# Prelim Bits 06-08-2021 | UPSC Daily Current Affairs

## Net Zero Carbon Targets

- Net-zero or carbon-neutrality does not mean that a country would bring down its emissions to zero. That would be **gross-zero**, which means reaching a state where there are no emissions at all.
- So, net-zero is a state in which a country's emissions are compensated by absorption and removal of greenhouse gases from the atmosphere.
- One way by which carbon can be absorbed is by creating **carbon sinks**.
- Until recently, Amazon Rainforests (world's largest tropical forests), were carbon sinks. But eastern parts of the forests have started emitting $CO_2$ instead of absorbing them due to deforestation.
- It is also possible for a country to have negative emissions, if the absorption and removal exceed the actual emissions. (e.g.): Bhutan.

### Net-zero Targets of Countries

- US - launched a bipartisan organisation called **World War Zero** to reach net-zero carbon emissions in the country by 2050.
- China - announced that it would become net-zero by 2060 and it would not allow its emissions to peak beyond what they are in 2030.
- European Commission - asked all of its members to cut emissions by 55% below 1990 levels by 2030, through the EU's "Fit for 55" plan.

## Oxfam's Report

- Oxfam has recently releasd a new report titled "Tightening the Net".
- It said that 'net-zero' carbon targets announced by many countries may be a dangerous distraction from the priority of cutting carbon emissions.
- It says that if the challenge of change is tackled only by way of planting more trees, about 1.6 billion hectares of new forests would be required to remove the world's excess carbon emissions by 2050.
- To limit global warming below 1.5°C and prevent irreversible damage from climate change, the world should cut emissions by 45% by 2030 from 2010 levels, with the sharpest being made by the biggest emitters.
- Currently, countries' plans to cut emissions will only lead to a 1% reduction by 2030.
- Oxfam's report estimates that if only land-based methods to deal with climate change are used, food rises are expected to rise by 80% by 2050.
- If the entire energy sector were to set similar 'net-zero' targets, it would require a land area nearly the size of the Amazon rainforest, equivalent to a third of all farmland worldwide.

## Using Magnets to Produce Hydrogen

- Indian researchers have come up with a new hydrogen manufacture route that involves electrolysis of water to produce hydrogen ($H_2$) in the presence of an external magnetic field i.e. **magneto-electrocatalysis**.

- In this method, the same existing system that produces 1 ml of $H_2$ gas require 19% lower energy to produce 3 ml of hydrogen in the same time.
- This is achieved by synergistically coupling the electric and magnetic fields at the catalytic site.
- The electrocatalytic materials - cobalt-oxide nanocubes - are dispersed over hard-carbon based nanostructured carbon florets.
    - This material was developed with the support of the Department of Science & Technology's Material for Energy Storage program.
- **Advantages** - This route forms a system that doesn't require the constant presence of the external magnetic field and is able to sustain the magnetisation for prolonged time periods.
- The enhancements achieved are 650% increase in current density, 19% lowering of energy required and a 3-fold increase in volumetric hydrogen production rate.
- This route can be directly adopted in existing electrolysers with external magnets without any change in design or mode of operation.
- [Electrolysers use electricity to break water into hydrogen and oxygen.]
- One-time exposure of magnetic field for 10 minutes is enough to achieve the high rate of hydrogen production for over 45 minutes.

## Progress of Indo-US Nuclear Deal

- This deal, also known as the 123 Agreement or the US-India Civil Nuclear Agreement, was signed between the USA and India in 2005.
- **India** - Under the agreement, India agreed to separate its civilian and military nuclear activities.
- It also agreed to open up the civilian part to inspection by the International Atomic Energy Agency (IAEA).
- **US** - In return, the US offered to resume full nuclear trade i.e selling of reactors, Transfer of Technology, Uranium sale with India.
- The deal went through several complex stages including:
    1. Amendment of U.S. domestic law (Atomic Energy Act of 1954),
    2. Civil-military nuclear Separation Plan in India,
    3. India-IAEA safeguards agreement.
- It enabled American companies to build nuclear power reactors in India.
- However, other than the imported Russian-built reactor-based project in Tamil Nadu, which is grandfathered under an earlier 1998 agreement, there has been no progress of greenfield projects since the Indo-US nuclear deal.

## Ineffectiveness of Electric Vehicles Subsidy

- Electric Vehicles are powered through self-contained battery, solar panels or an electric generator to convert fuel to electricity.
- They use one or more electric motors or traction motors for propulsion.
- Currently, the Central government and five state governments (Delhi, Maharashtra, Gujarat, Karnataka and Meghalaya) provide subsidies for EVs.
- Together, these subsidies add up to Rs 5 lakh per car, which would benefit only a small population of car owners.
- Such a high subsidy to E vehicles would have been justified if there is no **alternative to electricity for replacing fossil fuels** in the transport sector.
- But there are alternatives - ethanol and methanol - whose superior quality and greater safety has made them the preferred.
- Though there are limitations to ethanol as the sole alternative to gasoline, there is no such

limit for methanol, which can be produced from any biomass waste from crop residues to municipal solid waste.

- Abnother area of greater promise for India is **gasification** because simple, air-blown gasifiers are already in use in food processing.
- They can convert rice and wheat straw into a lean fuel gas that can generate electricity.
- Biochar, a by-product of this process, , is also valuable because it can replace imported coking coal in blast furnaces and can be used as a feedstock for producing transport fuels even more easily than municipal solid waste.
- **Other challenges of EV Industry** includeTechnological challenges, infrastructural challenges, lack of a stable policy for production, lack of availability of skilled workers and materials for domestic production.

## Gamma Irradiation Technology

- Presently, there are 26 Gamma Radiation Processing Plants operational in India in private, semi government and government sector.
- Gamma Irradiation technology is used for **food preservation/shelf life extension** by applying pre-determined radiation doses, as it
    1. Inhibits sprouting in bulbs and tubers,
    2. Insect disinfestation of cereals, pulses and grains,
    3. Microbial decontamination (hygienization) of dry spices etc.
- Setting of food irradiation facilities in the PPP mode mitigates the huge quantum of post-harvest and storage losses of agricultural produce and food that results in national saving.

### Food irradiation

- It is the process of exposing food and food packaging to ionizing radiation, such as from gamma rays, x-rays, or electron beams, without direct contact to the food product.
- When ionizing radiation passes through a food product, some energy is absorbed by some chemical bonds.
- Some bonds rupture and produce free radicals which are highly reactive and unstable. They instantaneously rejoin with neighbouring compounds and the results are called radiolytic compounds.
- Food irradiation is used to improve food safety by
    1. Extending product shelf life (preservation),
    2. Reducing the risk of food-borne illness,
    3. Delaying or eliminating sprouting or ripening,
    4. Sterilization of foods, and
- It is used as a means of controlling insects and invasive pests.

**Source: PIB, The Indian Express**

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