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Down To Earth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT, ENVIRONMENT AND HEALTH

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ENERGY GAMES

Will climate change be a loser in this horrific war?

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Infant, maternal mortality high despite historic rise in hospital childbirths

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HEAT OFFICERS

Most sought-after cadre in a warming planet

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LNG, but not for rich world

I AM at the annual meeting of energy business magnates and experts—perhaps the most important of all such events—held in Houston, Texas. CERAWeek, as it is called, has been held this year, after a two-year hiatus because of COVID-19. It is the worst of times—the Russia-Ukraine war has just broken out; sanctions have been imposed; and energy prices are spiraling out of control. As I sit and listen to the oil and gas producers, I realise that I am seeing a tectonic shift in the global energy chessboard.

The fact is, the energy price hike before and during the war has brought back focus on the role of conventional oil and gas companies. They are buoyant about their role in the post-war energy scenario—from drilling and pumping for more oil and gas, to their role in the lucrative new markets in Europe. I wrote about this last fortnight ('Will climate action be a casualty?', 16-31 March, 2022) and about the false narrative being bandied about—that this price hike and disruption is due to the efforts to transition from fossil fuels to green energy. This time I want to discuss the issue of natural gas. The Russia-Ukraine war has put a spotlight on the role of liquefied natural gas (LNG) in the global energy futures. LNG works where pipelines cannot reach; meaning, where major gas producers, Qatar and the US, cannot supply. They have developed options to first liquefy the gas so that it can be transported by container ships and then gasified for use in power plants or vehicles or in homes to generate energy.

Industrialised countries need deep decarbonisation. They cannot reinvest in fossil fuels and call it clean

The war has meant that LNG is in greater demand—the US, for one, has a surfeit of it. So, at CERAWeek, the point of conversation was how the US could work with its allies to promote the use of this "cleaner" fossil fuel. Natural gas emits roughly 50 per cent less carbon dioxide (CO_2) compared to coal. But it also has the additional problem of methane emissions—primarily from flaring and from leakages during transport and distribution. Methane is an extremely potent greenhouse gas—it has a shorter residence time in the atmosphere but it "forces" the temperature to increase more than CO_2 does.

But the big oil and gas industry is smelling like a rose. It wants to capitalise on this opportunity of an energy crisis—and so it is making all the right noises. It says that this clean gas revolution will be done responsibly. Industry will invest in methane abatement; the CO_2 emissions will be captured, utilised or stored, and, of course, it will use the gas to manufacture "clean" hydrogen. As against green hydrogen that is manufactured using renewable energy, this hydrogen will be blue—as it will be produced using natural gas, and then the emissions will be handled and abated. This plan is nothing less than a lullaby for energy-stressed governments.

In this scenario, climate change can be handled without the pain of changing energy futures, and the companies who know the business will continue to run the world. Forget the fact that the International Energy Agency (IEA) has said that there cannot be new investment in oil and gas post 2020 if the world needs to stay on track to net-zero in 2050. Before I go any further, let me also put my cards on the table. I believe gas is an important clean fuel for our part of the world—which has a huge challenge of air pollution because of dirty combustion from coal. Way back in 1998, we at the Centre for Science and Environment (CSE) advocated for bringing in compressed natural gas (CNG) to displace the use of diesel in vehicles. This happened and improved air quality. Now, we have coal being used in industrial boilers across the country, adding to massive health problems because of poor air. The option is to use cleaner natural gas or to use biomass in boilers, including in our polluting coal thermal power plants. We need clean fuel so that we can have clean electricity to drive our energy transition—biomass, renewables and natural gas are our best bet to clean up local air pollution. But the question is, if the already industrialised world should also get the "benefit" of using this fossil fuel. The fact is the carbon budget has already been appropriated by a few countries for their growth. These countries need deep decarbonisation, which would mean a transition to renewables and other non-fossil energy sources. They cannot re-invest in fossil fuels and call it clean and green.

The problem is not just that these countries will take up more of the carbon budget because of their continued use of fossil fuel. It also means that the price of energy transition will go up—already, LNG is being diverted to Europe, which has a higher capacity to pay the costs. This will mean that countries like India will find it difficult to get out of the coal-trap. This is cheaper fuel, however dirty, and because it is under our ground it has a higher quotient for the energy security experts. It takes us backwards. It makes the entire world unsafe and insecure. This is where the rubber meets the road—quite frankly. DTE @sunitanar

A NEW ENERGY DISORDER

At a time when the world is moving towards decarbonisation, the Russia-Ukraine war has brought energy poverty on the doorstep of rich nations. Europe's energy ministers are now touring countries of all hues and persuasions to strike deals for supply of fossil fuels to hedge against inflation and future shortages. The new energy order that emerges post this conflict could well be devoid of climate change as its focal point

ROHINI KRISHNAMURTHY AND AVANTIKA GOSWAMI

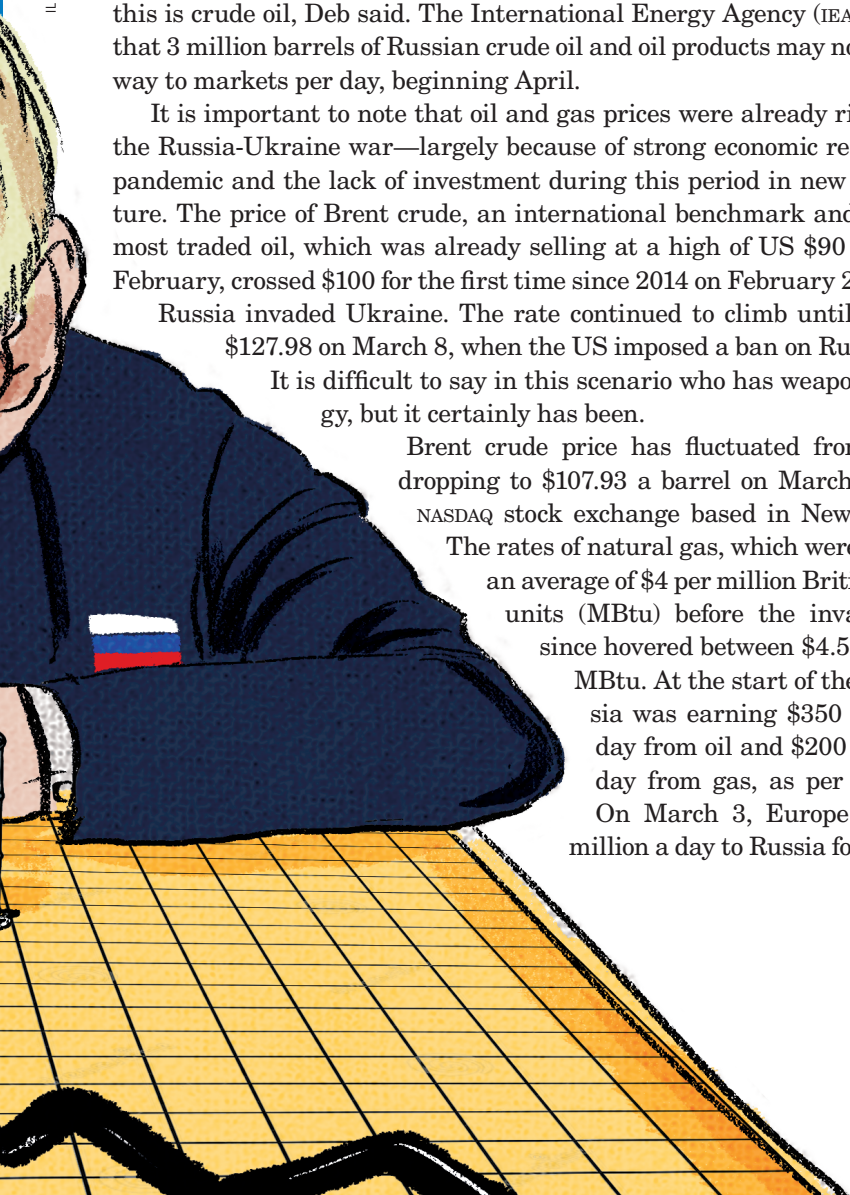
NO ONE knows how long this horrific and inhuman war waged by Russia against Ukraine will last, and how it will end. But it is already reshaping the global order of energy. And in this age of climate change, it is bound to shape the future as we know it. Energy prices have already surged across the world, and governments that were discussing how to move away from fossil fuels are now urging oil and gas producers to increase supply. Energy poverty, a term well understood in emerging countries, where millions live without access to basic electricity, has now found place in the lexicon of rich nations. What will governments do to "cool" the energy markets, and what will this mean in a world that has already run out of carbon space and time in terms of climate change?

The war has made the energy crisis more acute. Russia is a major producer of oil and gas and the US and its allies have put severe sanctions on the country. "Six of the top 10 shipping companies in the world, controlling over 60 per cent of global capacity, have suspended Russian bookings," Kaushik Deb, senior research scholar at Columbia University's School of International and Public Affairs, told *Down To Earth* (DTE) in the second week of March, soon after the US banned import of Russian fuel. This is a disruption of the 5-6 million barrels that Russia exports by the sea every day; about half of this is crude oil, Deb said. The International Energy Agency (IEA) estimates that 3 million barrels of Russian crude oil and oil products may not find their way to markets per day, beginning April.

It is important to note that oil and gas prices were already rising before the Russia-Ukraine war—largely because of strong economic recovery post pandemic and the lack of investment during this period in new infrastructure. The price of Brent crude, an international benchmark and one of the most traded oil, which was already selling at a high of US $90 a barrel in February, crossed $100 for the first time since 2014 on February 24—the day Russia invaded Ukraine. The rate continued to climb until it reached $127.98 on March 8, when the US imposed a ban on Russian fuels. It is difficult to say in this scenario who has weaponised energy, but it certainly has been.

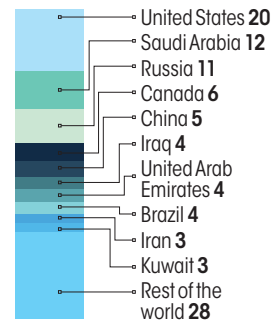
Brent crude price has fluctuated from then on, dropping to $107.93 a barrel on March 18, as per NASDAQ stock exchange based in New York City. The rates of natural gas, which were trading at an average of $4 per million British thermal units (MBtu) before the invasion, have since hovered between $4.5 and $5 per MBtu. At the start of the year, Russia was earning $350 million per day from oil and $200 million per day from gas, as per *Bloomberg*. On March 3, Europe paid $720 million a day to Russia for gas alone.

ILLUSTRATIONS: RITIKA BOHRA / CSE

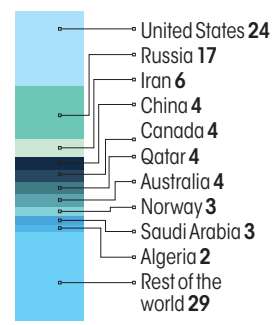


RUSSIA, A MAJOR OIL AND GAS PRODUCER

Share of top 10 **crude oil producers** in 2019 (in %)



Share of top 10 **natural gas producers** in 2019 (in %)



Source: US Energy Information Administration

FUEL, ECONOMY IMPACTED

"Coordinated sanctions by the US, UK, EU and Japan on the Russian oil, not only for themselves but also on third-party buyers, will cause a massive fiscal problem for Putin's regime, even in the short run, and defund his war chest," Rasmus Grand Berthelsen, project manager at Rasmussen Global tells DTE. Headquartered at Copenhagen and Brussels, the political consultancy firm advises governments and businesses on transatlantic relations, security policy and economic development.

The impacts are particularly severe in the EU, which depends on Russia for over 40 per cent of natural gas, 27 per cent of crude oil and 47 per cent of solid fuel, mostly coal, as per Eurostat, statistical office of the EU. In fact, the largest proportion of Russia's export revenue comes from the EU. Germany, under pressure from the US, has already stopped certification of Nord Steam 2 pipeline, which was supposed to double the flow of Russian gas to it. But EU countries are resisting joining others in imposing a ban on Russian energy and have committed to move away from it by the end of this year.

German Chancellor Olaf Scholz has said Europe had "deliberately exempted" Russian energy from sanctions because its supply cannot be secured "any other way" at the moment. Netherlands' Prime Minister Mark Rutte said, "The painful reality is we are still very much dependent on Russian gas and Russian oil and if you now force European companies to quit doing business with Russia that would have enormous ramifications around Europe including Ukraine but also around the world."

"The prospect of large-scale disruptions to Russian oil production is threatening to create a global oil supply shock," IEA warned in its monthly report, released just a week after Russian troops stormed Ukraine. This could be the "biggest supply crisis in decades", said the intergovernmental organisation, which was established in the wake of the first global oil shock in 1973.

The International Monetary Fund (IMF) has also warned that the Russian war on Ukraine will have spillover effects on the entire global economy by slowing growth and accelerating inflation. As countries im-

GRAIN CONSTRAIN

Russia and Ukraine are among the world's major wheat and sunflower oil producers, and the conflict will have far-reaching food security implications in coming years

APART FROM energy, the Russia-Ukraine war also poses risk to global food security. A March 11 forecast by the UN Food and Agriculture Organization (FAO) says the war is likely to raise prices by 8-22 per cent.

Prices were already rising due to the COVID-19 pandemic. FAO's food price index, which measures changes in international prices of a basket of food commodities, jumped from 98.1 points in 2020 to 135.4 points in January 2022. It was at 140 points in February, the highest since 1961, says FAO.

This is not the first time food and fuel have seen simultaneous shocks. In 2005-08, oil prices peaked at US $100 per barrel due to high demand from India and China. At the same time, the index rose from 67.4 points in 2005 to 117.5 points in 2008. A similar trend occurred in 2010-14.

"Implications on the food sector will be a major issue in the next 6-10 months," said Craig Hanson, vice president of food, forests, water and ocean, World Resources Institute, in an online press meet on March 18.

Supply disruptions also warrant concern. Ukraine and Russia together account for 30 per cent of global wheat, 18 per cent corn and 70 per cent sunflower oil exports. Since the invasion, wheat rates have jumped by 28 per cent, corn 23 per cent and barley 22 per cent, says *The Observatory of Economic Complexity*, a trade data platform. In early March, Ukraine banned exports of wheat, millets, live cattle, meat and other products to ensure domestic supplies.

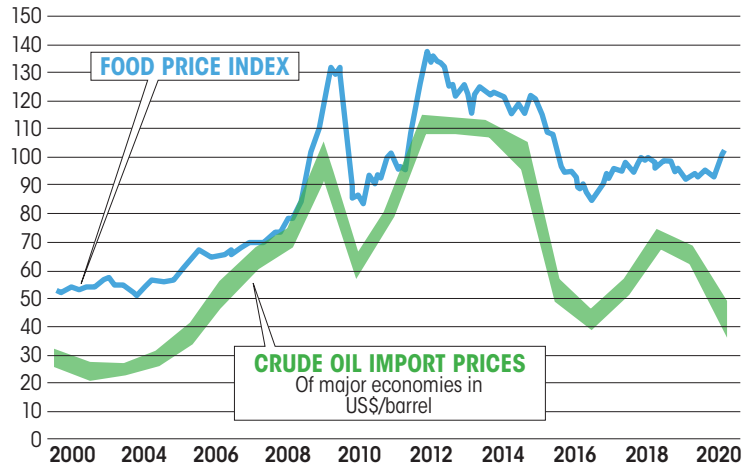
Prices could also rise if Russia in response to the global sanctions bans exports of essential food crops.

A steep rise in prices could create widespread scarcity. West Asia and North Africa will be particularly affected, predicted Hanson. IMF estimates costs for harvesting, transporting and processing food could rise due to low fertiliser supplies and high oil prices.

The crisis presents challenges to climate security, too. Hanson says the war could increase deforestation and ploughing of grasslands to compensate for lost production.

CLOSE LINK

Spikes in crude oil import prices have a direct impact on food prices



Sources: Organisation for Economic Co-operation and Development and Food and Agriculture Organization

pose sanctions on Russia, the move will substantially impact the global economy and financial markets, IMF says. But what needs to be noted is that the cost of energy determines the cost of growth and for countries like India this will be a tough time.

NEW ORDER

The war has changed the global energy chess board. With Russia being a pariah, allies of the US are now looking at new suppliers for their energy needs. The US gas companies are a major beneficiary of this search—there is surplus shale gas in the US, which has been in need of markets. But its shale gas is supplied through ships after liquefaction (as liquefied natural gas, or LNG), as against the Russian gas that is brought through overland and undersea pipelines and is therefore cheaper. But since Europe is now desperate, the murmur in the energy circles is that every LNG ship from the US bound for Asia is being diverted to Europe.

The high oil and gas prices also means that climate change is no longer the focus

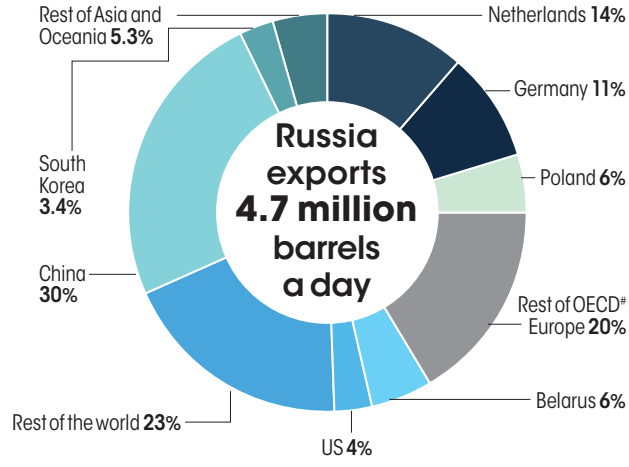
Market watch

The Russia-Ukraine war has caused a spike in global oil prices that had already been on the rise since last year

CRUDE OIL

Brent* crude was selling at high of US $90 a barrel in February. It crossed $100 for the first time since 2014, after the war started

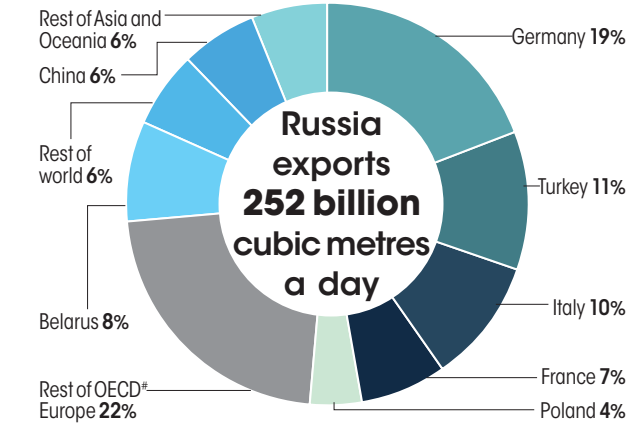
At least 46 countries import crude oil from Russia, which alone meets 27 per cent of EU's oil needs



NATURAL GAS

The commodity was trading at an average of $4 per MBtu in February. The rates have since hovered at $4.5- $5 per MBtu

At least 45 countries import natural gas from Russia, which meets over 40 per cent of EU's gas needs



*An international benchmark and one of the most traded oil; #Organisation for Economic Co-operation and Development, an intergovernmental economic organisation with 38 member states; Source: Trading Economics and US Energy Information Administration

when countries talk energy. Till the Glasgow Conference of Parties (COP26) to the UN Framework on Climate Change, held in November 2021, the West was high on the idea of energy transition, moving away from oil and gas—fossil fuels indicted for climate change.

Now, its leaders are running around asking their erstwhile foes to ramp up oil and gas production—from Iran to Venezuela. What then does this mean for climate change? Can the world stay on track on cutting emissions at the required scale and pace after it has revived its romance with fossil fuels?

Or, will this be a time for a new spin on the fact that fossil fuels like natural gas can be clean?

EUROPE'S RETREAT

A panicky Europe may just renege on its fossil fuel phase-out commitment

THE WAR has upended geopolitical stability at a time when the world had to address the other existential threat: climate change. The narrow window to avoid climate catastrophe is fast closing, the Intergovernmental Panel on Climate Change has warned in its latest report released in February 2022. But the war has also made the connections between energy, climate change and national security apparent like never before.

A powerful weapon in Russia's arsenal is its production of fossil fuels—US security analysts will tell you that Russia has weaponised energy in this war. But the fact is, the US and its allies are the ones who have put sanctions on Russia, including on its energy supplies, hoping to cripple it economically through these moves. But countries that have imposed sanctions on Russia are not so dependent on it for their energy supplies. The US, for instance, is a global supplier of oil and gas.

The EU, on the other hand, imports more than 40 per cent of its total natural gas requirement from Russia, and has not found it easy imposing sanctions on it. Though Germany, under pressure from the US-led front, has cancelled the certification of Nord Stream 2 pipeline that would have doubled its natural gas supply, the bloc has said it will wean itself away from Russian energy supply—cutting by two-thirds by the end of 2022.

Russian gas was convenient (and cheaper) because a majority of it came to Europe through overland and undersea pipelines. Now that Europe is rushing to secure its energy future by transitioning from Russian fuel, will it fill the supply gap with more expensive liquefied natural gas—a natural gas turned liquid under extremely low temperatures for easy transport and then regasified for use? This will require Europe to look to suppliers in the US that has a surfeit of the gas, or Qatar and even Iran. Or, will Europe accelerate towards renewable energy, which are "freedom" sources? Once built, this infrastructure will use the abundantly available solar and wind to generate power.

The EU imports over 40% of its total gas from Russia. Russian gas is convenient and cheaper because it is supplied to Europe via pipelines

Energy experts are quick on the draw. "Nobody is under any illusions anymore. Russia's use of its natural gas resources as an economic and political weapon shows Europe needs to act quickly to be ready to face considerable uncertainty over Russian gas supplies next winter," said IEA executive director Fatih Birol, while releasing a 10-point plan for the EU to help it reduce reliance on Russian supplies by over a third within a year. IEA prepared it within five days of the Russian troops marching into Ukraine.

The first point in the IEA plan is that Europe must not negotiate any new contracts with Russia on oil and gas and also let the expiring contracts lapse by the end of the year. Then it must replace Russian gas with LNG, potentially increasing supply by 60 billion cubic metres (bcm) over 2021 levels. To do this, it has to add to its gas storage capacity so that it can weather price fluctuations. And then it must accelerate towards renewable energy—wind and solar. This is the same IEA, which in its roadmap for the global energy sector, Net Zero by 2050, said there should be no new investment in oil and gas post 2021 if the world has to stay on course to meet the climate goals.

Then there is the counter-view. "This crisis is going to accelerate Europe's path to net-zero since that is the only way to reduce energy dependence from the rest of the world, and especially Russia," Alicia García Herrero, senior fellow at European think-tank Bruegel, tells *Down To Earth*. But can the bloc achieve the ambitious climate targets of slashing emissions by over half by the end of the decade and reaching net-zero emissions by mid-century amid uncertainty

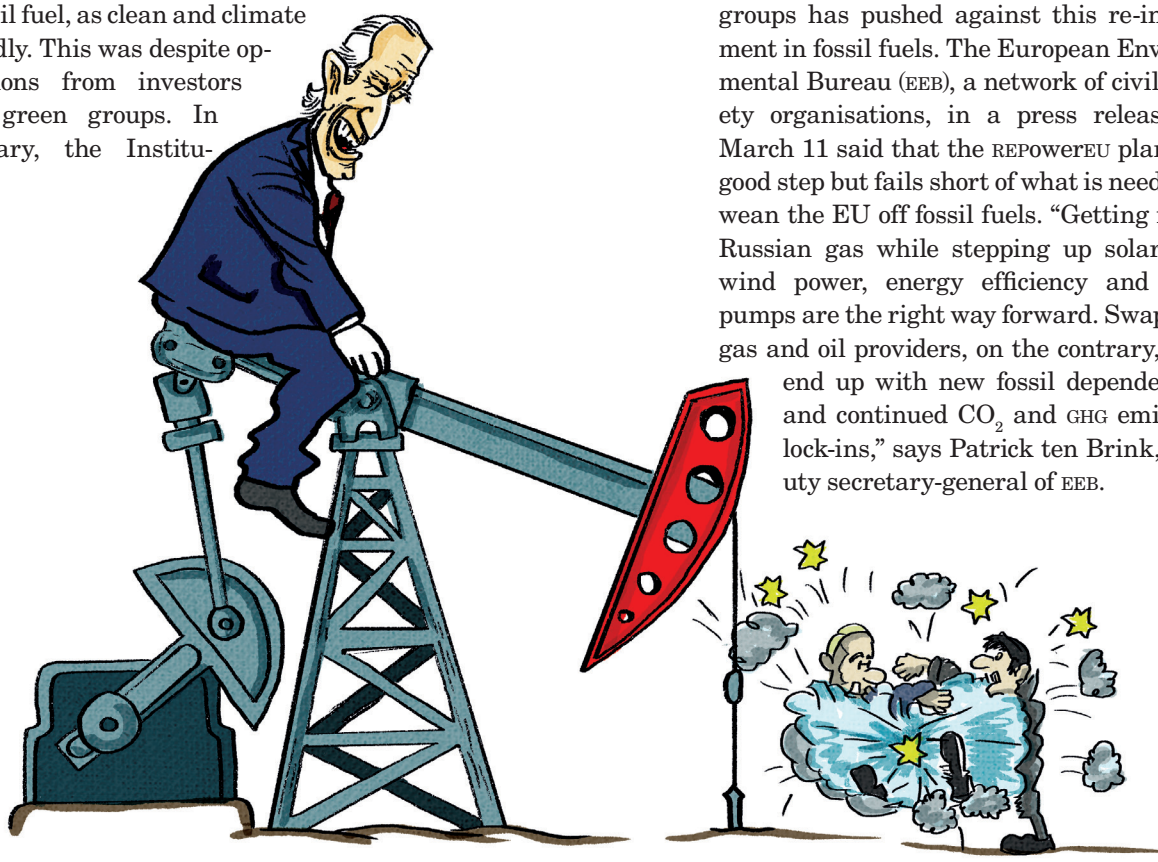
of its energy supply from Russia?

On March 8, the European Commission announced a strategy, titled "the REPowerEU plan: Joint European action for more affordable, secure and sustainable energy" for "greater security of supply". The plan is three-fold. One, to diversify its energy suppliers to move away from Russia at the earliest by buying from Qatar, US, Algeria and Norway. Then, to focus on reducing energy demand—full implementation of the Fit-for-55 proposal for climate change action—by reducing gas consumption by 30 per cent (equivalent to 100 bcm) by 2030, says the REPowerEU plan. This includes investment in added solar and wind capacity, as well as the manufacture of hydrogen through renewable power.

Natural gas, as it stands, will remain an important fulcrum of EU's energy strategy. The EU in February issued a Complementary Climate Delegated Act, in which it has listed gas and nuclear activities as environmentally sustainable, of course, subject to strict criteria of emission control and safety. Meaning, it has accepted gas, a fossil fuel, as clean and climate friendly. This was despite oppositions from investors and green groups. In January, the Institutional Investors Group on Climate Change, a membership organisation of asset managers and investors, wrote an open letter to the EU, asking that gas should not be included in the EU taxonomy of sustainable energy as it would dilute climate ambition. Even the now energy-beleaguered Germany had taken the stand that nuclear and natural gas should not be included in the draft taxonomy, which would allow for further investment in fossil fuels as clean energy.

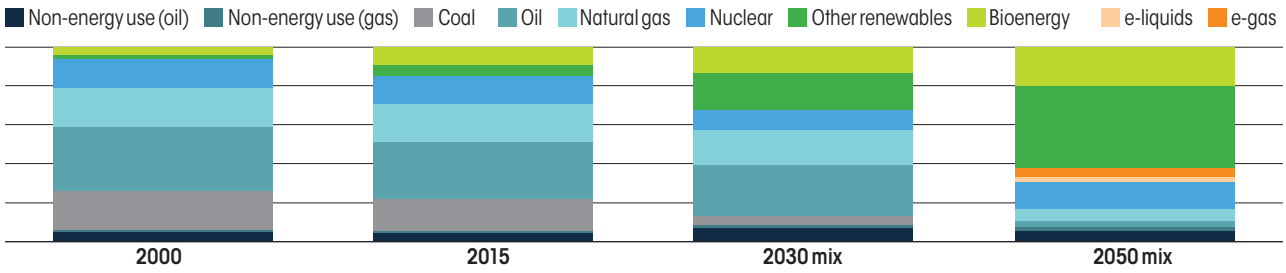
However, the immediate goal is to replace 155 bcm of natural gas that the EU imported from Russia in 2021. As of now, it has enough reserves to get through the winter, but things could get hard moving forward. So the European Commission plans to present by April a legislative proposal requiring underground gas storage across the EU to be filled up to 90 per cent of its capacity by October 1 each year. Countries are also setting up LNG terminals. The question is whether this new investment in building LNG terminals and storage will delay the transition to renewable energy.

The response from Europe's green groups has pushed against this re-investment in fossil fuels. The European Environmental Bureau (EEB), a network of civil society organisations, in a press release on March 11 said that the REPowerEU plan is a good step but fails short of what is needed to wean the EU off fossil fuels. "Getting rid of Russian gas while stepping up solar and wind power, energy efficiency and heat pumps are the right way forward. Swapping gas and oil providers, on the contrary, may end up with new fossil dependencies and continued CO_2 and GHG emission lock-ins," says Patrick ten Brink, deputy secretary-general of EEB.



EUROPE'S SHIFTING FOCUS

EU's Green Deal that sets the road map for achieving net-zero by 2050 requires the bloc to eventually reduce consumption of natural gas. Following Russia-Ukraine war, EU now plans to potentially add 60 billion cubic metres of natural gas a year



Source: European Council on Foreign Relations projections based on European Commission's Fit for 55 commitment
Note: e-liquids and e-gas are synthetic fuels produced by combining green hydrogen with carbon dioxide captures from a concentrated source or air

EEB also questions the plan's overestimation of the role of solutions with dubious green credentials, such as "nuclear-based" hydrogen. Besides, it says, the European Commission cannot talk about a massive deployment of renewable solutions and at the same time open the door to more fossil fuel subsidies, as it would be inevitable in the REPowerEU proposal.

Then there are fears that countries may resort to fossil fuel to ensure energy security. Germany depends on Russia for over half of its gas and coal and one-third of oil. Though it has pledged to phase out coal by 2030, it is now considering re-starting old coal power plants to ensure electricity supply security. The Germany Energy Network Agency has asked for the country's coal power plants to remain on standby if needed. "If we want to be more independent, we will have to operate with coal," said Olaf Lies, energy minister of Lower Saxony state. "That we choose this phrase once again is certainly not entirely self-evident given the country's plan to phase out coal by 2030," he said during a conference on March 8 that brought together the energy ministers of all German states. The country has also given the go-ahead to build two LNG terminals at Brunsbuttel and Wilhelmshaven. Amid fears of war shortage, Germany's economy minister has undertaken a quick trip to West Asia on March 20 and managed to bag a contract for the supply of LNG with Qatar, which as per *The Guardian* is expected to double its production by 2025.

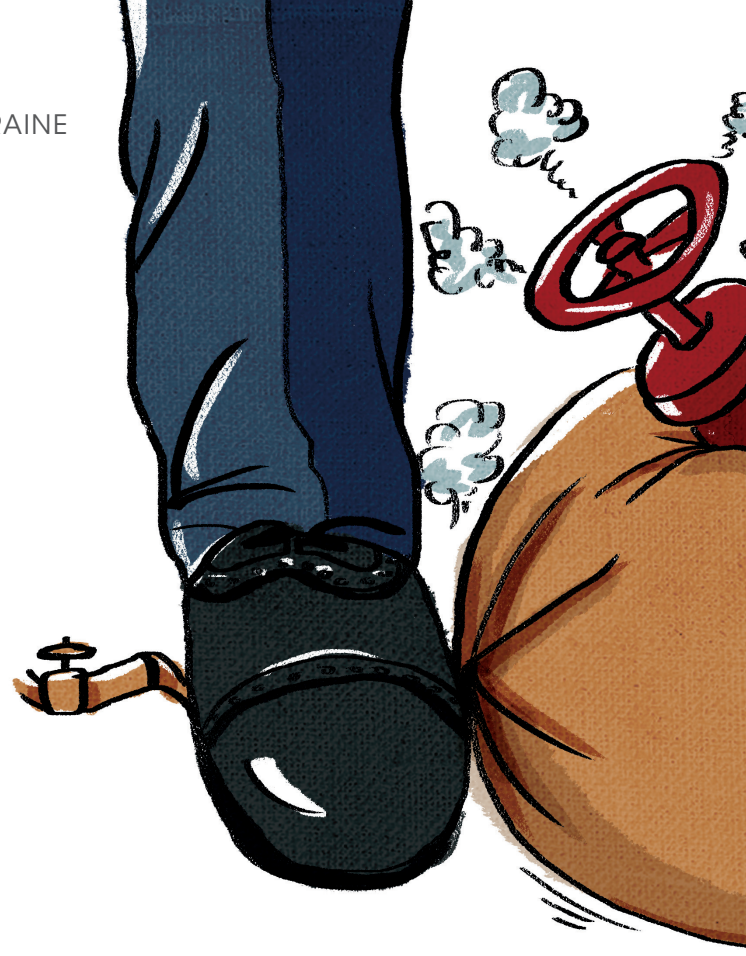
Though Germany has pledged to phase out coal by 2030, it has also asked its coal power plants to remain on standby in case they are needed

In Italy, which gets 45 per cent of its gas from Russia, Prime Minister Mario Draghi has suggested that he may reopen old coal power plants to replace Russian fuel. The nation's largest utility, Enel SpA, has also scrapped plans to switch the country's two largest coal power plants to gas. Media reports suggest Czech Republic and Poland, that have been slow to act on phasing out coal, might consider coal to ensure their energy security. They could replace Russian supplies with imports from the US, Colombia, South Africa, Australia, Mozambique and Indonesia. Belgium has also postponed a planned phase-out of nuclear energy.

UK, out of the EU post Brexit, is also looking to re-invest in its North Sea oil and gas energy and to lift the ban on fracking for gas. This, it says, is necessary to deal with soaring energy prices, hitting UK households. UK Prime Minster Boris Johnson was in the Gulf region in late March to urge countries to increase oil and gas supply. *The Guardian* writes that while coal was to be phased out in UK by 2024, the government has made informal contacts with the country's remaining coal operators to return to coal as a contingency response. How this all fits into the country's commitment to climate change and its self-professed leadership and lectures to the rest of the world to cut fossil fuels is difficult to understand. But the real politics of energy shortages and price rise are clearly gaining the advantage in this situation. The only concern is if this all will stymie the shift out of fossil fuels.

LNG, THE SAVIOUR

The price shock and now the war means a changed geopolitics of energy



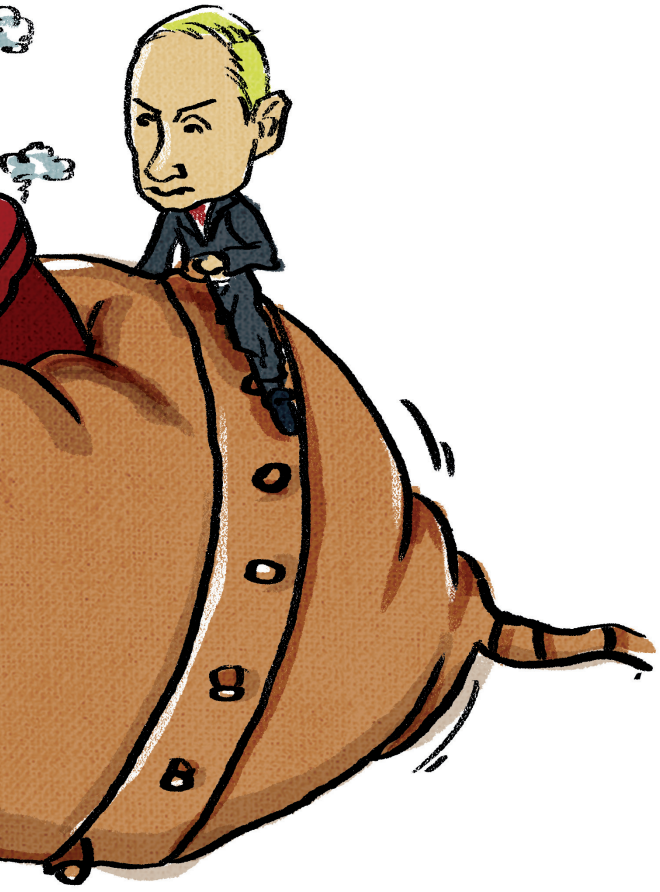
BEFORE RUSSIA'S tanks started rolling, we were already hearing that the best way to stop Putin's aggression is to ramp up fossil fuel production in North America. Within hours of the invasion, every planet-torching project that the climate justice movement had managed to block over the past decade was being frantically rushed back onto the table by right-wing politicians and industry-friendly pundits: every cancelled oil pipeline, every nixed gas export terminal, every protected fracking field, every Arctic drilling dream," writes Naomi Klein, professor of Climate Justice at the University of British Columbia, in *The Intercept*.

The question is if the way ahead will be to ramp up production of oil and gas—particularly shale gas, which the US has in abundance —to meet the shortfall in supply. Will "drill, baby, drill!" be back on the world's agenda? The question also is that even as leaders see it as a temporary halt in the march towards clean and non-fossil energy transition, will this push for increased supply and so, production lead to the investment that locks-in the world once again in the fossil fuel energy economy and so, delay, its phase out?

The government of Joe Biden came to power in 2021 with the promise to invest in clean energy. The big decisions he made were to put a moratorium on the exploration and production of oil and gas in the Arctic wildlife refuge; to revoke the permit for the Keystone XL pipeline—from Canada to bring tar sands for refining to the US—and, most contentiously to put a temporary halt on the grant of new leases for oil and gas production in federal lands which was later blocked by the courts in the US. But now, with the crunch on supply of oil and natural gas, there are calls to revoke all this and to go back to business as usual. The companies argue that for them to make big investments and ramp up production, they need assurance of long-term markets. It is feared that the Biden government might succumb to the pressure, and allow them in the interest of pragmatism.

As vice president in the Obama government, Biden has always had deep interest in the shale oil boom. He has supported natural gas as a "bridge fuel" before the renewables transition. During his second term as vice-president, Biden travelled to Ukraine to promote American shale gas over Russian gas and led the creation of a $50 million aid package, which included support for developing Ukraine's shale gas infrastructure.

It is also a fact that the Biden administration has approved oil and gas drilling permits more readily than his predecessor Donald Trump. According to advocacy group Public Citizen, the US Bureau of



Land Management (BLM) approved an average of 333 drilling permits per month since Biden took office in 2021. By comparison, in 2017, Trump's first year in office, BLM approved an average of 245 drilling permits per month.

"There is a resurgence of fossil fuel interests in the US. It had already started last year. The oil price turned upwards in May 2021 and has not looked back since. That changed the game," Adam Tooze, director of the European Institute at the Columbia University in New York told *Down To Earth*. The gas price shock that originated in China's uneven recovery from COVID-19 amplified the effect. And now on top of all that we have the Russia shock. But the crucial thing is while in the EU, the shock helps reinforce the pre-existing and strengthening commitment to energy transition on the part of the centrist political class, in the US this plays out completely differently. The electorate is not sold on climate; they expect cheap petrol, and the Democrats act in the interests of expanding supply. They tried to focus on OPEC+ (Organization of the Petroleum Exporting Countries) and Russia. Now that

SHALE GAME

The story of shale gas is about innovation, and also about pollution

THE OIL output of the US was believed to have peaked in 1970. Until 2005, the US imported oil from countries such as Venezuela and Saudi Arabia. However, innovations in oil and gas extraction methods that combined the processes of hydraulic fracturing (fracking) and horizontal drilling turned fortunes around. The techniques uncovered vast amounts of shale gas in the US. Its extraction became commercially viable between 2002 and 2006. From 2005 onwards, US oil and gas production rose for the next 10 years straight, reducing imports and raising exports of both oil and crude products.

Shale gas is a natural gas consisting mostly of methane, which can be used as an energy source. Fracking involves pumping water, chemicals and sand down at high pressure to crack tight shale rock formations and break open channels (fractures) in the reservoir rock trapping the deposit. Unlike most natural gas, shale gas cannot flow through a rock; the only way to extract it is by fracturing the rock apart. The shale boom was the largest expansion of natural gas production in US history and was overseen to a large extent by former president Barack Obama's administration. Natural gas obtained through fracking is a relatively clean-burning fossil fuel compared to coal. It is touted to be the most suited for a transition to low-carbon renewable energy sources.

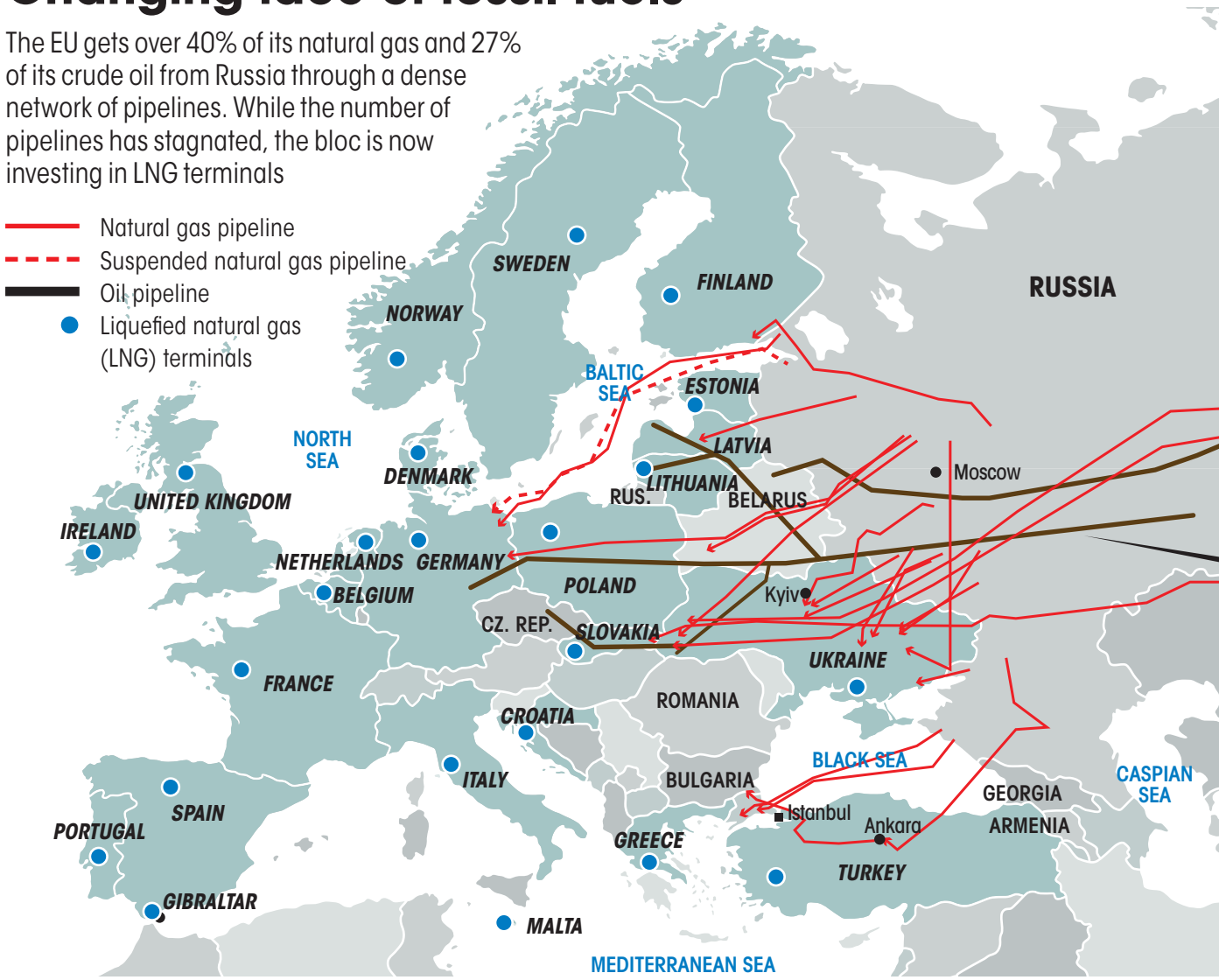
Fracking, however, has been widely opposed by climate advocates for the volume of water and toxic chemicals consumed by the process; the contamination threat to drinking water sources; its possible role in causing earthquakes; impact on reducing crop yield and quality for farmers; and methane leaks that occur throughout the natural gas supply chain.

Methane is a much highly potent greenhouse gas (GHG) than carbon dioxide. Recent studies have traced a global spike in methane emissions to shale gas production—the process produces 'lighter methane'. Since 89 per cent of shale gas is produced by the US, a bulk of gas-related methane emissions could be attributed to them. The infrastructure lock-in is another risk—contracts for building pipelines or gas-fired power plants can last for decades at a time, making phase-out attempts difficult. In fact, a report by Food and Water Watch released in 2019 traced a massive infrastructure build-out: More than 700 fracked gas infrastructure projects have been built or proposed for development in the US.

Fracking had thus emerged as a key debate issue during the 2020 US presidential elections, with both the candidates—Joe Biden and Donald Trump—attempting to woo rural voters, some of whose livelihoods are entrenched in the oil and gas sector.

Changing face of fossil fuels

The EU gets over 40% of its natural gas and 27% of its crude oil from Russia through a dense network of pipelines. While the number of pipelines has stagnated, the bloc is now investing in LNG terminals

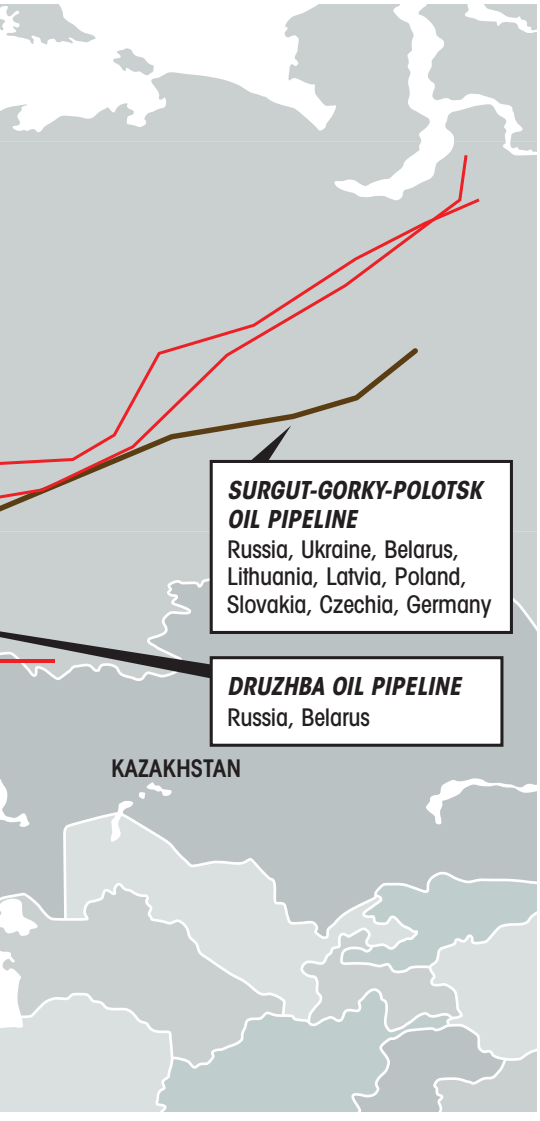


Mohammed bin Salman Al Saud, crown prince of Saudi Arabia, and Russia's president Vladimir Putin make that unpalatable, the door opens to the domestic fossil interests from coal to gas to oil with senators like Joseph Manchin acting as linchpins, adds Tooze.

This is certainly not what the International Energy Agency (IEA) meant, when it said last year in its strongest warning yet that no new oil, gas or coal development should be done from now—from this year—if the world is to reach net-zero by 2050.

Bloomberg estimates that the EU's need for LNG imports could grow global demand by nearly 10 per cent this year, which will further put a squeeze on the stretched market. Even the March 2022 10-point plan of IEA to wean the EU off Russian natural gas, includes import of LNG, albeit in the short run. In addition to increasing renewable energy like wind and solar power, IEA recommended that the EU could ramp up LNG imports by about 60 billion cubic metres (bcm), compared to the 2021 levels, since it has some spare regasification capacity.

On March 7, Germany has already signed a contract to build the first LNG ter-



New focus

European countries have 39 operational and 29 proposed or under-construction LNG plants

	Operational	Proposed
BELGIUM	1	2
CROATIA	1	
FINLAND	2	1
FRANCE	4	3
GIBRALTAR	1	
GREECE	1	1
ITALY	5	1
LITHUANIA	1	
MALTA	1	1
NETHERLANDS	1	1
NORWAY	7	
POLAND	1	1
PORTUGAL	1	
SPAIN	5	3
SWEDEN	1	
TURKEY	3	
UNITED KINGDOM	3	
DENMARK		1
ESTONIA		1
GERMANY		2
IRELAND		4
LATVIA		1
SLOVAKIA		1
UKRAINE		1

Europe has four under construction LNG plants in **Poland (2), Turkey (1) and Finland (1)**

Source: Global Energy Monitor

minal that will have an annual regasification capacity of 8 bcm. The EU's plans will be music to the ears of the US oil and gas industry, which has since long attempted to ramp up exports of LNG to compete with Russia's vital role as the EU's energy supplier.

LNG is a natural gas that has been converted into a liquid for shipping and storage, by cooling to -162°C. This reduces the volume by about 600 times and enables transportation to areas where gas pipelines cannot reach, such as across international oceans. It is shipped in special tankers to terminals around the world, where it is regasified and pushed into the pipeline distribution network locally.

News reports based on the British oil and gas company BP's 2020 world energy assessment find that over the past few decades, LNG has given the cheaper piped natural gas competition. In 2019, natural gas through pipelines supplied 800 bcm as compared to 485 bcm of LNG—this fuel has taken up to 38 per cent of the share of the total global gas market. This, even though, the transportation of LNG involves significant infrastructure costs and makes it more expensive than piped natural gas.

The US shipped its first LNG cargo abroad in 2016. But as recently as 2020, the US LNG industry was suffering idling capacity, due to the pandemic and uncertainty over natural gas's role in a low-carbon energy system. The Global Energy Monitor as recently as March 2022, found that in spite of high energy prices, US LNG remains under-invested and its expansion projects stalled. This is partly because of market headwinds, regulatory challenges because of clean energy requirements and cheaper gas from countries like Qatar. But now, by late March 2022, the EU has become the top importer of US LNG for the third month in a row, according to *Reuters*. More than half of the US' LNG was being exported to the EU. LNG continued to flow at records rates, even raising concerns that the EU's storage space could not handle all the incoming cargo. And forecasts suggested that US exports would continue to rise through 2022 due to high prices in EU and East Asia.

The global supply of LNG is limited, and ramping up cargo to the EU, would induce competition with Asia, a major LNG import market, creating what IEA calls an "exceptionally tight LNG markets and very high prices". This could force many emerging Asian economies to renege on their climate goals and increase use of dirtier fuels like coal. India has been identified as being particularly exposed where higher fuel prices could significantly affect disposable incomes of citizens.

CLEAN FOSSIL?

Can liquefied natural gas, a fossil fuel, be compatible with global climate goals

NATURAL GAS, a fossil fuel, has been seen as a "transition" or "bridge" fuel that will facilitate a move away from polluting coal, and fill interim energy needs before zero-carbon renewable energy can be fully scaled up. Natural gas emits roughly half the carbon dioxide (CO_2) as compared to coal. But leakages of methane—an extremely potent greenhouse gas—during its production, supply and usage almost wipe out its emissions benefit. Methane has a higher global warming potential than CO_2.

Therefore, the first question is if natural gas—LNG or piped—can be seen as the transition fuel in a world that now has an extremely shrunk carbon budget?

The second question is if gas should be the transition fuel in economies like India or the continent of Africa that requires energy security or should it be used in the countries of the already developed world, which have overused their share of the carbon budget?

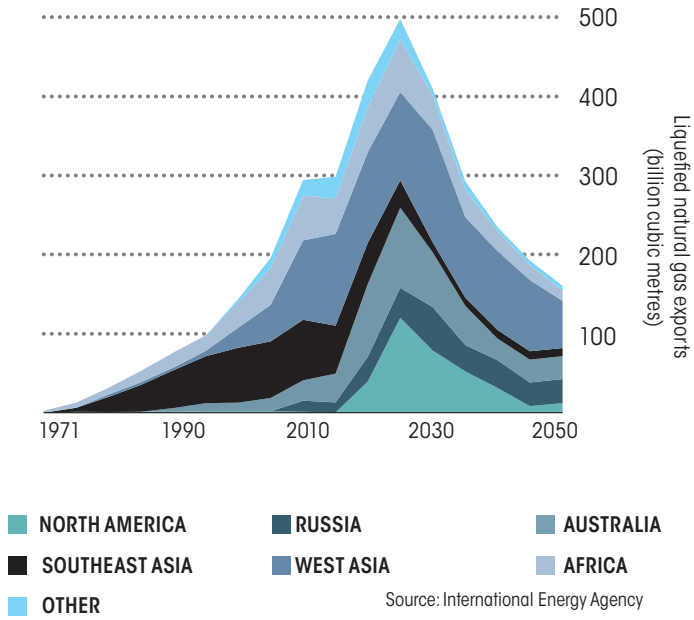
Third, if natural gas must be produced and used, should it be done without abatement of methane? Currently methane's abatement process is talked about but hardly implemented across the world (see 'Methane abatement', *p*39). Then there is the issue of CO_2 emissions from LNG, and the technologies and cost involved in reducing the emission through carbon capture utilisation and storage (CCUS) method in which the CO_2 emissions are captured and stored. The oil and gas industry is also gung-ho about the manufacture of blue hydrogen from natural gas. This, then, is seen as the future of fossil fuel, where the old industry becomes part of the energy transition—literally.

But this seemingly clean gas is not so clean, point out environmental groups. The Natural Resources Defense Council (NRDC), a US-based environmental advocacy group, highlights that the "extraction, transport, liquefaction and re-gasification of LNG can be almost equal to the emissions produced from the actual burning of the gas, effectively doubling the climate impact of each unit of energy created from gas transported overseas". According to NRDC estimates, the life cycle GHG emissions for solar power are less than 7 per cent of LNG emissions; GHG emissions for wind power are even lower—less than 2 per cent of LNG emissions.

In May 2021, the International Energy Agency (IEA) said that there must be no new oil and gas investment beyond those committed in 2021, if the world is to achieve a net zero emissions energy sector by 2050. In its Net Zero by 2050 report, it stated that in 2050, natural gas demand must fall by 55

IN THE LONG RUN

To achieve net-zero emissions, the world will need to reduce LNG use by 55% in 2050, compared to 2020



Source: International Energy Agency

The world must not make new oil and gas investment beyond those committed in 2021, to achieve a net-zero emissions energy sector by 2050, says IEA. The industry, though, sees the war and price rise as rallying point for natural gas

per cent compared to 2020. "The focus of energy security will evolve as reliance on renewable electricity grows and the role of oil and gas diminishes," said the report. IEA has also said that as far as LNG is concerned, no new projects should be planned for construction, if the world is to achieve its global net zero emission goal by 2050. Most importantly, in this coming period, natural gas traded as LNG must fall by 60 per cent over 2020 levels, not to be increased as the world would now like to see.

It was because of this carbon intensity of natural gas that US LNG investment and exports has slowed down. On March 8, 2022, a coalition of 120 advocacy groups urged the six largest US banks to stop financing LNG exports. "More than 20 new and expanded export facilities are currently proposed to liquefy and ship methane gas from the Gulf Coast of Texas and Louisiana to foreign markets. If built, these projects would lock in fossil fuel production for decades to come and exacerbate harm to Gulf Coast communities already facing disproportionate rates of industrial pollution from the fossil fuel industry and the impacts of extreme weather driven by climate change," said a statement by California-based environmental group Sierra Club.

But the industry remains undeterred. It is seeing the Russia-Ukraine war as a rallying point for cleaner natural gas as compared to coal. It also remains buoyant that it can abate the emissions from gas—regardless of the fact that it continues to struggle to control the same emissions from burning of coal. Natural gas is clean, says the industry and we can make it part of the energy transition.

METHANE ABATEMENT

Extraction of LNG results in leakage of methane, a super greenhouse gas

METHANE LEAKS from the extraction and transport of LNG can constitute up to 14 per cent of its life-cycle emissions, according to the US-based think tank Natural Resources Defense Council (NRDC). Methane is also purposefully flared or vented during natural gas development. Flaring refers to the controlled combustion of methane, while venting involves its direct release into the atmosphere. Thus, despite having a lower carbon content than coal, LNG's climate benefits are almost wiped out due to its methane emissions, and this must be tackled urgently. In 2020, natural gas produced about 38.5 million tonnes of methane, according to the IEA. This needs to reduce to 13.3 million tonnes in 2030 for a net-zero emissions energy sector by 2050.

The IEA suggests that it is technically and theoretically possible to avoid around three-quarters of today's methane emissions from global oil and gas operations. Methane can be captured and monetised commercially, thus making methane emissions reductions a low-cost effort. But all this will cost— big time. And as yet, it is clear that it is not happening.

The US produced around 13.82 million tonnes of methane from its oil and gas operations in 2021. In 2016, the Barack Obama administration sought to control methane emissions from this sector, by announcing new emissions standards and leak detection and repair requirements.

These were rolled back in 2019, under the presidency of Donald Trump, who proposed eliminating requirements from oil and gas companies to control leaks of methane from new wells, storage facilities and pipelines. It also proposed reducing the regulation of air pollution from the oil and gas industry.

This course has been reversed, at least in intention, by his successor and Obama's former associate Joe Biden, who announced a target to slash methane emissions by more than 50 per cent by 2030 during COP 26 in Glasgow. It would "require companies to monitor 300,000 of their biggest well sites every three months, ban the venting of methane produced as a by-product of crude oil into the atmosphere, and require upgrades to equipment such as storage tanks, compressors, and pneumatic pumps". The US also announced the Global Methane Pledge along with the EU. Joining countries committed to "a collective goal of reducing global methane emissions by at least 30 percent from 2020 levels by 2030 and moving towards using best available inventory methodologies to quantify methane emissions, with a particular focus on high emission sources."

In a world with a short fuse, the question is if this methane abatement will happen as fast as needed.

ENERGY SECURITY YES...

But climate change must drive the energy transition

IN THE energy chessboard, there are now new buzzwords—affordable, reliable, sustainable and secure sources. The war with Russia has brought the memories of the 1970s energy crisis back to Western economies—this is when because of the Yom-Kippur war of 1973 and the Iranian Revolution of 1979, the supply of oil from the West Asia was disrupted. An oil embargo was imposed by members of the Organization of Arab Petroleum Exporting Countries (OAPEC), leading to spikes in fuel prices and economic losses across the world. This energy crisis led the world to discuss the need for domestic energy security; it also temporarily energised the alternative energy business as solar was seen as the way out. But this crisis, as many others in the world, became a faint memory as things went back to business as usual and global trade in oil and gas exploded.

Now, once again, energy security is back on the table. Europe's dependence on Russian oil and gas has thrown up similar spectre of shortage and high energy prices, though this time it is because of the embargo being imposed by the importing countries in retaliation.

This also feeds into the narrative of wonks who would believe that it is time countries discussed energy security even as they talked about clean energy. This issue then spills out of the discussion on oil and gas—which is produced by some countries in the world and some of whom are not in the favoured few. It is then about supply chains of all new sources of energy—the minerals and components that are needed to make the renewable energy transition work. This then brings in China into the equation as it controls the world's rare minerals that are crucial for the new energy economy; including the batteries that will drive the vehicles of the future. Even Russia and Ukraine are crucial parts of the supply chain needed for the low-carbon transition.

China and Russia are major producers of several metals and minerals that are crucial for clean energy transition

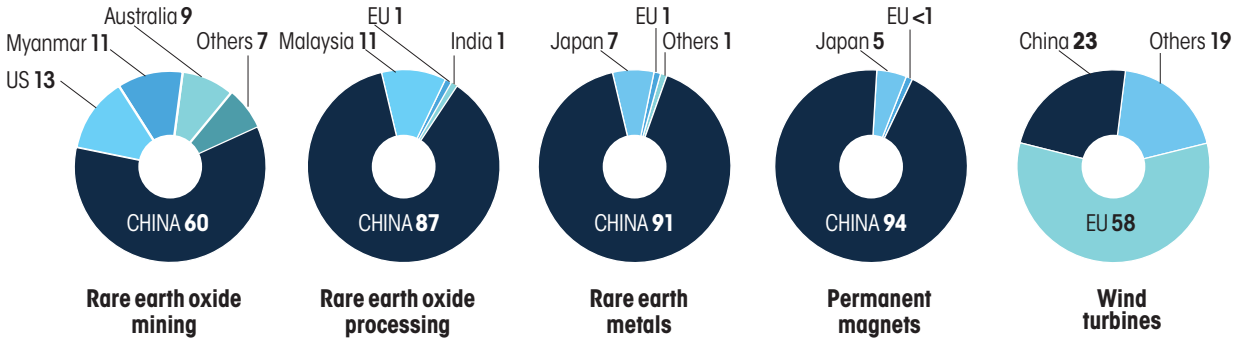
Both Russia and Ukraine are major producers of several metals and minerals that are crucial for clean energy transition. As per an article by the World Economic Forum, Russia accounts for 7 per cent of the world's mined nickel (a scarce metal needed to make electric vehicle batteries); one-third of the world's palladium (used in the car industry to control vehicle emissions); one-tenth of the world's aluminium and copper and a fifth of battery-grade nickel.

Ukraine is the world's largest supplier of a group of chemical elements known as "noble gases" (include neon and krypton) that are used to make semiconductor chips, a critical component of all electronic systems including those found in automobiles, renewables machinery and other technology. Ukraine supplies almost 90 per cent of its semi-conductor grade neon to the US. Now that Ukraine is under attack, the US has reportedly asked its semiconductor industry to "diversify its supply chain".

Just a few months before being attacked by Russia, Ukraine was to auction off exploration permits to develop its reserves of lithium, copper, cobalt and nickel—metals crucial for the clean energy transition. Ukrainian researchers speculate that the country's eastern region holds one of the world's largest reserves of lithium oxide—close to 500,000 tonnes—which is processed to extract lithium, critical to rechargeable batteries used in everything from mobile to electric vehicles. In November, there was cut-throat competition between European Lithium, an Australian-listed firm, and Chinese company Chengxin Lithium for se-

CHINESE DOMINANCE

While the EU is a world leader in manufacturing electric motors, it is almost fully import-dependent for rare earth elements, the supply and production of which has been monopolised by China (figures in %)



Source: Estimated market share for 2019 by International Energy Agency

curing rights to two promising lithium deposits in the country. Even though mining work has not begun in the region, the move was crucial for Ukraine to establish itself as a major player in the clean energy future, while supplying the world with the critical metal whose demand is going to double by 2025 due to increase in battery demand for electric vehicles.

So far, the war has not interfered with the flow of energy metals. But analysts worry that the conflict and future sanctions on commodities may disrupt supply, which can snowball in a world still struggling to recover from the pandemic and trying to transition away from fossil-fuels. Though price swings of these materials have been as violent as in oil and natural gas since the war—on March 8, the London Metal Exchange suspended nickel trading for only the second time in its 145-year history after its prices increased by 250 per cent in 48 hours—prices have continued a northward march since last year.

Its impact will be particularly worse for Europe that now banks on clean energy to hedge against inflation and to achieve energy security. Estimates show that EU's demand for rare earths could increase 10-fold by 2050; demand for lithium will grow 60 times and cobalt by 15 times. But just like its energy supplies, Europe heavily depends on other countries for these critical raw materials. In September 2021, the European Raw Materials Alliance (ERMA), established by the European Commission for securing raw materials for European market, released an action plan which says, Europe has significant rare earth reserves but no primary production takes place within the EU, which recycles just less than 1 per cent of rare earth elements. While the EU is a world leader in the manufacturing of electric motors, it is almost fully import dependent for rare earth permanent magnets, critical for applications like wind power, electric mobility and communications technology.

Russia, for instance, supplies the majority of the feedstock for Europe's only commercial rare earth separation plant in Estonia. As per the ERMA action plan, China sends 16,000 tonnes of rare earth permanent magnet to Europe each year, which represents 98 per cent of the EU market. All, this then adds to the energy vulnerability of Europe, even as it moves away from Russia oil and gas. In March, ERMA has said it will support development of a rare earth separation plant in Poland, which will source its raw material from Malawi.

Overall, the issue of supply chains is now an important issue with the proponents of globalisation. Energy has been weaponised and now when climate change is banging on our doors and windows, can the world stay on course in spite of this war? Or, will the war accelerate climate change? Clearly, there is much at stake. DTE @down2earthindia