

**Workshop on "Cleaner Liquid Fuels and Improved  
Vehicular Technologies"**

**- May 31, 2011, IHC, New Delhi**



***“Technological & Infrastructural  
Requirements for  
Cleaner Liquid Fuels”***

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- ▶ Auto Fuel Policy – Background & Recommendations
- ▶ Auto Fuel Policy Review
- ▶ Technological & Infrastructural Requirements for Cleaner Liquid Fuels
  - ▶ Approach for Cleaner Fuels
  - ▶ Technologies for cleaner fuels
  - ▶ IOC-R&D Initiatives for cleaner fuels
- ▶ Conclusions

# Auto Fuel Policy: Background

- ▶ Consequent on meeting taken by the Prime Minister on August 30, 2001, the Govt. of India constituted a **Committee of Experts** on September 13, 2001 under the chairmanship of Dr. R. A. Mashelkar, the then Director General Council of Scientific and Industrial Research (CSIR) & Members from CPCB, MoEF, NIPFP, IIT Chennai, CII, IIM Ahmadabad, University of Roorkee, IIP Dehardoon & JS (R) MoP&NG as Member Secretary to recommend an **Auto Fuel Policy** for the country.

**Indian Fuel Quality Road Map & Vehicle Technology is Driven by Auto Fuel Policy Recommended by Mashelkar's Committee**

# Terms of Reference Concerning Petroleum Sector



- Recommend an Auto Fuel Policy for the country, including major cities and devise a road map for its implementation.
- Recommend suitable **Auto Fuels** for the country and their specifications considering:
  - Availability and logistics of fuel supplies
  - The processing economics of auto fuels; and
  - The possibilities of multi-fuel use in different categories of vehicles

# Vehicular Emissions & Auto Fuels

- Committee observed that vehicular emissions are dictated by combination of vehicle technology, **auto fuel quality**, vehicle maintenance, driving patterns and various other factors
- There are a total of 15 & 16 parameters in **Petrol** and **Diesel** specifications respectively, of which four have an impact on environment

# Auto Fuels Upgradation Program

- **Low lead petrol** (0.15 gm/ltr.) was implemented in Metros from September 1995 & state capitals / major cities from December 1996
- **Unleaded petrol** was introduced in Delhi & Mumbai from April 1995, Kolkata from Oct 2000 & Chennai July 2001
- **Low sulphur HSD** (0.5%) was introduced from April 1996 in Metros/ Taj Trapezium
- **Ultra Low Sulphur HSD** (0.05%) was introduced in NCR from April 2000 & Mumbai from Jan 2001

**India achieved phase out of lead from Petrol in 6 years compared to 10 to 20 years taken by other developing countries**

# Road Map for BS-III & IV Auto Fuels

- The Expert Committee had recommended the following road map for implementing BS-III & IV Petrol & Diesel:
  - **BS-IV Petrol & Diesel:** In the identified 13 cities w.e.f. **01.04.2010**
  - **BS-III Petrol & Diesel:** In the rest of the country w.e.f. **01.04.2010**

## Major Specifications Recommended for change for BS-III Fuels

- **BS-III Petrol**
  - RON (Min): 91 regular & 95 premium
  - MON(Min): 81 regular & 85 premium
  - Sulphur, total, max. (mg/kg): 150 regular & premium
  - Benzene content, max. (% volume): 1
- **BS-III Diesel**
  - Cetane number (CN), min: 51
  - Cetane index (CI), min: 46
  - Distillation: 95% vol. recovery at °C, max: 360
  - Total Sulphur, max (mg/kg): 350



# Major Specifications Recommended for change for BS-IV Fuels

- **BS-IV Petrol**
  - RON, min: 91 for regular & 95 for premium
  - MON, min: 81 for regular & 85 for premium
  - Sulphur, total, max (mg/kg): **50 for regular/prem.**
  - Benzene content, max (% vol.): 1 for regular/prem.
- **BS-IV Diesel**
  - Cetane Number (CN), min.: 51
  - Cetane Index (CN), min.: 48
  - Distillation: 95% vol. recovery at °C, max: 360
  - Total Sulphur, max (mg/kg): **50**

## Review of Key Recommendations

### Pollution Reduction from In-use Vehicles:

- PUC system up-gradation to identify polluting vehicles: ***yet to be fully done***
- Introduction of I&M system for vehicles starting 2005 to 2010 in phases for reducing emissions: ***not in practice***

**Old and poorly maintained vehicles are gross polluters**

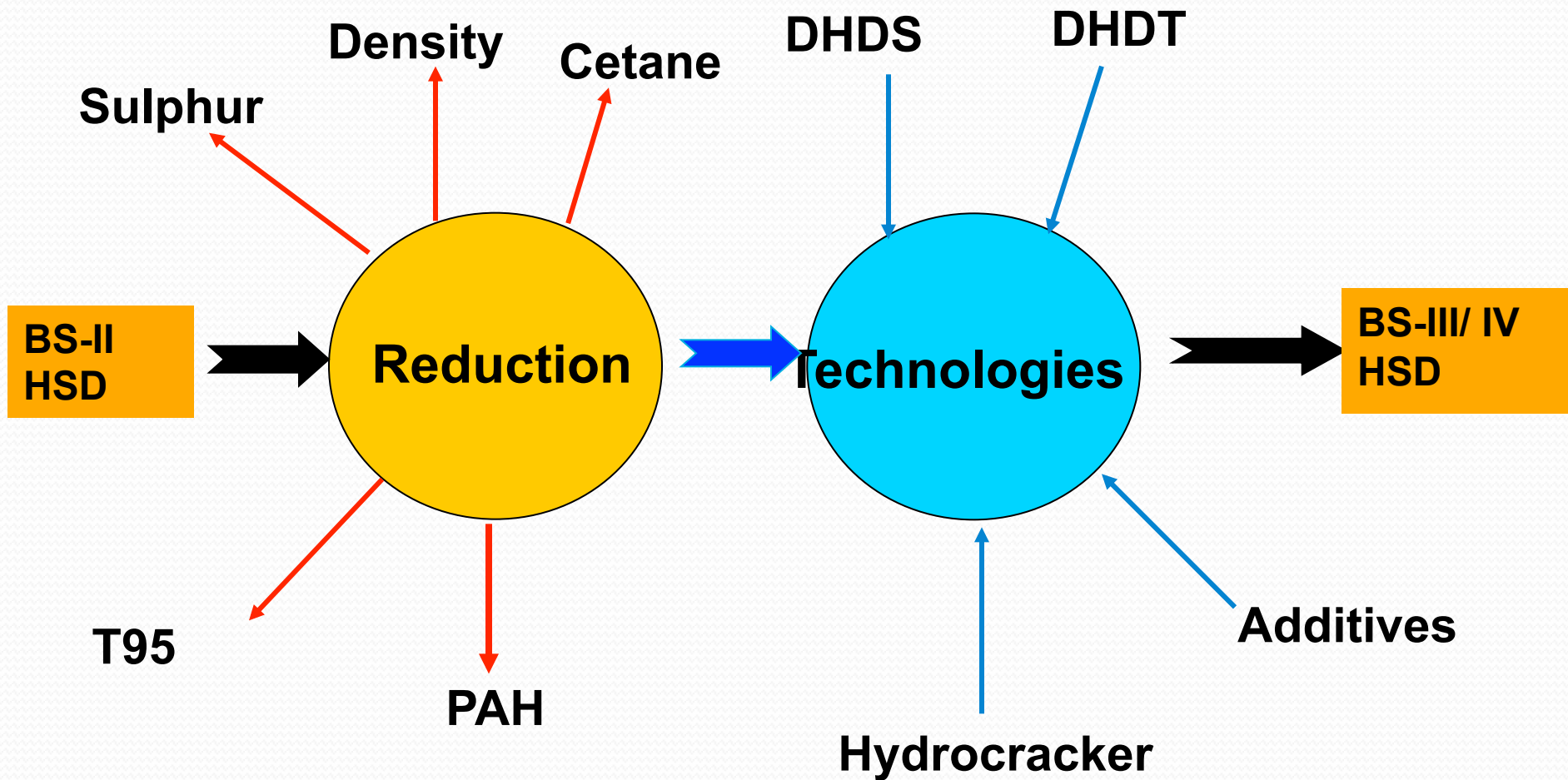
## Review of Key Recommendations

- Checking of Emission warranty for new vehicles: **no system in place to verify**
- Mandatory performance checking of catalytic converter from 2005 in 11 cities: **no system developed**
- Schemes with incentives for Retrofitting of devices on old vehicles: **need to develop a programme**
- Declaration of fuel economy: in km / litre: **now being implemented**

**Retrofitment (PSF/CRT) with 50ppm Sulfur Fuel – An ideal approach in Indian Context**

# Technological & Infrastructural Requirements for Cleaner Liquid Fuels

# Approaches for Clean HSD

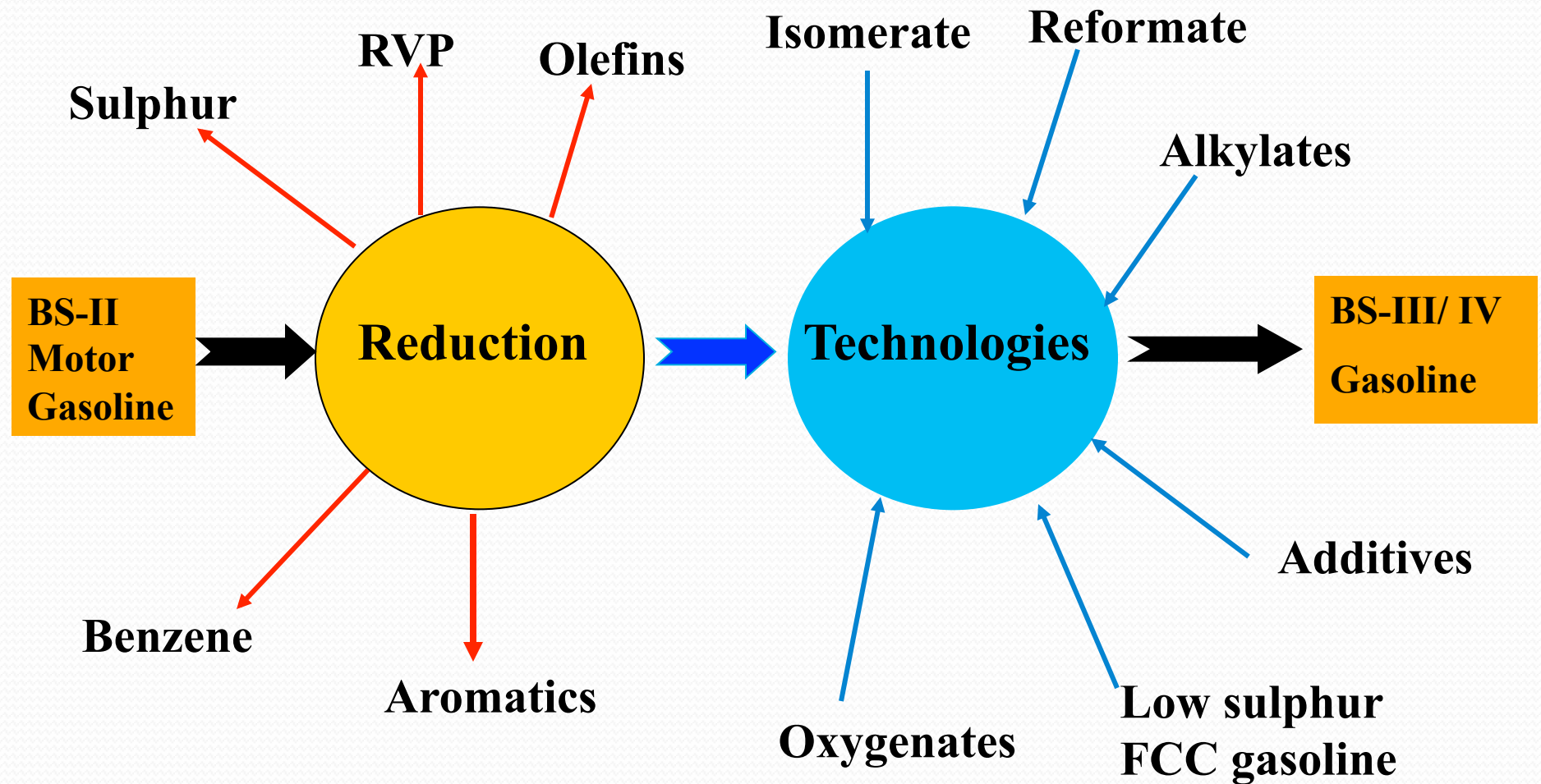


# Technologies for Clean HSD



Technologies	Impact
DHDS (35+ bar pressure)	Where only sulfur reduction is required
DHDT (85 bar + pressure)	Large sulfur reduction and high Cetane gain coupled with T-95 point improvement
Hydrocracker	For middle distillate maximisation along with Cetane improvement and very high sulfur reduction

# Approaches for Clean Gasoline

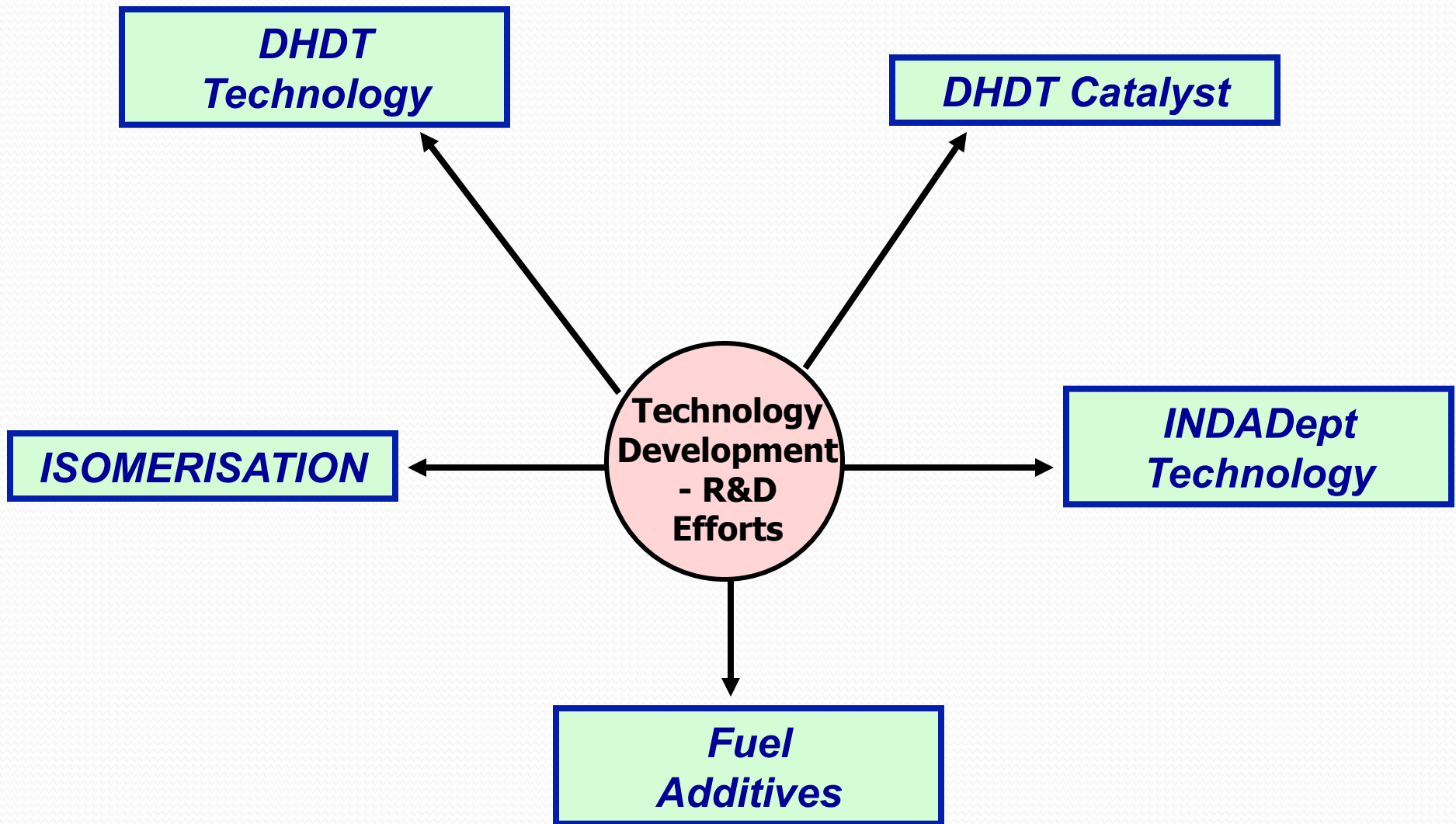


## Technologies for Clean Gasoline

Technologies	Impact
Reformate Splitter	Separation of Benzene rich light cut from rest of reformate
Isomerisation:	Benzene saturation & Octane boost
Continuous Catalytic Reforming	Octane boost
FCC Gasoline splitter	Separation of light cut, mid cut and heavy cut
Selective desulphurisation	Sulphur reduction



# Technology Development by IOC-R&D for Cleaner Fuels



# Technology Development by IOC-R&D for Cleaner Fuels



## DHDT Technology

- IOC R&D has licensed 1.2 MMTPA unit to Bongaigaon Refinery
- The unit is under commissioning

## DHDT Catalyst

- IOC R&D has developed high activity catalyst for deep desulphurisation of diesel for production of 10 ppm sulphur diesel
- Catalyst is working satisfactorily in CPCL since 2009.

# Technology Development by IOC-R&D for Cleaner Fuels



## Isomerisation

- IOC R&D has licensed 150 TPA unit to Bongaigaon Refinery
- The unit is under commissioning

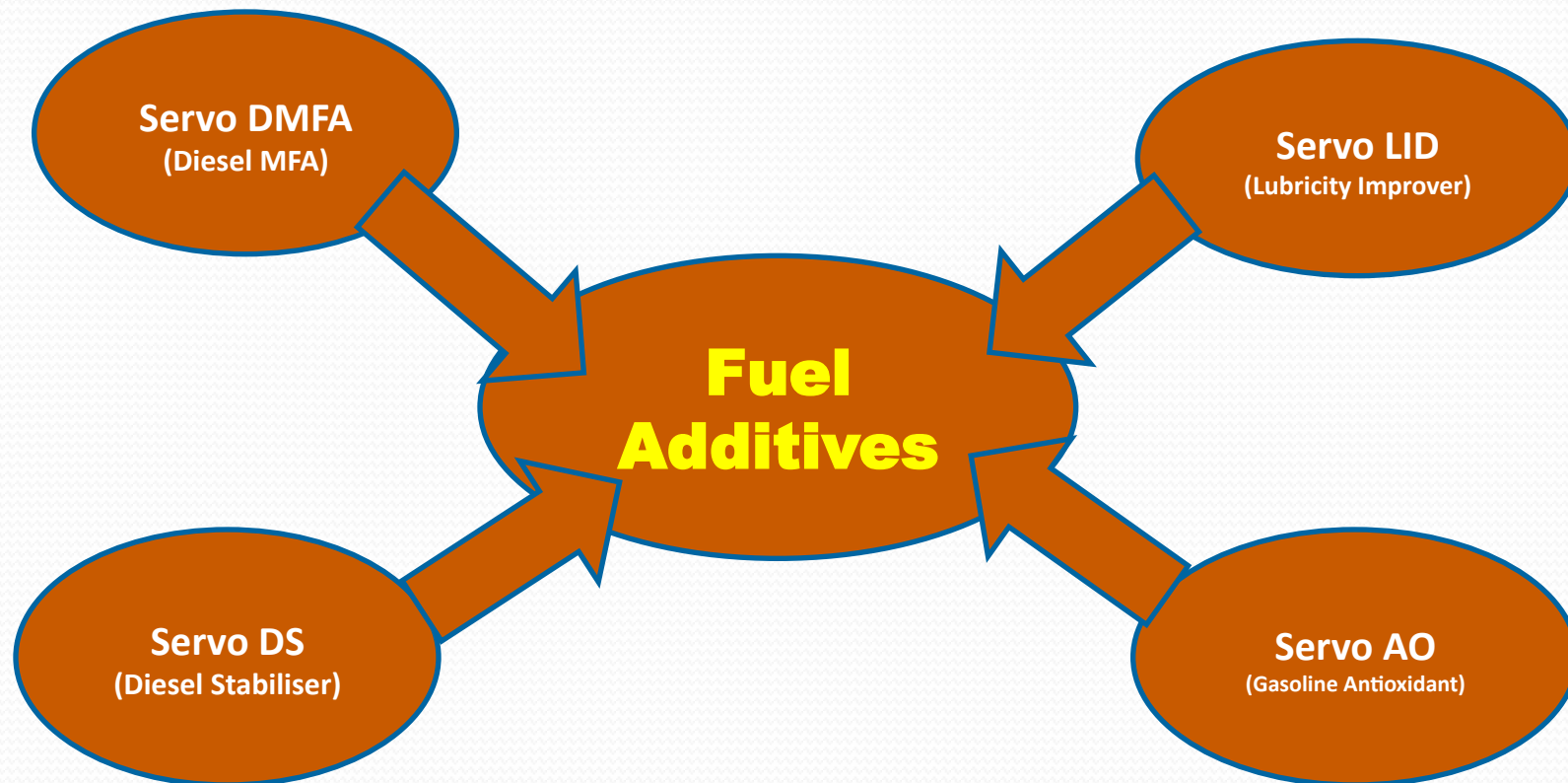
## INDADept Technology

- Novel technology based on adsorbent for deep desulphurisation of diesel and gasoline developed.
- Demonstration unit of 42000 TPA is planned at Guwahati Refinery for desulphurisation of INDMAX Gasoline for production of 50 ppm sulphur gasoline.

# Technology Development by IOC-R&D for Cleaner Fuels



## Fuel Additives



# Technology Development by IOC-R&D for Cleaner Fuels



## Fuel Additives

Fuel Additive	Status
Diesel Stabilizer	Already in Commercial Use
Antioxidant for Gasoline	Already in Commercial Use
Lubricity Improver for ULHSD	Already in Commercial Use
MFA for Diesel	Already in Commercial Use
MFA for gasoline	Under advanced stage of development

## Conclusions

- Oil Industry strictly adhering to the recommendations of Auto Fuel Policy
- Required technologies and infrastructure put in place for implementing the same at significant cost
- Auto Fuel Policy Review reveals certain shortcomings [*e.g. PUC System Upgradation, I&M Systems, Emission Warranty, Performance Checking of Cat. Convertors, Incentives for retrofittments, etc*], which need immediate attention.
- Options like Retrofittment (e.g. PSF/CRT) by fleet operators with 50ppm Sulfur Fuel – An ideal approach in Indian Context need to be exercised