



# Flex Fuel Cars

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## What's in News?

Toyota has launched **India's first 'flex fuel' car**, that can **run on one or multiple fuel types**.

## Flex fuel technology:

- A flex fuel, or flexible fuel, vehicle has an **internal combustion engine (ICE)**, but unlike a regular petrol or diesel vehicle, this can **run on more than one type of fuel, or even a mixture of fuels**.
- The most common versions use a blend of petrol and ethanol or methanol, but these engines are also equipped to run on 100 per cent petrol or ethanol as well.
- This is made possible by equipping the engine with a **fuel mix sensor and an engine control module (ECM) programming** that senses and automatically adjusts for any ratio of designated fuels.

## Advantage of this Technology:

- The use of ethanol blending sharply **lowers harmful pollutants** such as carbon monoxide, sulphur, and carbon and nitrogen oxides.
- The blending will help **cutback on oil imports** for fueling vehicles.
- They will have a wider option of fuels that may **shield them from highly volatile fuel prices**.

## Disadvantage of this Technology:

- A flex fuel car typically takes a **small hit on fuel efficiency** when using ethanol for motive power, ranging from between 4 per cent and 8 per cent.
- So, while fuel economy is generally lower with increased levels of ethanol (engines are optimised for petrol) and on the flip side, flex fuel vehicles have improved acceleration performance when operating on higher ethanol blends

## Problems with Ethanol Blending:

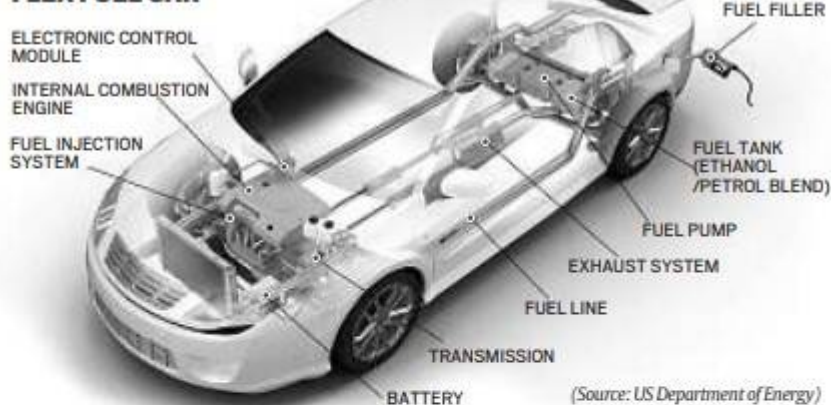
- Crops such as **sugarcane** are usually very **water-intensive**.
- A NITI Aayog report suggested that in 2019-20, of the total **ethanol produced in the country**, over **90 per cent came from sugarcane alone**.
- **Currently, around 9.5 per cent ethanol blending** with petrol has been achieved and it is likely that the targeted 10 per cent ethanol blending will be achieved by November 2022.
- But this is slated for a major bump up, with the government's 2025 target of 20 per cent blending of ethanol in petrol envisaged in its National Biofuel Policy 2018.

## News Highlights:

- The **Flex Fuel Strong Hybrid Electric Vehicles (FFV-SHEV) imported from Brazil** will be used as a pilot to assess its performance in terms of reduced carbon emissions.

- It was developed as part of a new pilot aimed at **deleveraging the country's dependence on imported fossil fuels for transportation.**
- As of 2018, there were over **21 million flex fuel vehicles in the United States, but Brazil is the biggest market and a leader** in this segment.
- This aims to **replicate the commercial deployment** of this particular technology in other markets such as Brazil, Canada and the US.

## KEY COMPONENTS OF A FLEX FUEL CAR



(Source: US Department of Energy)

**BATTERY:** The battery provides electricity to start the engine and power vehicle electronics/accessories

**ELECTRONIC CONTROL MODULE (ECM):** The ECM controls the fuel mixture, ignition timing, and emissions system; monitors the operation of the vehicle

**EXHAUST SYSTEM:** The exhaust system directs the exhaust gases from the engine out through the tailpipe. A three-way catalyst is designed to reduce engine-out emissions within the exhaust system

**FUEL FILLER:** A nozzle from a fuel dispenser attaches to the receptacle on the vehicle to fill the tank

**FUEL INJECTION SYSTEM:** This system introduces fuel into the engine's combustion chambers for ignition

**FUEL LINE:** A metal tube or flexible hose that transfers fuel from the tank to the engine's fuel injection system

**FUEL PUMP:** A pump that transfers fuel from the tank to the engine's fuel injection system via the fuel line

**FUEL TANK (ETHANOL/PETROL BLEND):** Stores fuel on board the vehicle to power the engine

**INTERNAL COMBUSTION ENGINE:** Fuel is injected into either the intake manifold or the combustion chamber, where it is combined with air, and the air/fuel mixture is ignited by the spark from a spark plug

**TRANSMISSION:** The transmission transfers mechanical power from the engine and/or electric traction motor to drive the wheels