Aviation Turbine Fuel

Mains Syllabus: GS III - Infrastructure: Energy, Ports.

Why in the News?

Recently in a meeting with Civil aviation minister, the airlines' representatives requested tax relief on Aviation Turbine Fuel.

What is Aviation Turbine Fuel (ATF)?

- **Aviation Turbine Fuel** – Also known as jet fuel, It is a specialized petroleum-based fuel used to power aircraft, particularly those with gas-turbine engines.
- It's a refined kerosene or a blend of kerosene and gasoline to meet stringent quality and safety standards.
- **Types** - The two primary types are Jet A and Jet A-1, with Jet A-1 being the global standard due to its exceptional cold-weather performance.
- **Testing Standards** - These fuels are rigorously tested to meet international standards set by leading organisations such as ASTM (American Society for Testing and Materials) and DEF STAN (the UK Ministry of Defence Standard).
- **Specialized Characteristics** - Formulated with advanced additives, jet fuel effectively prevents static discharge, corrosion, and microbial growth, ensuring safety and reliability even in the most demanding conditions at 35,000 feet.
- **Production** – ATF is primarily derived from crude oil refining and the process starts in petroleum refineries, where crude oil is distilled into various fractions.
- **Purifying Kerosene** - One of these fractions is kerosene, which is then hydrotreated to remove impurities like sulphur.
- **Blending** - The resulting jet fuel is blended to meet performance requirements.

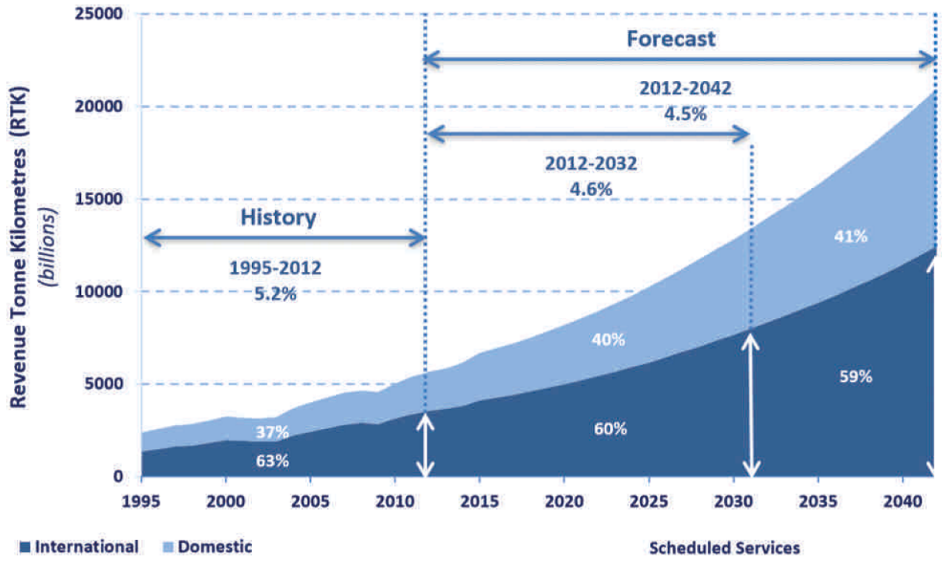
What is sustainable aviation fuel (SAF)?

- **SAF** – It is a liquid fuel and a bio-based alternative to traditional jet fuel which reduces CO2 emissions by up to 80%.
- **Sources** - It can be produced from a number of sources (feedstock) including waste oil and fats, green and municipal waste and non-food crops.
- **Blending** - SAF can be blended with traditional jet fuel at various levels, allowing for gradual adoption and compatibility with existing infrastructure.
- **Examples of SAF** - Types of SAF include HEFA-SPK (produced from hydroprocessed esters and fatty acids), FT-SPK (synthesized from Fischer-Tropsch technology), and ATJ-SPK (produced from alcohols).
- **ICAO Framework** - The International Civil Aviation Organization (ICAO) has established a Global Framework for Sustainable Aviation Fuels, aiming to reduce CO2

emissions in international aviation.

What is the need for SAF?

- **Energy Intensive Aviation Sector** - The aviation industry's reliance on aviation turbine fuel makes it one of the most energy-intensive sectors in the world.
- **Reduce Carbon Footprint** - In 2023***, aviation accounted for 2.5% of global energy-related CO2 emissions***, having grown faster between 2000 and 2019 than rail, road or shipping.
- As the world shifts toward sustainability, the aviation industry is under pressure to reduce its carbon footprint.
- **Increasing Aviation Demand** - The aviation sector is growing fast and will continue to grow.
- The most recent estimates suggest that demand for air transport will increase by an average of 4.3% per annum over the next 20 years.



What are the challenges faced by sustainable aviation fuel production?

- **High Production Costs** - Depending on the production method, SAF can cost 50% to 200% more than traditional jet fuel.
- **Limited Feedstock Availability** - SAF relies on feedstocks such as used cooking oil, plant oils, animal fats, agricultural residues, and other waste materials.
- The supply of these feedstocks is limited and often competes with other industries like food, agriculture, and cosmetics
- **Supply Chain Challenges** - Developing robust supply chains and logistics for collecting and processing diverse feedstocks is complex and capital-intensive.
- **Inadequate Production Capacity** - Current global SAF production capacity is insufficient to meet the ambitious targets set by governments and industry.
- **Regulatory Barriers** - Lack of harmonized global standards and regulations creates uncertainty and can hinder cross-border SAF production and adoption.

What lies ahead?

- Sustainable aviation fuel holds great promise for decarbonizing aviation, but overcoming high production costs, limited feedstock availability, infrastructure and supply chain challenges, insufficient production capacity, and regulatory barriers is essential for its widespread adoption.
- Addressing these issues will require coordinated efforts from industry, governments, and technology providers, as well as significant investment and policy support.

References

[The Hindu | Fuelling the aviation industry]

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