



Directed Energy Weapons and Hypersonic Weapons

For Prelims: Directed Energy Weapons (DEWs) and Hypersonic Weapons features

For Mains: Significance of Directed Energy Weapons (DEWs) and Hypersonic Weapons

Why in News?

Recently, India's Air Chief Marshal highlighted the need to push the development of [Directed Energy Weapons \(DEWs\)](#) and [Hypersonic Weapons](#) and integrate them into its airborne platforms to get the desired range and accuracy.

What are DEWs and Hypersonic Weapons?

▪ About:

- In layman's parlance, a directed-energy weapon damages or destroys its target using focused energy by means of lasers, microwaves or particle beams.
 - Example - Microwave weapons, Lasers weapons, drone defence systems etc.
- A hypersonic weapon is one that can hit its target **five to ten times (Mach 5 to Mach 10) the speed of sound.**

▪ Advantages of DEWs over Conventional Ammunitions:

- DEWs, particularly lasers, have **high precision, low cost per shot, logistical benefits and low detectability.**
- They **transmit lethal force at the speed of light** (about 300,000 kilometers per second)
- Their **beams are not affected by the constraining effects of gravity or atmospheric drag.**
- Their **effects can be tailored** by varying the type and intensity of energy delivered against targets.

▪ Disadvantages:

- **Limited Range:** Most DEWs have limited range, and their effectiveness decreases rapidly as the distance between the target and the weapon increases
- **High Cost:** DEWs and hypersonic weapons can be expensive to develop and manufacture, and the cost may not be justified by their effectiveness in some situations.
- **Countermeasures:** DEWs can be countered by using reflective materials or other countermeasures, which can reduce their effectiveness.
- **Arms Race:** The development of hypersonic weapons and DEWs by one country leads to an arms race, as other countries seek to develop their own hypersonic weapons in response. This can lead to increased tensions and instability.

▪ Significance for India:

- The application of these technologies in the aerospace industry can transform the way wars will be fought **enabling India to produce cutting edge platforms, weapons, sensors, and networks essential to fight and win a future war.**
- DEWs and Hypersonic Weapons could **act as a deterrent** against hostile nations such as **China, Pakistan** by increasing India's defence capabilities.

▪ Other Countries with DEWs:

- **Russia, France, Germany, the United Kingdom, Israel, and China** are reportedly among countries which have programmed to develop DEWs or Laser Directed Energy Weapons and militaries of several countries have also employed them.
- Earlier, [US also accused Cuba of carrying out sonic attacks \(Havana Syndrome\)](#)

What are the India's DEWs and Hypersonic Technology Projects?

- **1KW laser Weapon:** DRDO has tested a 1KW laser weapon which hit a target 250m away.
- **Directionally Unrestricted Ray-Gun Array (DURGA) II:** DRDO has initiated a project DURGA II, which is a 100-kilowatt lightweight DEW.
- **Hypersonic Technology Development:** Hypersonic technology in India has been developed and tested by both DRDO and ISRO.
 - In 2021, DRDO successfully flight-tested the [Hypersonic Technology Demonstrator Vehicle \(HSTDV\)](#), with the capability to travel at 6 times the speed of sound.
 - India is also developing an indigenous, dual capable (conventional as well as nuclear) hypersonic cruise missile as part of its [Hypersonic Technology Demonstrator Vehicle Programme](#).

Way Forward

- The concept of [Atmanirbharta or self-reliance in defence](#) should encompass evolving home-grown designs and development capabilities by utilizing the Indian defence.
- There is a need to increase investment in defence research and development to boost our defence capability.

[Source: IE](#)

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