

Mahindra e2oplus  
Mahindra e-Verito.  
Tata Tigor Electric  
Mahindra e-KUV 100  
Tata Tiago Electric.

### Fuel cells

The fuel cell is used in space-craft, reverses this reaction combining hydrogen and Oxygen to release electrical energy with pure water as a byproduct.

The attraction of using in an internal combustion engine, is that the fuel cell is very efficient indeed, achieving 45 to 60% efficiency versus petrol engine 15 to 35%.

A danger involved in fuel cell is the hydrogen is an explosive gas that is difficult to store and handle.

### Lean burn engines

This engine are designed for Lean-burning, They have higher compression ratios and thus provide better performance, efficient fuel usage and low exhaust hydrocarbon emissions compare with the conventional gasoline engines. Lean mixtures with very high air-fuel ratios can only be achieved by direct injection engines.

### Driverless Cars

This is a vehicle that is capable of sensing its environment and navigating without human input.

Driverless cars combine a variety of techniques to perceive their surroundings, including radar, laser light, GPS and computer vision. Advanced control systems interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage.

The potential benefits of driverless cars include reduced mobility costs and infrastructure costs, increased safety, increased mobility, increased customer satisfaction, and reduced crime. And also potentially significant reduction in traffic collisions, resulting injuries and related costs, including less need for insurance.

Waymo is a self-driving technology development company and it is a subsidized by Google.

### Alternate fuel

Bio fuels are also considered a renewable source. Although renewable energy is used mostly to generate electricity, it is often assumed that some form of renewable energy of a percentage is used to create alternative fuels. Research is going on the search of more suitable bio fuel crops and improving the oil yields of these crops, Using the current yields, Vast amount of land and fresh water in needed to produce enough oil to completely replace fossil fuel usage. Alternative fuels, known as non-conventional and advanced fuels, any materials or substances that can be used as fuels, other than conventional fuel like; fossil fuels (Petroleum (oil), coal, and natural gas.

Some well-known alternative fuels includes biodiesel, bio alcohol (Methanol, ethanol), vegetable oil, propane and other biomass sources.

## Ministry of road transport & high ways

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**Objectives:** At the end of this lesson you shall be able to

- state the function of ministry of road transport & highways
  - state the function of NATRIP
  - state the function of ARAI
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### Ministry of road Transport & Highways

This is an apex organization under the central Government, is entrusted with the task of formulating and administering, in consultation with other central Ministries/Departments, State Governments/UT Administrations, organisations and individuals, policies for Road transport, National highways and transport research with a view to increasing the mobility and efficiency of the road transport system in the country. The ministry has two wings: Roads wing and Transport wing.

#### Roads wing

Deals with development and maintenance of National Highway in the country

#### Main Responsibilities

- Planning development and maintenance of national Highways in the country
- Extends technical and financial support to state Gov-

ernments for the development of state roads and the roads of inter-state connectivity and economic importance.

- Evolves standard specifications for roads and bridges in the country.
- Serves as a repository of technical knowledge on roads and bridges.

#### Transport wing

Deals with matter relating to Road transport

#### Main Responsibilities

- Motor vehicle legislation
- Administration of the Motor Vehicles Act, 1988
- Taxation of motor vehicles.
- Compulsory insurance of motor vehicles.
- Administration of the Road transport corporations Act, 1950.

- And promotion of transport co-operatives in the field of motor transport
- Evolves road safety standards in the form of a national policy on road safety and by preparing and implementing the Annual road safety plan.
- Collects, compiles and analyses road accident statistics and takes steps for developing a road safety culture in the country by involving the members of public and organizing various awareness campaigns.
- Provides grants-in-aid to non-governmental Organisations in accordance with the laid down guidelines.

**National automotive testing and R&D infrastructure project (NATRIP)**

The largest and one of the most significant initiatives in Automotive sector so far, represents a unique joining of hands between the Government of India, a number of state Governments and Indian Automotive industry to create a state of the art testing, Validation and R&D infrastructure in the country.

The project aims at creating core global competencies in Automotive sector in India and facilitate seamless integration of Indian Automotive industry with the world as also to position the country prominently on the global automotive map.

Create state-of-art research and testing infrastructure to drive India into the future of global automotive excellence.

**(NATRIP) aims at setting up of seven-of-the-art automotive testing and R&D centers across the country and thereby: (Fig.1)**

- Creating core global competencies.
- Enhancing competitive skills for product development leading to deepening of manufacturing.
- Synergizing Indias unique capabilities in information technology with the automotive sector.
- Facilitating seamless integration of Indian automotive industry with the world to put India strongly on the global automotive map.

**Automotive Research Association of India (ARAI)**

The Automotive Research Association of India (ARAI) has been Playing a crucial role in assuring safe, less polluting and more efficient Vehicles. ARAI provides technical Expertise in R & D, testing, certification, homologation and framing of vehicle regulations.

ARAI is research association of the Automotive Industry with Ministry of Heavy Industries and Public Enterprises, Government of India, It works in harmony and complete confidence with it members, customers and the Government of India to offer the finest services, which earned for itself ISO 9001,ISO 14001, OHSAS 18001 and NABL accreditations.

ARAI has a strong base of state-of-the-art technology equipments, laboratory facilities and highly qualified and experienced personnel. With these assets, ARAI has goals, strategies and action plans to achieve fullest customer satisfaction.

These are

- to compete in service with excellence
- to cover global market
- to obtain recognition and accreditation
- to build commitment of all personnel
- to develop team sprit and sense of belonging amongst all.

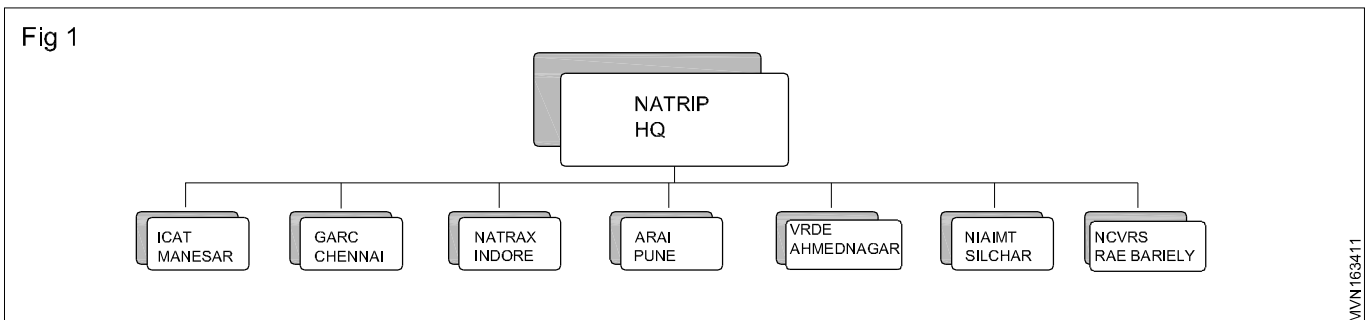
**Automotive research association of India**

ARAI has been providing various services to the Indian Automotive Industry in the areas of design & development and know-how for manufacture & testing of components/ system to national /international standards. ARAI shall strive to achieve international recognition in these areas.

ARAI shall seek the valuable guidance and support from association members, from time to time to achieve growth and stability.

With the globalization of economy and business, ARAI shall enlarge its scope of services to meet the requirements of automotive industries anywhere in the world.

ARAI strongly believes that satisfaction of the customer needs on continuing basis is of prime importance to earn the loyalty of the customers. Therefore, emphasis shall be on meeting and exceeding the customer needs through continuing quality improvement with active participation of employees and also the customer.



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