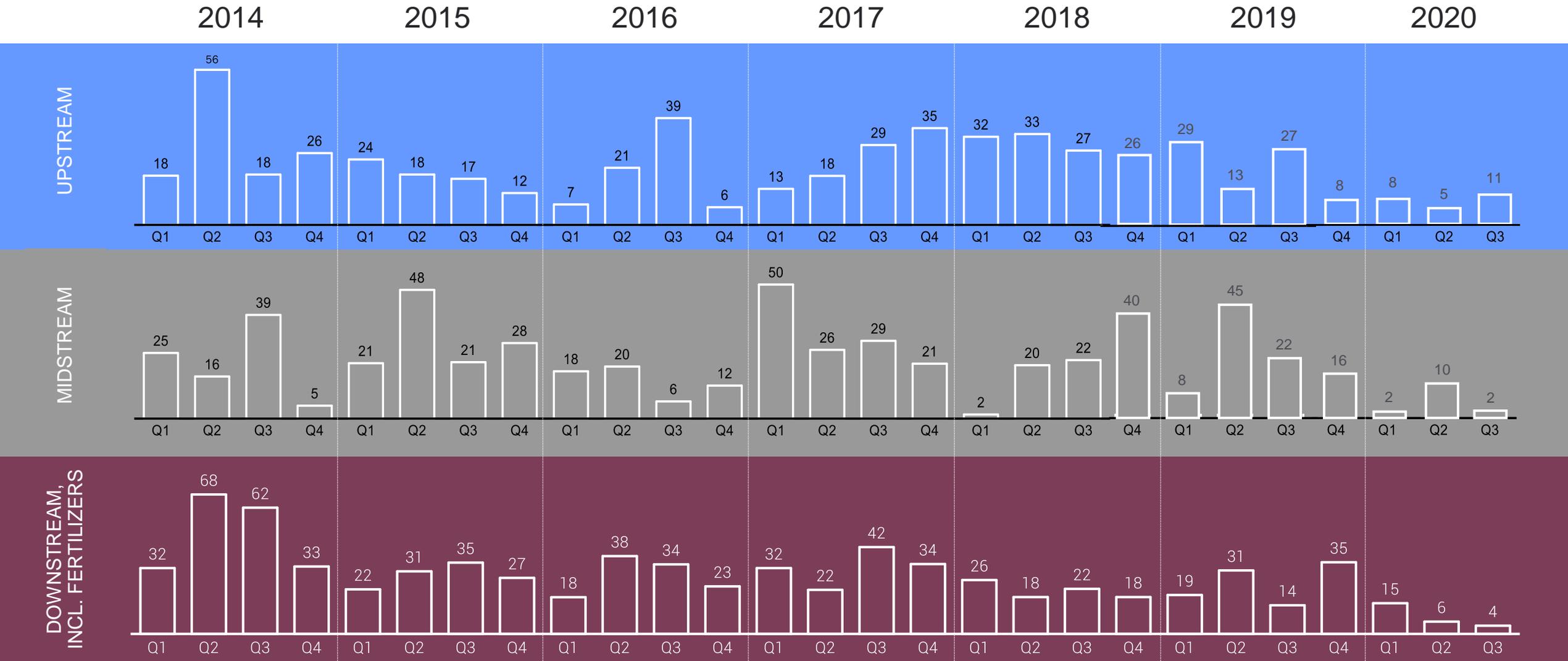
Perception of under-investment with expected rebound

Since the beginning of COVID19, **Governments in G20 countries** have committed at least **\$421B** to supporting different energy types, out of which **55% to Fossil Fuels**



Quarterly evolution of Oil&Gas project awards

Oil&Gas Top Projects awarded, Global (\$ Billion)

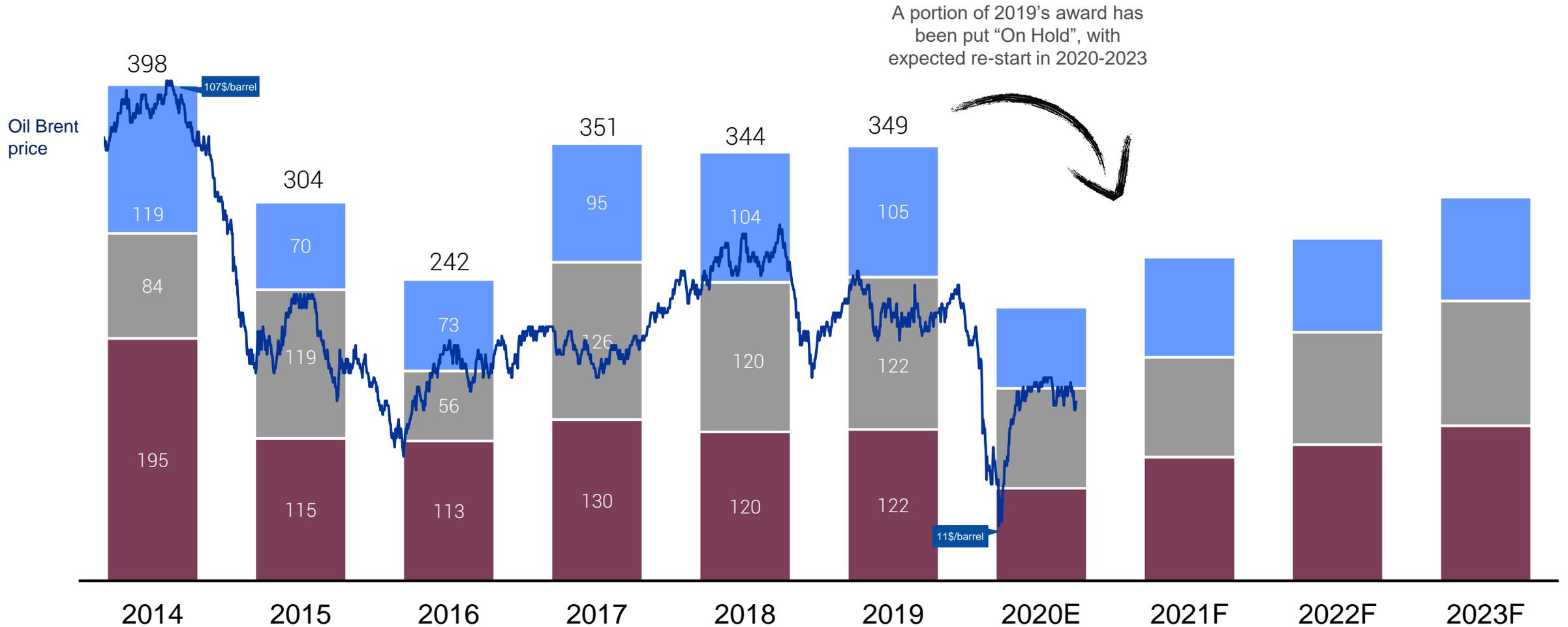


Note: not considering Exploration and Drilling CAPEX
Source: Suppli Market Compass

Oil&Gas Plant CAPEX evolution

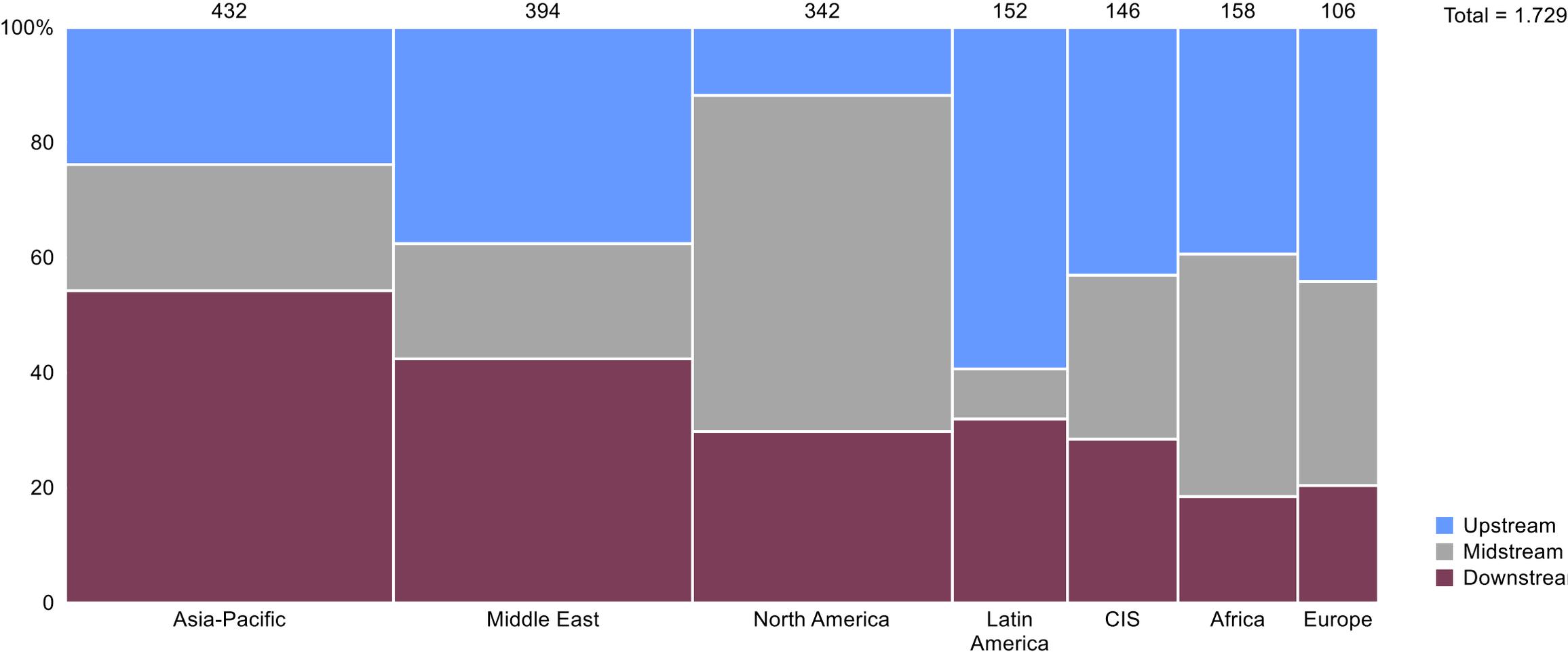
- Upstream
- Midstream
- Downstream, incl. Fertilizers

Distribution of CAPEX for Oil&Gas Top Projects, Global (EUR Billion)



Oil&Gas CAPEX sees high relevance of Downstream in APAC and ME, while strong LNG investments in North America

Estimate of the Oil&Gas (incl. Fertilizers) Plant CAPEX - 2019-2024, Billion €



Note: not considering Exploration and Drilling CAPEX
 Source: SupplHi Market Compass

The Oil&Gas industry is “riding” multiple CAPEX waves

UPSTREAM



Upstream CAPEX is experiencing a **30% drop** in 2020/2021



Significant CAPEX in new Oil & Gas production will be **still required** to sustain depletion and continuous demand, even in a fast energy transition scenario

MIDSTREAM



Current wave of LNG capacity additions coming to an end, with COVID-19 delaying LNG CAPEX



Gas to support the energy transition, with a potential new wave of LNG investments to be started after 2022/2023

DOWNSTREAM,
INCL. FERTILIZERS



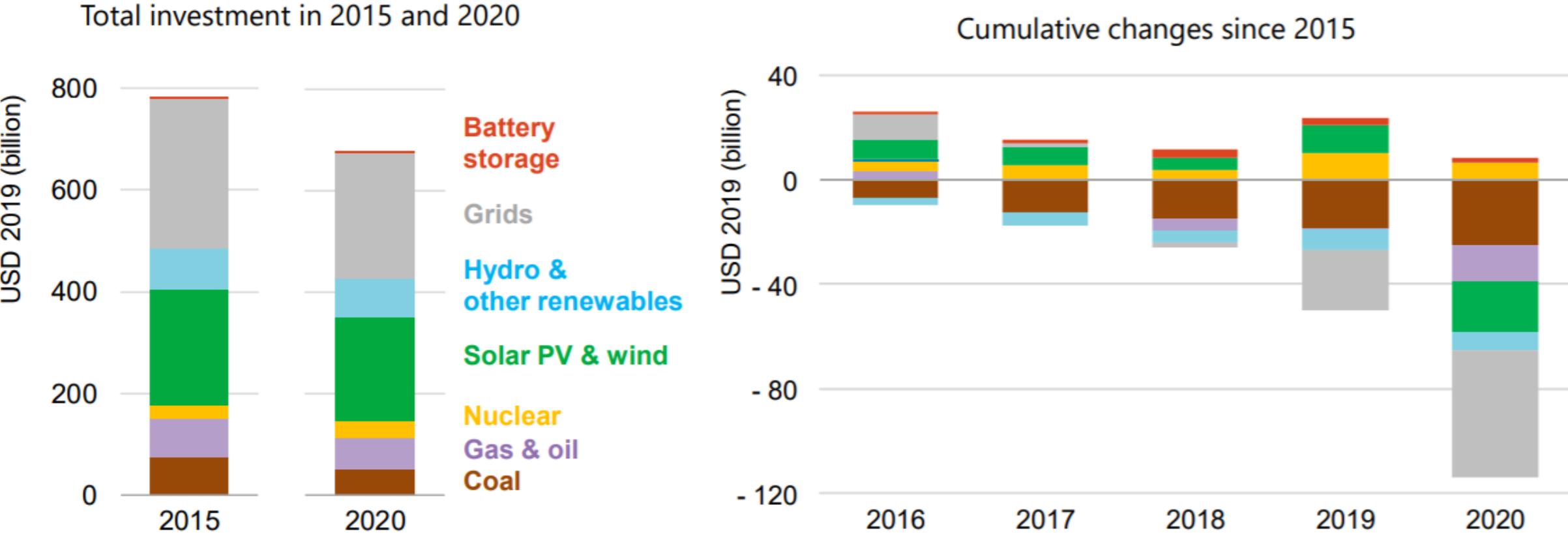
Petchem supply was already outpacing demand pre-COVID (17% petrochemicals price decline in 2019) and oversupply will be exacerbated by global economy contraction



Continued momentum for Downstream (large greenfield & brownfield projects – mainly biorefineries), even if at **slower pace**, also to **sustain local economies’ development**

Investment in Power in 2020 has seen higher reduction in Grids and Solar

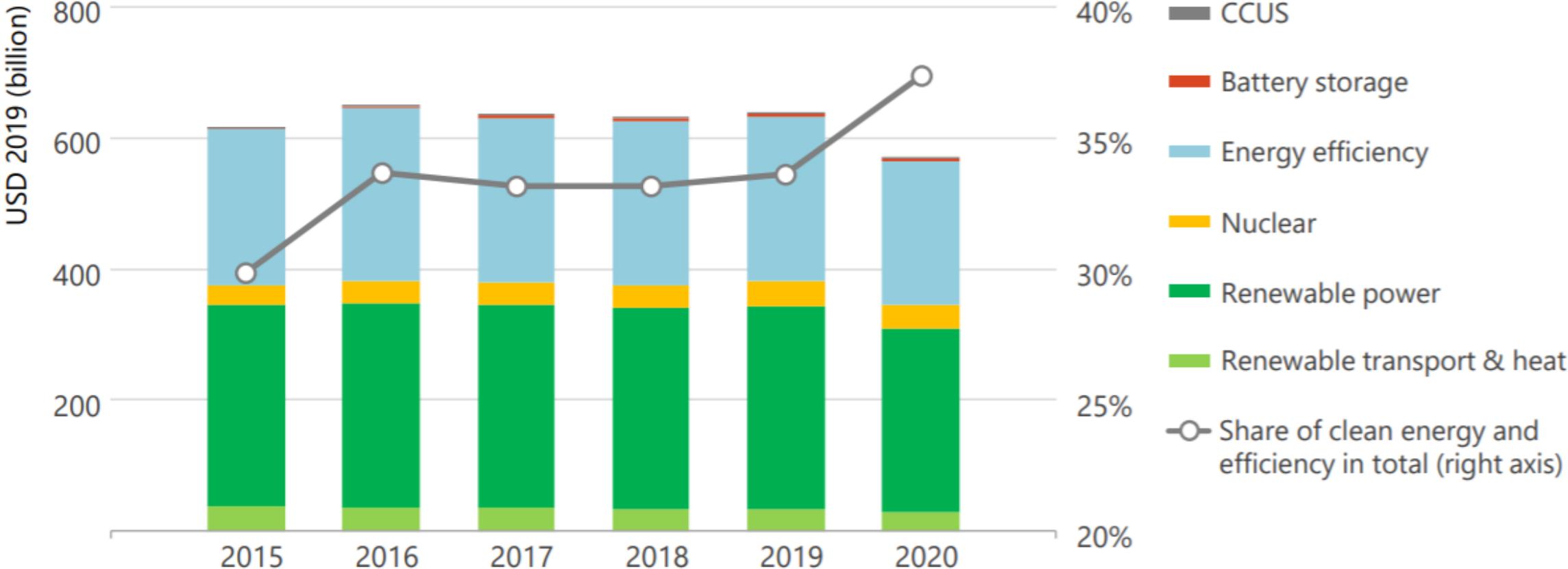
Global Power investment



Investment in solar PV and wind has held up, even as costs have come down, but spending on other aspects of a secure & sustainable system – grids, storage, flexibility – are lagging behind

Clean Energy CAPEX in 2020 has been resilient and increased its share

Global investment in clean energy and efficiency, and share in total investment

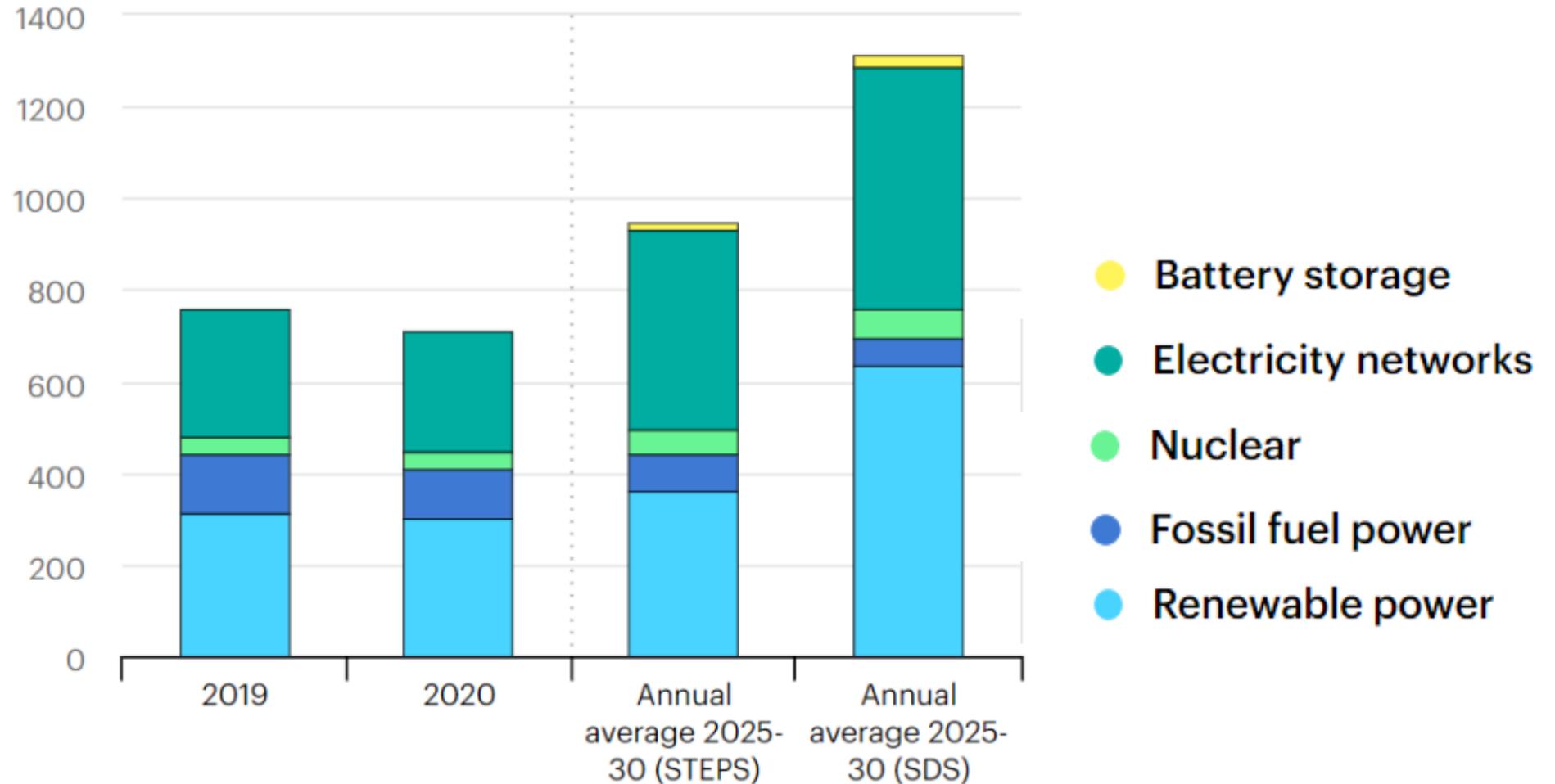


Under the IEA's Stated Policies Scenario, energy supply investment would rise to nearly \$1.3 trillion within 10 years

Global Power CAPEX

billion USD (2019)

Sustainable Development Scenario (SDS)



Agenda

Market Context

Outlook on Investments

Top10 Trends in Supply Chain

Top 10 Trends in Plant Engineering Supply Chain, 2020

1	Energy Transition	↑	6	Sustainability	↑
2	CAPEX Challenge	→	7	Digital	↓
3	In Country Value	→	8	Project Management	→
4	Green & Circular	↑	9	New Talents	→
5	Standardization	→	10	Political relevance	↑

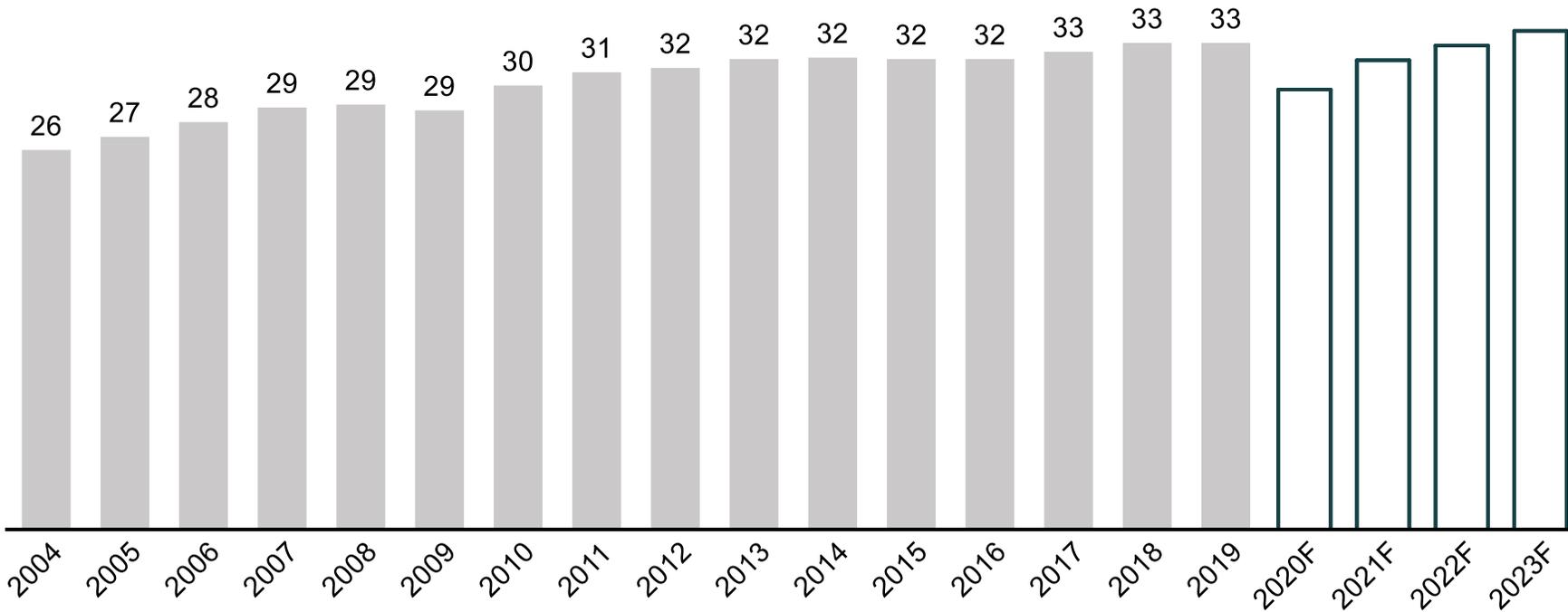


Relative change in relevance from previous year

The new reference standard

CO2 Global emissions from the combustion of coal, gas, oil, and other fuels, including industrial waste and non-renewable municipal waste.

Metric gigatons (GT)

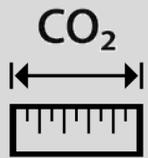


Today, with ANIMP online attendance, we are saving 7,2 tonnes of CO2

Currently driven by:

- 30% China
- 15% US
- 9% Europe
- 7% India

- 25% Electricity
- 23% Agriculture
- 21% Industry
- 14% Transportation
- 6% Buildings



Are we ready to measure in terms of CO2 all our activities?

Supply Chain's CO2 footprint estimation

CO2 of a Plant in industrial B2B

Development phase (EPC-I): 2-5 years

20+ years

Raw materials

Sub-components

Plant Logistics

Manufacturing processes

Project Logistics

Construction / Installation

Operations phase

Procurement-based "upstream" manufacturing by Vendors.

Carbon footprint of each production line, by category of supply.

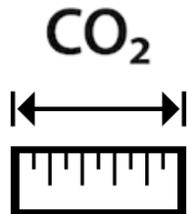
Location of the manufacturing plant (for distance from destination)

Installation mainly relevant for Offshore activities (e.g. naval spread, ...)

Each Technology Licensor has its own internal estimation model for CO2



CO2 Estimation Engine



Carbon footprint measurement methodology that identifies actions to reduce the footprint of the entire supply chain

Is your product & service portfolio, GHG-ready?

Most demanded categories of supply - NOT EXHAUSTIVE

CO₂
Carbon Removal
&
Carbon Avoidance

EQUIPMENT

- CO2 Capture packages / systems
- Dedusting Filters
- Ash Removal systems
- Water Treatment systems
- Electrolysers
- Fuel Cells
- ...

SERVICES

- Environmental Monitoring
- **Environmental Product Declaration (EPD) consulting**
- **Life Cycle Assessment (LCA) consulting**
- Carbon Credit Trading / Carbon Offset Management
- Logistics Route Optimization Software
- GHG Monitoring Software
- Sustainability Reporting Software
- ...



Environmental Product Declaration

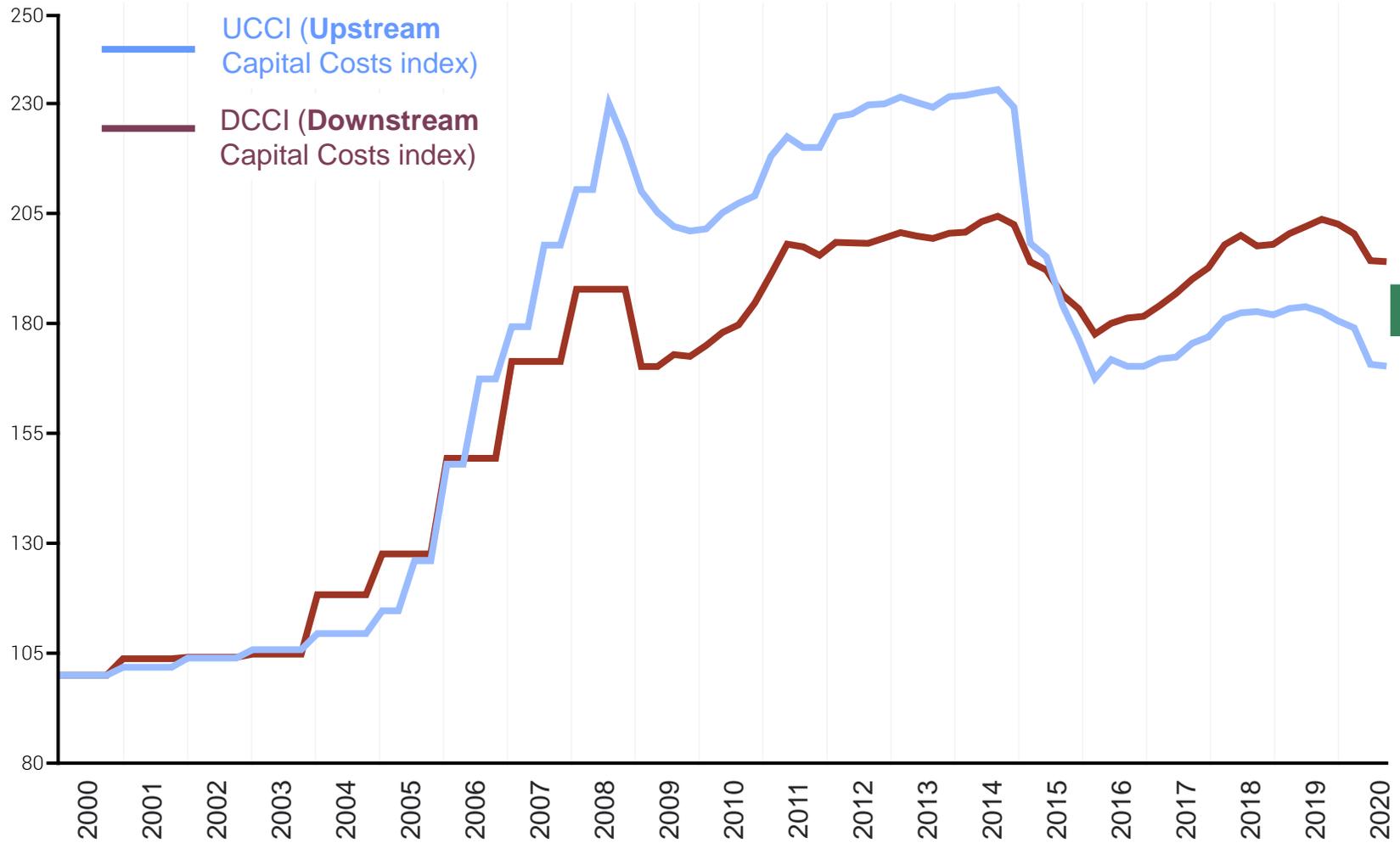
Life Cycle Impact Results (per m³)
Declared Unit: 1 m³ of 3,000 psi concrete

OPERATIONAL IMPACTS (per m ³)	Residential Concrete
Plant Operating Energy Consumption (MJ)	15.8
On-Site Plant Fuel Consumption (MJ)	172.9
Concrete Batch Water (m ³)	1.94E-01
Vehicle and Equipment Wash Water (m ³)	6.2E-01
On-Site Waste Disposed (kg)	0.68
ENVIRONMENTAL IMPACTS	
Total Primary Energy (MJ)	3,136
Climate Change (kg CO ₂ eq)	364
Ozone Depletion (kg CFC11 eq)	1.34E-08
Acidification Air (kg SO ₂ eq)	2.41
Eutrophication Air (kg N eq)	5.55
Photochemical Ozone Creation (kg O ₃ eq)	1.14

NSF Environmental Product Declaration

Costs to remain under control, efficiency is a must

Cost Index (2000=100)



This is what the market is able to pay to let projects fly.

Costs now cannot increase back.



In 2021-2022 - after the delivery of the current backlog - the **supply chain will be challenged by the impact of less CAPEX awarded in 2020** and by project delays.

“In Country Value” makes you win or lose contracts

Example: Critical equipment

SuppliHi pilot on Industry-shared evaluation
(out of ~200 observations)

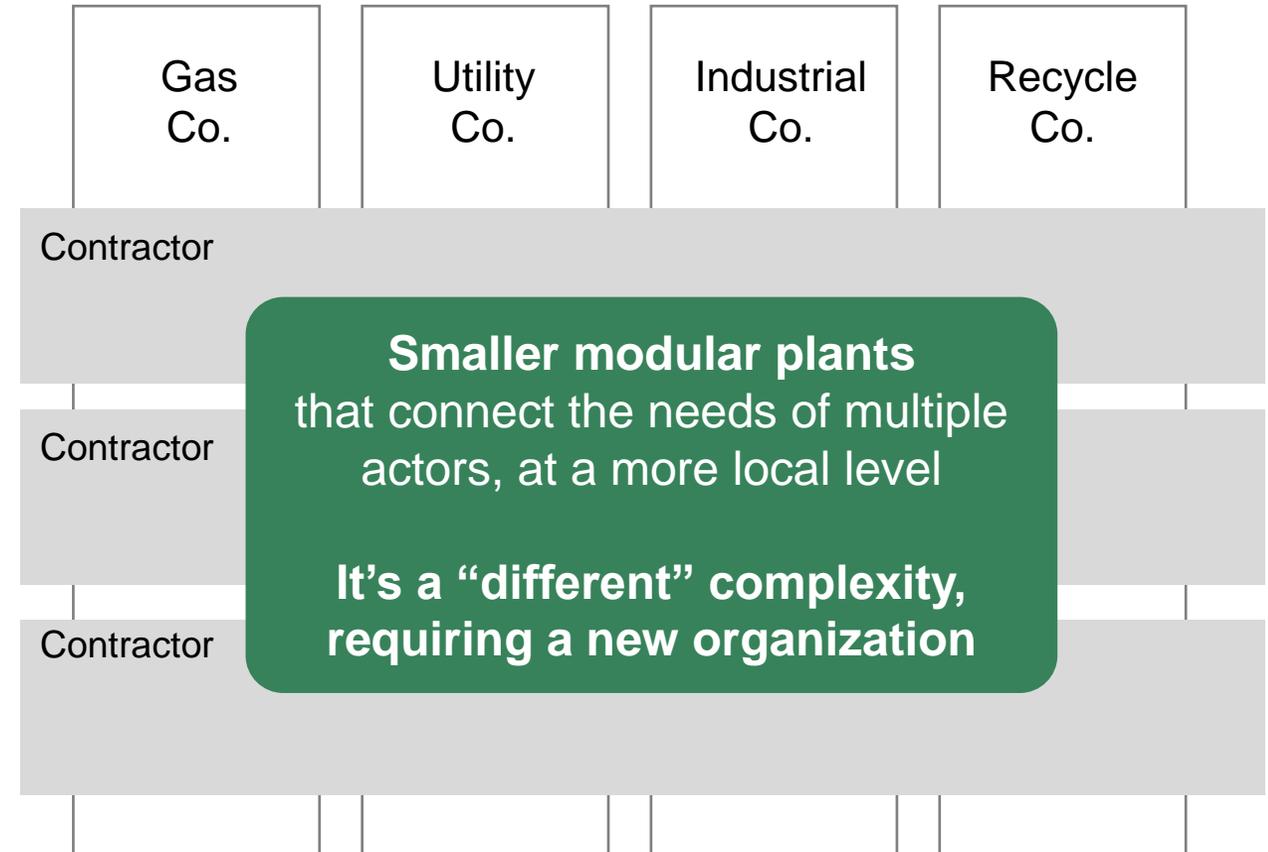
Country of the Vendor	# of total players	Quality	Delivery time	Behaviour	Overall Score
European Country	215	4.3	4.1	3.7	4.0
Asian Country	128	3.1	3.3	2.7	3.2
North American	72	3.2	2.8	2.8	3.2
Asian Country	61	2.8	3.3	2.5	2.9
 Russia	45	4.2	3.2	4.1	4.0
 Saudi Arabia	43	3.9	4.1	3.4	3.8
 UAE	36	4.1	3.2	3.7	3.5
Asian Country	32	3.3	2.9	3.2	3.1

- Evolution, from “**Local Content**” to “**In Country Value**”
- Contractors are the first ones subject to ICV Certificates - **ICV regulations** differ from country to country, requiring tailored approach
- **Local supply chains grew** in number and competences and they **do deliver**
- How to transform ICV into an opportunity?

Green Value Chains require a different business model by End-Users and Contractors

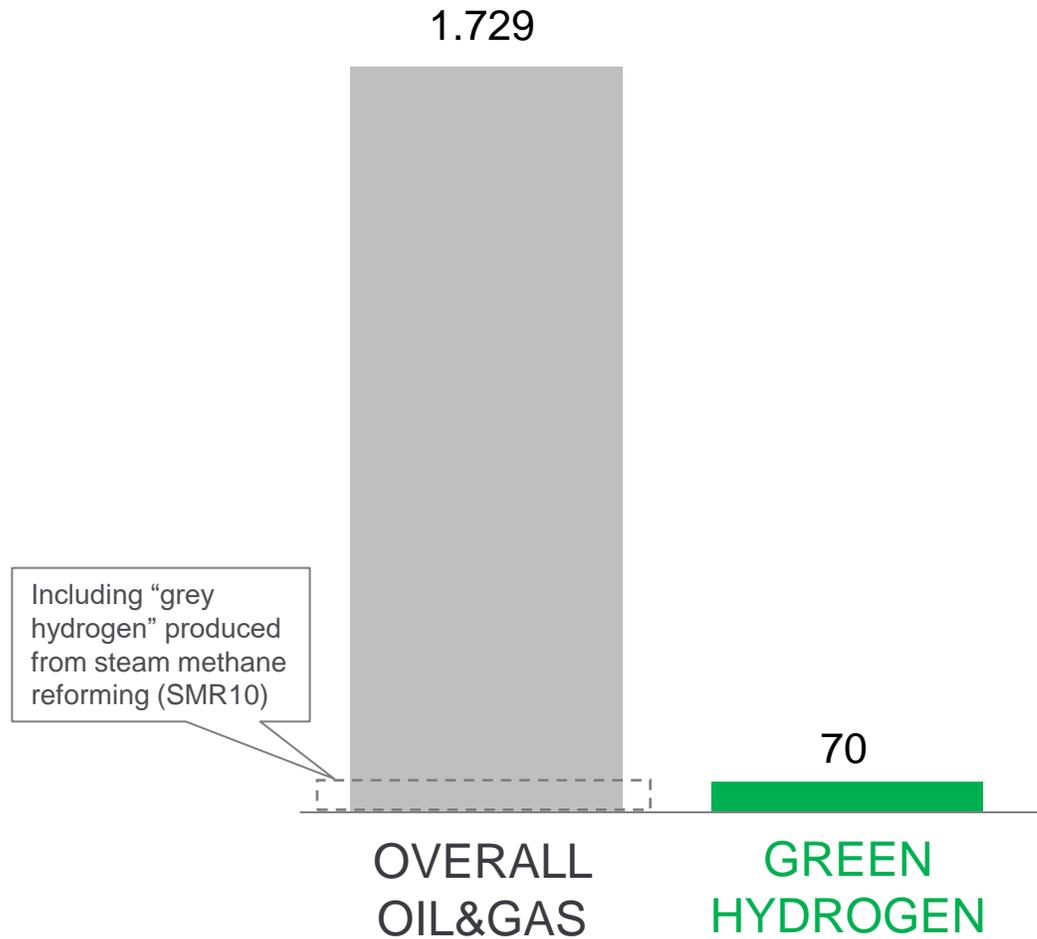
- The green industry is creating **new opportunities** (including the **infrastructure** required to support the “core”):
 - Circular Economy
 - Green Chemistry
 - Green and Blue Hydrogen
- The new Green Value Chains do not support the traditional “silos” industrial model
 - issues in **evaluations of benefits**
 - focus on **permitting** and local presence
 - **co-investment / financing** by Contractor?

Traditional “silos” industrial model



Green Hydrogen CAPEX will not immediately drive industry backlog, yet

Plant CAPEX, 2019-2023, Billion €



- **50 green hydrogen projects under development worldwide**
 - large scale facilities starting up in 2022-23 and 2025-26 - mainly in **Australia** and **Europe** (announced €470 billion toward hydrogen infrastructure)
 - Projects mainly at an **early stage** (just 14 having started construction and 34 at a study or MOU stage), with many that could face **delays** due to **uncertain financing** and complex JVs
- Dedicated **M&A wave** targeting technology owners (e.g. fuel cells, ...)
- Future relevance of **Hydrogen storage CAPEX** (e.g. salt caverns or depleted gas fields)

Traditional approach



All main IOCs and NOCs are replacing specs and datasheets, even on already started projects



Multi-year creation of a new standard library

Future of Energy



Energy Transition requires smaller and more replicable (“faster”) plants

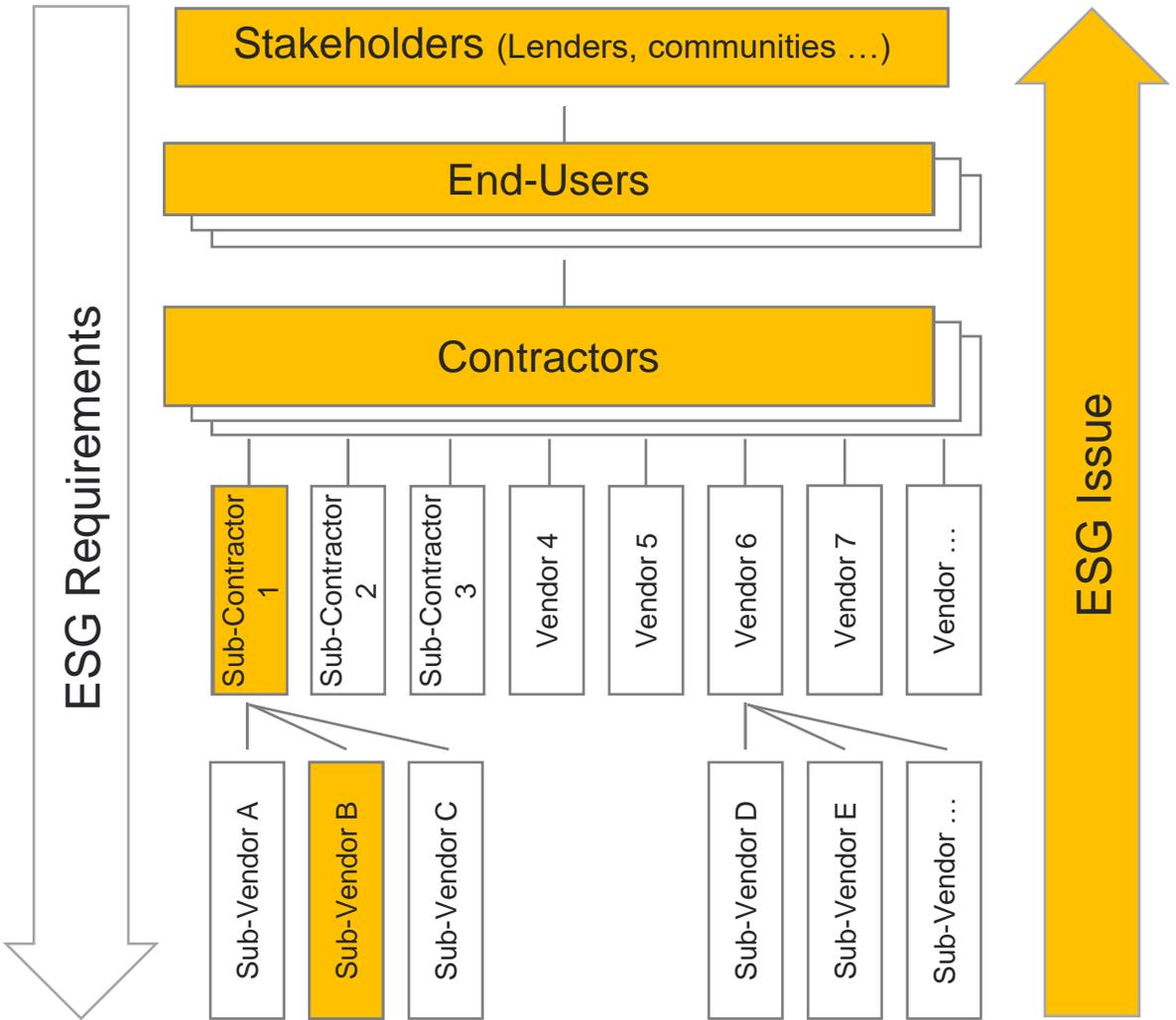


Native & Fast

Standardization is inevitable

- **New way of working** (the knowledge of the different company specs has been a competitive advantage, ...)
- **Fast adopters** will be the ones benefiting the most
- How to ride the standardization?

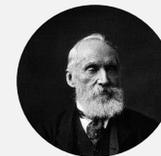
Sustainability is not just a hype in our articulated Supply Chain



Environment, Social, Governance (ESG) principles, practices, standards, metrics and requirements are:

- becoming an **award factor in tenders**
- a **pass-through to the entire value chain** repeating the case of **“Quality systems”**, 30 years later
- entering the **Banking system**

If you can't measure it,
you can't improve it.



Sir William Thomson
Inventor of the Kelvin international system of absolute temperature

Industry-shared guideline for ESG sustainability assessment of plant engineering supply chain

ESG SUSTAINABILITY ASSESSMENT WORKGROUP

Guideline for industry-shared assessment of ESG Sustainability in the Supply Chain of the Energy industry



Sustainability Managers of:







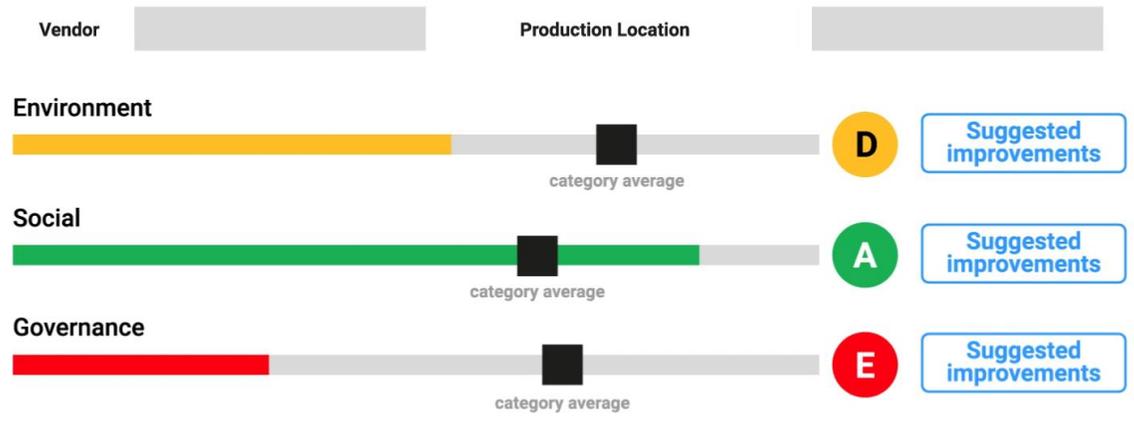



The workgroup is always open to other players to join the discussion

Solution providers




Open source and free to join for continuous review



EXPECTATION

Innovation is a process of creative destruction that revolutionizes the economic structure.



J. Schumpeter, 1939

REALITY

Digital in Plant Engineering is mainly focused on **process improvement**:

- **Speed** of interface among functions
- **Cost savings** on selected activities
- more **Compliance**

Currently:

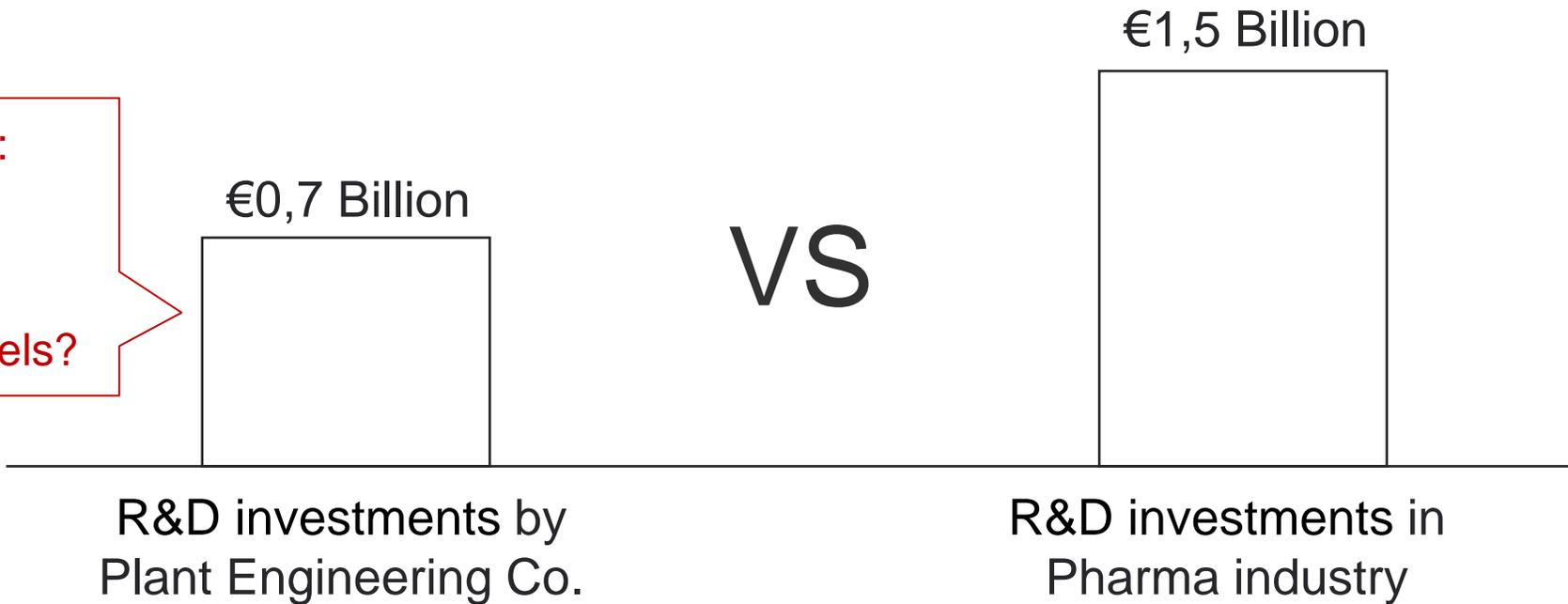
- all EPC players are performing **Digital Programs** looking for **incremental improvements to their operations**
- End-Users are the actors that can benefit the most in terms of **operational savings in their plants**

Beyond Digital, generalized under-investment in R&D

Annual R&D investments of Italian companies, average 2014-2018

Where is R&D on:

- New materials?
- New applications?
- New business models?



% on Sales



How to apply Amazon's Two-Pizza Team Rule ...

No matter how large your company gets, individual teams shouldn't be larger than what two pizzas can feed (5-10 people max)



... to a €1 Billion project in Energy?

The cost of coordinating, communicating, and relating with each other snowballs to such a degree that it lowers individual and team productivity

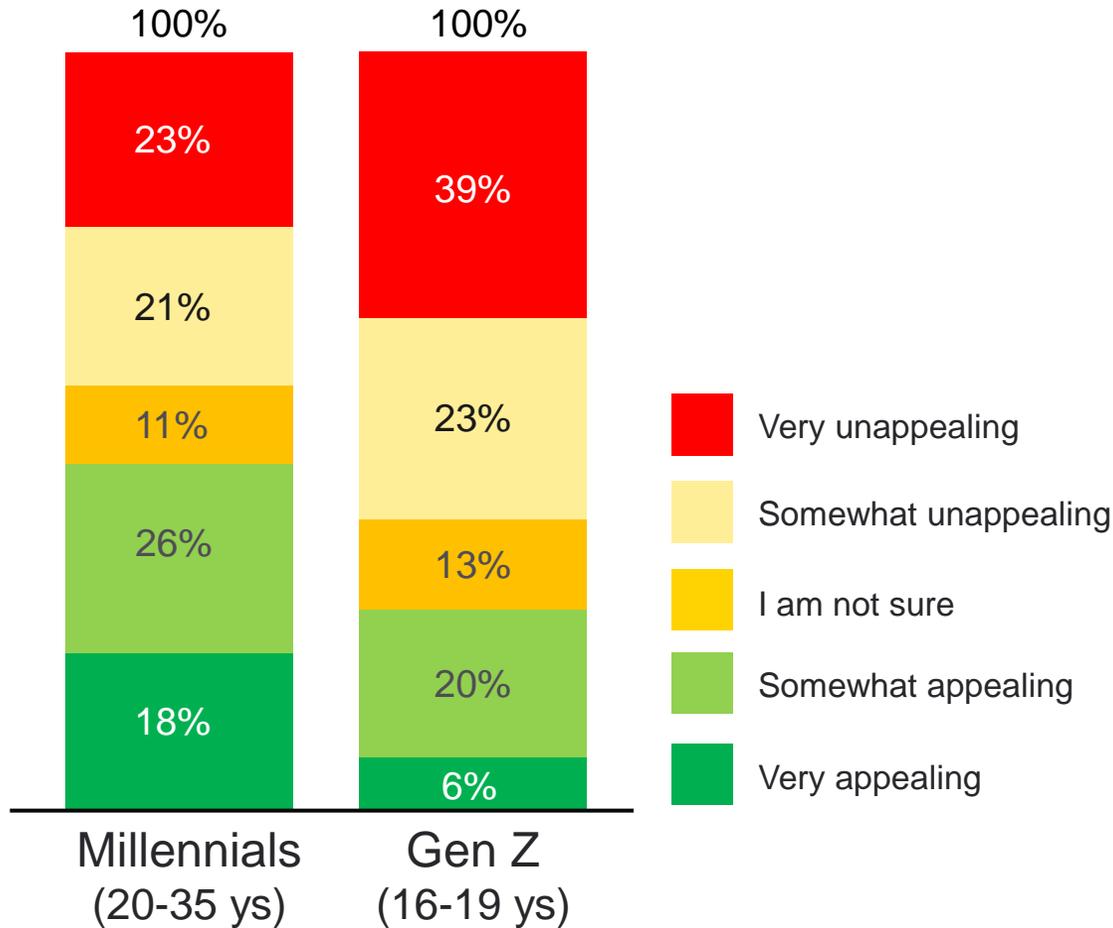


- **Decisions** will move **faster**
- **Specs** will be more **standardized**, and the **supply chain** will be increasingly **local**
- Execution will be even more **decentralized** with larger use of **outsourcing to specialists**, and support activities delivered **as-a-Service**

Which tools for a PM?

How to attract the next talents?

Survey by EY: How appealing to you is a career in the Oil & Gas industry?



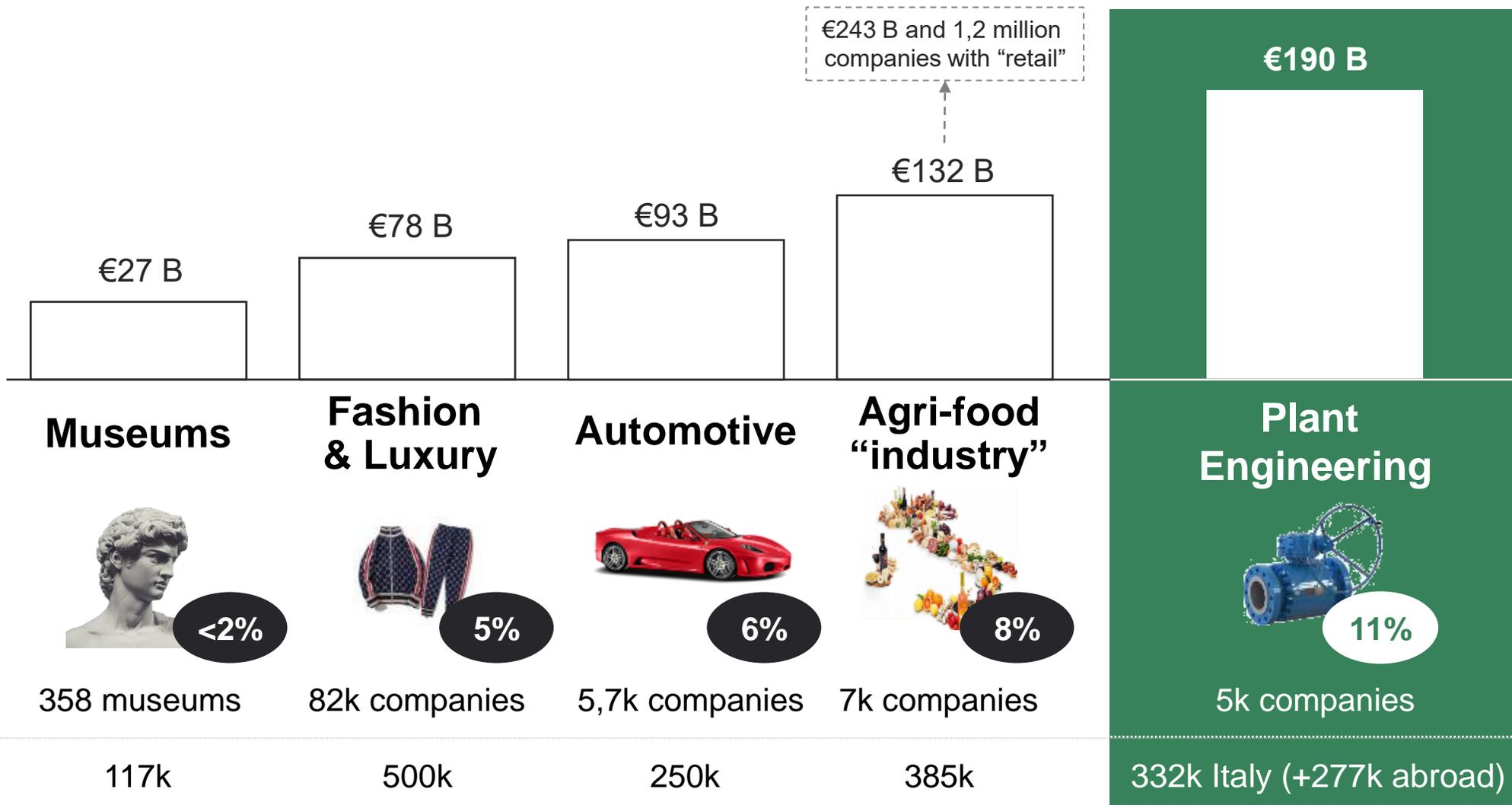
Generation Z will be looking for businesses with:

- a **purpose** (other than making money)
- **international** exposure
- **entrepreneurial values** (72% of teens say they want to start their own business)
- **continuous self-education** (33% watch lessons online, 20% read textbooks on tablets, and 32% work with classmates online)

How to cater these values to future professionals?

How to let emerge the relevance of our industry?

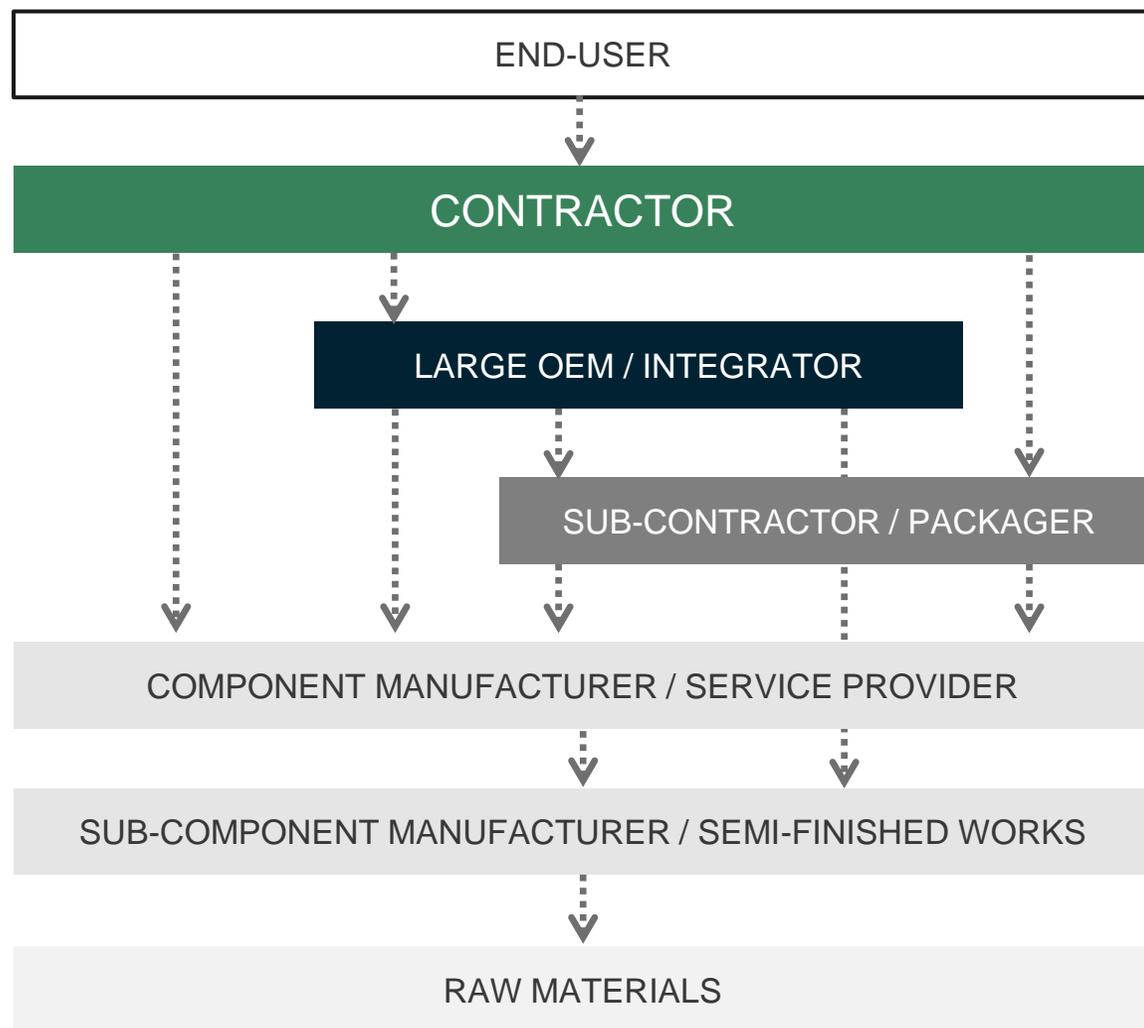
Value of Production, 2018



Incidence on total GDP

Source: analysis by Cribis D&B and SupplHi on Cribis D&B, BCG, Quattroruote, AlixPartners and ICE public data. Note: not considering Italian End-Users (Eni, Enel, ...)

Roles in our supply chain



Engine for innovation
More collaboration

More specialization

More risks, more innovation



Webinar, Sezione
Componentistica d'Impianto ANIMP

November 26th, 2020

Thank you for your attention

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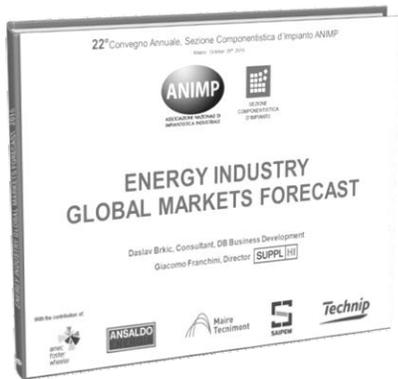
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