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### Colour Codes:

- 1. Recently in News & Very Important**
- 2. Important for Prelims + Mains**
- 3. Important for Prelims**

#### 4. Very Important for Prelims

#### 5. Important for Mains

#### 6. Key Word or Key Phrase

### {Envi – Air Pollution – 2021/04 } Styrene Gas

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TH | Prelims + Mains | GS3 > Environment Pollution

- **Context:** The gas that leaked from a chemical factory on the outskirts of [Visakhapatnam](#) leaving people dead is called **styrene**.
- Styrene is an organic compound that is a **derivative of benzene**.
- It is in **stored in liquid state** and **evaporates easily**.
- It must be kept **under 20°C**.

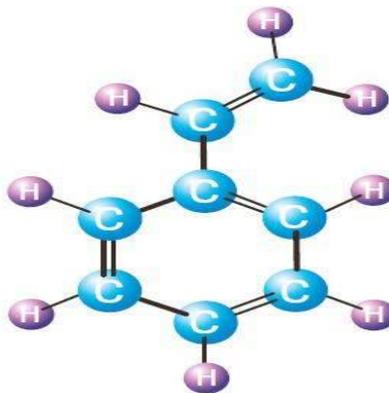
#### What is styrene used for?

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- It is main **raw material for synthesis of polystyrene**.
- Polystyrene is a versatile plastic that is used to make **parts of various appliances** such as refrigerators or micro-ovens, automotive parts, computers, disposable items, etc.

#### What happens if someone is exposed to styrene gas?

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Molecular structure of styrene ( $C_8H_8$ ), with bonding in the form  $C_6H_5CH=CH_2$ . Used for synthesis of plastics, it is stored as a liquid in factories but evaporates rapidly.

[Source and Credits](#)

#### Short term Effects

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- It affects the **central nervous system**.

- **It causes** breathlessness & respiratory problems, irritation in eyes, indigestion & nausea, & loss of consciousness
- It is the **mucous membrane that is mainly affected by exposure** to styrene gas and it **can be fatal**.

### Long-term effects

- There is a chance developing **leukaemia and headaches in patients**.

MAJOR GAS LEAKS IN INDIA IN THE PAST				
	When did it happen	Where did it happen	What caused the disaster	Number of deaths/casualties
Bhopal gas tragedy	December 2-3, 1984	Union Carbide India pesticide plant, Bhopal, Madhya Pradesh	Methyl isocyanate (MIC) gas leak	Nearly 5,000 were killed and more than 5,00,000 were affected
GAIL pipeline blast	June 27, 2014	GAIL plant, Nagaram, East Godavari, AP	Underground natural gas pipeline rupture	Over 18 people were killed, over 40 injured
Bhilai Steel Plant gas leak	June 12, 2014	Bhilai Steel Plant, Durg, Chhattisgarh	Methane gas leak	6 people were killed, over 40 were injured
Tughlakabad gas leak	May 6, 2017	Container depot, Tughlaqabad, S-E Delhi	Chemical gas leakage from a container truck	Over 400 school children were hospitalised
Kanpur ammonia gas leak	March 15, 2017	A cold storage facility at Shivrajpur, Kanpur, Uttar Pradesh	Ammonia gas leak	5 people were killed, 9 injured
Belur chlorine gas leak	May 16, 2017	A water treatment plant at Gandehalli in Belur, South Karnataka	Chlorine gas leak	More than 10 people fell sick
Bhilai Steel Plant blast	Oct 9, 2018	Bhilai Steel Plant, Durg, Chhattisgarh	Explosion in a gas pipeline connected to the coke-oven section	9 people were killed, 14 were injured

WHAT HAPPENED IN VISAKHAPATNAM			
WHAT LEAKED	WHAT IS IT	HOW DANGEROUS IS IT	WHAT IS IT USED FOR
Styrene	It is also called ethenylbenzene, vinylbenzene and phenylethene. It is an organic compound derived from benzene	Sustained exposure affects the central nervous system. Studies have shown that it causes cancer	Manufacturing polystyrene plastics, fibreglass, rubber and latex

Compiled by Annapurani V

[Source and Credits](#)

### Benzene pollutants

- **Benzene is found in crude oil.**
- It is used to make plastics, resins, synthetic fibres, rubber lubricants, etc.
- As a **Volatile Organic Compound**, benzene reacts with other air pollutants to form **ground levels ozone** which can damage crops (in the form of **smog**) and materials).
- **Toluene (methylbenzene):** used in **paint thinners** and as an **octane booster in gasoline engines**.
- **Xylene (dimethylbenzene):** used as a **solvent** in printing, rubber, and leather industry.

- **Styrene (ethenylbenzene / phenylethylene / vinylbenzene):**raw material for synthesis of **polystyrene** (used to make **parts of various appliances**).

## {Envi – CC – 2021/02} Carbon Watch

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[PIB](#) | [IE](#) | [Prelims + Mains](#) | [GS3](#) > Conservation, Environmental Pollution and Degradation.

- **Context: Chandigarh** became the first state/UT in India to launch the **Carbon watch, a mobile application to assess the carbon footprint of an individual**.
- The app is accessible by everyone in the country but has specific options for the residents of Chandigarh.

## Carbon footprint

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- **Carbon footprint** is a measure of the impact your activities have on the amount of CO<sub>2</sub> produced through the burning of fossil fuels and is expressed as a **weight of CO<sub>2</sub> emissions produced in tonnes**.
- It is measured during the course of a year & can be associated with an individual, organization, product etc.
- **India has pledged a 33-35% reduction in the emissions intensity (carbon footprint) of its economy by 2030 compared to 2005 levels.**

## How can personal carbon footprint be measured?

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- There are **online calculators like WWF, TerraPass** where information such as how do you commute to work, your usual diet, how much you drive/fly, type of electricity used is inquired.
- **Eating meat** is on average very carbon polluting as decomposing biomass produce methane.

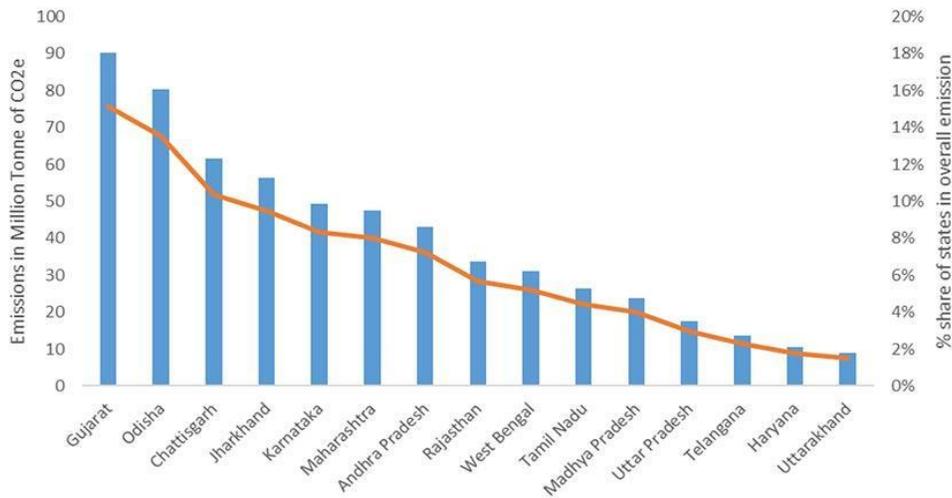
## Working of the Carbon Watch Application

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- An individual is asked details on four segments namely Water, Energy, Waste generation and Transport.
- With the above-mentioned details, the mobile application calculates the carbon footprint of the individual.
- The application also provides the individual's contribution to national and world average emissions.
- The app will suggest methods to reduce carbon footprints on the basis of information furnished.
- If a person feeds in the app that they travel only in four-wheelers, the app will advise them to reduce travel in four wheelers, opting for a bicycle or carpool occasionally.
- The goal of the app is to make people **Climate smart citizens**.

## State wise carbon emission in India

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- **Electricity generation:** Contributed to 35.5% of total CO<sub>2</sub> emissions in 2010-2015.
- Largest contribution of CO emissions come from Maharashtra, West Bengal and Gujarat.
- **Road transport:** Maharashtra’s annual contribution is the highest followed by Gujarat and Uttar Pradesh.
- **Cement and steel industries:** Major sources of industrial CO<sub>2</sub> emissions are from Rajasthan, Andhra Pradesh, Tamil Nadu and Madhya Pradesh and are major producers (57% of total cement in the country).
- Steel industries are distributed in Chhattisgarh, Jharkhand, Maharashtra and Gujarat.
- **Agriculture:** methane emissions from biomass is highest in Uttar Pradesh, Punjab, West Bengal, Madhya Pradesh and Andhra Pradesh.
- **Carbon sequestration** - Forest vegetation and soil sequester carbon and highlights the share of forests (vegetation, soil) and agriculture sector.

## {Envi – CC – 2021/02} Net Zero Emissions

**TH | Prelims + Mains | Environment > [Fighting Climate Change](#)**

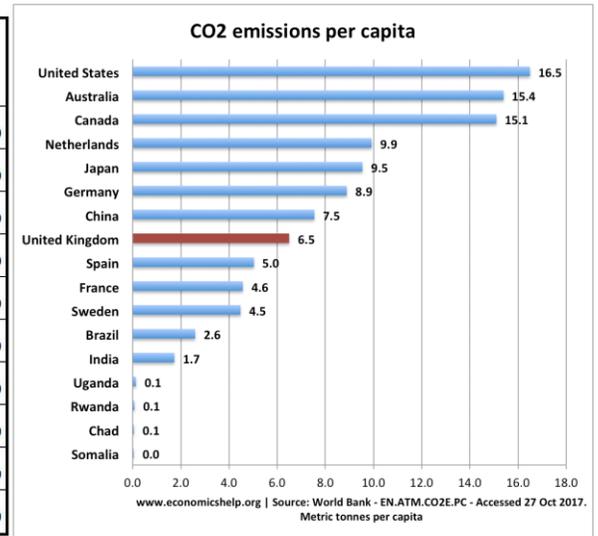
- **Context:** India’s is the 3<sup>rd</sup> largest carbon dioxide emitter in the world. The clamour is growing for India to join many other big economies and commit itself to **net zero emissions**.

## Net Zero Emissions & Carbon Neutrality

- **Net-zero** is achieved when the **total emissions is balanced by the amount of absorption of CO<sub>2</sub> through natural sinks, or removal of CO<sub>2</sub> from the atmosphere through technological interventions.**
- **Carbon neutrality (net zero carbon footprint)** refers to achieving net zero carbon dioxide emissions.
- According to [IPCC Special Reports on Global Warming](#), to keep temperature rise to within **1.5 °C as decided under the Paris Agreement**, the world would need to bring down its GHG emissions to **45% of its 2010 levels by 2030, & to net zero by 2050.**

- If the 'net zero' target is achieved by 2050 then the world can move to **carbon negative** trajectory till 2100.
- Some countries have already announced their intention to achieve the net zero target, but the most prominent emitters — **China, US, India** — have so far not done so.
- Of the five developed countries with **national net zero legislation** — **Sweden, Norway, UK, France** and **New Zealand** — **only Sweden aims to become net zero before 2050.**

Country	2018 CO2 Emissions in Billion Metric Tons	Global Share	Change Since Kyoto Protocol
China	9.43	27.8%	54.6%
U.S.	5.15	15.2%	-12.1%
India	2.48	7.3%	105.8%
Russia	1.55	4.6%	5.7%
Japan	1.15	3.4%	-10.1%
Germany	0.73	2.1%	-11.7%
South Korea	0.70	2.1%	34.1%
Iran	0.66	1.9%	57.7%
Saudi Arabia	0.57	1.7%	59.9%
Canada	0.55	1.6%	1.6%



## How can net zero emissions be achieved?

- The world must stop using coal for its energy needs & shift completely towards renewables and gas.
- Better policies for quick Electric Mobility adaptation is also important.

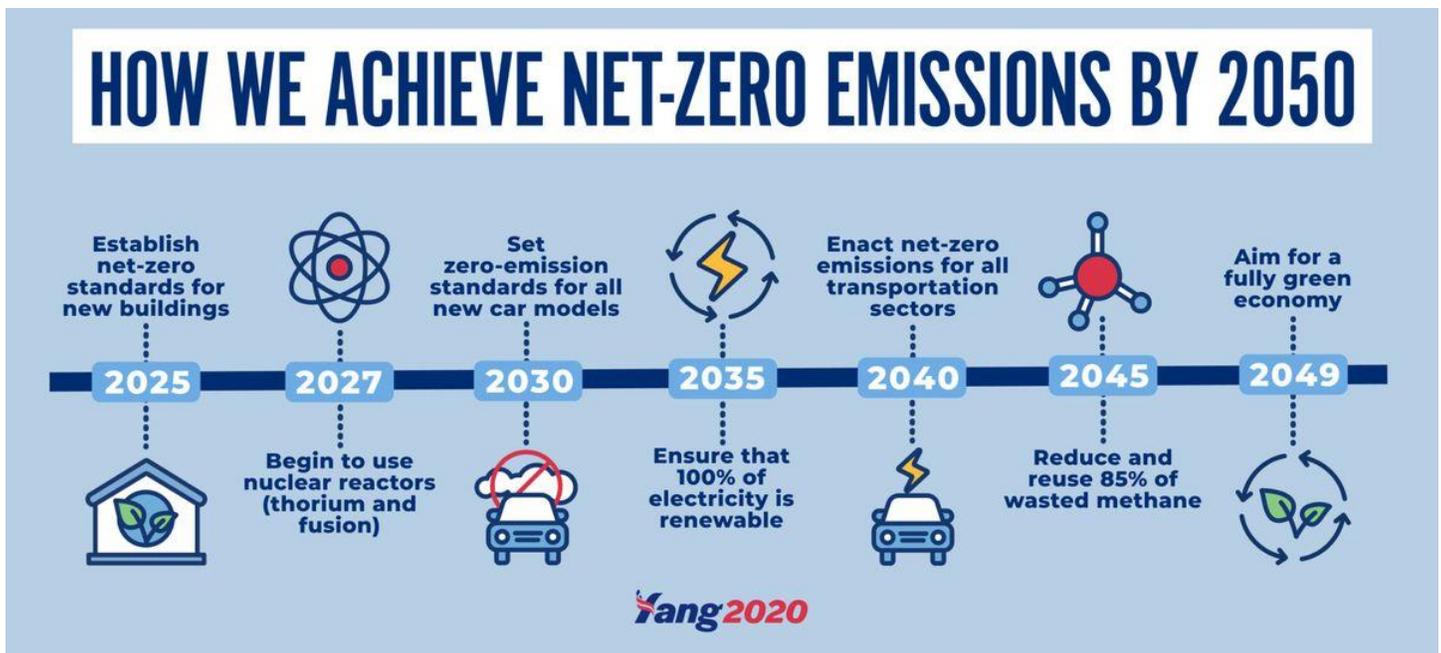
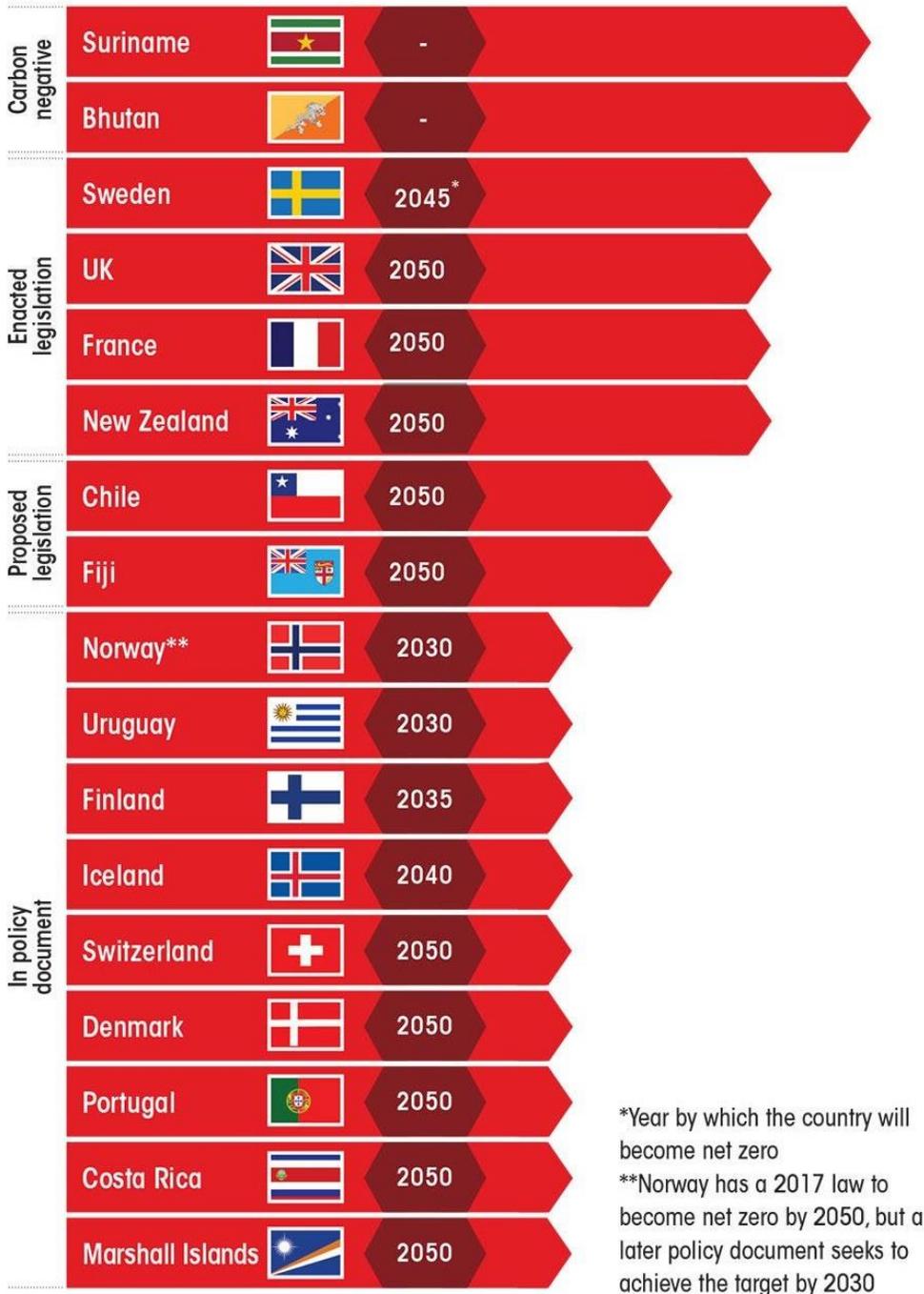


Image Credits: [Yang 2020](#)

# AHEAD OF THE CURVE

These 17 countries have enacted laws, proposed legislations or framed policies to achieve net zero carbon emissions



Source: Energy & Climate Intelligence Unit 2019

[Source & Credits](#)

## Carbon Trading & Carbon Tax (long-term measure)

- To contain carbon emissions, UNFCCC summits have arrived at the “polluter pays” principle by placing a price on carbon dioxide and other greenhouse gas emissions.

- The “polluter pays” principle can be implemented either through a **Carbon Tax** or **Carbon Trading**.

### Clean coal technology to reduce CO<sub>2</sub> in atmosphere (short-term measure)

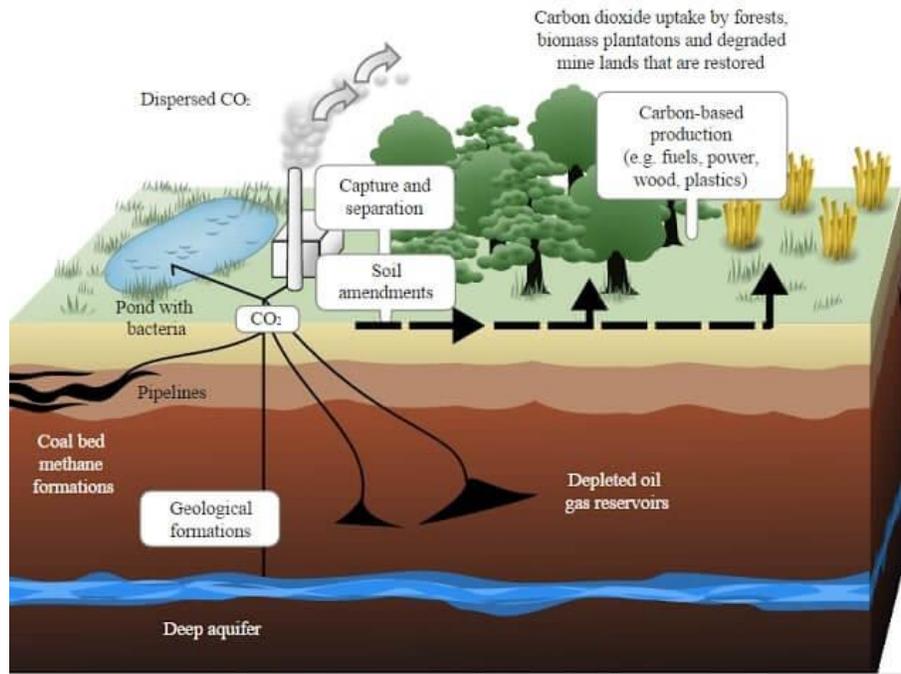
- Half of the world’s electricity is still generated by burning coal.
- Coal will remain a dominant energy source for years to come.
- **CO<sub>2</sub>** and **CO (carbon monoxide)** are the major GHGs released during burning of coal.
- Along with these, **nitrogen oxides (destroys ozone)** and **sulphur oxides (acid rains)** are also released.
- Clean coal technology seeks to reduce emissions by using multiple technologies to clean coal before it burns.
- **Coal washing** removes unwanted minerals by mixing crushed coal with a liquid and allowing the impurities to separate and settle.
- Other systems control the coal burn to minimize emissions of sulphur dioxide, nitrogen oxides & particulates.
- **Electrostatic precipitators** remove particulates by charging particles with an electrical field and then capturing them on collection plates.
- **Gasification** avoids burning coal altogether. With gasification, steam and hot pressurized air or oxygen combine with coal in a reaction that forces carbon molecules apart.
- The resulting **syngas, a mixture of carbon monoxide and hydrogen**, is then cleaned and burned in a gas turbine to make electricity.
- **Wet scrubbers, or flue gas desulfurization systems, remove sulphur dioxide, a major cause of acid rain, by spraying flue gas with limestone and water.**
- Low-NO<sub>x</sub> (nitrogen oxides) burners reduce the creation of **nitrogen oxides, a cause of ground-level ozone**, by restricting oxygen and manipulating the combustion process.

### India’s coal

- Coal mined in India is a **poor-quality coal (India’s coal is not Carboniferous Coal. It is Gondwana coal)** with **less carbon, high ash (hard to dispose) & high moisture content (more gases; less fuel efficiency)**.
- To improve efficiency and reduce adverse effects, India should **do away with its present sub-critical coal power plants** and **build more super-critical and ultra-super-critical ones** (15-20% increase in efficiency).
- It should employ clean coal technology.

### Carbon sequestration

- Carbon sequestration is the process of capture and long-term storage of atmospheric carbon dioxide.
- It has been proposed as a way to slow the atmospheric and marine accumulation of greenhouse gases.



## Afforestation: Forests as carbon Sinks (long-term sustainable measure)

- Forests are **carbon stores**, and they are **carbon dioxide sinks** when they are increasing in density or area.
- Trees absorb CO<sub>2</sub> during photosynthesis thereby converting atmospheric CO<sub>2</sub> into biomass.
- When this biomass is buried the carbon is trapped forming a carbon sink.

## Geoengineering to fight climate change (last resort superhuman options)

- The Oxford Geoengineering Programme defines **geoengineering** as “the deliberate large-scale intervention in the Earth’s natural systems to counteract climate change”.
- Geoengineering technologies include **managing solar radiation, removing carbon dioxide and other greenhouse gases** from the atmosphere.

## Greenhouse Gas Removal (GGR) or Carbon Geoengineering

- GGR techniques aim to directly remove carbon dioxide or other greenhouse gases from the atmosphere.
- **Afforestation:** Engaging in a global-scale tree planting effort.
- **Biochar:** 'Charring' biomass and burying it so that its carbon is locked up in the soil.
- **Bio-energy with carbon capture and sequestration:** Growing biomass, burning it to create energy and capturing and sequestering the carbon dioxide created in the process.
- **Ambient Air Capture:** Building large machines that can remove carbon dioxide directly from ambient air.
- **Ocean Fertilisation:** Adding nutrients to the ocean in selected locations to increase primary production.

- **Enhanced Weathering:** Exposing large quantities of minerals that will react with carbon dioxide in the atmosphere and storing the resulting compound in the ocean or soil.

### Will it work?

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- Some of the geoengineering methods are criticised as they are **unrealistic** and some of the **proposed technologies are too complex to develop**.
- Proponents claim that geoengineering is the only way out since the traditional ways of fighting climate change have not worked due to lack of coordination at the global level (E.g., repeated failure of UNFCCC).

### India's Objection to Net Zero

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- Basic argument by India is that **net zero goals do not figure in the 2015 Paris Agreement**.
- Paris Agreement only requires every signatory to take best climate action it can.
- Most of the countries have submitted targets for the 2025 or 2030 period.
- Developed countries have not delivered on their past commitments.
- Most of them are not in line to achieve [Paris Agreement targets](#).
- India argues that instead of opening up parallel discussion on net zero targets outside of Paris Agreement, **countries must focus on delivering what they have already promised**.
- India as a developing country needs to **achieve higher economic growth**.
- Most of the **carbon removal technologies** are **unreliable or very expensive**.
- With increase in India's growing energy demands **net zero emissions in immediate future is impossible**.
- India is already well on its way to over-achieve its 3 targets under the **Paris Agreement**.

### Carbon Credits Trading (Carbon Trading)

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- The principles of carbon markets (Carbon Credits Trading) were established in the [1997 Kyoto Protocol](#).

### Carbon credit

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- A carbon credit (often called a **carbon offset**) is a **tradable certificate or permit**.
- One carbon credit is equal to **one tonne of carbon dioxide**.
- Carbon credits or carbon offsets can be acquired through **afforestation, renewable energy, [CO<sub>2</sub> sequestration](#), methane capture, [buying from an exchange \(carbon credits trading\)](#)** etc.

### Carbon trading

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- Carbon trading is the name given to the **exchange of emission permits (carbon credits)**.

- This exchange may take place within the economy or may take the form of international transaction.
- Under Carbon Credits Trading mechanism **countries/companies that emit more carbon than the quota allotted to them buy carbon credits from those that emit less.**
- In Carbon trading, one credit gives the country or a company right to emit **one tonne of CO<sub>2</sub>**.
- A developing nation such as **India, turns out to be a seller of such credits.**
- Carbon credits are traded at various exchanges across the world.
- **Multi-Commodity Exchange of India (MCX)** launched futures trading in carbon credits in 2009.

## Types of Carbon trading

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1. **Emission trading**
2. **Offset trading**

### Emission trading/'cap-and-trade'

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- Emissions trading allows countries to sell unused emission units to countries that have exceeded their targets.
- Carbon is tracked and traded like any other commodity in a "carbon market."

### Offset Trading/Carbon Project/'baseline-and credit' trading

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- Another variant of carbon credit is to be earned by a country by investing some amount of money in such projects, known as **carbon projects**, which will emit lesser amount of greenhouse gas in the atmosphere.

## Issues with Carbon Trading (Carbon Markets)

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- There are no measurable reductions in GHG emissions that can be attributed to carbon markets.
- The two most important carbon markets so far – the **EU Emissions Trading System (EU-ETS)** and the UN's carbon offsetting scheme, **Clean Development Mechanism (CDM)** – are failures.
- The EU-ETS power stations and factories have been allocated more allowances (higher quota) than they actually need due to intense industry lobbying.
- There has been a flood of **cheap CDM carbon credits (from China and India)**, which has contributed to the price of carbon being so low that it currently is a negligible cost to industry.
- More importantly, it **does not incentivise investments in low-carbon technologies.**
- The carbon markets have been infested by corruption and non-transparency. In fact, carbon markets have created a lot of income for consultants, carbon brokers, NGO professionals, etc.

## Carbon tax

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- A carbon tax **imposes a tax on each unit of greenhouse gas emissions** and gives countries/companies an incentive to reduce pollution whenever doing so would cost less than paying the tax.
- Carbon tax is proposed in many developed and developing countries.
- The proposal faced political resistance (politician – corporate nexus; people feared more burden).

## **Differential Global Carbon Tax (DGCT)**

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- To understand the idea of differential global carbon tax, let's look at the similar concept of "**Common but Differentiated Responsibilities**" under Kyoto Protocol.

## **Common but Differentiated Responsibilities (CBDR) under Kyoto Protocol**

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- CBDR divides countries into two categories.
  1. **Historically biggest polluting developed countries** like US, UK, France, Japan, Russia etc. (they are polluting the earth since Industrial Revolution).
  2. **Recently polluting developing countries** like China, India, Brazil, etc. (polluting since 1950s).
- **"Common"** → Every country must take part in the fight against climate change.
- **"But differentiated responsibilities"** → **Historically biggest polluters should do more compared to the recent polluters, i.e., responsibilities proportional to pollution caused.**
- Thus, under CBDR, developed countries like US, UK, Russia etc. must contribute more to reduce GHGs.
- They must accept to **certain binding limits** on GHG emissions.
- They must **contribute funds** towards reducing **GHG** emissions in developing and least developed countries.
- On the other hand, developing and least developed countries should do everything possible to cut down their GHG emissions. But **nothing is binding on them (the bone of contention).**

## **(Proposed) Proposed Differential global carbon tax (DGCT)**

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- Similar to CBDR, **DGCT would put higher obligation on countries with higher per capita emissions.**
- Those countries which emit more than the global per capita average would pay a transition fund as part of the energy transition of those who are below this average.
- So, those at the **receiving end of climate injustice** are duly compensated and also the entire world transitions to greener earth as a result of this process of carbon tax sharing.

## **(Proposed) Finance Energy Transition (FET – similar to DGCT)**

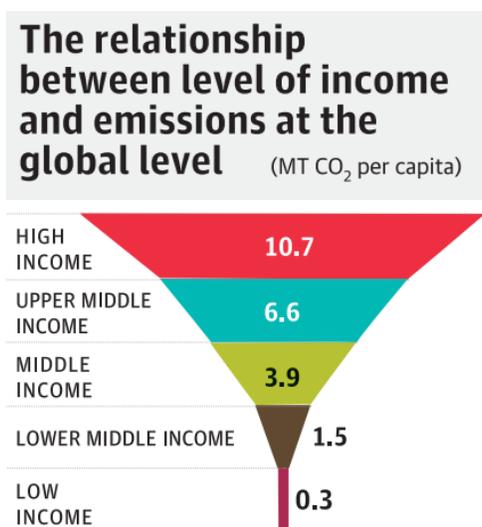
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- Currently, the global average of carbon emissions is **4.97 metric tonne per capita.**
- All the countries with emissions above this level (~68 in all) are "payers" to **Finance Energy Transition (FET)** for 'beneficiary' countries (135 in number), which are emitting below this level.

- The total amount of “carbon compensation” made by the payer nations would be around \$570 billion.
- The distribution of this amount across the payer countries is based on their distance from the global average.
- The other side of the same coin is the compensated countries, and the distribution of this fund across them is also based on how lower their emissions are in comparison to the global average.

### The need for a differential global carbon tax?

- If the emission targets are not met, **tropical regions** of the world (mainly concentrated in the **global South**) are likely to be most negatively affected because of their low altitudes and pre-existing high temperatures.
- Some impact of this was already felt during the Tamil Nadu water crisis in 2019.
- The **global South, who’s historical as well as the present per capita emissions are much lesser than global North**, happens to be at the receiving end of the **lifestyle choices made by the global North**.
- Thus, **the burden of adjustment cannot be equal** when the underlying relationship between the two worlds has been historically unequal (**climate injustice funnel**).



Source and Credits: [The Hindu](#)

- A just approach would involve a **global sharing of the responsibility among countries according to their respective shares in global emissions**.
- Currently, the most accepted model of mitigating strategy has been the **carbon trading process**.
- However, carbon trading process has its limitations and hence there is a need for an alternate approach such as **differential global carbon tax**.

### Is differential global carbon tax a globally-just policy?

- The two top ‘payer’ countries in terms of absolute amounts of transfers are the **U.S.** and **China** since their emissions are higher than the global average.

- In terms of 'compensated' countries, India comes at the top due to its population size and its distance from the global emissions' average (**India has per capita emissions of 1.73 metric tonne**).
- The other suspects are all countries from the global South.
- The list springs a few surprises like France, Sweden, and Switzerland.
- It means that **even high-income countries which have currently kept their per capita emissions low are beneficiaries of this (globally-just) policy**.
- With China in the first list and some of the first world countries in the second, DGCT wants all nations to climb down the emissions ladder. **It is a global green Robin Hood tax!**

### Carbon Tax vs. Carbon Trading (Cap-and-Trade): Which is a Better?

Carbon Tax (price instrument)	Carbon Trading (quantity instrument)
<ul style="list-style-type: none"> <li>• A pure carbon tax <b>fixes the price of carbon</b> but <b>allows the amount of carbon emissions to vary</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• A pure carbon cap <b>places a limit on carbon emissions</b>, letting the <b>market price of carbon credits vary</b>.</li> </ul>
<ul style="list-style-type: none"> <li>• A carbon tax directly establishes a price on greenhouse gas emissions. (<b>One has to pay for every ton of emissions</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• Carbon Trading program issues a set number of emissions "allowances" each year. (<b>One has to pay only after they exceed their emissions quota</b>)</li> </ul>
<ul style="list-style-type: none"> <li>• Carbon tax ensures everyone knows the price being paid for each unit of carbon dioxide emitted, but <b>uncertainty remains about the actual quantity of emissions</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• Conversely, cap-and-trade provides <b>certainty about the quantity of emissions</b> (it cannot exceed the cap), but uncertainty about the cost of achieving these reductions.</li> </ul>
<ul style="list-style-type: none"> <li>• A carbon tax offers stable carbon prices, so energy producers and entrepreneurs can make investment decisions without fear of fluctuating regulatory costs.</li> </ul>	<ul style="list-style-type: none"> <li>• The regulatory costs are always fluctuating and hence making investment decisions is fraught with risks.</li> </ul>
<ul style="list-style-type: none"> <li>• Both policies encourage investors and entrepreneurs to develop new low-carbon technologies.</li> <li>• Both policies generate government revenue that can be used in productive ways.</li> <li>• Some economists <b>recommend a hybrid model</b> that may offer the best of both worlds.</li> <li>• This tends to comprise of a cap on emissions (to <b>regulate the quantity of pollution</b>), but with adjustments such as a carbon price floor or ceiling, to <b>keep the price of a permit within acceptable bounds</b>.</li> </ul>	

### Meanwhile, what is Indian Government doing?

- At the peak of COVID-19, GOI saw it fit to press ahead with environmental clearances to projects that have a serious negative impact.
- It **extended the deadline for coal plants to adopt strict pollution control**.
- It proposed **gross dilution of norms to assess environmental impact of projects**.
- Hiked fuel prices by increasing taxes with no specific **environmental dividend since the poorest are worst hit** by its inflationary effects (more poverty = more environmental problems).

## What it should be doing instead?

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- India should come up with a domestic climate plan that explains to the citizen how it will bring green development in this decade, specifying a target by sector for each year.
- It should build equity (based on common but differentiated responsibilities) by taxing luxury emissions, whether it is cars, air-conditioners, big properties or aviation, for specified green development outcomes.

## {Envi – In News – 2021/03} Earth Hour

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### TH | Prelims | “In News” topic for Prelims

- **Earth Hour** is a worldwide movement organized by the **World Wildlife Fund for Nature (WWF)**.
- It encourages people worldwide to switch off the lights from 8.30 pm to 9.30 pm as per their local time.
- It was started in 2007 and is **held every year on the last Saturday of March**.
- Earth Hour 2021 was held on March 27, from 8:30 pm to 9:30 pm.
- The idea is to refrain from the use of non-essential lighting in a symbolic call for environmental protection.
- Earth Hour has been successful in pursuing legislative changes by harnessing the power of collective action.
- For example,
  - ✓ It helped create a 3.5-million-hectare marine-protected area in Argentina.
  - ✓ Ban all plastics in the Galapagos in 2014, etc.

## World Wide Fund for Nature (World Wildlife Fund)

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- It is an international **NGO** founded in 1961.
- It works in the field of the wilderness preservation, and the reduction of human impact on the environment.
- WWF aims to "**stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.**"
- The **Living Planet Report** is published every two years by WWF since 1998.
- WWF has launched several notable worldwide campaigns including **Earth Hour** and **Debt-for-Nature Swap**.

**Q. Consider the following statements regarding 'Earth Hour' (UPSC Prelims 2014).**

- It is an initiative of UNEP & UNESCO.
- It is a movement in which the participants switch off the lights for one hour on a certain day every year.
- It is a movement to raise the awareness about the climate change & the need to save the planet.

**Which of the statements given above is / are correct?**

- a) 1 & 3 only
- b) 2 only
- c) 2 & 3 only.
- d) 1, 2 & 3

**Earth Hour**

- Earth Hour is an initiative organized worldwide by the **World-Wide Fund for Nature (WWF)**.
- The event is held annually encouraging individuals, communities, & businesses to **turn off their non-essential lights for one hour**, from 8:30 to 9:30 p.m. towards the end of March, as a symbol for their commitment to the planet.

**Answer: two & three only**

**{Envi – In News – 2021/04} Swachhata Pakhwada**

**PIB | GS3 > Environment conservation and pollution etc.**

- Swachhata Pakhwada, inspired by **Swach Bharat Abhiyan**, started in 2016 as an initiative that allows government ministries/departments **to observe and practice cleanliness activities**.
- For the **Pakhwada fortnight**, observing ministries are considered as **Swachhata Ministries** and are expected to bring qualitative **Swachhata improvements in their jurisdictions**.

**{Envi – Invasive Species – 2021/02} African catfish**

**TH | Prelims + Mains | Environment > Biodiversity Loss > Invasive Species**

- Context: the **banned African catfish (invasive species)** is illegally reared and sold in Kerala and Tamil Nadu.
- Factoring in the health & environment hazards posed by the African catfish, the Central government issued a **ban on catfish farming (Breeding, transportation and sale)** in 2000.
- The fish variety has wreaked havoc in Kerala.

- The voraciously carnivorous fish was **posing a threat to indigenous fish varieties**.
- It can destroy the native fish species by preying on them, besides feeding on microscopic zooplankton.
- Native to Africa and the Middle East where it inhabits freshwater lakes, rivers, swamps, and urban sewage systems, the African catfish was introduced all over the world in the early 1980s for aquaculture.
- Its ability to survive in shallow mud for long periods of time, high tolerance for poorly oxygenated water, and fast breeding give it an edge over other native species.
- Inland fishers prefer catfish as they grow faster and fetch a good price.
- Many of the farms use chicken waste as feed, polluting water sources, and the environment.
- Experts feel that the ban would have little effect unless the existing stocks are destroyed.

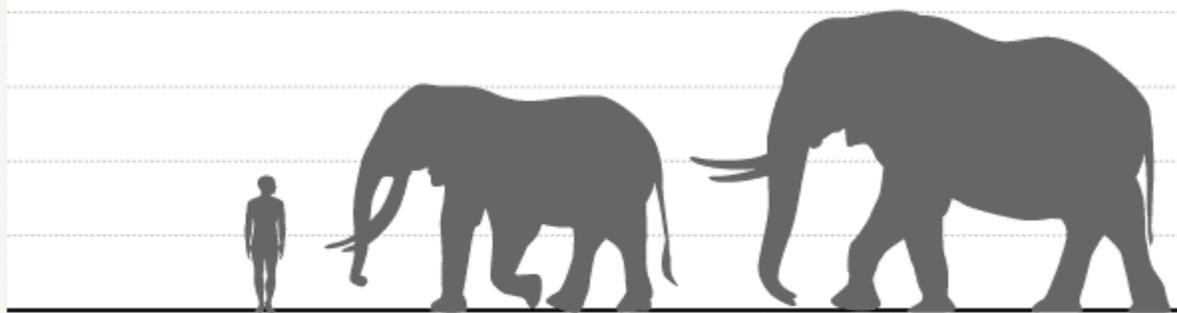
## **{Envi – IUCN – 2021/03} Africa’s elephants IUCN Status**

### **D2E | Prelims | Environment > IUCN Red List**

- **Context:** Africa’s forest & savanna elephants are now ‘critically endangered’ & ‘endangered’ due to population declines caused primarily by poaching & habitat loss.

## **Difference between African Forest Elephant and African Savanna Elephant**

<b>African Forest Elephant</b>	<b>African Savannah Elephant</b>
IUCN Red List: <b>Critically Endangered</b>	IUCN Red List: <b>Endangered</b>
Habitat: Tropical forests of Central Africa & in a range of habitats in West Africa.	Habitat: A variety of habitats in sub-Saharan Africa including grasslands & deserts.
<ul style="list-style-type: none"> <li>• Poaching &amp; land use changes remain prominent challenges to African elephant populations.</li> <li>• As <b>both males &amp; females possess tusks</b>, the impact of ivory poaching is especially severe.</li> <li>• Earlier, African elephants were treated as a single species, listed as <b>Vulnerable</b>.</li> <li>• This is the first time the two species have been assessed separately for the IUCN Red List.</li> <li>• <b>African Forest Elephants</b> have a <b>longer pregnancy than any other mammal — almost 22 months</b>.</li> <li>• This compounds the problem of conservation. Hence, they are now added to <a href="#">Critically Endangered</a> list.</li> </ul>	



NAME	FOREST ELEPHANT <i>Loxodonta cyclotis</i>	SAVANNAH ELEPHANT <i>Loxodonta africana</i>
LOCATION	West and central Africa	Eastern and southern Africa
HEIGHT	2.4–3 metres	3–4 metres
WEIGHT	2–5 tonnes	4–7 tonnes
FIRST PREGNANCY	23 years	12 years
TIME BETWEEN PREGNANCIES	5–6 years	3–4 years
POPULATION DOUBLING TIME	60 years	20 years

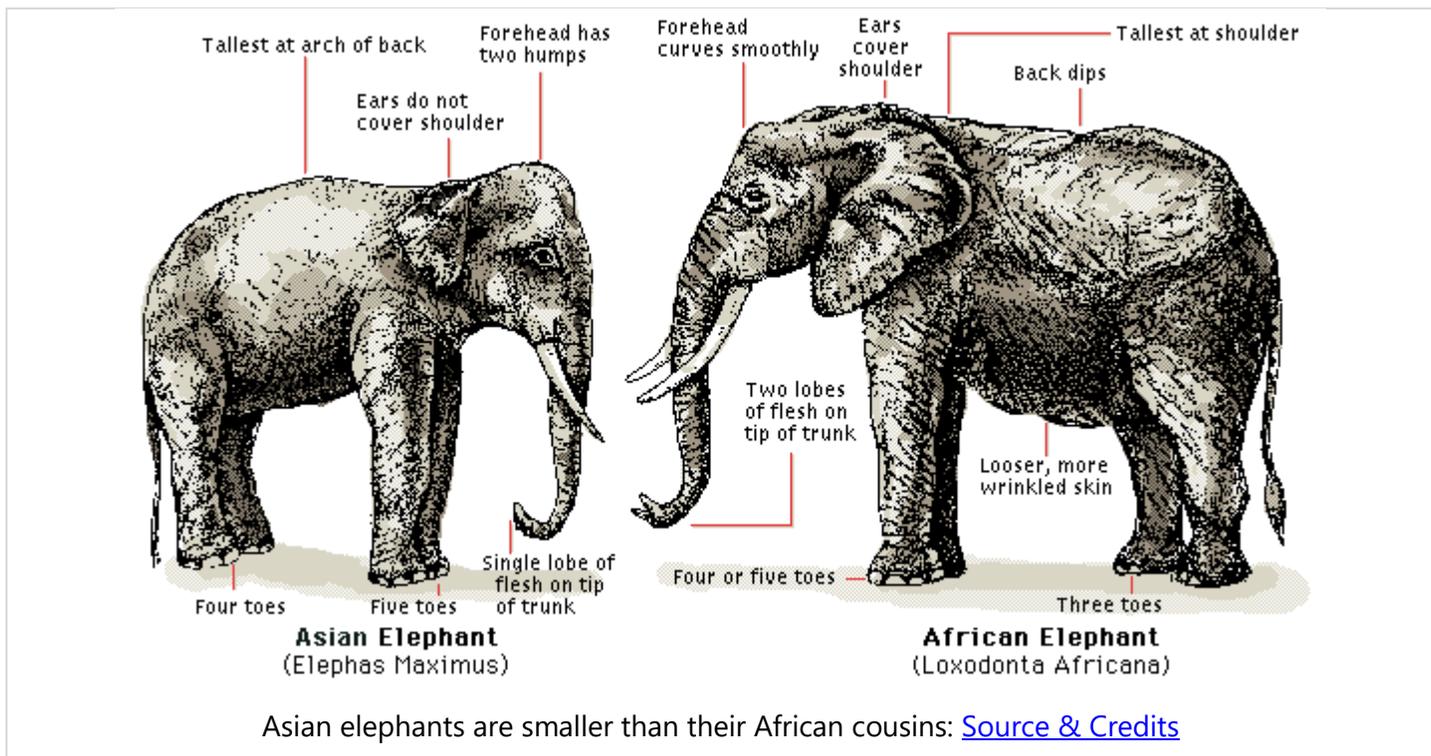
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## Difference between African Elephant and Asian Elephant

- Elephants are **matriarchal**, meaning they live in female-led groups.

African Elephant	Asian Elephant
<ul style="list-style-type: none"> <li>Estimated: 4,15,000</li> </ul>	<ul style="list-style-type: none"> <li>Estimated 40,000 to 50,000.</li> <li><b>28,000 elephants in India with around 25% of them in Karnataka.</b></li> </ul>
<ul style="list-style-type: none"> <li>Forest Elephant IUCN Red List: <a href="#">Critically Endangered</a></li> <li>Savannah Elephant IUCN Red List: <a href="#">Endangered</a></li> </ul>	<ul style="list-style-type: none"> <li>Subspecies: Indian, Sumatran &amp; Sri Lankan.</li> <li>IUCN Red List: <a href="#">Endangered</a></li> </ul>
<ul style="list-style-type: none"> <li><b>CITES:</b> Appendix-1</li> </ul>	<ul style="list-style-type: none"> <li><b>CITES:</b> Appendix-1</li> <li>Wildlife (Protection) Act, 1972: Schedule I.</li> </ul>
<ul style="list-style-type: none"> <li><b>Both male &amp; female African elephants grow tusks.</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Only some male Asian elephants have tusks</b></li> </ul>
<ul style="list-style-type: none"> <li>They have two finger-like features on the end of their trunk.</li> </ul>	<ul style="list-style-type: none"> <li>They have only one finger-like feature on the end of their trunk</li> </ul>



## {Envi – Solid Waste – 2021/02} Anaerobic Gas Lift Reactor (AGR)

### TH | Prelims + Mains | Environment > Treating Biomass [Solid Waste](#)

- **Context:** CSIR-Indian Institute of Chemical Technology (IICT) has designed the high rate biomethanation technology based Anaerobic Gas lift Reactor (AGR).
- The technology is meant for scientific treatment and disposal of organic waste through the generation of renewable energy in the form of **biogas & bio-manure**.

### Benefits

- Incorporated with high-rate anaerobic digester (no foul smell, renewal energy is produced).
- High methane yield.
- End to end solution for solid waste management.
- It is an environmentally benign method for the reduction of GHG's also.
- Could be designed for the treatment of 500 kg to 10 tons of organic solid waste per day.

### Anaerobic digester

- Anaerobic digestion is the process by which organic matter such as animal or food waste is broken down to produce **biogas & biofertilizer**.
- This process happens in the **absence of oxygen** in a sealed, oxygen-free tank called an anaerobic digester.
- Every tonne of food waste recycled by anaerobic digestion as an alternative to landfill prevents between 0.5 and 1.0 tonne of CO<sub>2</sub> entering the atmosphere, one of the many benefits of anaerobic digestion.



[Source & Credits](#)

## {Envi LBT – NP – 2021/04} Bandhavgarh National Park & Tiger Reserve

### IE Prelims | Environment Mapping/Location Based Topics > [National Parks](#)

- Bandhavgarh National Park & Tiger Reserve is located in Umaria district of **Madhya Pradesh**.
- **Notable Fauna: Royal Bengal Tigers & Gaur (Indian bison) – Reintroduced from Kanha National Park.**
- Other Fauna: [Sambar](#), [Barking deer](#), [Nilgai](#), [Indian wolf](#), [striped hyena](#), etc.
- It is richly endowed with **Sal trees**.
- **Bhandavgargh Fort** is located at the centre of park.
- **Historical Significance:** Mentioned in 'NaradPancharatra' and the 'Shiv Purana'.
- All major streams in the part merge into the **Son River**.