



Important Facts For Prelims

Radiative Cooling Paint

Tags:

- Quick Facts for Prelims
- GS Paper - 3
- Environmental Pollution & Degradation

Why in News?

Researchers at the **Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)** Bengaluru, an autonomous institute of the **Department of Science and Technology**, have introduced an **innovative paint** that utilizes radiative cooling.

- In the wake of **escalating global temperatures** and the **pressing need for sustainable cooling solutions**, this new, cost-effective, and eco-friendly radiative **cooling technology** stands as an effective solution.

What is Radiative Cooling Technology?

- **About:**
 - **Radiative cooling technology** is a method designed to **dissipate heat from an object by emitting thermal radiation** into the atmosphere, allowing the object to become cooler.
 - It leads to **creation of cool surfaces by emitting thermal radiation directly into the extremely cold universe (around 3 Kelvin)**, using the atmospheric transmission window (8 - 13 μm).

- Notably, this process occurs without any reliance on electricity.

- **Need:**

- Increased global warming and urban heat island effects have accentuated the necessity for effective cooling technologies.
 - Conventional active cooling devices like air-conditioners, **fans, and refrigerators demand substantial electrical energy**, contributing to greenhouse gas emissions and elevated surface temperatures.
- **Radiative cooling technology** addresses these challenges by **emitting thermal radiation** without electricity consumption, through the **atmospheric transmission window**.

- **Radiative Cooling Paint:**

- It is derived from a **novel magnesium oxide (MgO)-polyvinylidene fluoride (PVDF) polymer nanocomposite** prepared from materials that are earth abundant, cheap, non-toxic and non-harmful.
 - It showcases remarkable cooling capabilities with **high solar reflectivity and infrared thermal emissivity**.
 - The **MgO-PVDF** with dielectric nanoparticles resulted in **high solar reflectance (96.3%) and exceptional thermal emission (98.5%)**.
- Tailored to counter **escalating heat impact on buildings**, this paint minimizes electricity usage and provides **crucial cooling during sweltering summer days**.
 - With outstanding optical features, **it lowers surface temperatures by about 10°C** in strong sunlight, outperforming standard white paints.
- Its **water-resistant, hydrophobic nature** guarantees effortless application on diverse surfaces, ensuring consistent coverage and strong adhesion.