

# Emission Control Technologies : BS6 & Beyond *- A Holistic Approach*

**P. Panda**

*Executive Vice President*

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Way of Life!

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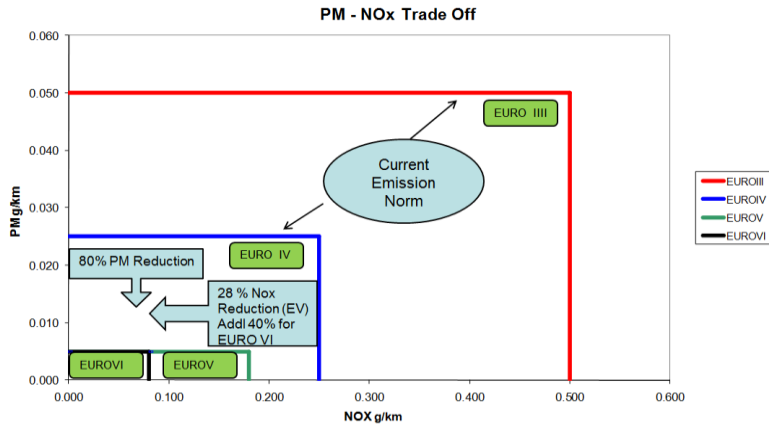
**Flash Back : 2010-2017**

**Future Mobility Drivers**

**Flash Back : 2010-2017**

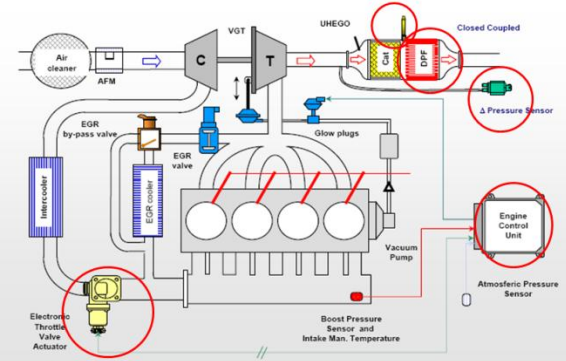
**Future Mobility Drivers**

### The Emission Challenge



Future Diesel emission standards are very stringent. There is an 80% reduction in PM and 28% reduction in Nox as we move from EURO IV to EURO V

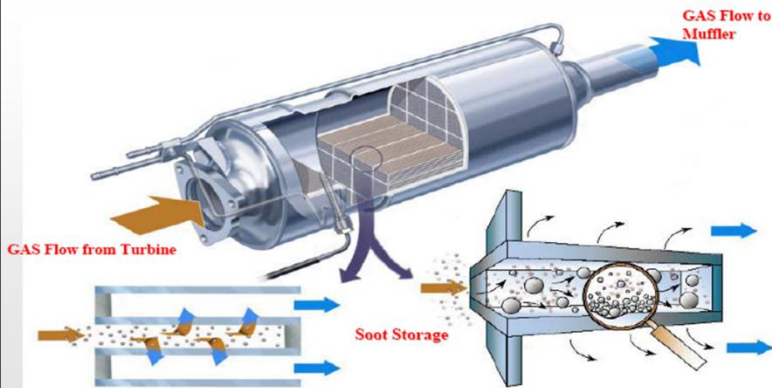
### Possible Solution – Catalyzed DPF



Some modifications in the engine hardware layout is required

- DPF
- Exhaust Pressure sensor
- DPF Temperature Sensor (Optional)
- ECU Calibration for DPF Management
- Addition of a Throttle Valve

### How DPF works



Wall flow DPFs are the industry norm. DPF needs about 600 deg C to burn off accumulated soot.

### Challenges for DPF intro in India



❑ Low Sulphur fuel (10 ppm level) will have to be made available over the entire country to have uniform fuel quality

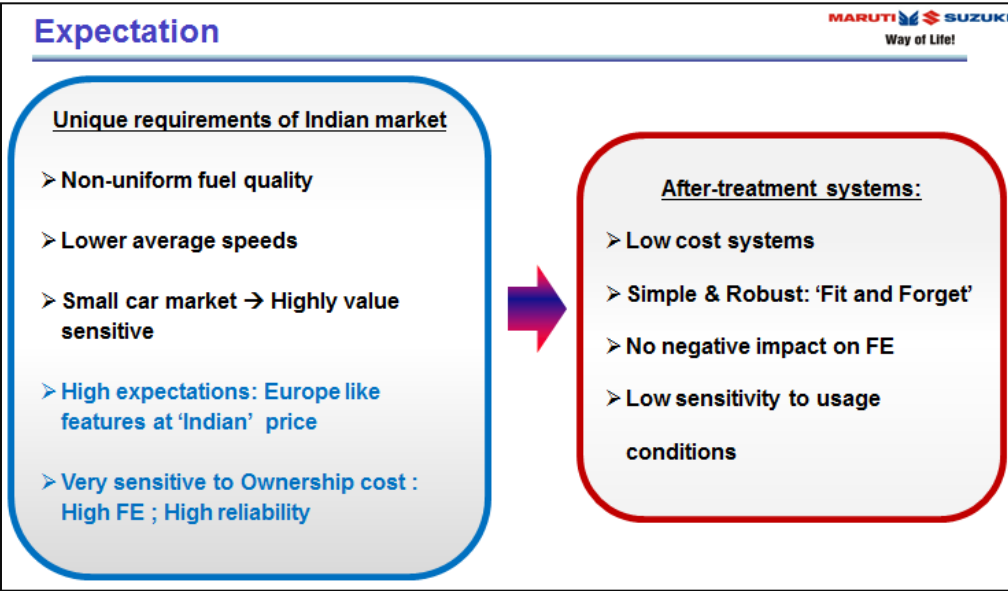
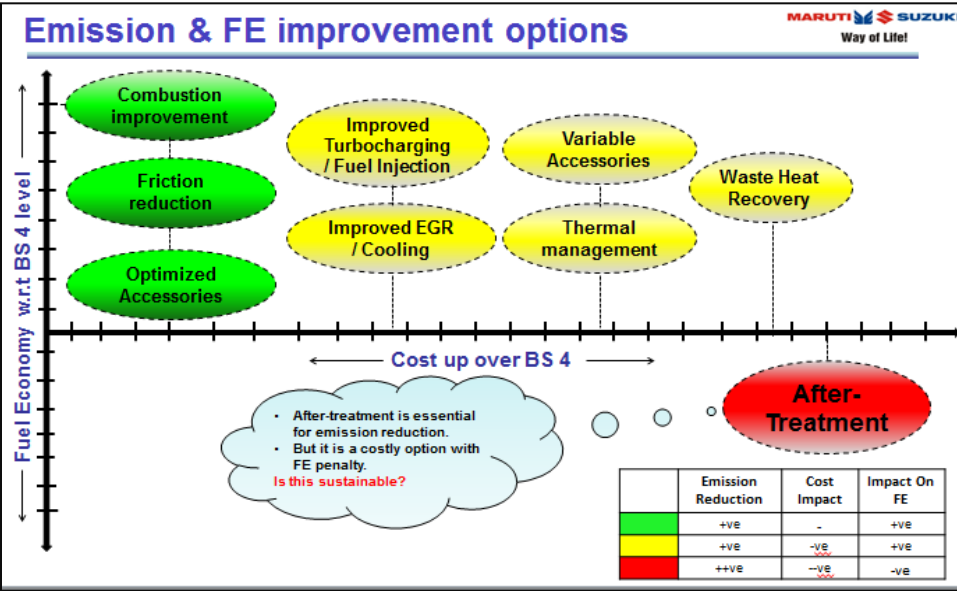
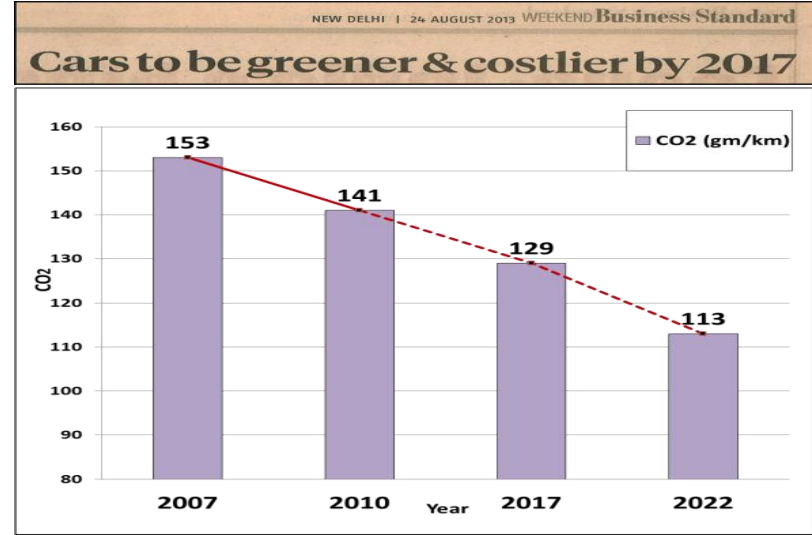
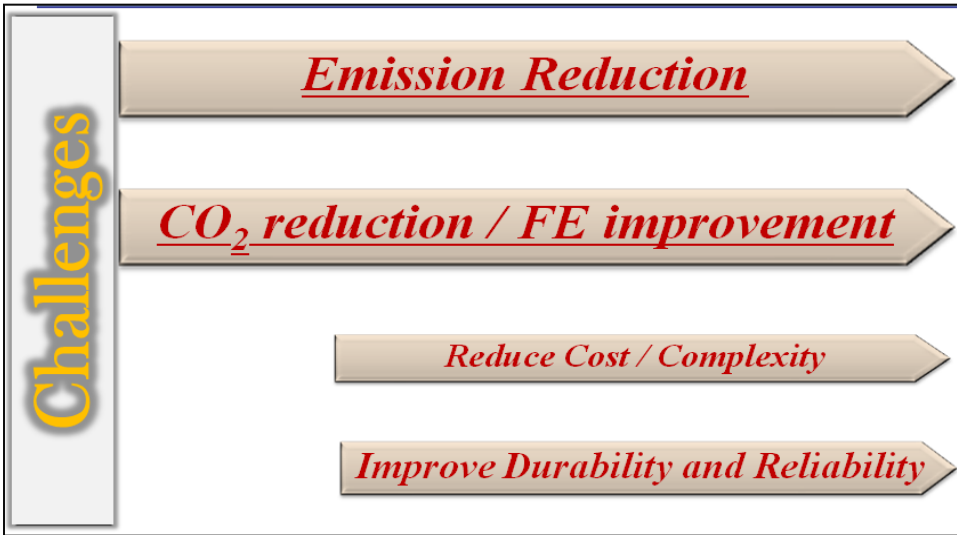


❑ Extensive validation needs to be carried over various cities and under various traffic conditions to ensure the success of the technology.



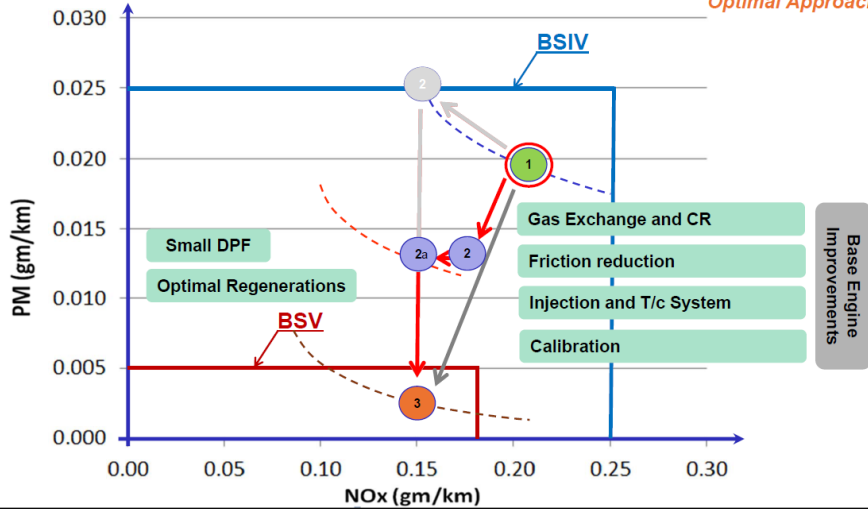
❑ Oil Dilution and Increase in Fuel Consumption due to active regeneration are open issues which need to be addressed.

# BS V Diesel Emission Challenge : Possible technology to mitigate it

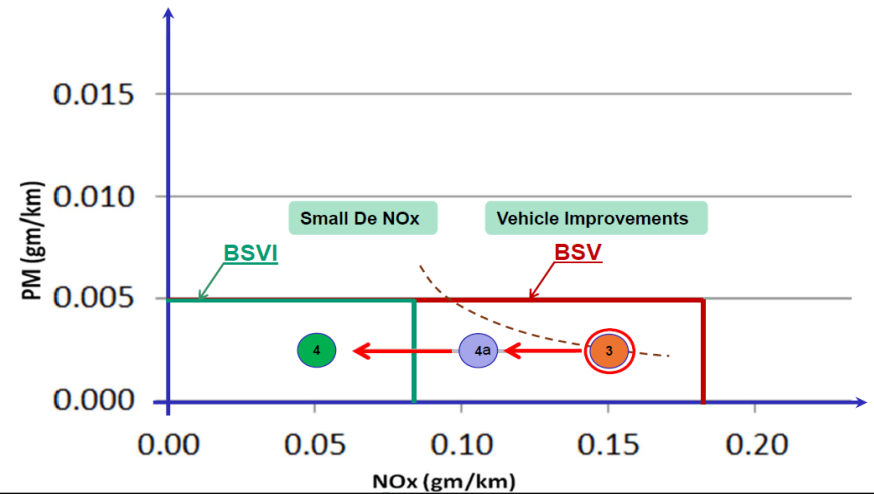


## BS V Emission and FE Challenges – Cost Effective & Durable System

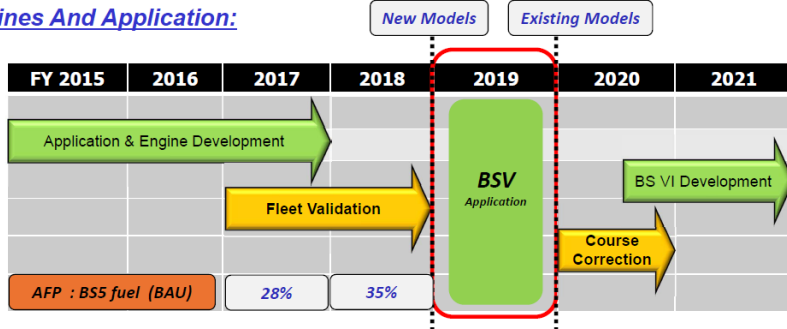
**Regulation : Targets & technical requirements from BSIV to BSV** *Traditional Approach*  
*Optimal Approach*



**Regulation : Targets & technical requirements from BSV to BSVI** *Traditional Approach*  
*Optimal Approach*



**Timelines And Application:**



Front Load Development Work

BSV Fuel for fleet validations

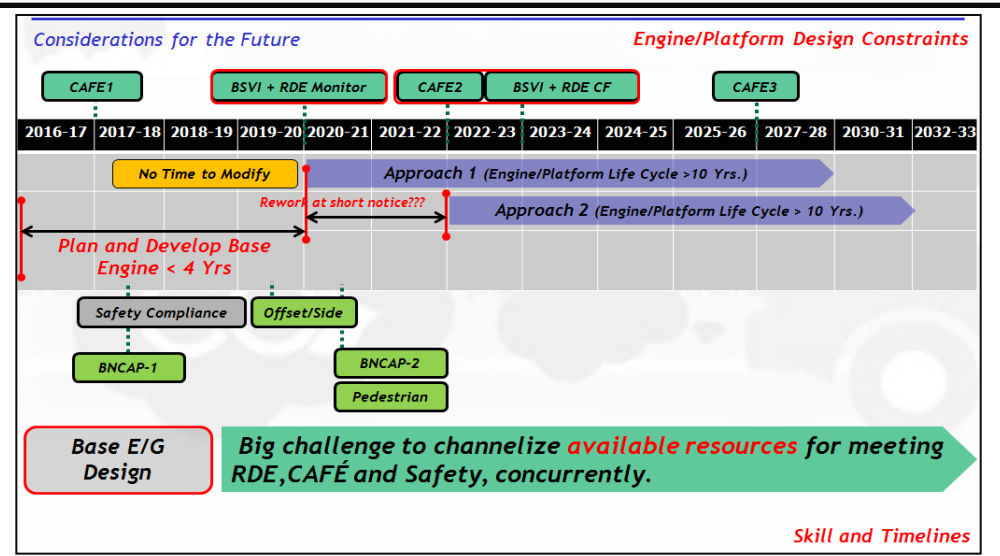
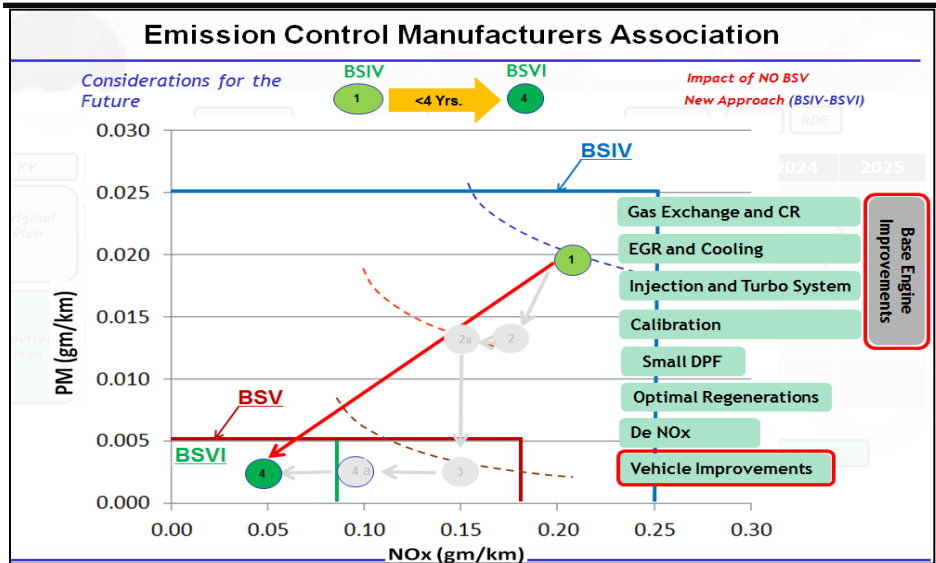
**Quantum :**

Total Variants : 350  
Total Manufacturers : 10  
Variants / Manufacturer : 35  
BSV Application / month: 3

**Summary:**

1. After treatment exhaust is not sufficient, the base engine needs to be worked upon.
2. Apart from the base engine, vehicle improvements are also required.
3. Front load development work needs to be done for meeting BS V in 2019
4. Fuel implementation

## New Base Engine Development as a strategy for BS V & BS VI



## Considerations in New Approach : (BSIV-BSVI < 4Yrs)

- Very Short Time** for Vehicle Level improvements and Base Engine Design Changes.
- Skilled Manpower** in huge nos. and **Phasing In** to meet targets.
- Suppliers Skill Upgradation** in huge nos. Required in a very short timeframe.
- Base Engine Design (Life Cycle >10 Yrs.) : **RDE (2023) + CAFE 2 (2022) + Safety**
- Big challenge** to upgrade skills and develop new technology, **indigenously**.
- Planned Investments by Supplier** to meet the emission norms for Diesel market.

# Skill Upgradation Approach to meet BS IV → BS VI

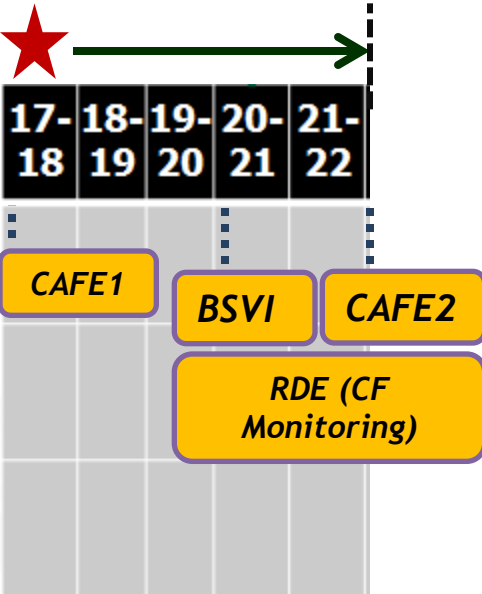
**Flash Back : 2010-2017**

**Future Mobility Drivers**



Shift from Short term → Long term Strategy/Planning

Short term – 5 Y



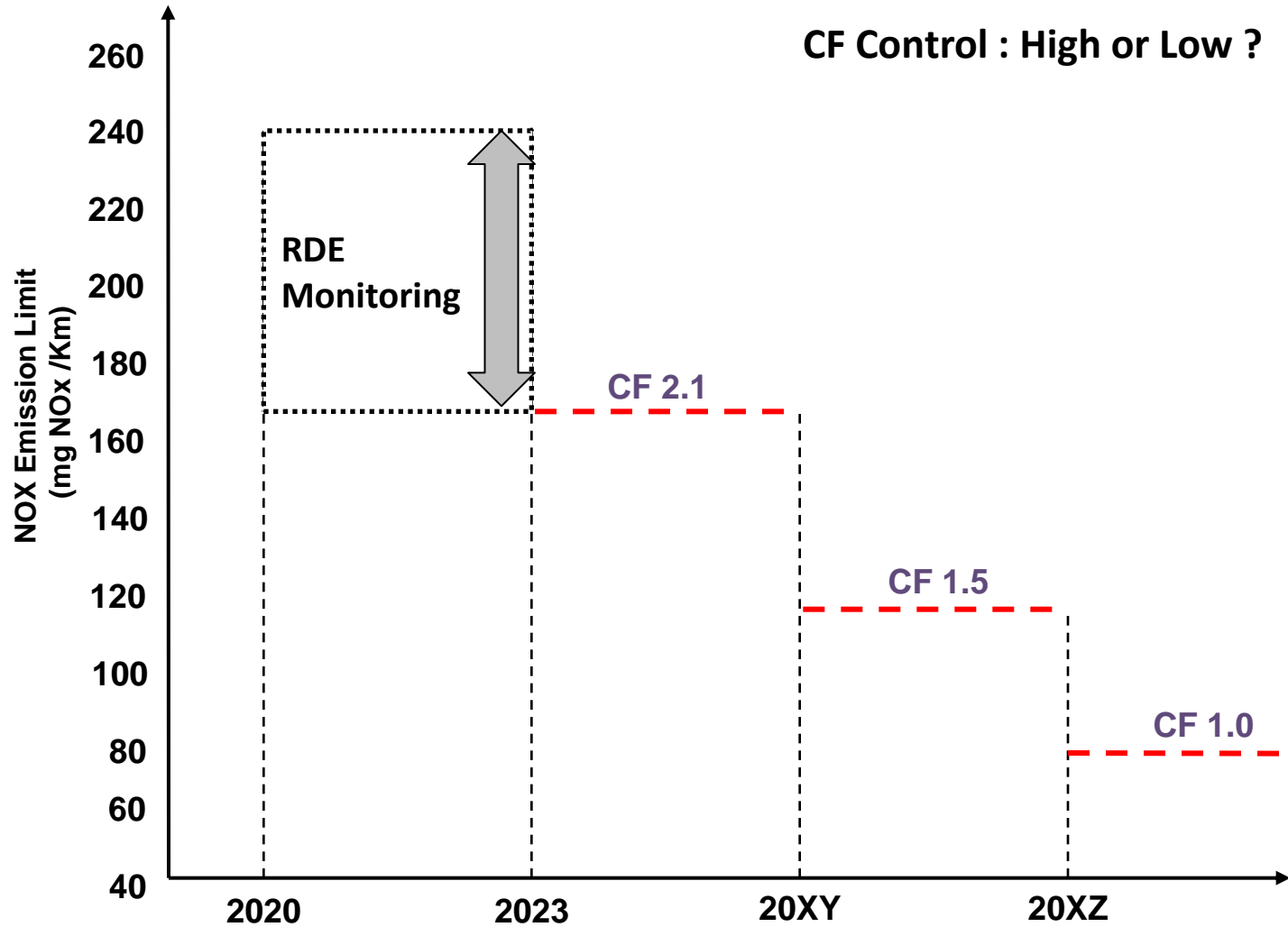
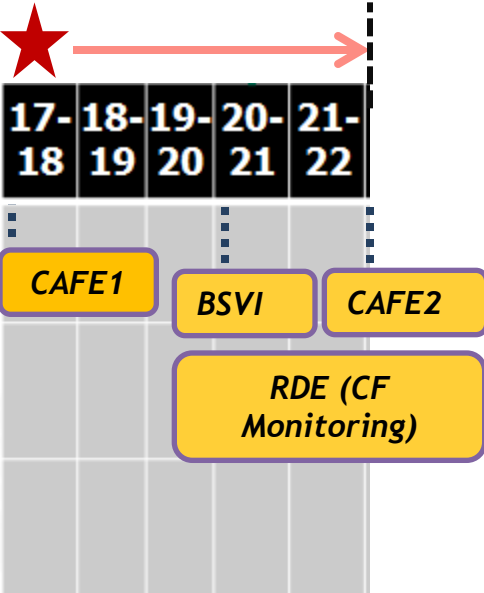
Short term milestones: (5 Years)

- ✓ BS VI
- ✓ RDE – CF Monitoring
- ✓ CAFÉ 2

BS VI – 1<sup>st</sup> Milestone ; RDE – The Biggest Challenge

Shift from Short term → Long term Strategy/Planning

Short term – 5 Y

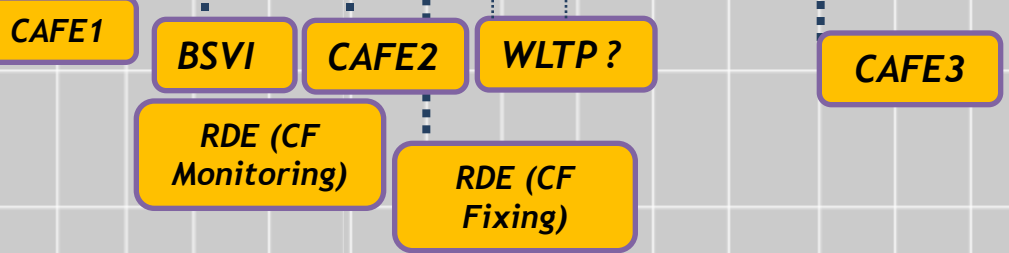
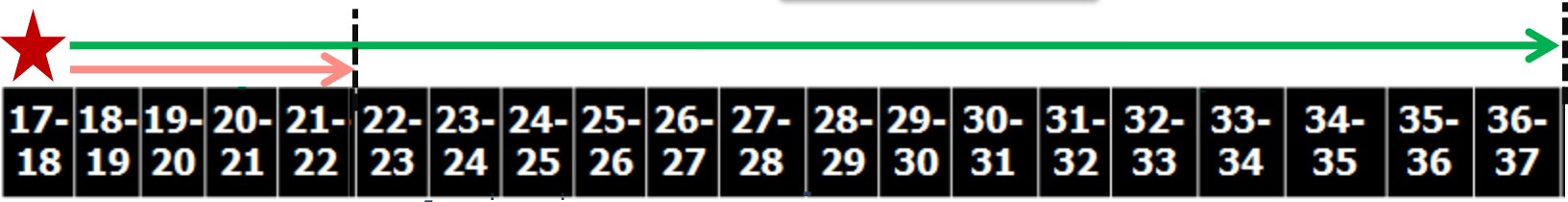


CF to control as low as possible to be future ready

Shift from Short term → Long term Strategy/Planning

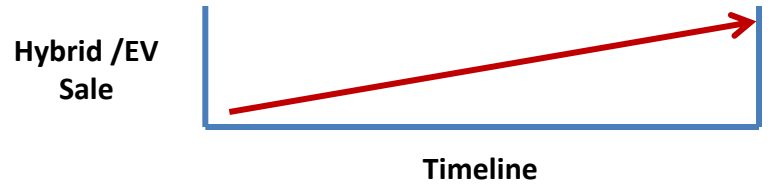
Short term – 5 Y

Mid term – 15 Y



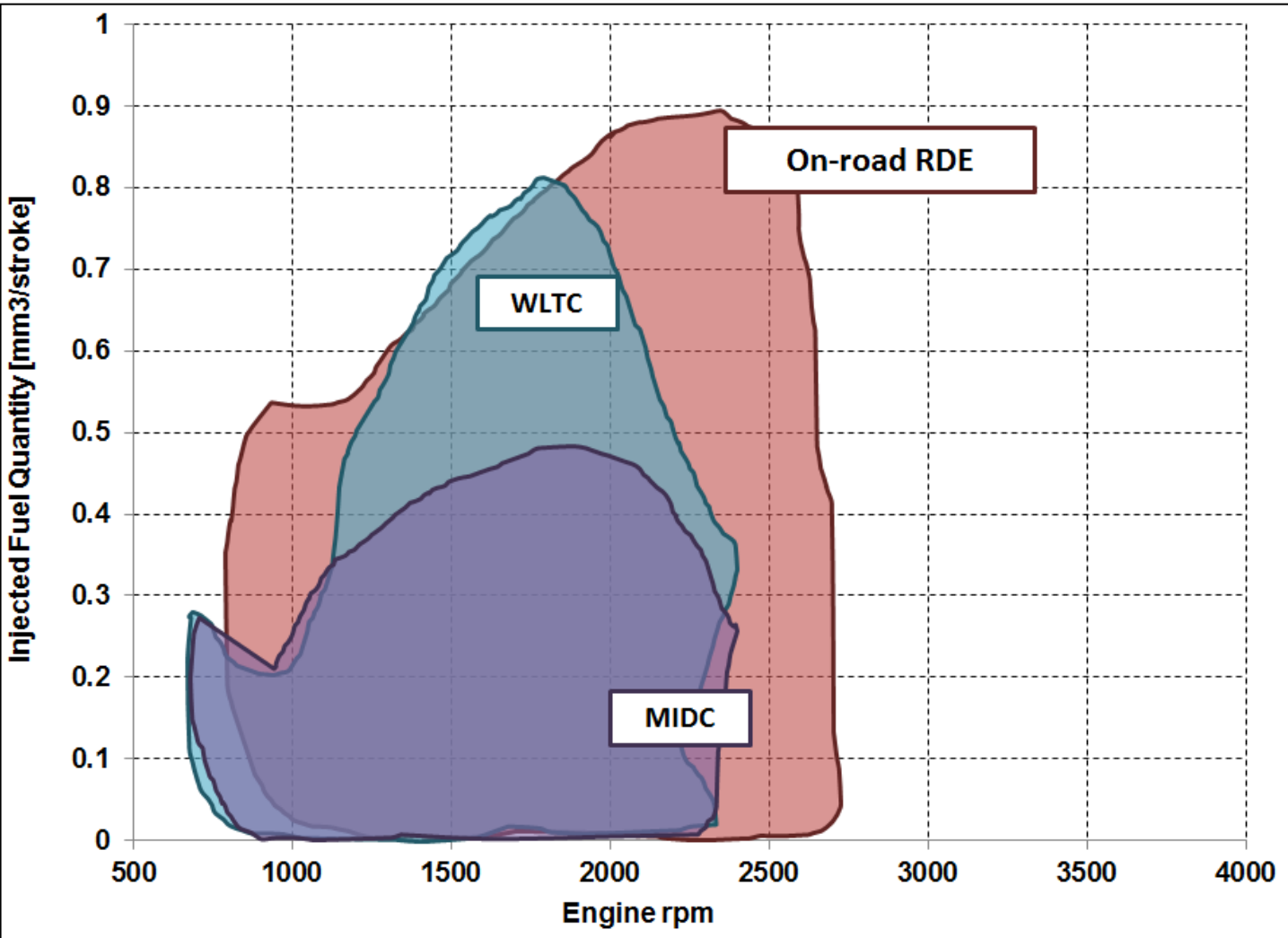
To meet CAFÉ 3

1. E/G technology improvement (GDI?)
2. Stronger Hybridization?
3. Electric Vehicles (EV)?



BS VI – 1<sup>st</sup> Milestone ; RDE, WLTP, CAFÉ 3 to follow

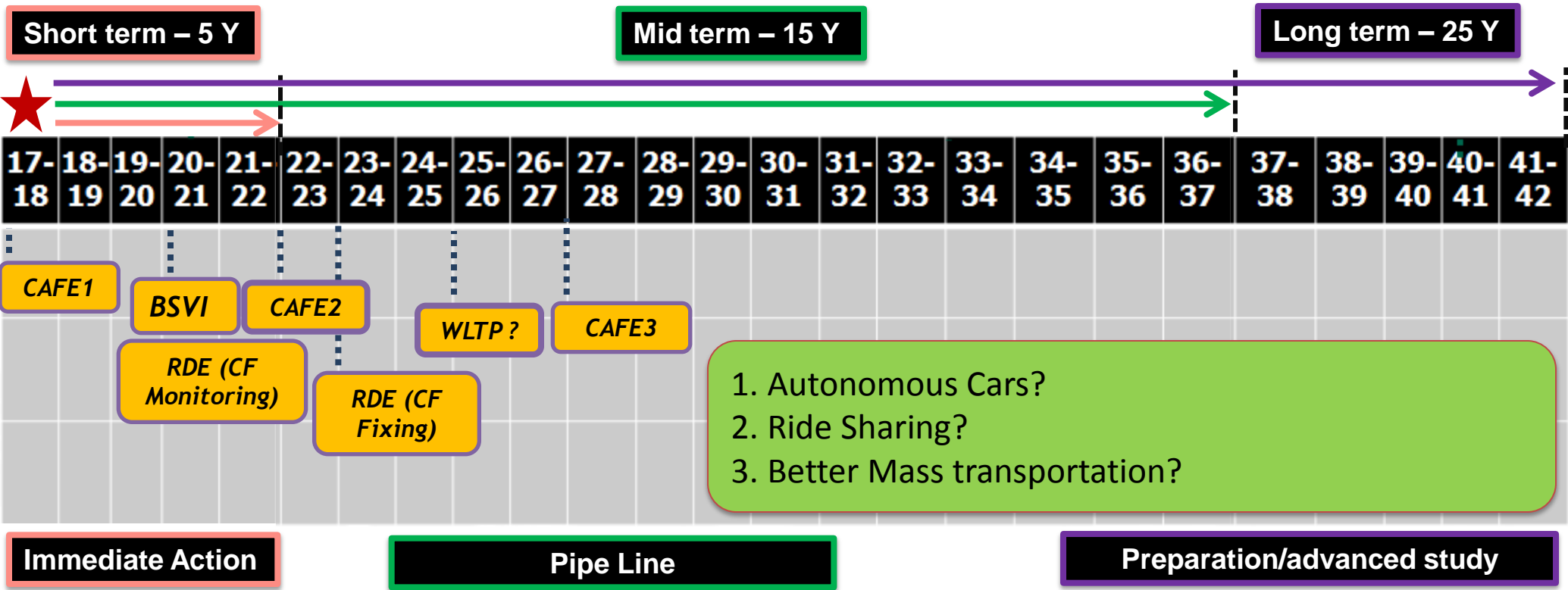
**WLTP : The Next Big Challenge**



- Wider Operating Zone
- Dynamic Speed
- Cycle Distance increase by 2 times
- Cycle Time increased
- Average Speed Increase by 1.5 times

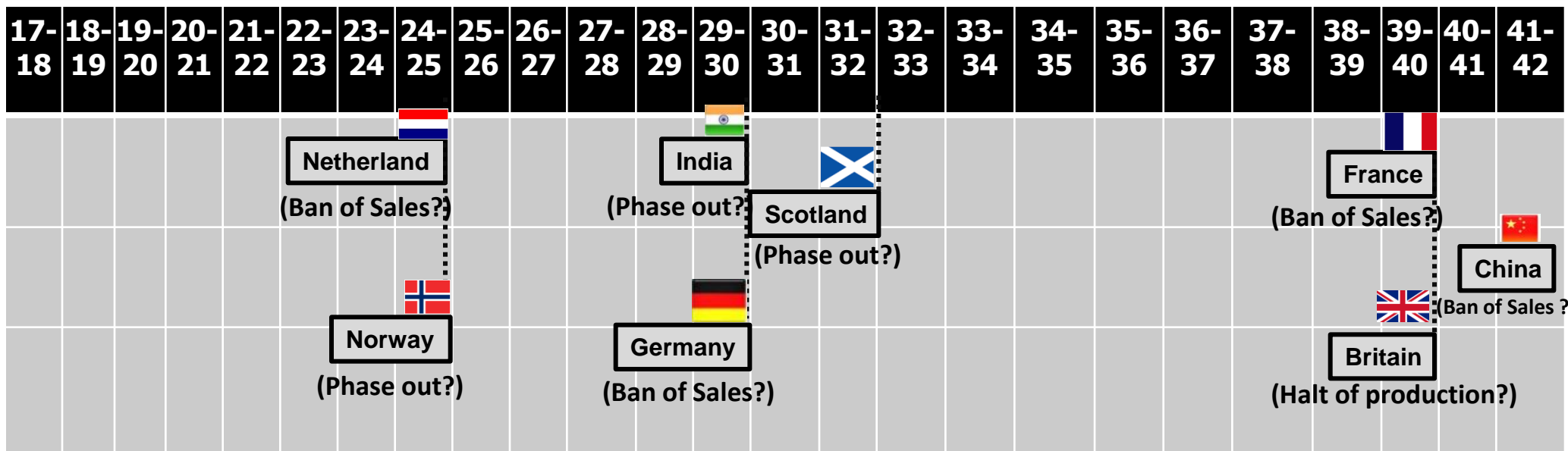
**WLTP-CAFÉ going to be a big challenge**

Shift from Short term → Long term Strategy/Planning



It is time to plan for Mid term and Long term future mobility

Global Proposals for Phasing out/Halt of Production/Ban of sales of Diesel/Gasoline Vehicles



Indian Road Map for EV/Hybrid vehicle to be prepared

## Summary:

1. BS VI – 1<sup>st</sup> Milestone ; RDE – The Biggest Challenge
2. CF to control as low as possible to be future ready
3. WLTP-CAFÉ 3 will see a sea change in technology.
4. Preparation for long term “Electrification” Road Map for India

**Thank you very much !!**