BCG

Executive Perspectives

War in Ukraine: View on Energy Impact

BCG Global Advantage and Energy Practice Areas

Prepared: 17 March 2022

Introduction to this document

The war in Ukraine is above all a political and humanitarian crisis…

Russia's invasion of Ukraine has led to a serious **humanitarian crisis**. BCG condemns this attack and the violence that is killing, wounding, and displacing so many people.

The top priority in moments like these must be the **safety and security of people**. Corporates, governments, and non-for-profit organizations should focus on supporting the people in Ukraine, Russia, Europe, and globally affected (physically and mentally).

It is the duty of political, societal, and business leaders to navigate through this crisis. **The intent of this document is to inform discussions on the energy impact of the war in Ukraine.**

The situation surrounding Ukraine is dynamic and rapidly evolving - this document reflects information and analysis as of **17 March 2022.**
It is not intended as a prediction of future events and is shared only as a resource for BCG and client conversations.

BCG Executive Perspectives

IN THIS DOCUMENT

ENERGY IMPACT

Global energy supplies were already limited before Russia invaded Ukraine. Now, sanctions on Russia—a leading exporter of natural gas, oil, and coal—and uncertainty over the risks ahead are throwing energy markets into greater turmoil. Many buyers and traders are unwilling to deal in Russian oil due to the risks. Major energy producers are pulling out of Russia altogether. The invasion is already raising energy costs for consumers and industries such as steel, chemicals, and transportation. The second-order effects—on supply chains, consumer prices, agriculture, and beyond—will likely intensify.

Many energy importers are trying to reduce their reliance on Russia. But that transition will be challenging. Europe, which depends heavily on Russian natural gas, plans to reduce its consumption of Russian gas by two-thirds by the end of 2023. But its current gas reserves are at historic lows. Supplies of non-Russian liquefied natural gas (LNG) are tight, and the infrastructure needed to transport it is insufficient. Even if timelines for adding new wind, solar, and nuclear capacity on the continent accelerate, it will take years for this capacity to come online.

As they seek to mitigate the immediate fallout, companies must review their energy-supply footprints and investments. They may also need to rethink their strategies for the transition from fossil fuels. Governments will need to reassess their energy security and climate goals.

War in Ukraine: Impact on Energy

AGENDA

Deep-dive: First view of impact on Energy

> **Context and current situation**

> Impact on energy supply

> Implications: consumers, companies & governments

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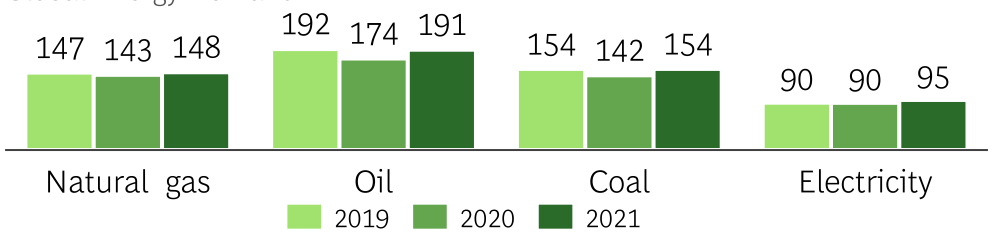
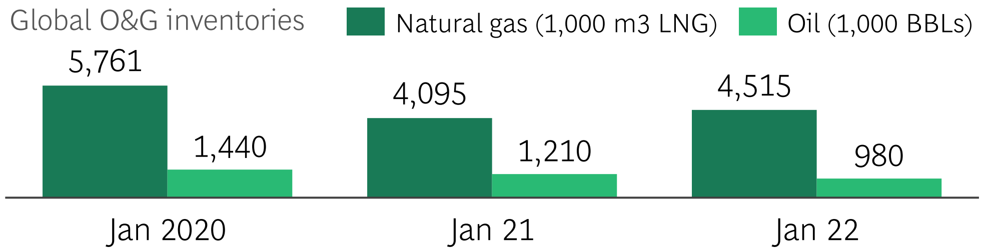
Prior to the war, global energy already "tight" with inflationary pressures

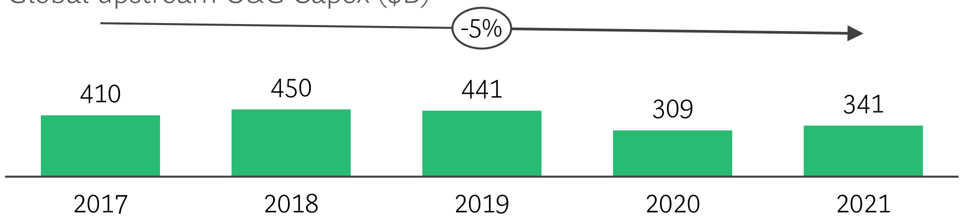
Strong demand recovery from COVID began in 2020



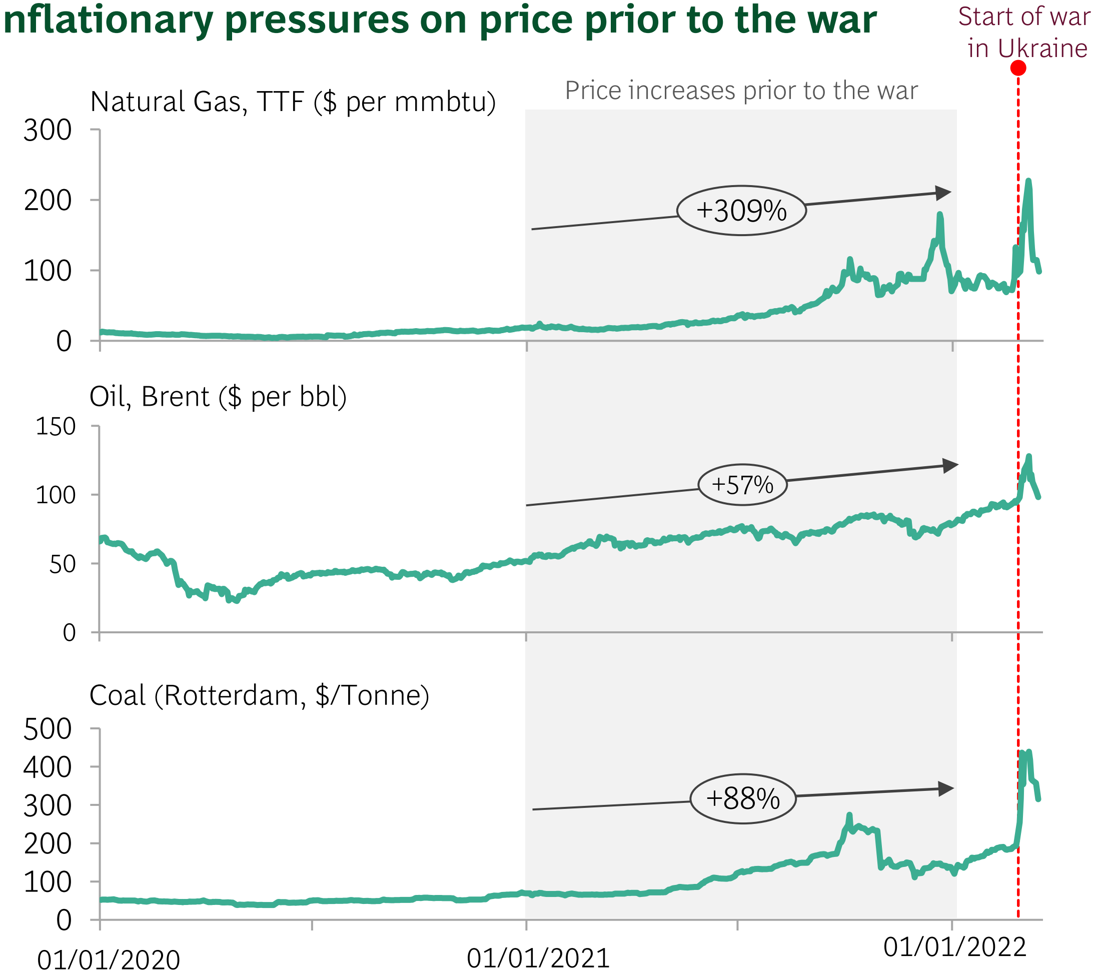
Inventories substantially below pre-COVID levels



Insufficient investment: reducing capex in last 5y



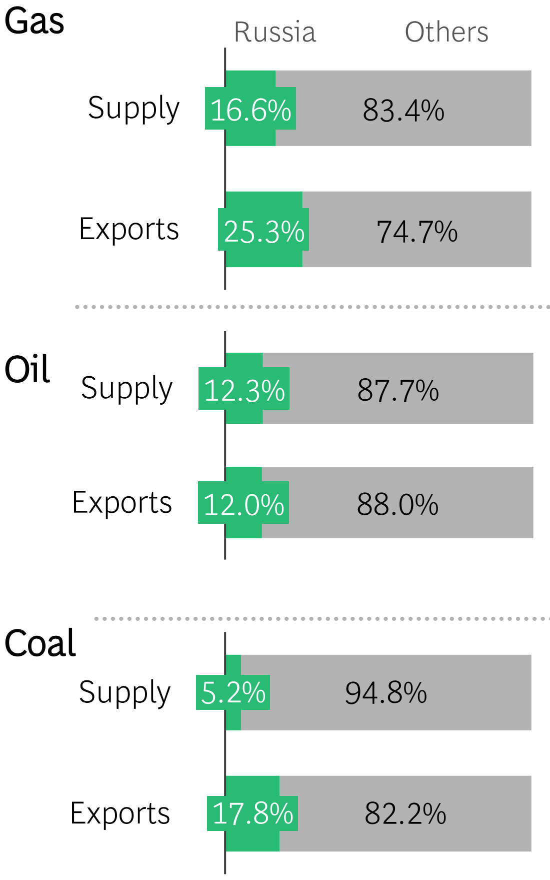
Inflationary pressures on price prior to the war



Note: LNG: liquid natural gas; BBL: Barrel, TTF: Title Transfer Facility, mmbtu: Million British thermal units
Source: IEA, GIE Aggregated LNG Storage Inventory, Reuters, Bloomberg, IEF, IHS Markit, Yahoo, Trading Economics, BCG Analysis

Russia plays important role in global energy, the war heightens supply risks

Russia's role in global energy market



Second globally behind US

Main exporter in Europe; Norway second

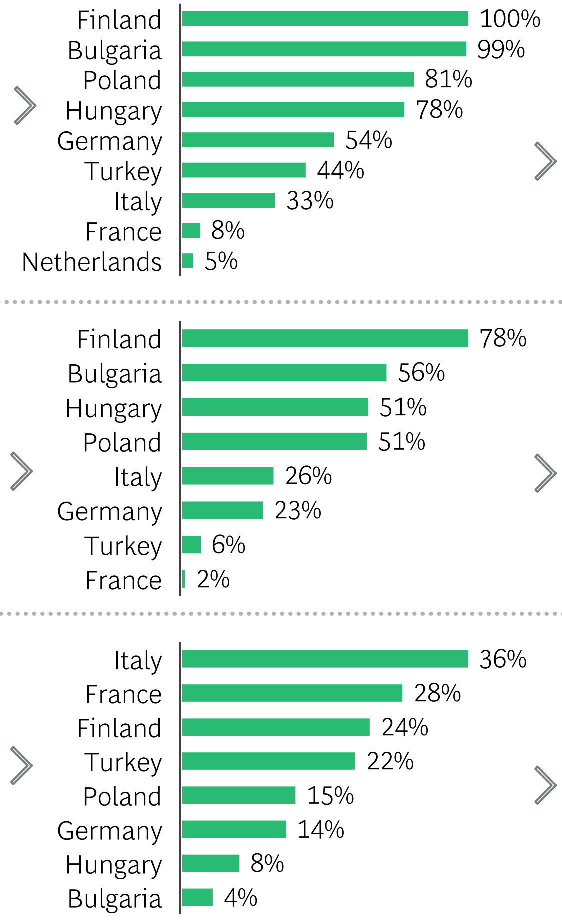
World's 3rd largest oil producer (after US, Saudi Arabia)

World's largest oil exporter

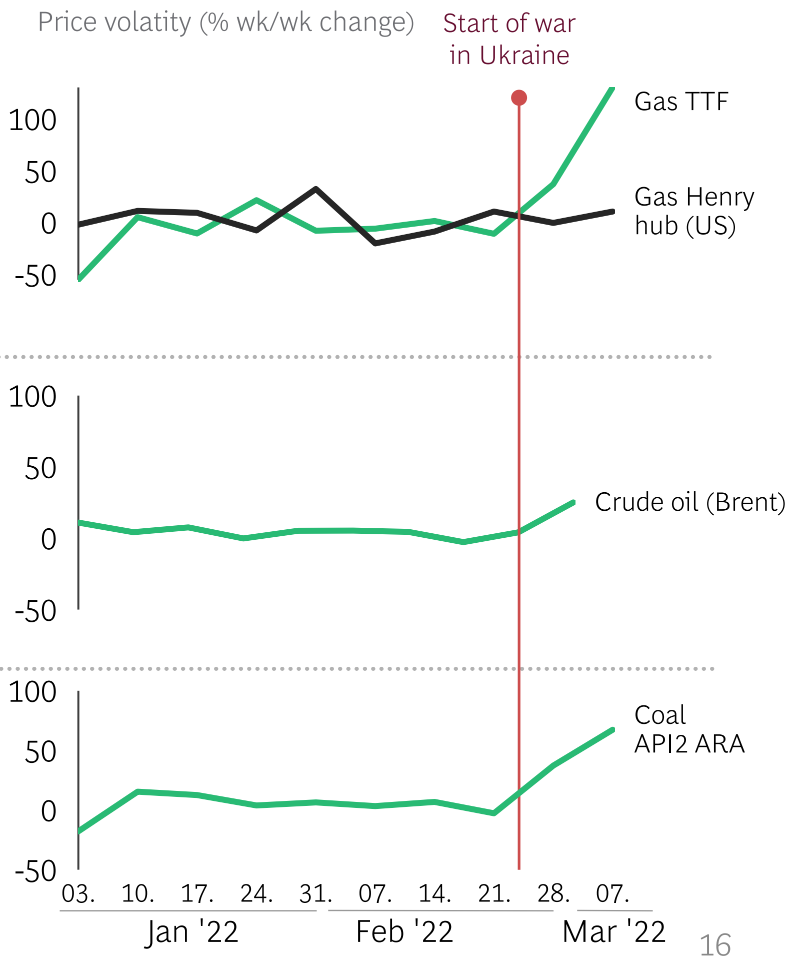
World's 2nd largest coal reserves, 6th largest producer

3rd largest coal exporter

Russia supply by end market



Increased volatility



Source: International Energy Agency, BP Statistical Review; Eurostat, Bruegel, IHS Markit, S&P Capital IQ, BCG analysis

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Deep-dive: First view of impact on Energy

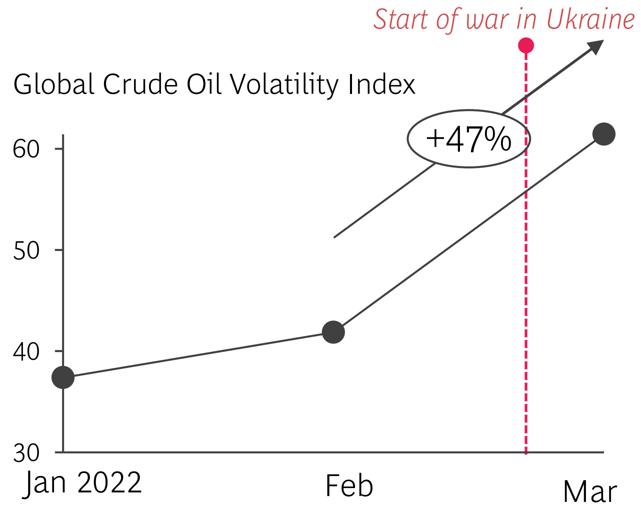
- Context and current situation
- **Impact on energy supply**
- Implications: consumers, companies & governments

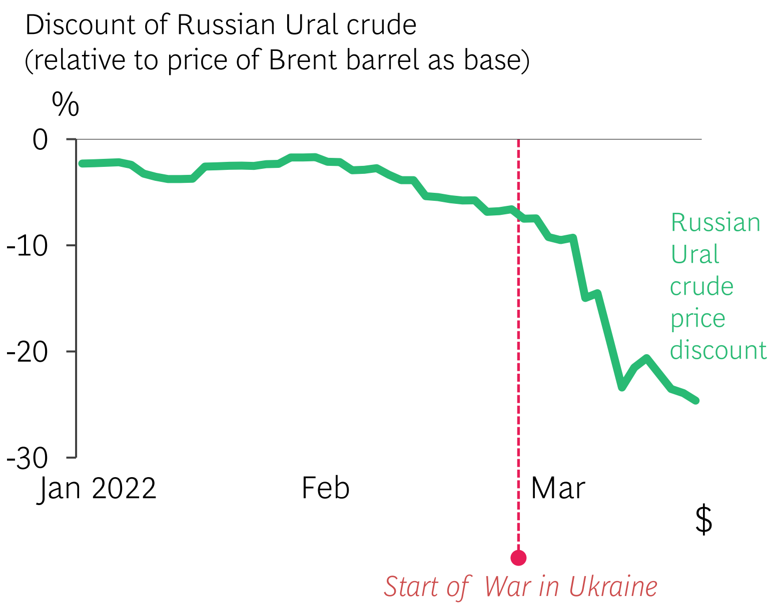
Pricing - Oil | Significant crude and oil volatility, with the market pricing in risk of long-term disruption of Russian flows

Disruptions to Russian Energy sector…

1. **Geopolitical risk:** uncertainties around the evolution of the conflict
2. **Liquidity pressure** due to sanctions on Russia - increases hedging and margin calls
3. **Unwillingness of most buyers & traders** to take Russian oil given supply chain risks
4. **Reputational risk** prompting major oil producers to exit/reduce Russia exposure

…has caused global volatility across oil markers and relative premiums

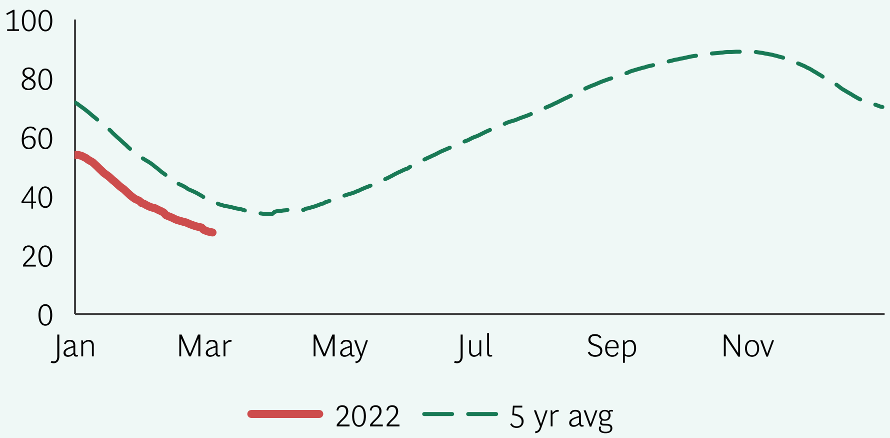




Sources: EIA, Company filings and press releases; Refinitiv, Refinitiv Eikon, Reuters, UK Government, Government of Canada, The White House, CME, BCG Analysis

Pricing - Gas | Low European storage levels forcing a response to ensure security of supply, markets pricing in future risk of disruption

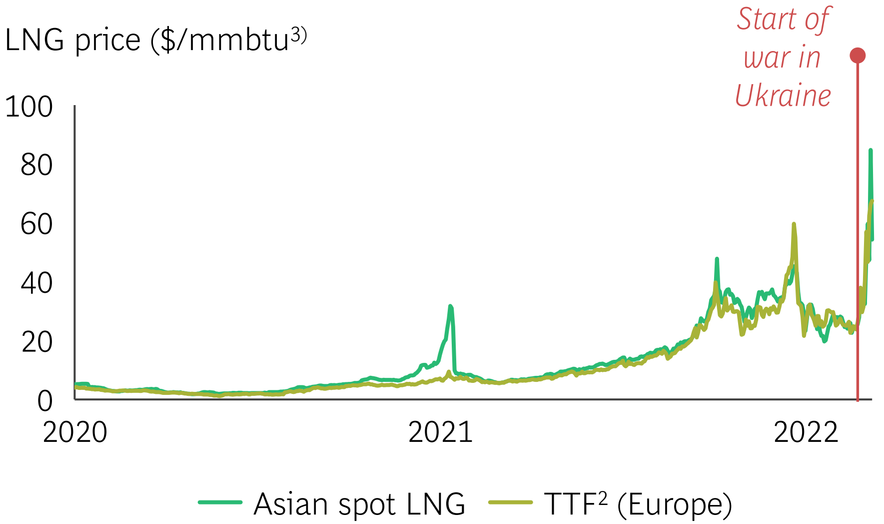
Historically-low gas inventories in Europe, with the EU considering imposing forced filling requirements…



EU's consideration of **90%+ storage filling requirement** to create **immediate buying pressure**

Europe and Asia

… leading to surges in prices in Europe, with Asian LNG[1] prices closely following (competing to secure supply)



Currently spikes are not rooted in adverse supply impacts, but instead **driven by need to increase/buffer inventories**

1. Liquid Natural Gas; 2. Title Transfer Facility, a virtual trading point for natural gas in the Netherlands; 3. mmbtu = Metric Million British Thermal Unit (unit of heat)
Source: AGSI, EnergyScan, Reuters John Kemp, Forbes, Council of the European Union, European Commission, Euronews, Italian Government, BCG Analysis

Supply shock – Oil | Full shutdown of Russian oil exports unlikely given global importance and energy transition timescale

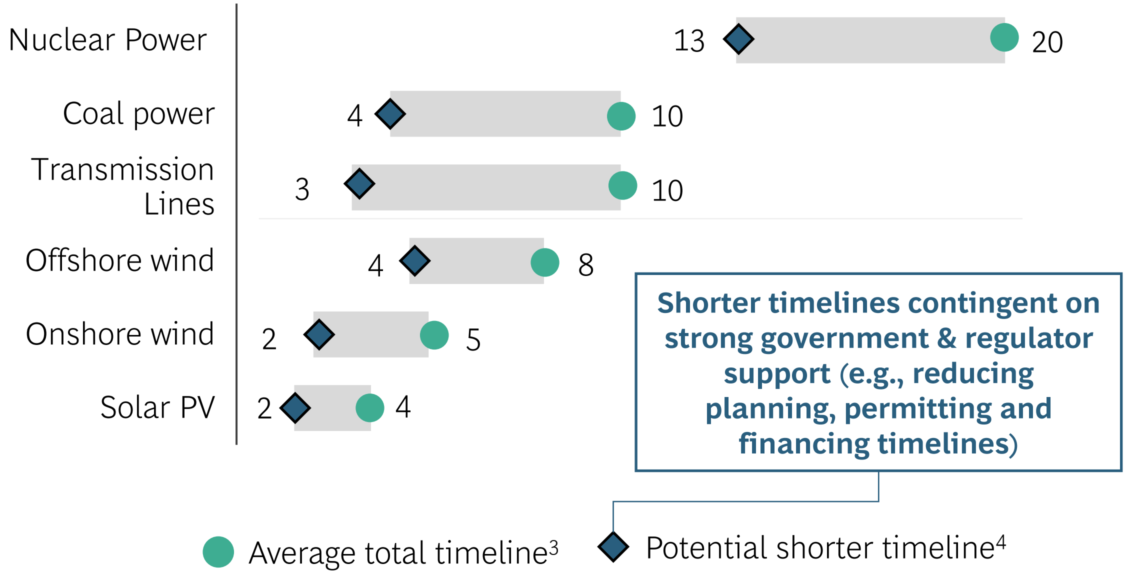
Full shutdown of Russian oil exports unlikely given high risk…

Global Scenarios for Oil & Liquids Production, QBtu[1]

Shutdown would risk **large global supply shock**, price surges & demand destruction – thus risk of **leakage of Russian** crude to market

…and years-long 'energy transition' project timelines

Indicative timeline range (number of years for new mid-sized projects in each energy transition/renewables capacity area)[2]



1. Quadrillion British thermal units (the amount of energy required to raise one pound of water one degree Fahrenheit); Notes: Scenarios include BP, Shell, and IEA; 2. Timeline ranges are based on pre-Ukraine estimations for new projects (not projects where work is under way). 3. Average total timeline is indicative average based on average-size projects in the space. Time can vary based on scale and scope; 4. Potential shorter timelines assumes speeding up of planning, permitting and financing stages, yet execution stage of these projects unlikely to be able to be reduced significantly; Sources: Wood and Mackenzie, Feb 2022; Resources for the Future Global Energy Outlook; Kpler; Refinitiv Eikon

Supply shock – Gas | EU reliance on Russian gas increases its vulnerability, fueling an accelerated push for alternatives

RePowerEU: EU have launched plans to reduce Russian gas import dependence

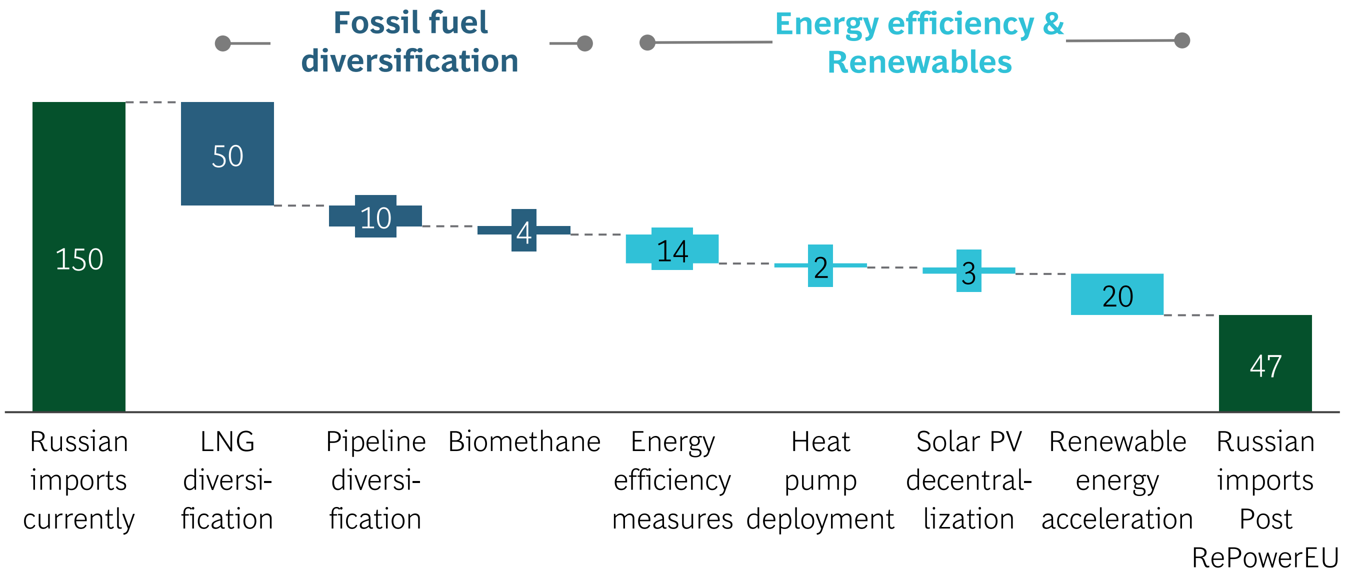
66% **target reduction in Russian natural gas supply** by end of 2023

Requires strong coordination to realize, given risks (e.g., intense competition for LNG from Asia, pace of Net-Zero transition)

90% Long-term reduction target of gas consumption requires front-loading of already aggressive plans

Target levers for reduction of Russian gas dependence

Billion cubic meters equivalent



Source: IEA, Oxford Institute for Energy Studies, ENTSOG Transparency Platform, Eurostat, Gas Infrastructure Europe, Rystad, Aurora, Broker reports, BCG analysis

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Supply-shock - Gas Market | EU plans technically possible, but challenging to realize in the available time horizon

Supply Risks

Renewable Energy bottlenecks

Growth in renewable development will create supply-chain pressure & risk of worse inflation

Further, $700+ bn financing required for renewable energy plan

LNG market is already tight

Competitive pricing between EU & APAC for LNG

Higher logistics costs, as LNG supply will most likely come from the US and Qatar

France nuclear capacity and utilization constraints

EU plans rely on French capacity at/above current level. However, no capacity step change is expected till 2030s

Transmission system operators' risks

Difficulty for oil and gas transport network to fully accommodate growth demand without risking its integrity

Demand Risks

Demand increase – winter risk

Current plans based on "normal" winter seasons, not considering risks of colder winter and higher energy demand

Financing across gas purchases

$90bn required to fill gas storages this year

Note: LNG = Liquid Natural Gas; Source: The Wall Street Journal, Mar. 2022 Forbes, Feb.2022, BCG experience and analyses

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Energy market pricing and supply shocks make products more expensive to produce and buy, as governments seek to improve energy security

Consumers

Energy is outsized driver of inflation currently: 7% of CPI[1] yet account for 24% of inflation[2]

Rising energy prices **reducing discretionary spend**

Subsidies increasingly likely, where not already in place

Companies

High energy-intensity industries (e.g., steel, cement, chemicals, fertilizers, travel, freight) experience cost increases presenting risk to profitability

Businesses **assessing impact** and ensuring continuity of business-critical operations

Mid-to-long-term, likely positive impact on climate goals – yet need to de-average impact by country

Governments

Extend of government actions vary – focus on energy security (esp. EU)

Emphasis on reducing price pressures, stockpiling, diversifying energy supply

Will impact **speed of transition to renewables** – impact varied by country

1. US Bureau of labor statistics; 2. in Feb 2022; BCG macroeconomic analysis; Source: BCG analysis and experience

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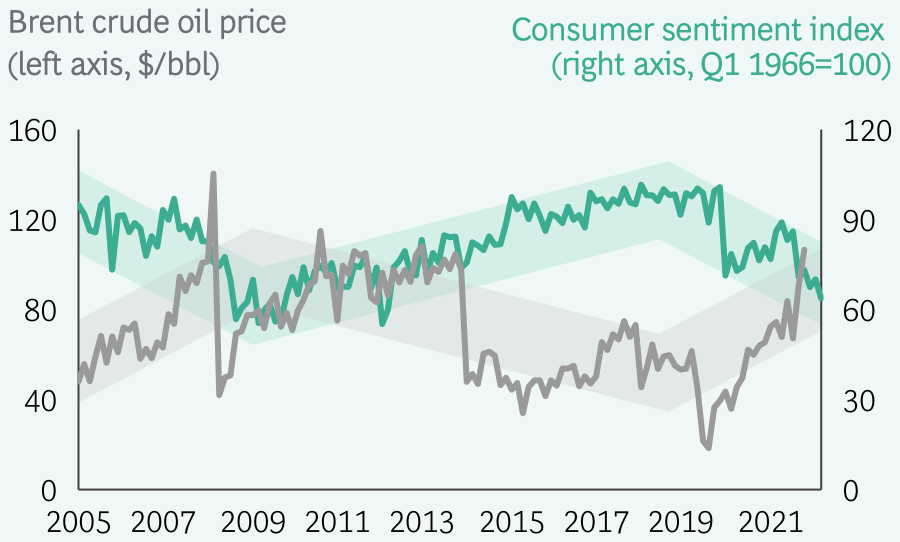
Consumers | High energy prices impacting total demand - but governments likely to support consumers and small businesses

Higher oil & gas prices impacting consumer demand



Consumers likely to **reduce discretionary spend**:

- 30% say rising gas will greatly **affect their decision to travel**[1]
- 59% **likely to change lifestyle** if gasoline price rises by ~20%[2]

Governments responding with direct subsidies

- €0.17 per liter reduction in tax on fuel
- €0.11 per liter of diesel from April 1
- Value added tax on electricity cut from 21% to 9% from July 1

- Expected to unveil full measures
- Mandated EDF to only adjust tariffs by 4%
- Already spent €20bn to moderate gas and power costs

- Proposals of a “crisis discount” (fuel subsidy)
- If approved, gas prices cut €0.20+ per liter

- Imposed prices caps on some basic foods, fuel and mortgages, extending a cap already in place on household energy

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- Several states considering reducing or suspending gas tax – bills already proposed and are being voted on soon

1. Survey of 1,000 consumers over the age of 18 by Longwoods International regarding next 6mos ; 2. According to survey conducted by American Automotive Association; Other Source: BCG Center of Macroeconomics Forbes (Mar. 10 2022); The Wall Street Journal (Mar.15, 2022); ABC News (Mar.15, 2022); Reuters (Mar 15 2022); Dutch News (Mar.11, 2022); Reuters, Mar 2022 Euro news (March 10, 2022), Financial Times (Feb 18 2022)

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Companies | High energy-intensity industries will experience the largest cost impact

	Steel	Chemicals & fertilizers	Cement	Air Travel & Freight	Shipping Freight
First-order impact	Higher costs in energy will increase steel prices **Energy represents 10-20% of total costs in steel** production in EU (varies by region and year) [1]	Ammonia - for which **72-85% of cost is natural gas**[3]– and other chemicals are critical for production – already significant price increases	Higher costs in energy will increase cement prices Energy is **10-30% of total cement costs**, depending on region and year[4]	**Jet fuel prices up 27%** month over month[5], likely to drive cargo rates up Airspace closures leading to fewer, longer (more fuel consuming) flights	**Bunker (marine fuel) up 84%** vs. last year[6] where fuel represents **~45% of total cost** for shipping **Further cost increases** due to delays (lane closures, & reshuffling of trade flows)
Second-order impact	**Construction, auto, rail, shipbuilding, machinery, metal, equipment** impact	**Global food supplies, chemical factories, auto, etc.** will be negatively impacted by input prices & less supply	**Construction and infrastructure** impacted	**Logistics and consumer travel cost** impacted **Shifts in air networks** to optimize aircraft utilization as travel spending reduce	**Most traded goods** affected, especially long-haul freight[7] Route re-configurations for capacity optimization

Further inflationary pressures, erosion of margins & conservative capex are likely as energy prices remain high

1. OECD (link) 3. USDA (link) 4. cement (link) 5. IATA: Europe-Asia, Asia-North America most heavily hit by airspace closure, Based on CTKs (cargo ton kilometers) over the past 12 months
6. Freightwaves: Ship fuel spikes to historic $1,000/ton mark as war fallout worsens, 7. OECD (link), BCG Analysis

Companies | Assess first- and second-order impact, devise mitigation plans and build resilience in the mid term

Short-term

Mid-to-long-term

Assess exposure and risks to input costs, ensure operational business continuity

Partner closely across value chain to improve transparency. Assess reputational & operational impact (incl. suppliers of suppliers)

Assess second-order impact for your customers. Prioritize impacted customers and develop differentiated mitigations plans

Understand investment shifts and capital implications (e.g. RePowerEU) in your industry – balance planning and flexibility

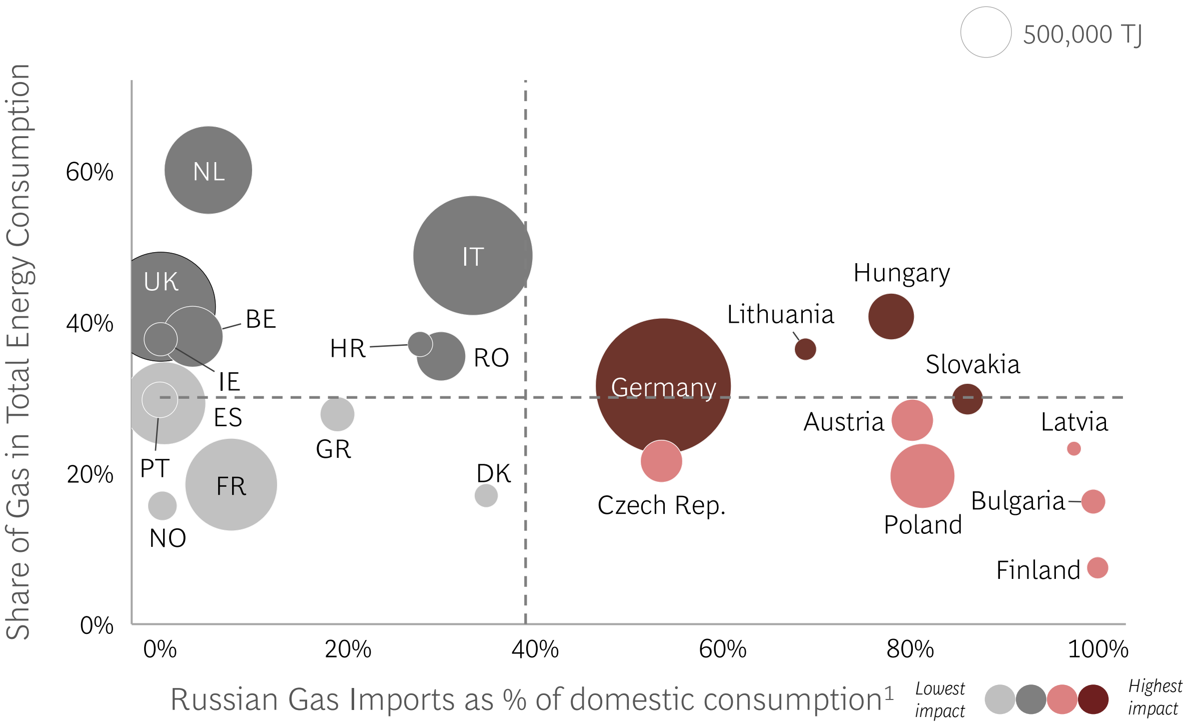
Review climate goals, assess impact, develop a mitigation plan by country – as governments accelerate or decelerate transition

Build agility in scenario planning to assess similar external shocks and their impact (e.g., network level 'digital twins')

Source: BCG analysis and experience

Governments | Key levers should be utilized to respond to energy crisis based on individual nation's position

Governments exposed to risk differently…



… and response highly dependent on country's position

More heavily reliant on Russia

More susceptible to supply shocks and market volatility

Potential steps:
- Stockpiling energy resources
- Identifying new short-term suppliers (e.g., LNG from US)
- Potential delay of coal & nuclear power decommissioning
- Investing in renewables for longer term independence

Less reliant on Russia

Less susceptible to supply shocks; equally to price increases

Potential steps:
- Implement short-term fiscal stimulus, subsidies, price caps
- Invest in renewables for longer term price reduction – and support of other less advanced countries in the space

Reducing regulatory hurdles, permitting periods, legal procedures needed to increase speed of supply increases

Note: TJ = terajoule; AT = Austria, BE = Belgium, DK = Denmark, ES = Spain, FR = France, GR = Greece, IE = Ireland, IT = Italy, HR = Croatia, NL= Netherland, NO = Norway, PT = Portugal, RO = Romania, UK = United Kingdom;
Source: Eurostat, Supply, transformation, and consumption of gas; Primary Energy Consumption; Imports of natural gas by partner country, Reuters. Also, Forbes, Washington Post, Council of the European Union, the Wall Street Journal, European Commission, Euronews, Italian Government. ENTSOG, Bruegel 1. Imports which are consumed within a country (which are not traded beyond country border)

Governments | EU and key member-states are implementing concrete policies to reduce short-term and long-term dependence on Russia

Short-term → Mid-to-long-term

Implement fiscal stimulus & price caps

Enact short-term measures (subsidies, tax cuts) to shelter vulnerable electricity consumers

France: Capped energy bill price increases to 4%, significantly under market

Diversify & increase energy supply

Enact minimum gas storage obligations

Identify alternative sources

Maximize generation from low-emissions sources: e.g., bioenergy

Stockpile energy resources

Italy: Increasing gas imports from Algeria and Azerbaijan and increasing use of LNG terminals

Increase efficiency, reduce demand

Accelerate energy efficiency in industry and in heating pumps

Encourage a temporary thermostat lowering and highway slowdowns – to reduce energy usage

EU: RePowerEU advised turning down thermostats 1°C to reduce electricity demand

Expand renewable capacity

Accelerate the deployment of new renewable projects

Step up efforts to diversify and decarbonize sources of power system

Enable renewables for energy independence

Germany: Plans to expand renewable capacity & legislate full supply from renewables by 2035

Source: Reuters, Forbes, Washington Post, Council of the European Union, the Wall Street Journal, European Commission, Euronews, Italian Government

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