

# Gist of **DOWN TO EARTH** MAGAZINE

APRIL 2022 EDITION

**PART-I**



**Important Articles  
Simplified!**

**The Arctic Policy**  
**A New Energy Order**

**Russia-Ukraine War: Risk To Global Food Security**

**Microbes To Improve Crop Yield**

**Lantana Invasion in the Western Ghats**

**Vanishing Vultures**

**Clean Fossil**

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# 1. The Arctic Policy

## Relevance

### GS 3: Environmental Pollution & Degradation, Conservation

#### Introduction

- The Centre on March 17 released the government of India has announced India's Arctic policy titled **'India and the Arctic: building a partnership for sustainable development'**
- This policy lays down measures for **scientific research and cooperation; climate and environmental protection; economic and human development; transportation and connectivity; governance and international cooperation, and national capacity building in the Arctic region.**
- Implementing India's Arctic policy will involve multiple stakeholders, including academia, the research community, business, and industry.

#### 6 Pillars of Arctic Policy

- **Strengthening India's scientific research and cooperation.**
- **Climate and environmental protection.**
- **Economic and human development.**
- **Transportation and connectivity.**
- **Governance and international cooperation.**
- **National capacity building in the Arctic region.**

#### The importance of the Arctic Region for India

- India has a significant stake in the Arctic.
- It is one of thirteen nations holding Observer status in the Arctic Council, a high-level intergovernmental forum that addresses issues faced by the Arctic governments and the indigenous people of the Arctic.
- India's engagement with the Arctic region has been consistent and multidimensional.
- India maintains that all human activity should be sustainable, responsible, transparent, and based on respect for international laws.

#### Agenda Of India's Arctic policy

1. Strengthening national capabilities and competencies in science and exploration, climate and environmental protection, maritime and economic cooperation with the Arctic region.
2. Inter-ministerial coordination in pursuit of India's interests in the Arctic.
3. Enhancing understanding of the impact of climate change in the Arctic on India's climate, economic, and energy security.
4. Contributing better analysis, prediction, and coordinated policymaking on the implications of ice melting in the Arctic on India's economic, military and strategic interests related to global shipping routes, energy security, and exploitation of mineral wealth.
5. Studying linkages between polar regions and the Himalayas.
6. Deepen cooperation between India and countries of the Arctic region under various Arctic forums, drawing expertise from scientific and traditional knowledge.
7. Increase India's participation in the Arctic Council and improve understanding of the complex governance structures in the Arctic, relevant international laws, and geopolitics of the region.

## 2. A New Energy Order

### Context

- Russian President **Vladimir Putin's** invasion of Ukraine is forcing governments worldwide to digest the geopolitical consequences of war pursued by an energy superpower.
- Russia and Saudi Arabia are the world's top oil exporters, accounting for **29% of the global total**.

### Background

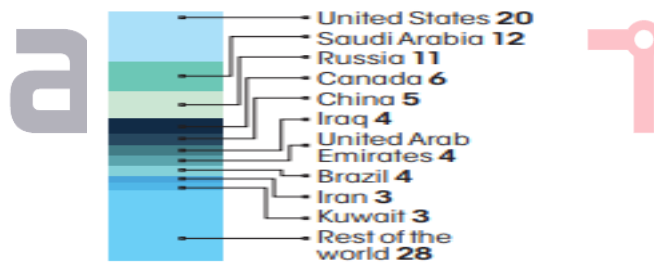
- Soon after **Russia's invasion of Ukraine**, the **27-nation European Union** has responded by speeding up its disconnection from Russian gas, while the U.S. has barred Russian oil imports and is scouring the world for alternative supplies.
- Saudi Arabia is revelling in a renewed strategic importance as crude prices that collapsed two years ago hit new highs.
- And Russia, by threatening to withhold energy exports to Europe, is being thrust closer to China.

### What is a new energy order?

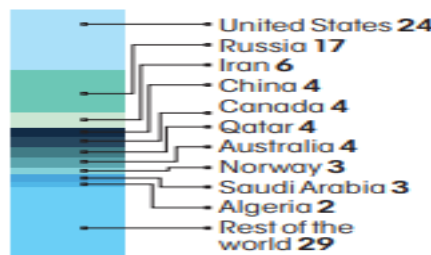
- As the war continues, the shifts underway are inflaming old grievances but also creating the opportunity for fresh alliances as blocs start to align in what looks like a new world energy order.
- The US and Canada have banned all imports of Russian crude oil and the UK has announced that it will phase out crude oil purchases from Russia by the end of the year.
- Russian cargoes of crude oil have been struggling to find buyers as many major firms are avoiding purchasing Russian crude over concerns of reputational damage.

### 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

- This represents the biggest re-drawing of the energy and geopolitical map in Europe — and possibly the world – since the collapse of the Soviet Union, if not the end of **World War II**.
- The outcome, he said, could be “**a sequel to the Cold War.**”

### Country's Policy Back to Cold War Era

- **For Berlin**, loosening its energy dependence on Russia is not simply about hitting Moscow's main revenue stream. It's a threat to roll back "**Ostpolitik**," a totemic **post-World War II** policy of rapprochement with the Soviet Union, and by extension later Russia, that involved economic and political engagement, notably through oil and gas links.
- The **demise of Ostpolitik** — symbolized by the halt to the **\$11 billion Nord Stream 2 gas pipeline** — is just one of the most visible signs of the rapid realignment underway as a result of Putin's aggression.
- Although initial sanctions deliberately spared Russian energy to avoid the knock-on effects for the world, government actions and near-universal condemnation since are rendering its supplies almost untouchable for buyers.
- Diesel prices in northwest Europe have hit the highest since the 1980s as a result.
- Yet as customers desert Russia, its partnership with the oil titans of the Middle East, with which it jointly leads the OPEC+ coalition, has so far stayed intact.
- Saudi Arabia has rebuffed U.S. pressure to replace Russian oil by tapping its spare production capacity, instead of letting prices surge to a **13-year high of almost \$140 a barrel**.
- Riyadh refused to even brook discussion of Moscow's difficulties when it was raised at an **OPEC+** meeting on **March 2**.

### Why Saudi Arabia does not want to Overpower Russia?

- **Riyadh's OPEC+** partnership with Moscow calmed years of distrust between the two oil rivals and saved the kingdom from relying exclusively on Washington.
- Saudi Arabia doesn't want to switch horses mid-race when they do not know if the other horse is actually going to show up.
- **Gulf Arab** nations accused the U.S. of a lack of support in the face of repeated attacks by Iranian-backed militia on Saudi oil facilities and Gulf tanker traffic and on Abu Dhabi this year.
- In a measure of the discord, the United Arab Emirates abstained in a **U.S.-led United Nations Security Council** vote to condemn Russia's invasion.
- Another source of friction lies in U.S. efforts to reinstate the nuclear agreement with Iran, Saudi Arabia's regional rival.
- A deal could see Iran revive production by 1.3 million barrels a day to pre-sanctions levels by the end of the year, according to the **International Energy Agency**.

### What US's move toward Venezuela signify?

- Demonstrating just how exceptional the times are, a U.S. delegation travelled to **Russian ally Venezuela** in an overture to a country that holds the largest known crude reserves in the world.
- Venezuela has been subject to international sanctions since the Trump era that have crippled its ability to sell oil.
- The U.S. is looking to confine the spheres of influence enjoyed by Russia and especially China, and for Venezuela, that means a gradual process "**to reincorporate with the West, through energy.**"

### India to buy More Crude Oil from Russia

- India imports about **85 per cent of its crude oil** requirements but only about 3 per cent of crude oil imports are ordinarily sourced from Russia.
- India & China will continue to carry on "**normal trade cooperation**" with Russia, including in oil and gas.
- Russia has already offered huge discounts and India has all the right to buy from Russia.

### 3. "Russia-Ukraine War: Risk To Global Food Security"

#### Relevance

"GS 2: Health, Government Policies & Interventions"

#### Introduction

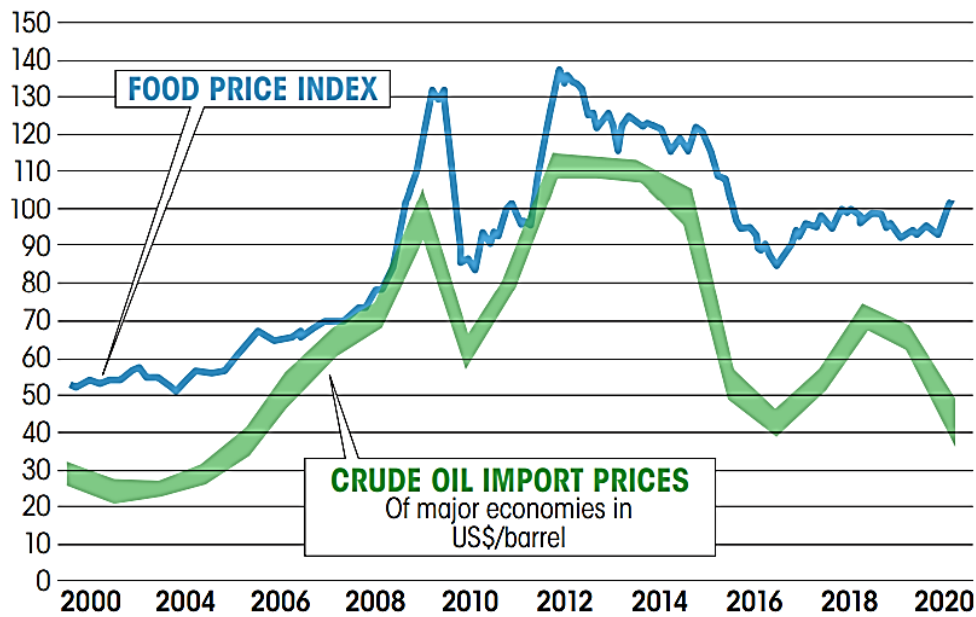
- Apart from energy, the **Russia-Ukraine war** also poses risk to global food security.
- According to the **UN Food and Agriculture Organization (FAO)**, the war is likely to raise prices by **8-22 per cent**.
- Earlier, prices were already rising due to the COVID-19 pandemic.
- Both countries play leading roles in supplying global markets in foodstuffs, for which exportable supplies are often concentrated in a handful of countries, exposing these markets to increased vulnerability to shocks and volatility.

#### Food Prices Prior to the War

- Already prior to the war in Ukraine, international food prices had reached **an all-time high**. This was mostly due to **market conditions**, but also high prices of **energy, fertilizers** and all other agricultural services.
- In **February 2022**, the **FAO Food Price Index** reached a new historical record, **21 per cent** above its level a year earlier, and **2.2 per cent** higher than its previous peak in February 2011.

#### 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

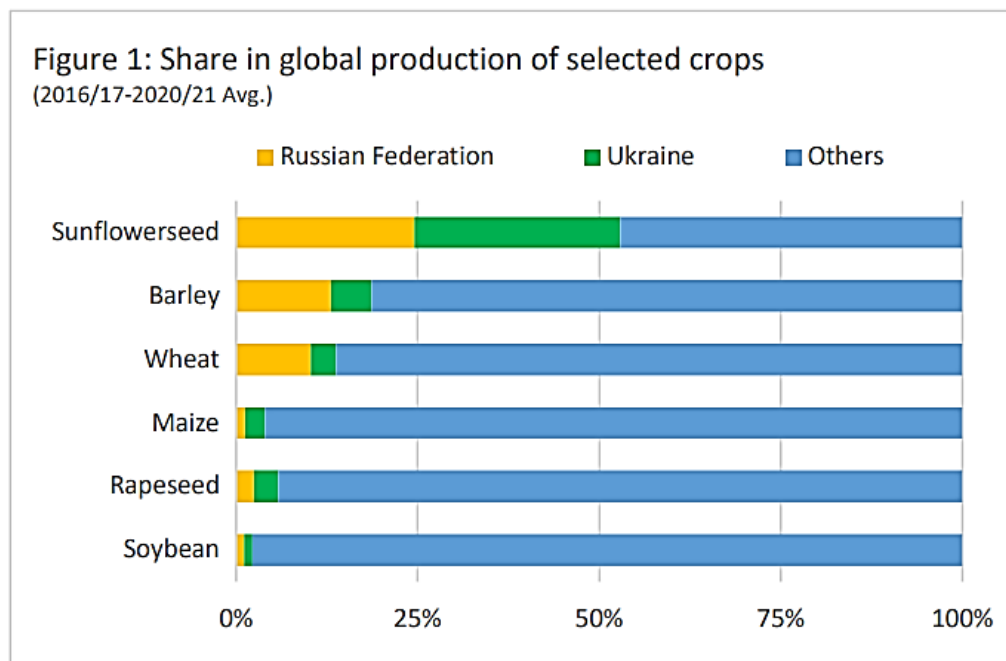
- FAO's food price index, which measures changes in international prices of a basket of food commodities, jumped from **98.1 points in 2020 to 135.4 points in January 2022**. It was at 140 points in February, the highest since **1961**.

## Recent History of Rising Food Prices

- 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**.

## Two Global Food Players are fighting

- The Russian Federation and Ukraine are prominent players in the global trade of food and agricultural products.
- 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**.
- In early March, Ukraine **banned exports** of wheat, millets, live cattle, meat and other products to ensure **domestic supplies**.



Source: FAO XCBS system

- Prices could also rise if Russia in response to the global sanctions bans exports of essential food crops.
- Nearly 50 countries depend on the Russian Federation and Ukraine for at least **30 per cent** of their wheat import needs.
- Of these, 26 countries source over **50 per cent** of their wheat imports from these two countries.

## Who will be immediately affected?

- A steep rise in prices could create widespread scarcity. **West Asia and North Africa** will be particularly affected.
- **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.
- The war could increase deforestation and ploughing of grasslands to compensate for lost production.

## Conclusion

Undoubtedly, this war will have multiple implications for global markets and food security, representing a challenge for food security for many countries, especially for low-income food import-dependent countries and vulnerable population groups. Joint, coordinated actions and policy responses are needed to address the current challenges for the people most in need and to mitigate the impact on food insecurity at the global level.





## 4. Microbes To Improve Crop Yield

### Relevance

"GS 3: Biotechnology, Achievements of Indians in Science & Technology"

### Context

- The current estimated demand for **bio fertilisers in India is 18,500 tonnes per year**, while production is **10,000 tonnes**.
- **Soil** contains several natural microbes that help plants absorb nutrients. These can be cultured and modified into **bio-fertilisers**. They increase the availability of nutrients and boost yield by **10-25 per cent**.

### Why should we focus on microorganisms?

- Chemical-free organic farming improves soil fertility, but there are conflicting views about their impact on yield.
- To overcome this and boost productivity, the agriculture sector can tap into microorganisms.
- Scientific research shows constructive and cost-effective use of bacterial, fungal and algal microbes can also have positive results on crop yields.
- Microbes can be used as **bio-fertilisers, biostimulants and biopesticides**, cultured in the laboratory.

### How do Bio fertilisers Works?

- They promote **root growth** and decompose organic matter.
- They do this by helping fix atmospheric nitrogen in the soil and the root nodules of crops, and by producing hormones and antimetabolites.
- They also scavenge and solubilise **phosphates** from soil layers and help in **soil mineralisation**.
- There are three bacteria used as **nitrogen-fixing bio-fertilisers**. The most common is **rhizobium**, which works best with legume crops.
- Azospirillum, on the other hand, is used with higher plants or cereals like sorghum, maize, millets and fodder grasses.
- Another common soil bacterium is **Azotobacter**.
- The species **A chroococcum** is widely present in Indian soil and grows using soil organic matter.

### What are Rice Organisms?

- Blue-green algae such as **Tolypothrix, Nostic, Schizothrix, Calothrix, Anoboenosois and Plectonema** are also used as bio-fertilisers.
- They are called rice organisms as they are found in these fields.

### What are biostimulants?

- Some microbes being cultured as biofertilisers can also be used as biostimulants.
- They are defined as **products designed to enhance plant's nutrition efficiency, improve tolerance to abiotic stress and boost crop quality**.
- They may have **organic and chemical matter**, or mixture of these and microbes. Microbial biostimulants can consist of a single or multiple species of **azotobacter, rhizobium and azospirillum bacteria, and even of Mycorrhizal fungi**.

### Safety Concerns

- The development and use of biostimulants through the years has shown that some can have negative impacts.
- So, countries like India and those in the EU have developed lists of “**positive**” and “**negative**” **microbial biostimulants**.
- In India, the lists are made by the **Central Insecticide Board and Registration Committee (CIBRC)** and the **Directorate of Plant Protection, Quarantine & Storage (DPPQS)**.

### India is the largest consumer of pesticides

- India is not only among the world’s largest consumers of pesticides but also ranks **12th** in their production. Their demand is also rising.
- According to a **2017 report by the Centre’s Department of Agriculture Cooperation and Farmers Welfare**, consumption of biopesticides increased from **219 tonnes in 1996-97 to 683 tonnes in 2000-01 and to around 3,000 tonnes in 2015-16**.
- In **2016**, the market was **\$70.45 million**, growing at a compounded annual rate of **17.08 per cent**.

### Way Forward

- **Biopesticide research** is at an early stage but evolving.
- **Investment** in fermentation technology, improved delivery systems and promotion of biological control will help.
- While the agriculture sector has found multiple uses for microbes, their promotion is hindered as they show **varying effects in different climate and soil conditions**.
- Researchers in recent years have made synthetic communities of beneficial microbes to improve yields.
- We can explore strategies to select synthetic inoculants that are better suited to different conditions.
- In addition, existing national schemes to promote organic and natural farming can also include measures to boost use of **microbial inoculants**.

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## 5. "Lantana Invasion in the Western Ghats"

### Relevance

"GS 1: Forest Resources"

"GS 3: Conservation, Government Policies & Interventions"

### Context

- In **1997**, some **96 per cent** of the **Western Ghat** reserve was under **native flora**, while **4 per cent** was under **lantana**.
- By **2018**, the area under native flora had shrunk to **53 per cent**, while lantana occupied **47 per cent** of the reserve.
- The tribal community plays a central role in the sustainable and long-term removal of this destructive species.
- For example, tribal artisans use lantana as a raw material to create objects of value.

### About Soliga Community

- This is a **hunter-gatherer** community that depends on the forests it inhabits for livelihood, mainly through the collection of **non-timber forest produce (NTPF)**.
- Nowadays they make handicraft items and furniture from a thorny shrub—**lantana (Lantana Camara)**— that has invaded the forests.

### About Lantana Shrub

- Native to **South America**, Lantana was introduced to India by the **British** as an **ornamental plant in the 1800s**.
- It has since taken over **40 per cent** of the **Western Ghats** and continues to grow.
- The proliferation of lantana has led to widespread impacts on the natural environment and, consequently, the people, whose ability to forage NTPFs has been drastically impacted by the species' spread.

### How many invasive species are in the country?

- The "**India State of Forest Report 2021**", released in January this year, for the first time provides **state-wise data on 29 invasive species in the country**.
- It shows that more than **9,793 sq km**— an area larger than Sikkim—is under lantana, with Madhya Pradesh being the most infested (2,852 sq km), followed by Karnataka (1,432 sq km) and Tamil Nadu (1,154 sq km).
- The report shows that the spread of lantana is only marginally less than the combined spread of the other **28 species (11,975 sq km)**.

### Conclusion

Though beautiful and unique, the furniture and artwork that the artisans create with Lantana are insufficient in restoring millions of hectares of forests. This underlines the need for approaches that are financially viable, prioritise the needs of communities affected by this weed and work to restore affected fores.

## 6. Vanishing Vultures

### Relevance

GS 3: Conservation, Government Policies & Interventions

### Context

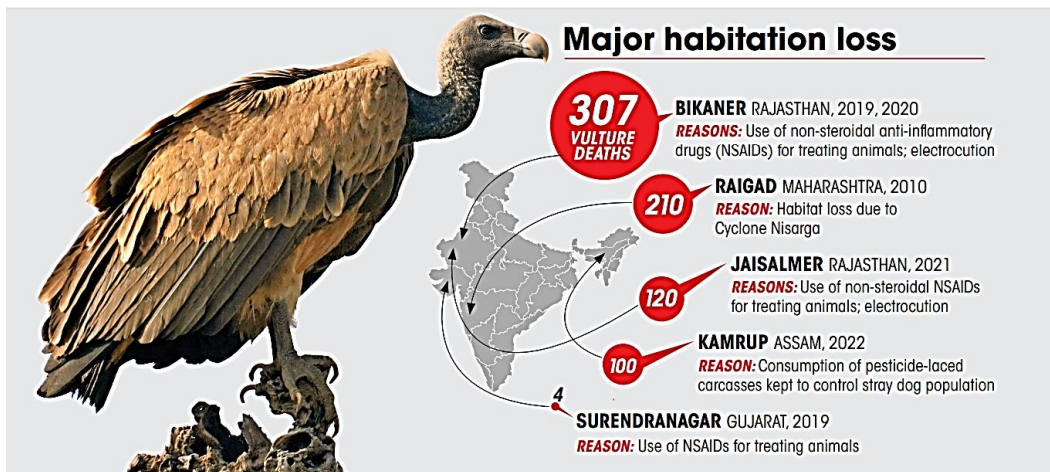
- On March 14, the Bombay Natural History Society wrote a letter urging the Union Ministry of Environment, Forest and Climate Change (MOEFCC) to ban the use of three veterinary drugs known to kill vultures in the country.
- This risk to the vulture population came sixteen years after India banned the veterinary use of diclofenac to save its vultures.

### Which are the three other drugs that revive the old challenge?

- The rampant use of the three non-steroidal anti-inflammatory drugs (NSAIDs) threatens to undo the Centre's two decades of work to arrest the dwindling vulture population in the wild.
- The three drugs are—**aceclofenac, ketoprofen and nimesulide**.
- Surprisingly, these drugs were introduced as alternatives to diclofenac, the NSAID that India banned in 2006 for animal use because it caused widespread vulture deaths.

### What is the new challenge?

- Deaths caused by NSAIDs are **invisible**. Birds die two-three days after ingesting the medicine, making it difficult to establish a clear link.



- India has slowed down the vulture mortality rate but has not stabilised the population.

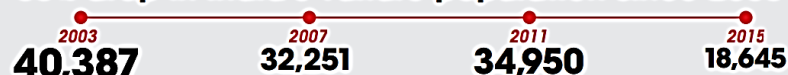
### What did the Data say?

- Vultures were quite common till the 1980s. Currently, **eight species** in the country face extinction.

## VANISHING VULTURES

High mortality hinders India's plans of stabilising its vulture population

### 53% drop in India's vulture population since 2003



### The fatal four

DICLOFENAC	ACECLOFENAC	NIMESULIDE	KETOPROFEN
was banned for veterinary use in 2006 to arrest the shrinking vulture population	gets converted into diclofenac within hours of administration to cattle	causes visceral gout and renal failure in vultures within 30 hours of ingestion	causes death in vultures within 48 hour after ingestion due to heightened toxicity levels

- The country's vulture population crashed from over 40,000 in 2003 to 18,645 in 2015, as per the last vulture census conducted by intergovernmental body **BirdLife International**.

### Vulture's IUCN Status

- The **Indian vulture (Gyps indicus)** is an Old World vulture native to India, Pakistan and Nepal.
- It has been listed as Critically Endangered on the **IUCN Red List since 2002**, as the population severely declined.

### India's vulture conservation action plan for 2020-25

- It recommends a ban on the veterinary use of the three drugs.
- It adds that the **Drug Controller General of India (DCG)** institute a system that removes a drug from veterinary use if it is found to be toxic to vultures.
- The country is also a signatory to the **Convention on Migratory Species' Multi-species Action Plan to Conserve African-Eurasian Vultures**, which recognises NSAIDS as a major threat to vultures in India.
- Still, little seems to have moved on the ground.



## 7. Clean Fossil

### Relevance

#### GS 3: Mineral & Energy Resources, Conservation of Resources

#### Introduction

- In many countries, natural gas, a fossil fuel, has been seen as a **“transition” or “bridge”** fuel that will facilitate a move away from polluting coal before renewable energy can be fully scaled up.
- Natural gas emits roughly **half the carbon dioxide (CO<sub>2</sub>)** 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<sub>2</sub>.

#### Is natural gas environmentally friendly?

- There is a lot of confusion on this matter. Because while natural gas is a fossil fuel, it's the cleanest fossil fuel.
- That means that while it still produces harmful gases, it creates less than oil or coal.
- Natural gases that can be used for fuel can be found in other places than deep undergrounds, such as under bodies of water and landfill sites, and even collected from livestock. This type of natural gas is called biomethane and can be relatively readily collected.

#### Why is natural gas harmful to the environment?

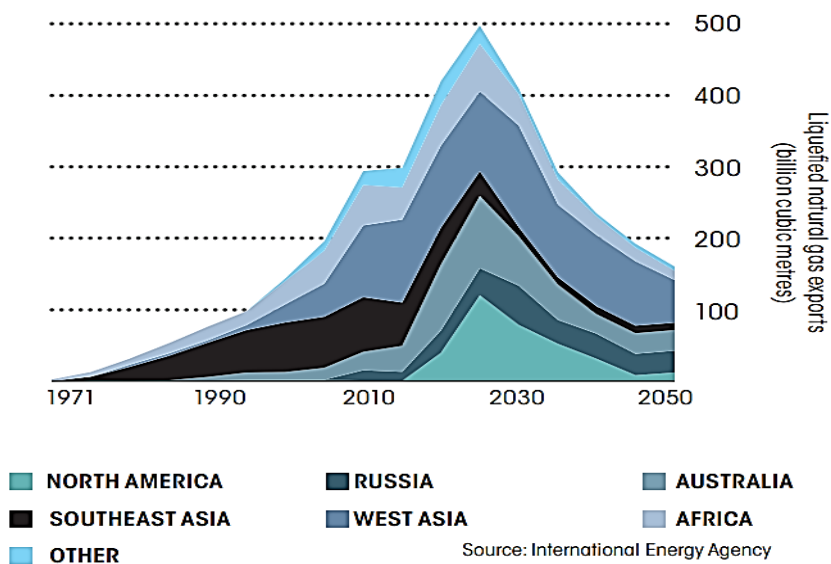
- Natural gas emits harmful gases, which contribute to global warming. Natural gas contains a lot of methane, which is one of the biggest contributors to the greenhouse effect.
- Methods of extraction have had to become more sophisticated as natural reserves are being used.
- Methods like **fracking disturb vegetation, destroy natural habitats, create air pollution, noise pollution, and use a huge amount of water** which also contributes to pollution of waterways and nearby soil.

#### IEAs complete no to the natural gas Idea

- 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 per cent compared to 2020**.

#### IN THE LONG RUN

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



- 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.

### Methane Abatement is the key

- 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.

### Conclusion

The focus of energy security will evolve as reliance on renewable energy grows and the role of oil and gas diminishes.

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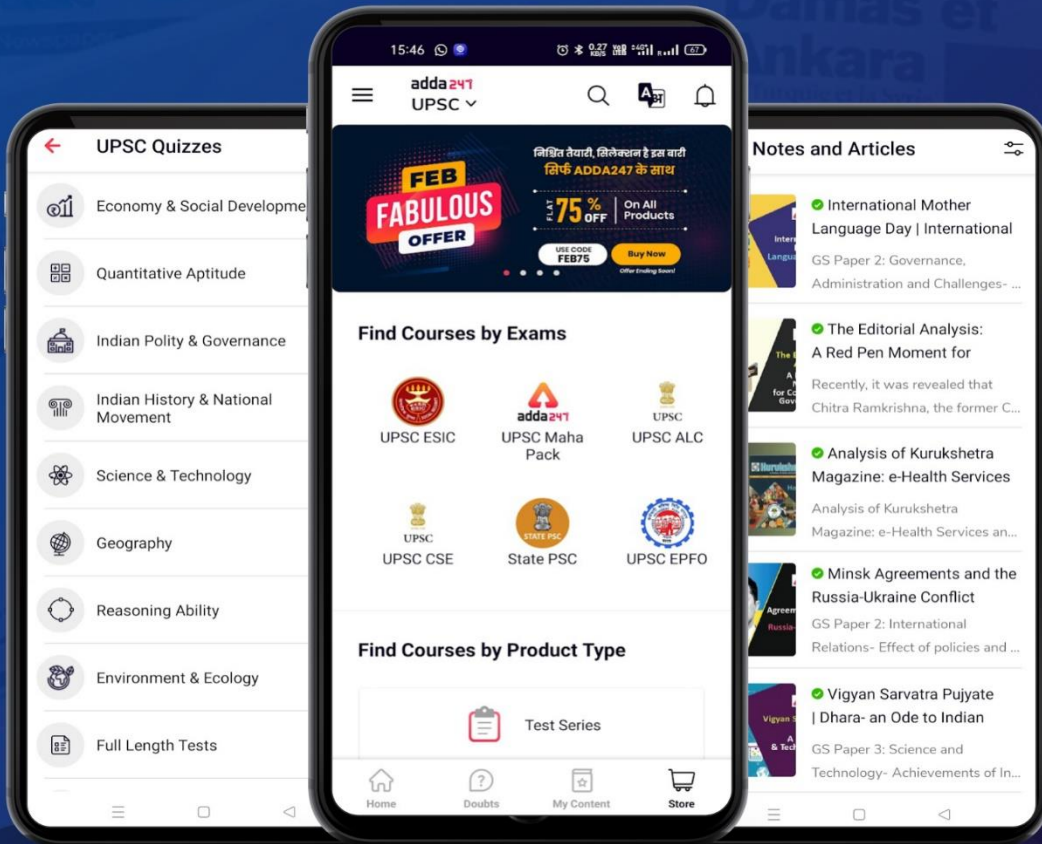
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