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AUTOMOTIVE

The effects of BS 6 and CO₂ regulations in India

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Suraj Ghosh, Manager, South Asia Powertrain Forecasts,
+91 88610 77100, suraj.ghosh@ihsmarkit.com

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Introduction

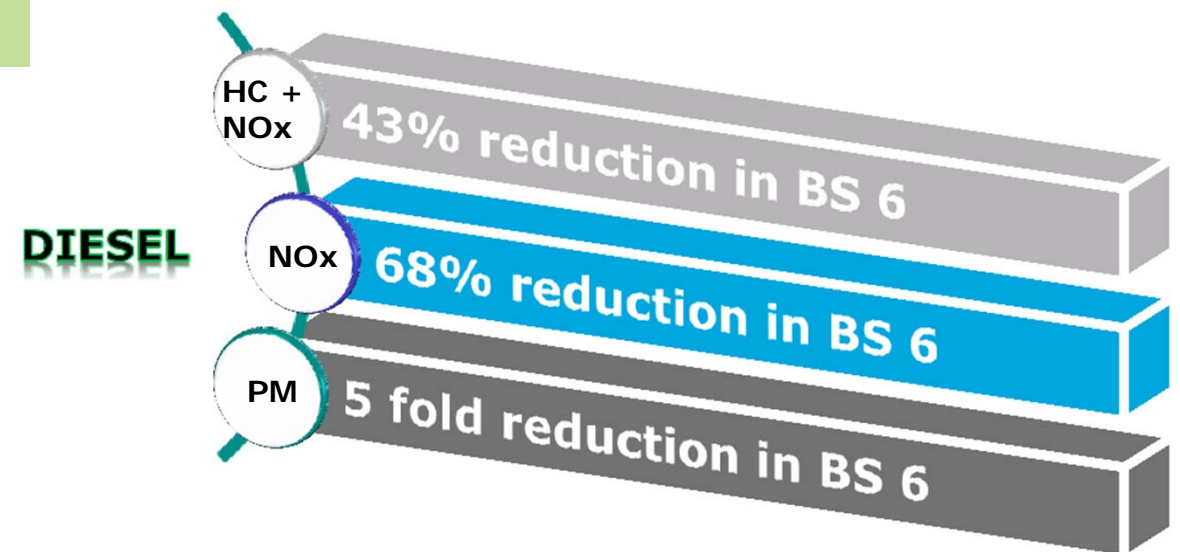
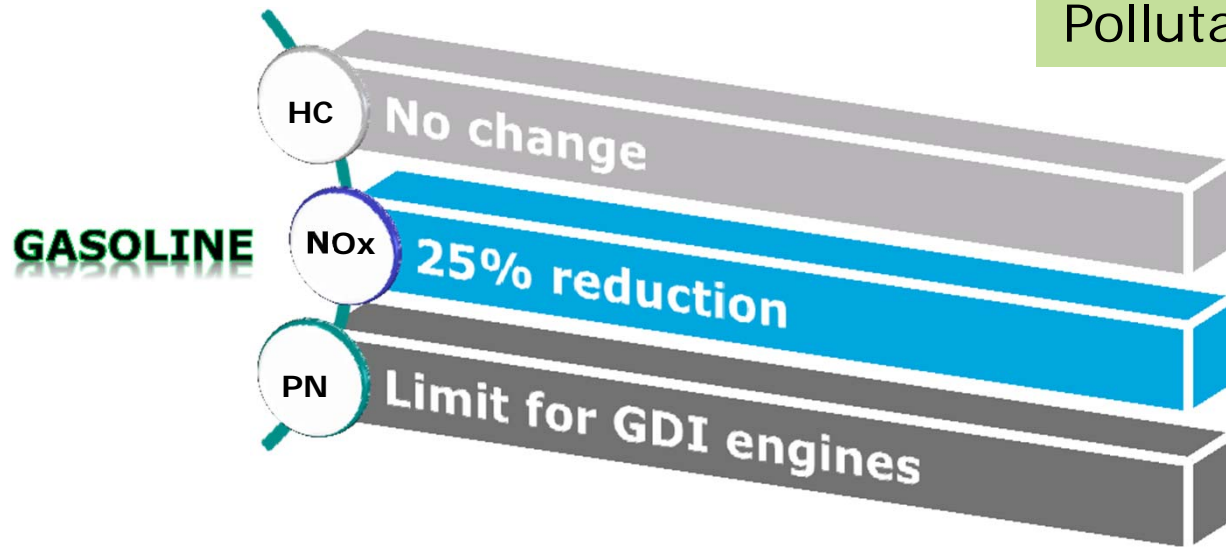
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+91 8861077100, suraj.ghosh@ihsmarkit.com

BS 6 - Emission Norms Schedule

Schedule

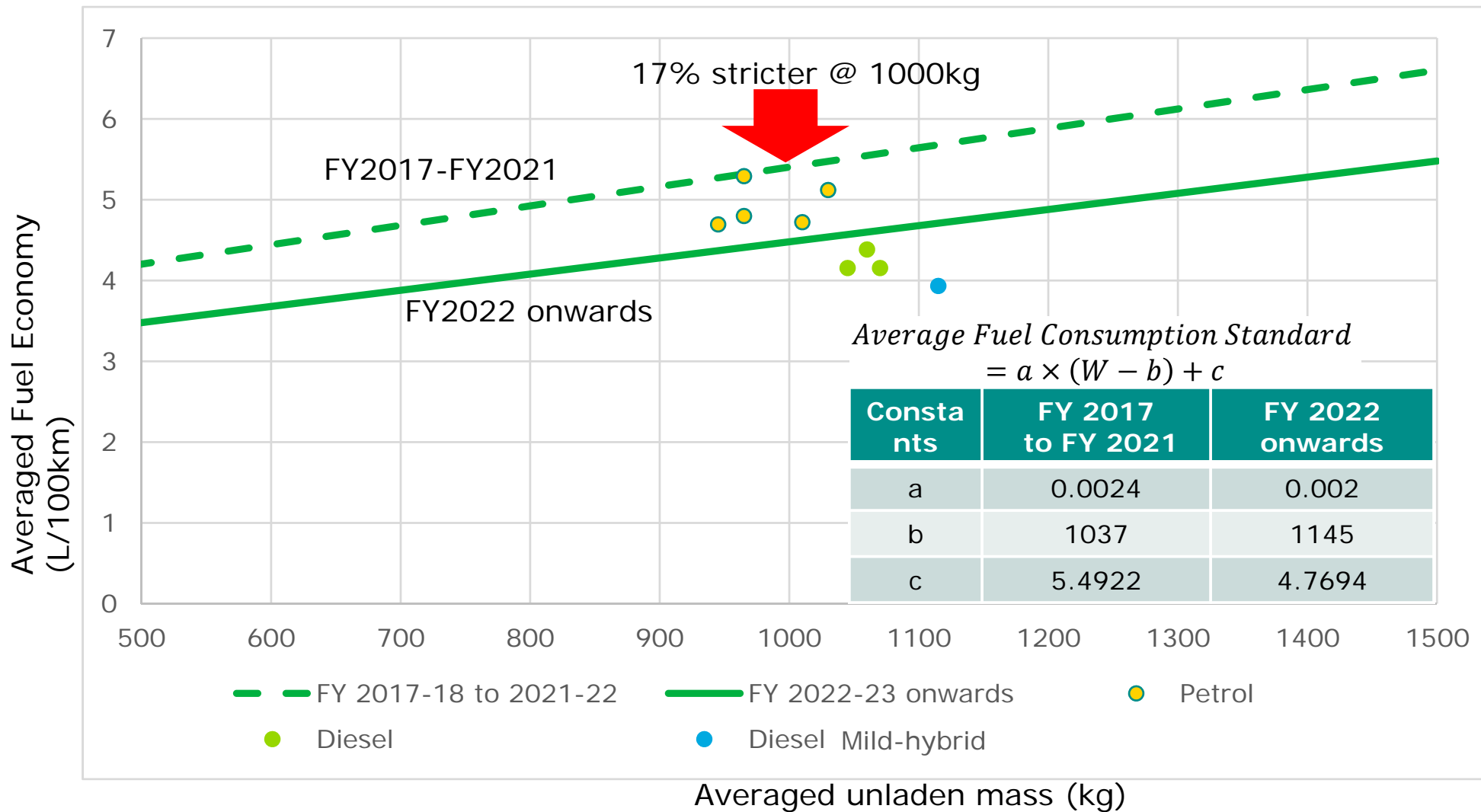
Region/Year	2010	2016	2017	2019	2020	2022
Select Cities		BS IV		BS V		BS VI
Rest of India		BS III	BS IV	BS V		BS VI
New Schedule Across India			BS IV		BS VI	

Pollutants



CO₂ Regulations – CAFE Norms

CAFE Targets : Starting from 1st April 2017



Fleet Target

Phase I (FY2017-2021)	Phase II (FY2021 onwards)
130 g/km	113 g/km

FAME

Faster Adoption and Manufacture of Electric Vehicles, based on the NEMMP 2020:

- ❖ Phase I (FY2015-FY2017) 170 million USD.
- ❖ 55 million USD for 1st year and 115 million USD for 2nd year.

The investment is further allocated into sub-categories, arranged in order of share of the allocation:

- Demand incentives
- Development of technology platform & Testing infra
- Pilot projects
- Charging infra
- IEC/Operations

- ❖ *Phase II (FY2018-FY2021) 200 million USD.*

- Demand incentives*
- Charging infra*

} IHS estimate

FAME

Tax/Incentives

₹10000 ~ \$150 ~ ¥15100

VEHICLE CATEGORY	EXCISE DUTY	Segment	Incentive (₹)	
Small cars (Length < 4m)	12.50%	Length < 4m (P<1200cc/D<1500cc)	Level 1	Level 2
Length >4m but engine capacity less than 1500cc	24%			
Length >4m and engine capacity more than 1500cc	27%	Mild HEV (Conventional battery)	13000	16000
		Mild HEV (Advanced battery)	19000	23000
SUVs/MUVs (length >4m, engine capacity >1500cc and Ground clearance >170mm)	30%	Length > 4m	Level 1	Level 2
		Mild HEV (Conventional battery)	11000	13000
Hybrid cars	12.50%	Mild HEV (Advanced battery)	20000	24000

Conventional battery – Lead Acid type

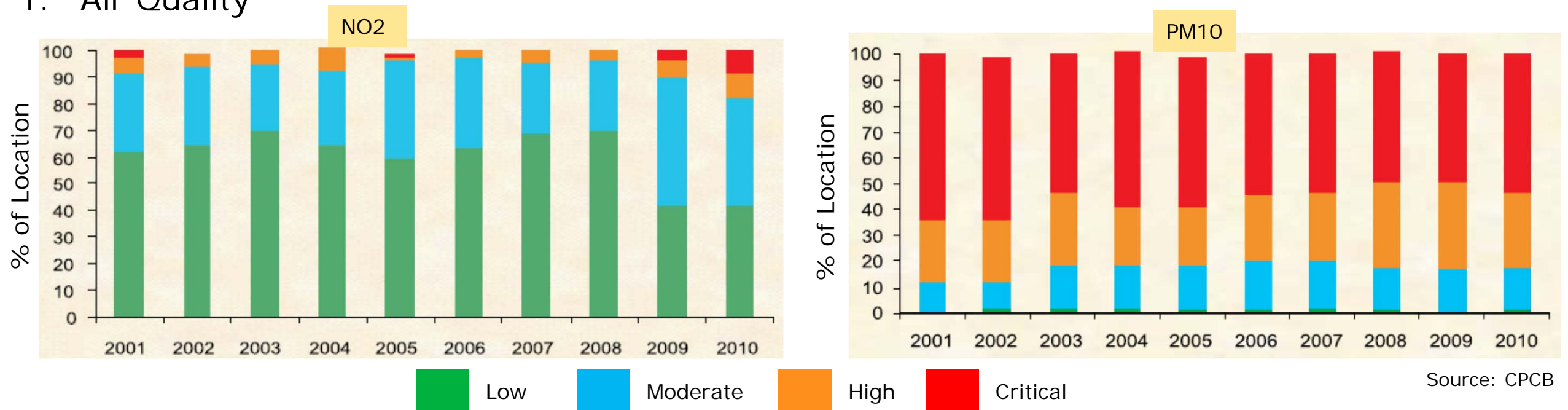
Advanced battery – All others

Background

Suraj Ghosh, Manager, South Asia Powertrain Forecasts,
+91 8861077100, suraj.ghosh@ihsmarkit.com

Background

1. Air Quality

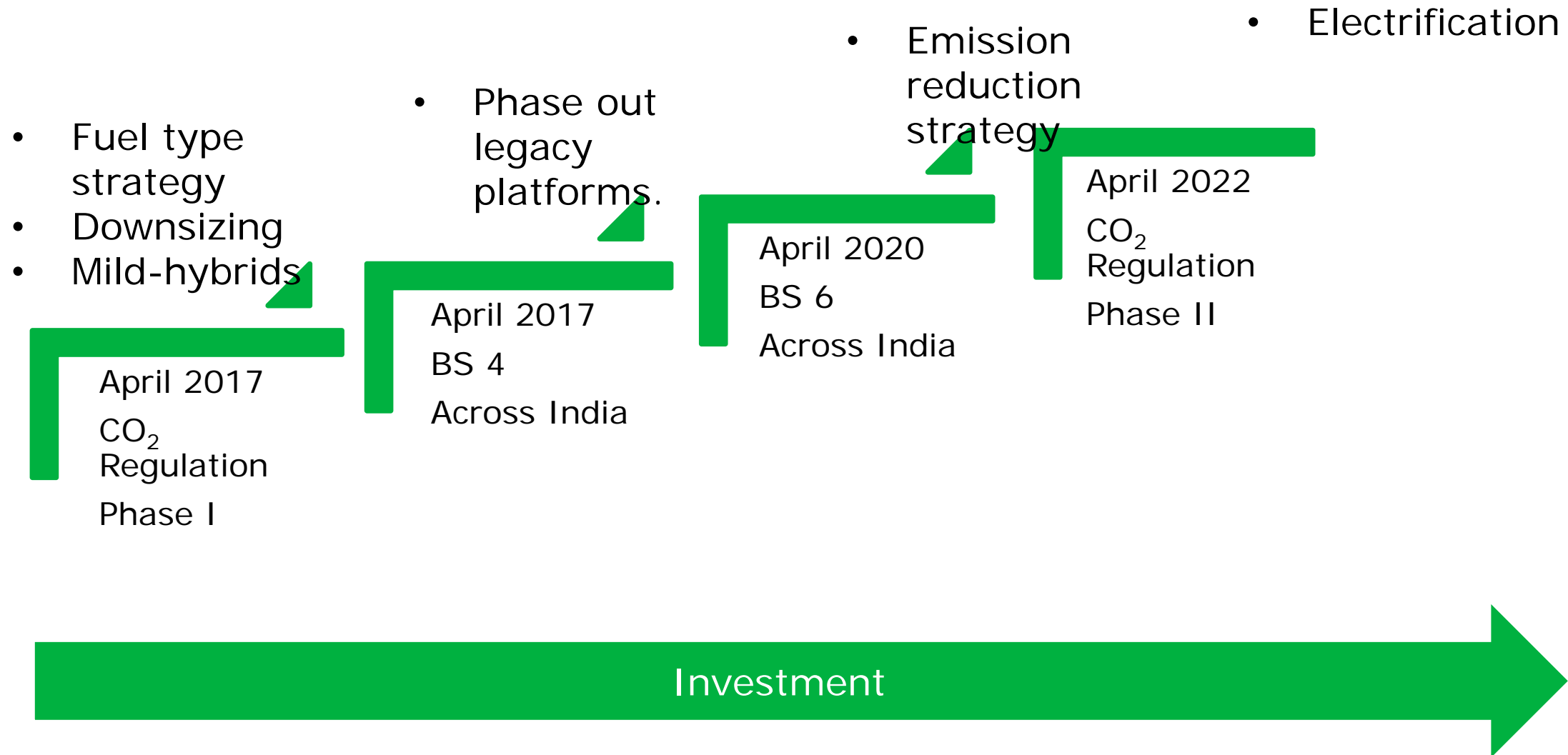


2. India's **CO₂ Pledge**: 20-25% reduction by 2020; 30% by 2030 compared to 2005 levels as base .
3. **Overdependence** on imported oil.
 - About 80% of India's crude demand is met by imports.
4. Government's aim for **alignment** with mature markets' policies.
5. Pressure from 'green' activists/NGOs.

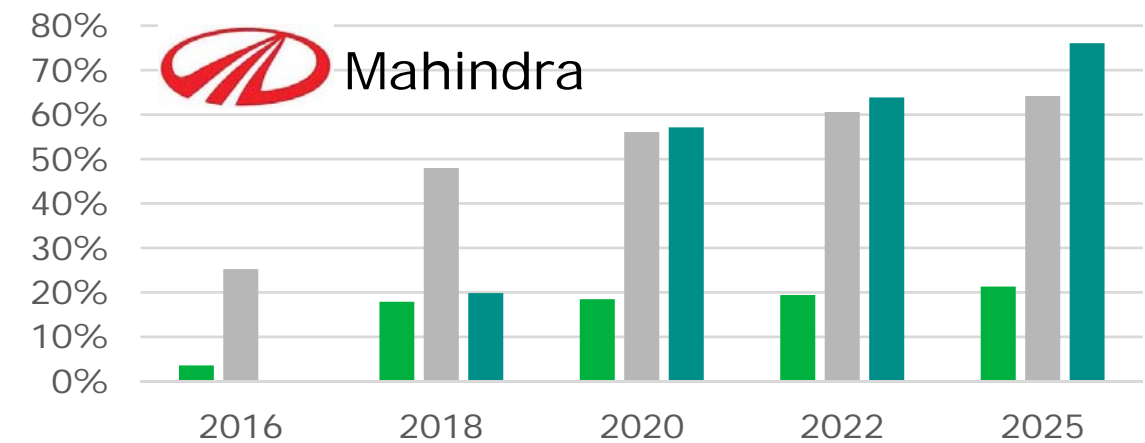
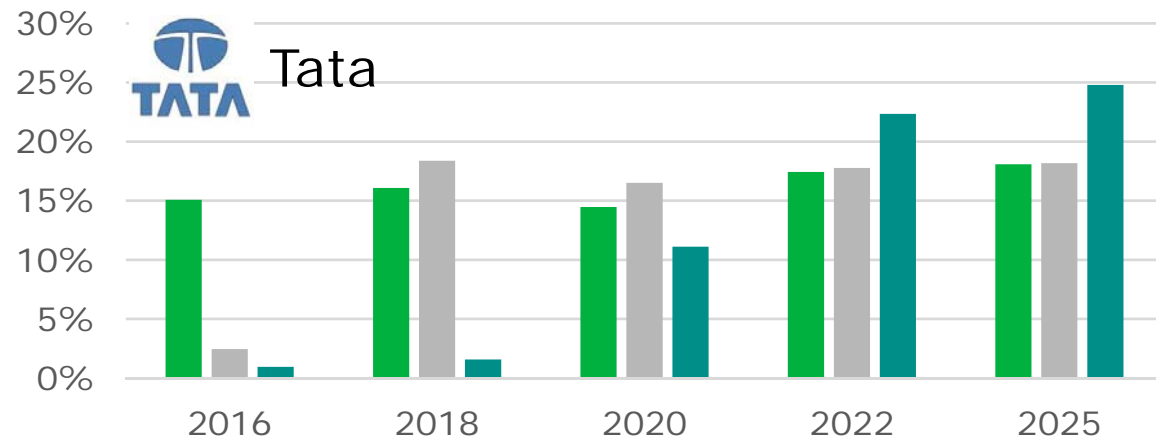
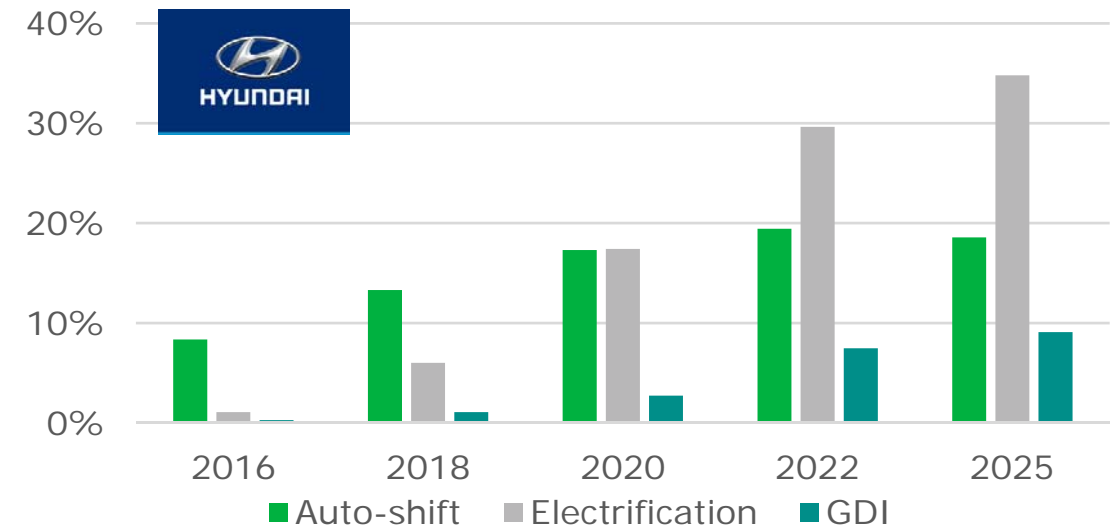
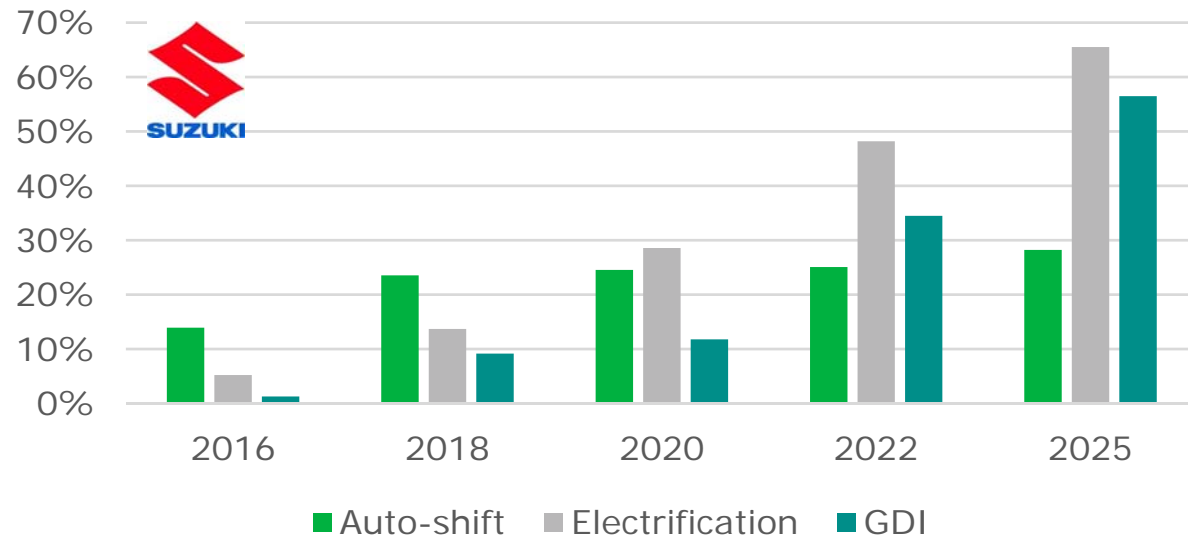
OEMs' Powertrain Strategy

Suraj Ghosh, Manager, South Asia Powertrain Forecasts,
+91 8861077100, suraj.ghosh@ihsmarkit.com

OEMs' Powertrain Strategy - Steps

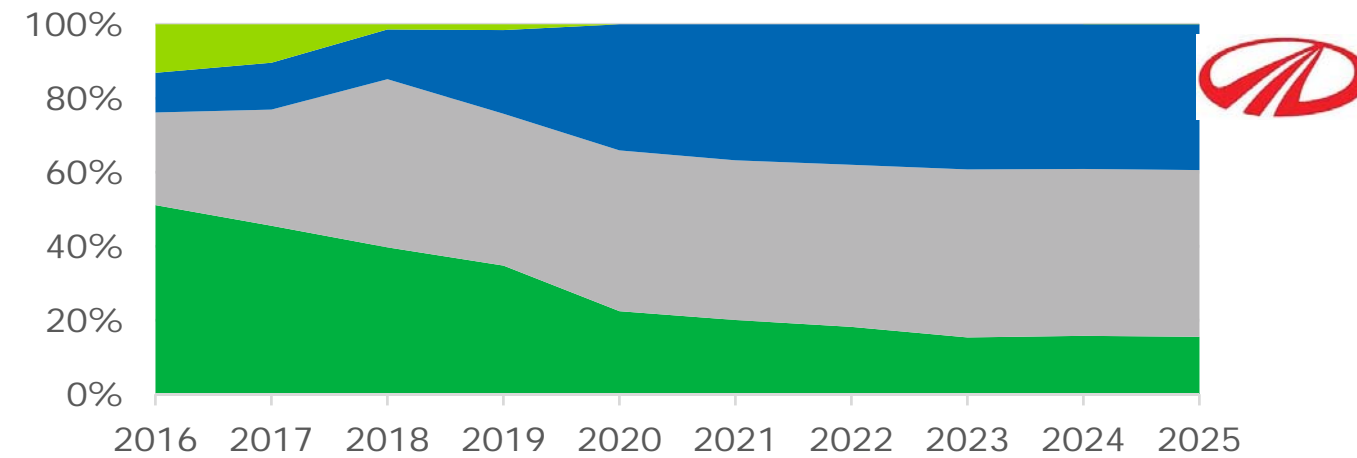
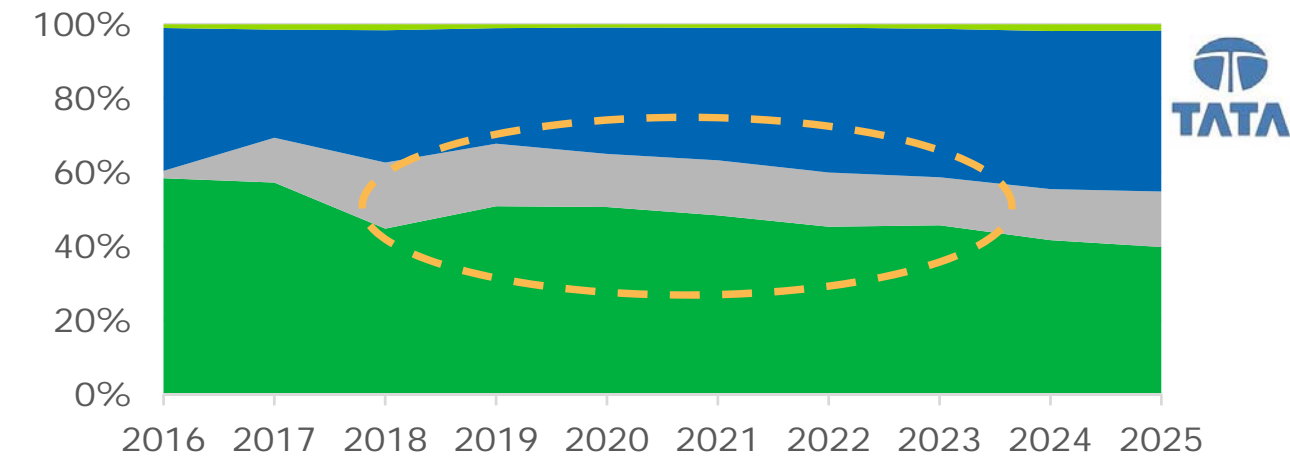
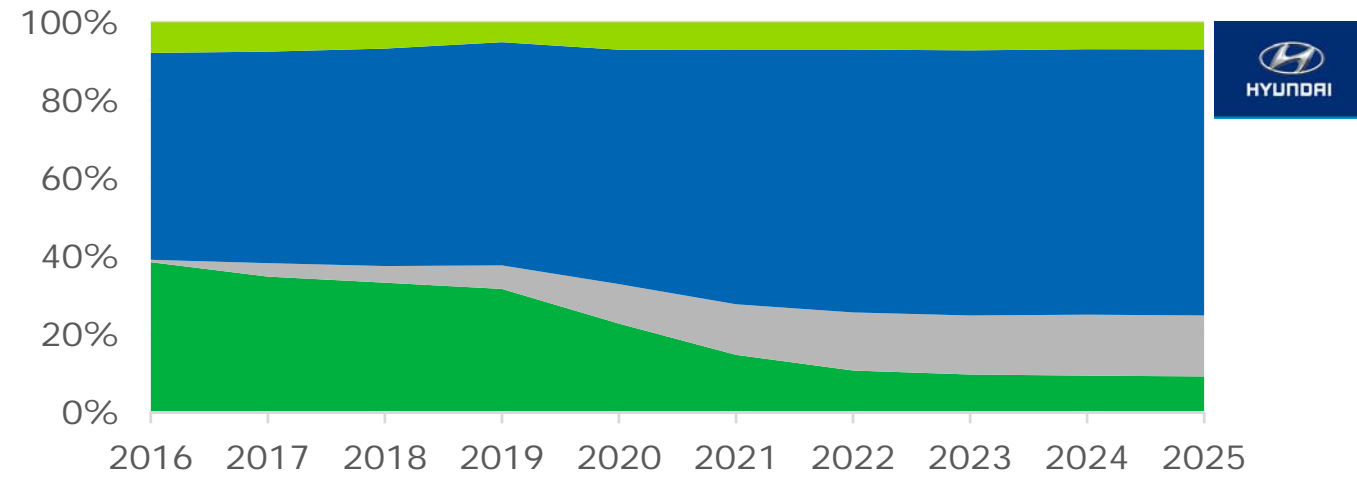
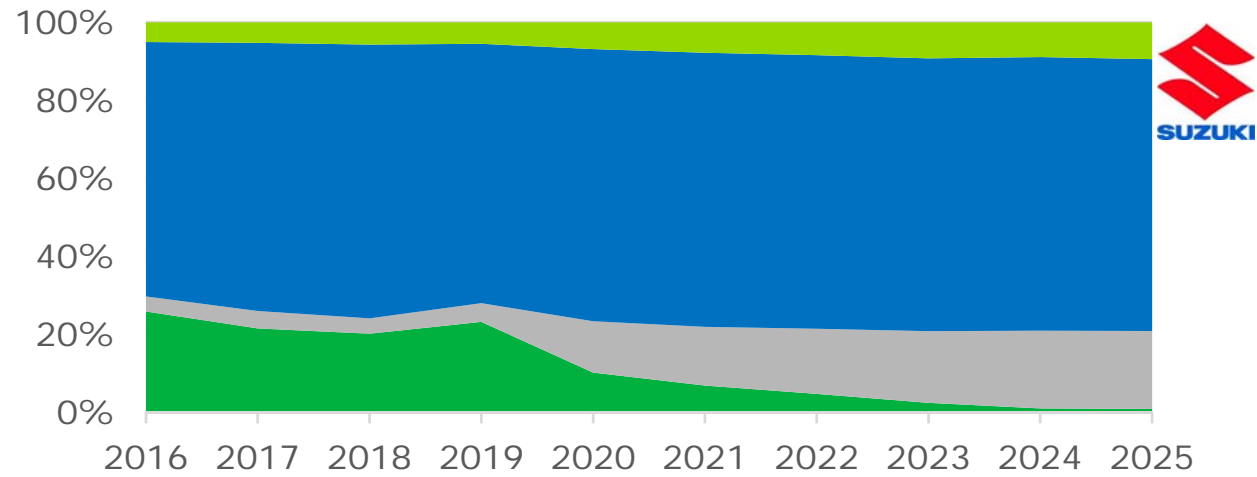


OEMs' Powertrain Strategy – The key players



Electrification = Stop/Start + Mild-Hybrid + Full-Hybrid

OEMs' Powertrain Strategy – The key players



■ Diesel-ICE ■ Diesel-Electrification ■ GAS ■ ALT Fuel

■ Diesel-ICE ■ Diesel-Electrification ■ GAS ■ ALT Fuel

OEMs' Powertrain Strategy – Cost of BS 6 compliance

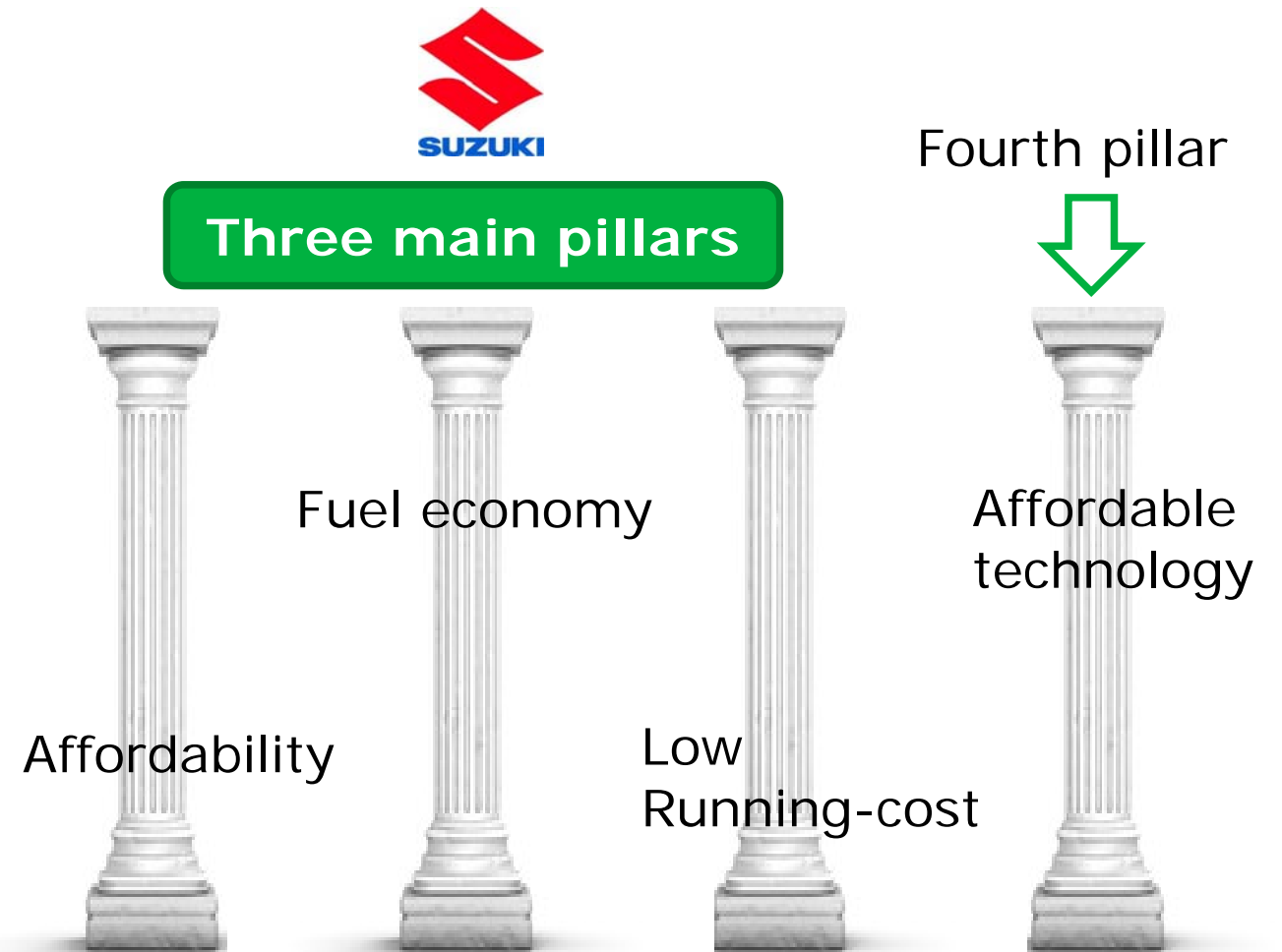
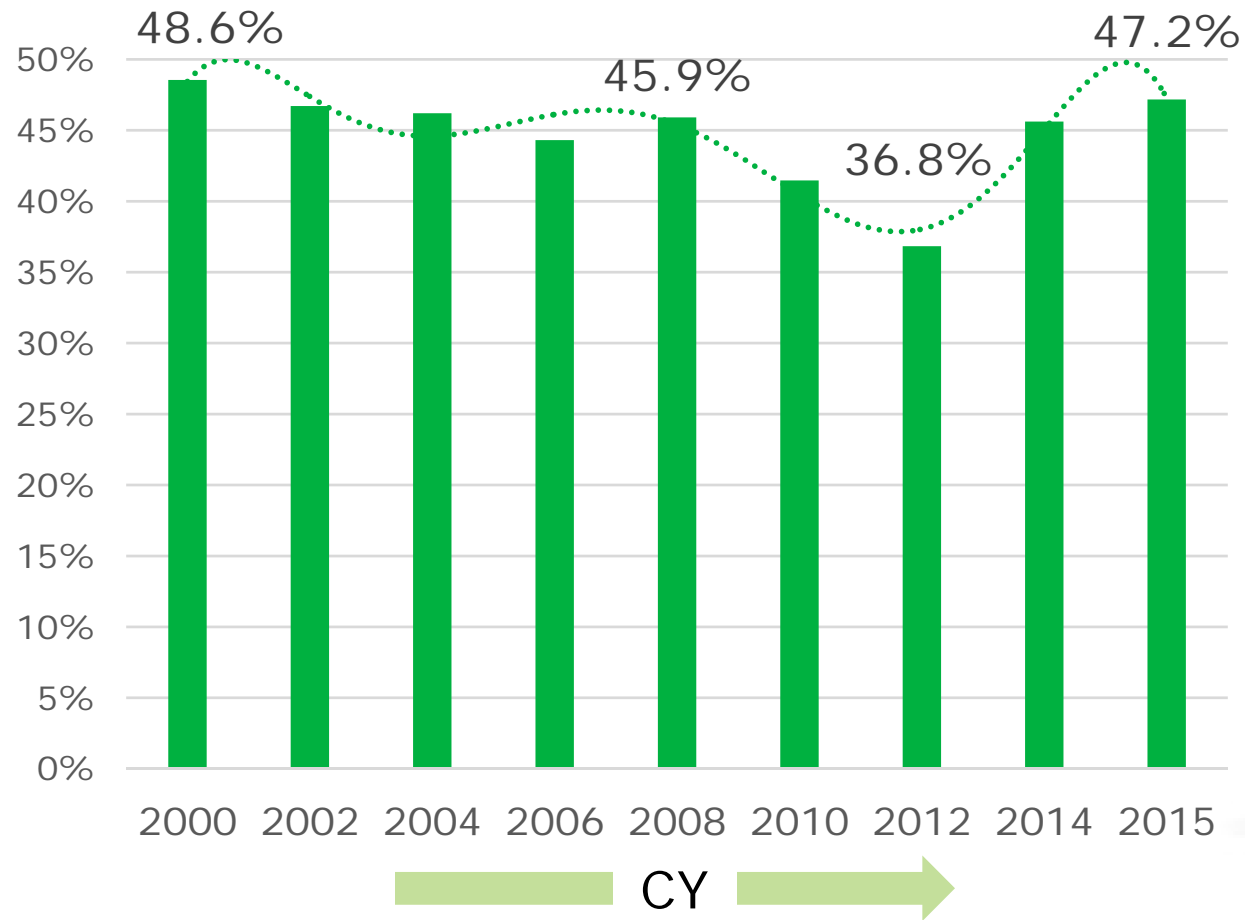
Cost Impact – IHS Estimate

₹10000 ~ \$150 ~ ¥15100

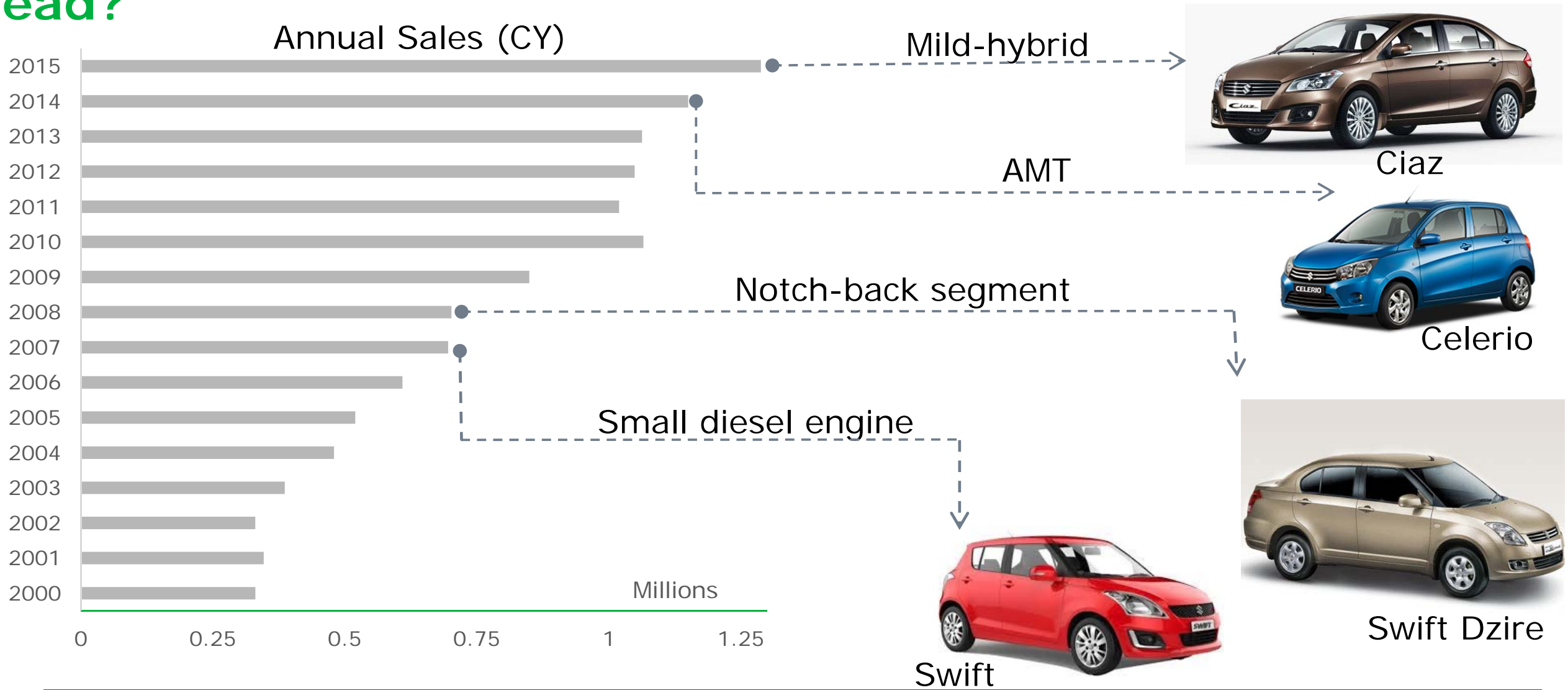
Engine Vol (liter)	PM Reduction	NOx Reduction	In-cylinder Measures	Cost/engine (₹)
Gasoline				
<1.2	Optimized cat/GPF*	None/EGR*	Low/Mild	0 – 10k
1.2 – 2.0	Optimized cat/GPF*	EGR	Mild	5k – 15k
2.0 – 2.5	Optimized cat/GPF*	EGR	Mild	10k – 20k
>2.5	Optimized cat/GPF*	EGR	Mild	10k – 20k
Diesel				
<1.5	DPF	LNT	Mild	20k – 30k
1.5 – 2.0	DPF	LNT/SCR	Mild to Strong	30k – 50k
2.0 – 2.5	DPF	SCR	Strong	50k – 70k
2.5 – 3.0	DPF	SCR	Strong	70k – 100k
>3.0	DPF	SCR	Strong	70k – 100k

OEMs' Powertrain Strategy – Why Maruti Suzuki continues to lead?

Market Share (LV<3.5T, Category: Cars)



OEMs' Powertrain Strategy – Why Maruti Suzuki continues to lead?

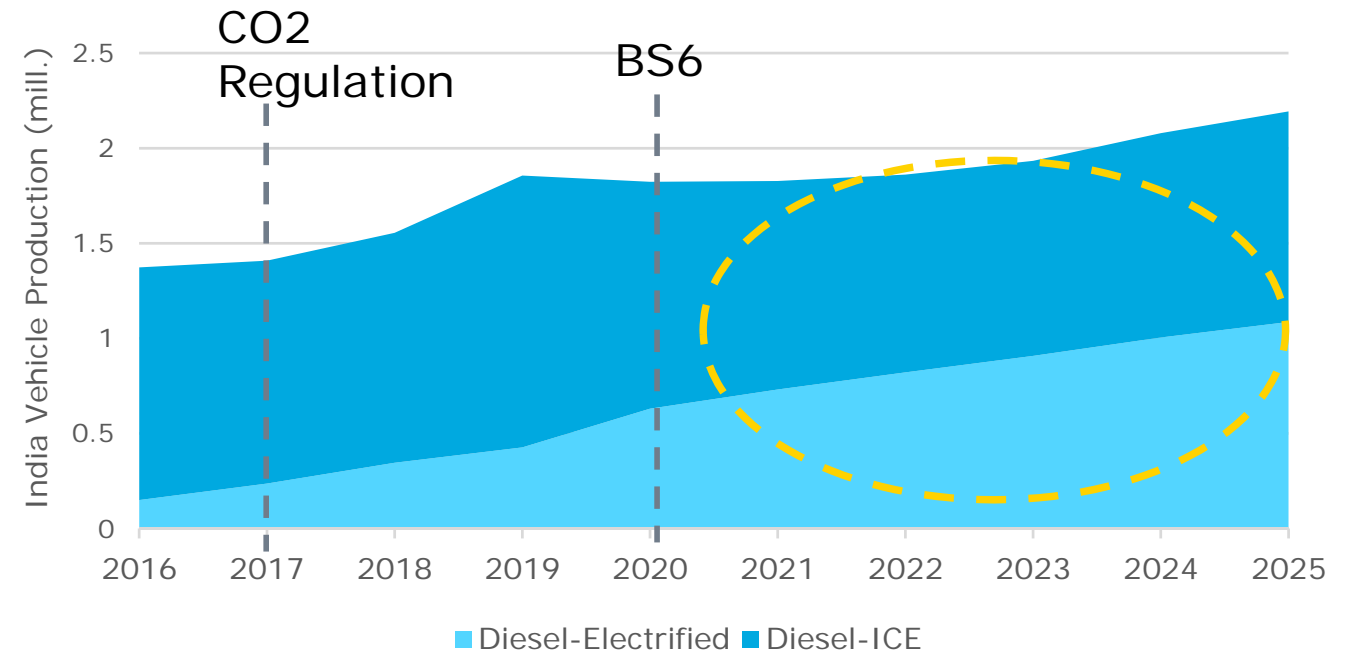
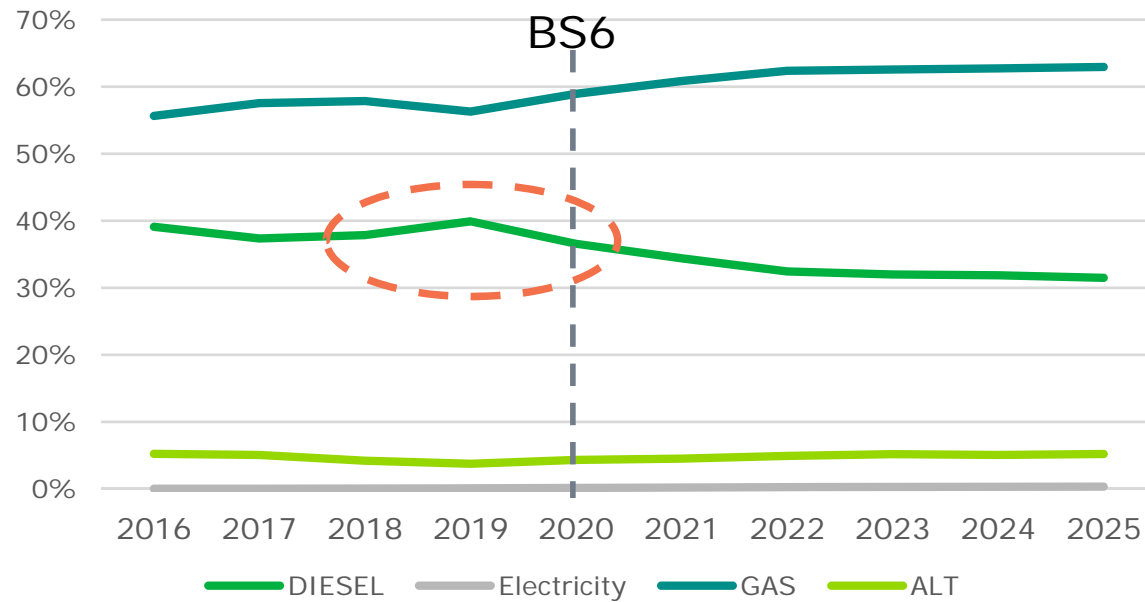


Customer Evolution

Suraj Ghosh, Manager, South Asia Powertrain Forecasts,
+91 8861077100, suraj.ghosh@ihsmarkit.com

Consumer Evolution

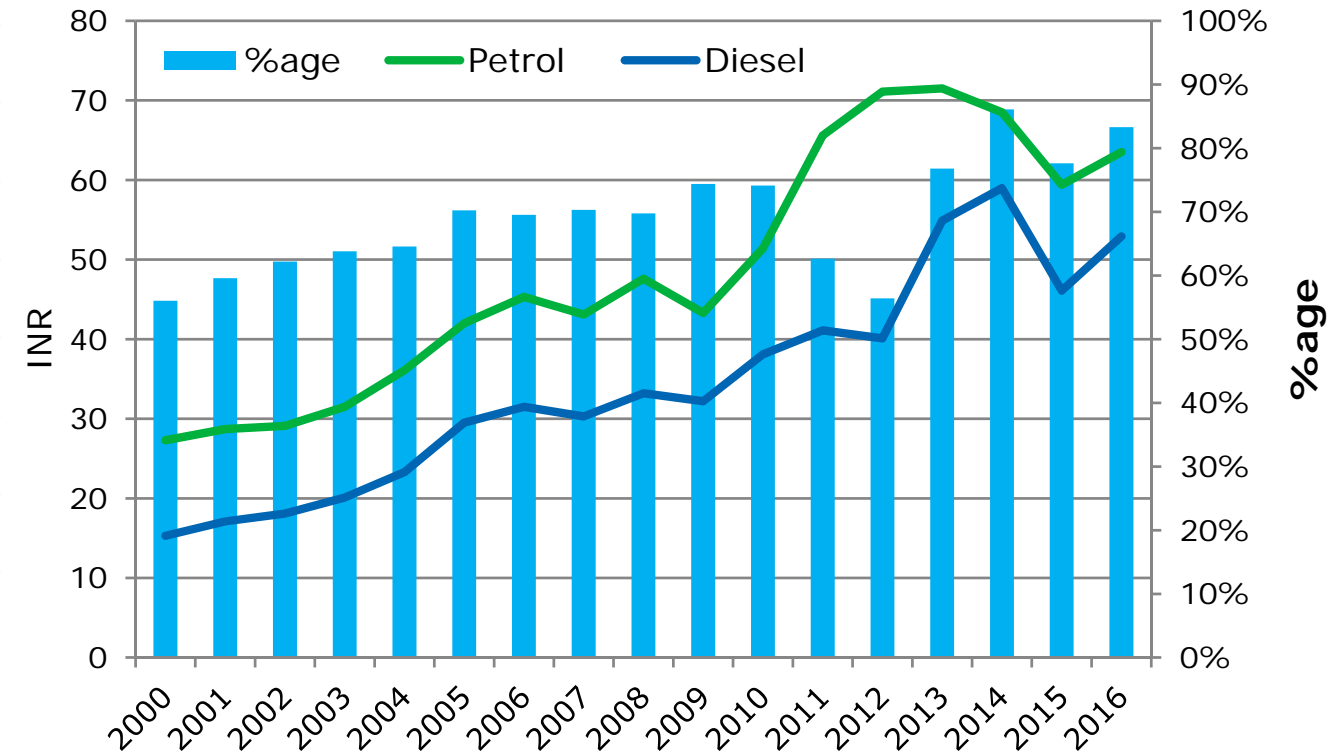
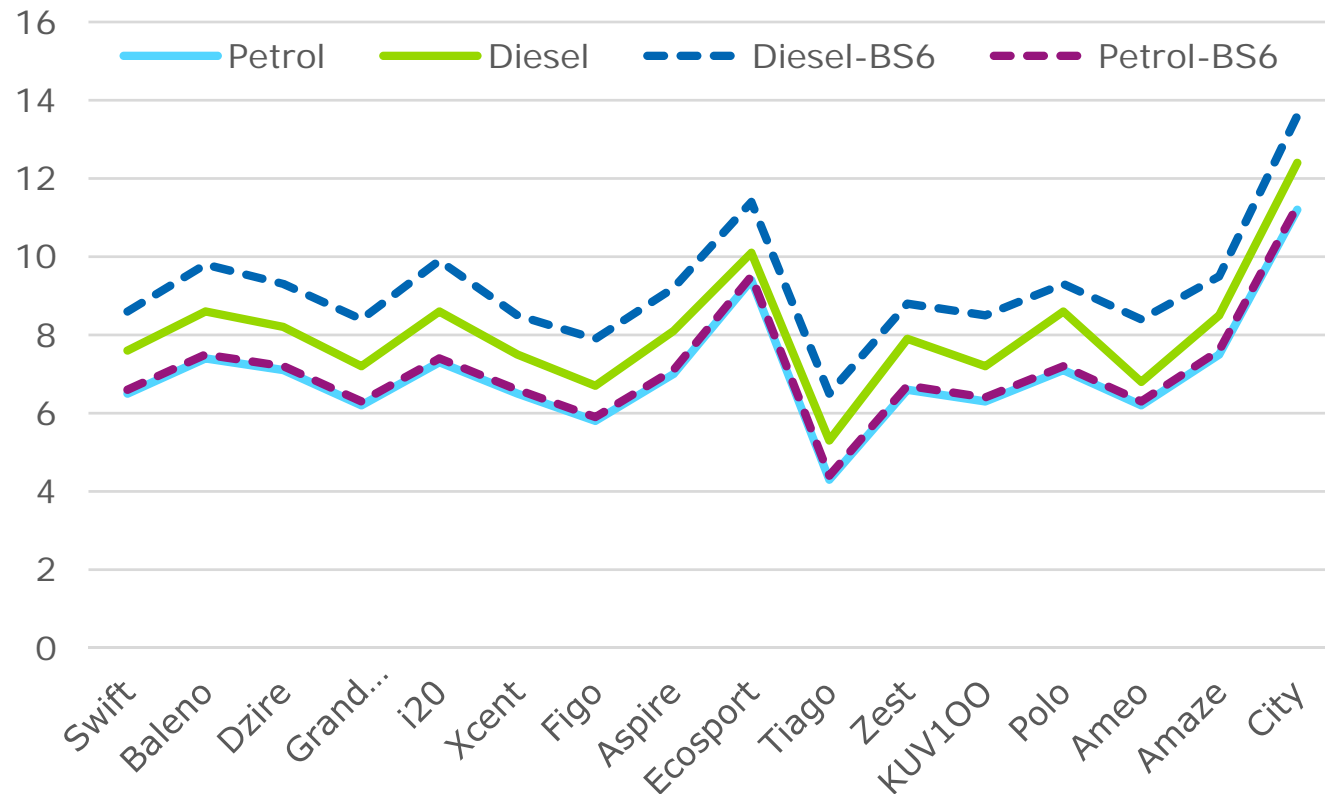
The Petrol vs Diesel Scenario



- Diesel share in PV segment will reduce to about 35% by 2020.
- Correspondingly, petrol share will increase to about 60%.
- Almost 40% of diesel cars will have some sort of electrification.
- Pre-buy effect expected in 2019.

Consumer Evolution – Why diesel car is losing favor?

Gap in Initial price & Fuel price

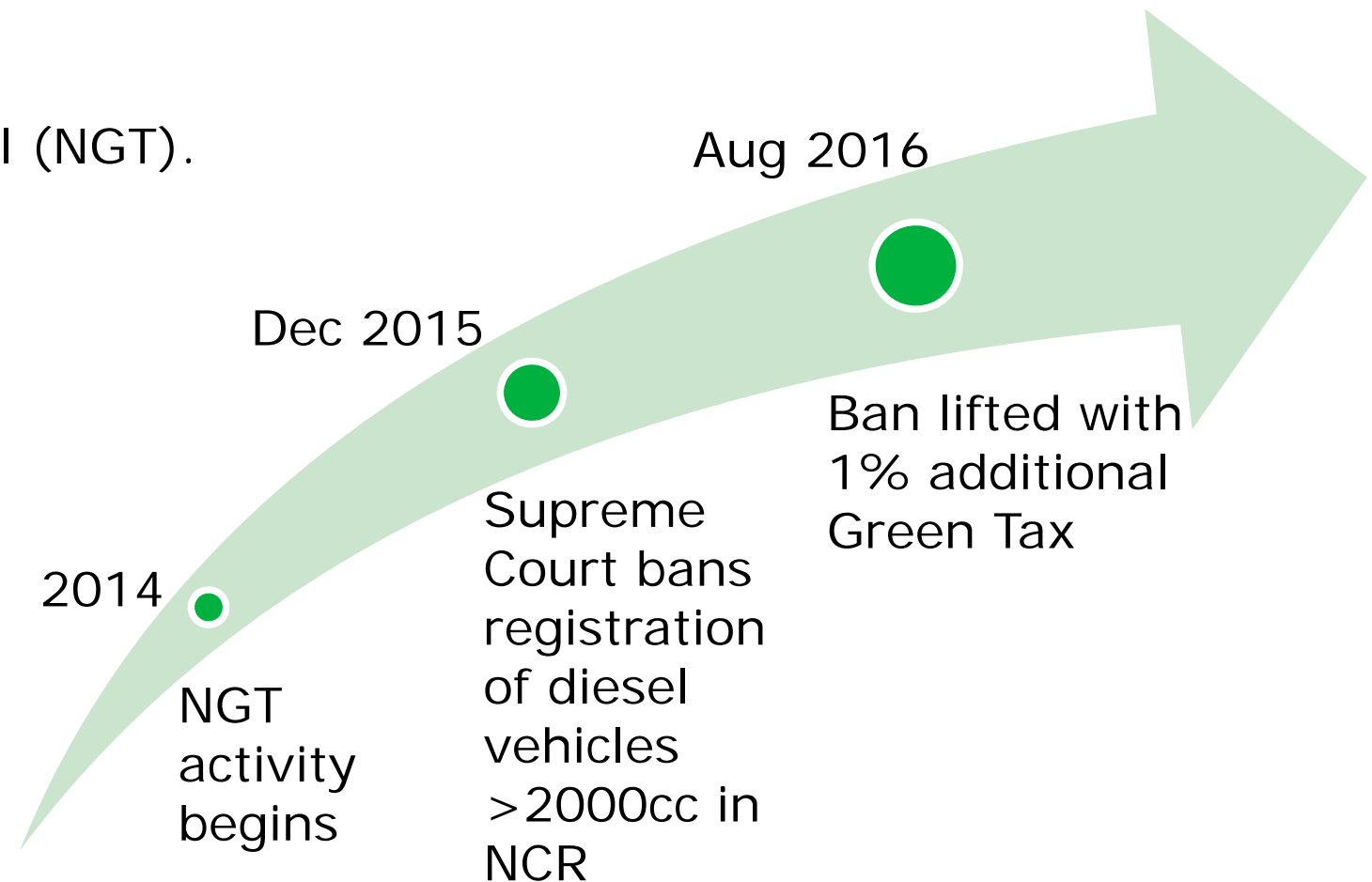


- Earlier the savings made on fuel expenditure justified higher initial price.
- Diesel cars will only get more expensive post-BS6.
- Subsidy on diesel fuel may never be back.

Consumer Evolution – Why diesel car is losing favor?

- Uncertainty around diesel cars.
 - Vilified by National Green Tribunal (NGT).
 - Judicial intervention.
 - Discouraged by government.

- ✓ Most impact on SUVs & luxury cars.
- ✓ NCR contributes to about 22-25% sales of SUVs & about 30% sales of luxury cars.



Consumer Evolution – Why diesel car is losing favor?

- Resale value affected.
 - Uncertainty over future court rulings.
- More options in petrol vehicles.



- Mahindra to introduce petrol engines across its portfolio.
- Maruti Suzuki will introduce petrol engine in its compact-SUV, Brezza.
- Luxury makers following similar path.
- Tata and Toyota are also expected to introduce petrol engines in their UVs.



377 KB15, K10C-GDI



M-SG (1.2L, 1.5L, 2.0L)



Dragon
(1.2L & 1.5L)



New L
New K



S1G
S2G

Consumer Evolution – Acceptability of xEVs in India?



Legislations



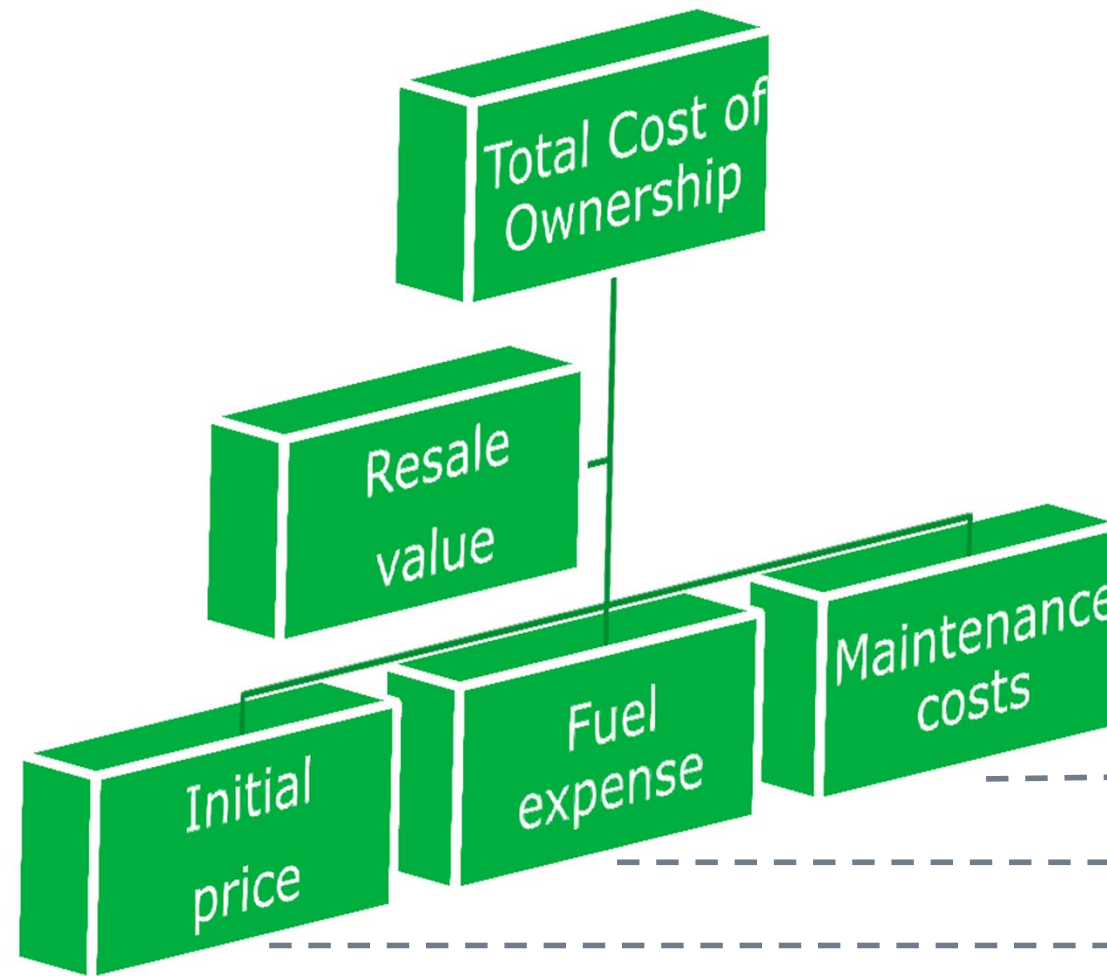
Oil price



Charging infra



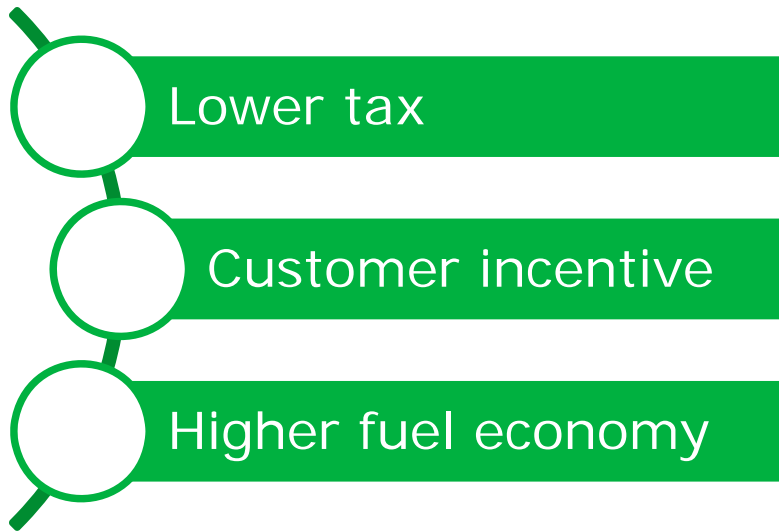
Incentives



BEVs	Orange
Full-Hybrids	Orange
Mild-Hybrids	Green
BEVs	Green
Full-Hybrids	Green
Mild-Hybrids	Orange
BEVs	Red
Full-Hybrids	Red
Mild-Hybrids	Green

Consumer Evolution – Success of Mild-hybrids in India

- Primary drivers:
 - FAME incentives.
 - Affordability.
 - Positive effect on TCO.
 - Odd-even rule in National Capital Region (NCR).
 - Cover from “abrupt” judicial interventions.



INR 0.9 million



28.09kmpl

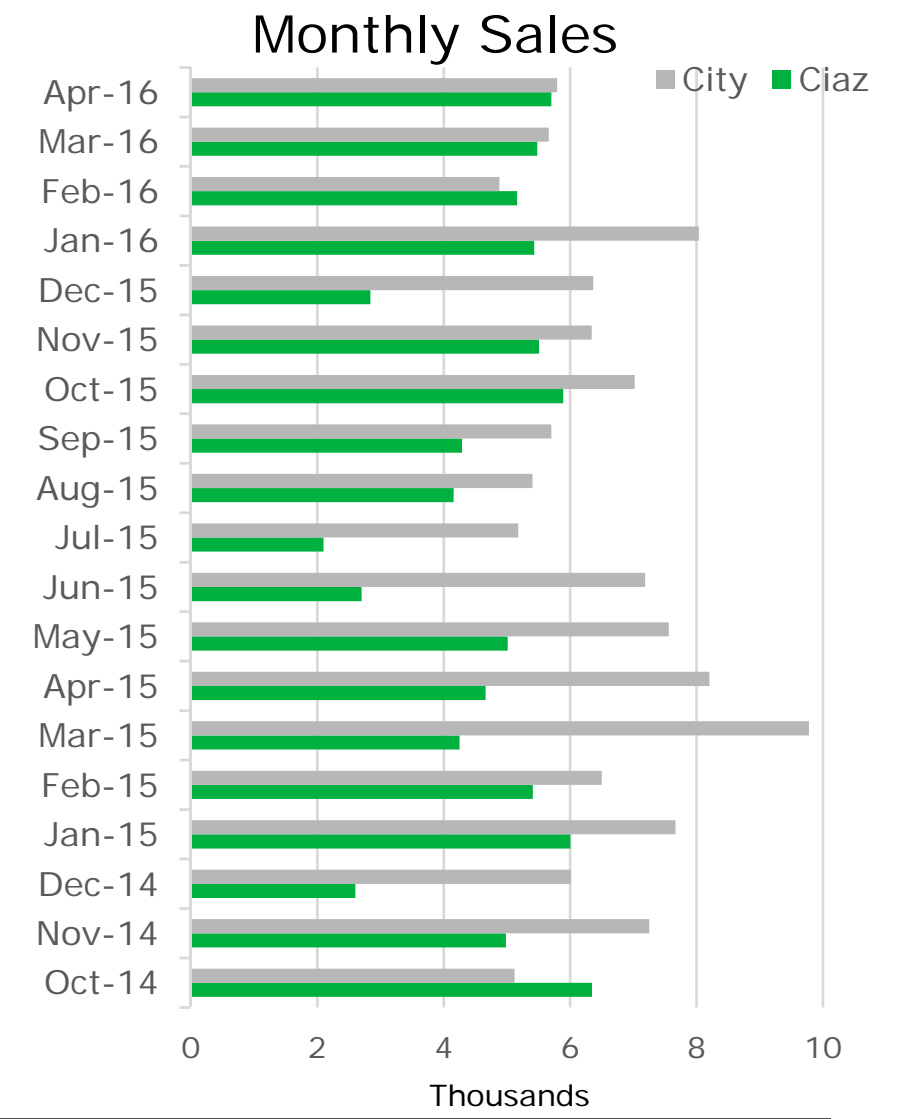


INR 11.2 million

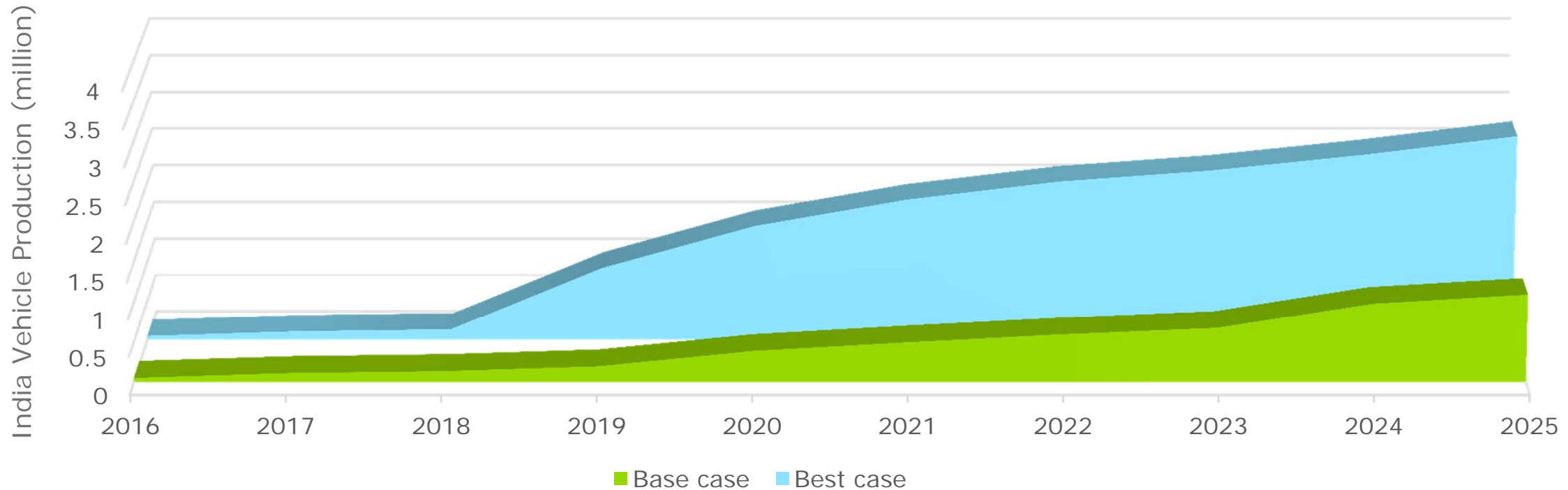


26.0kmpl





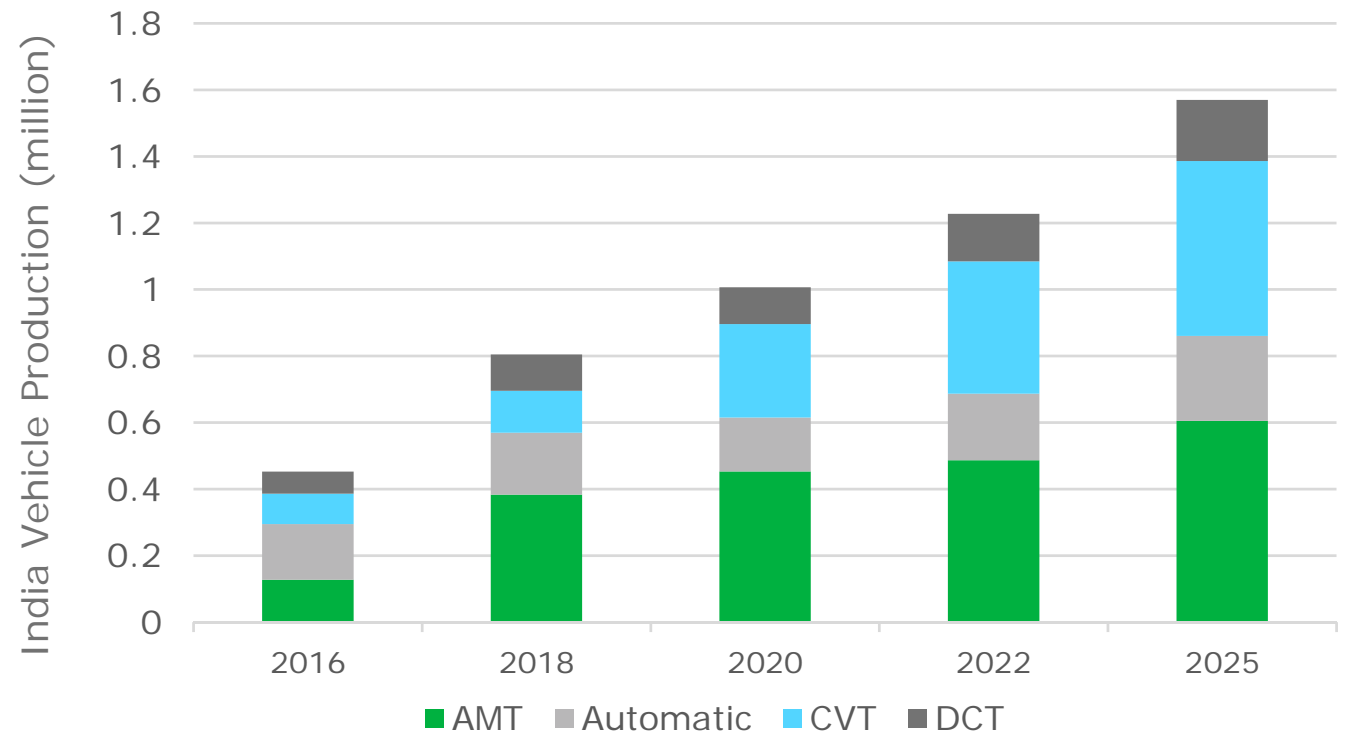
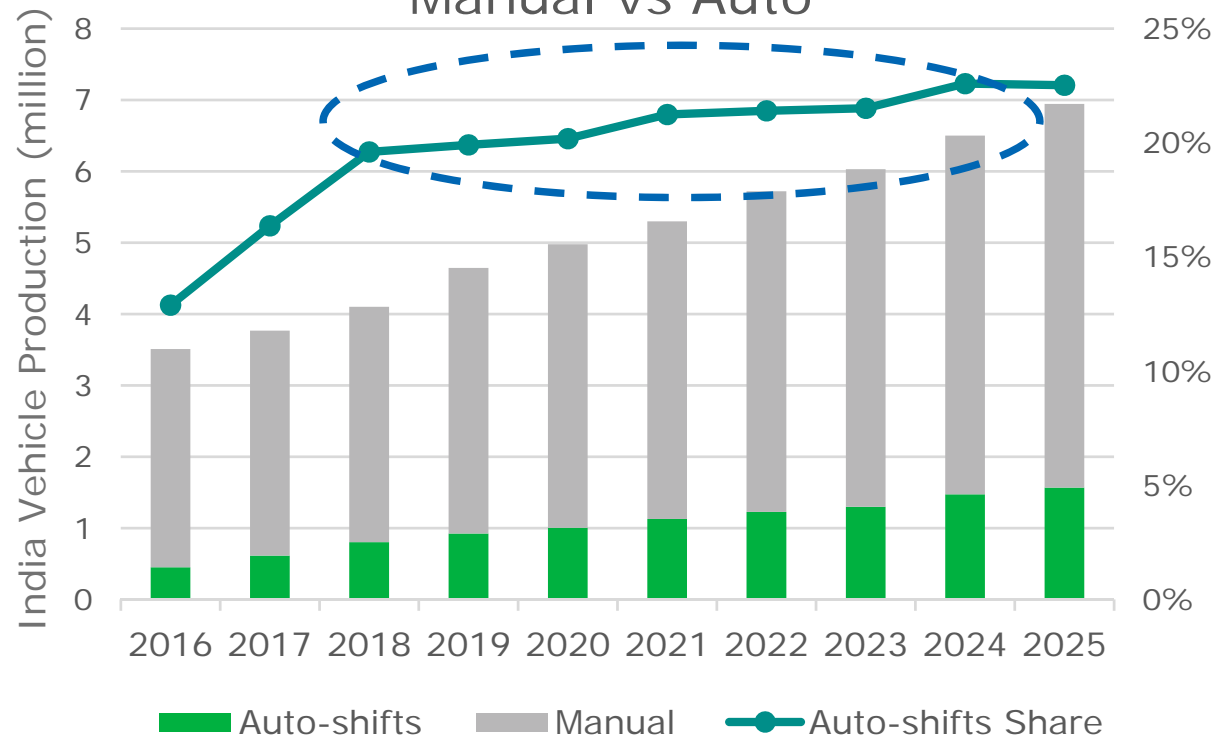
Consumer Evolution – Potential for Mild-hybrids in India



- Factors for "Best Case":
 - Continuanance of FAME incentives.
 - Legislative push.
 - Affordability vis-a-vis full-hybrids/BEVs.
 - Automakers' focus.
 - Escape route for diesel cars.

Consumer Evolution – Indian customer ‘tasting’ auto-shift

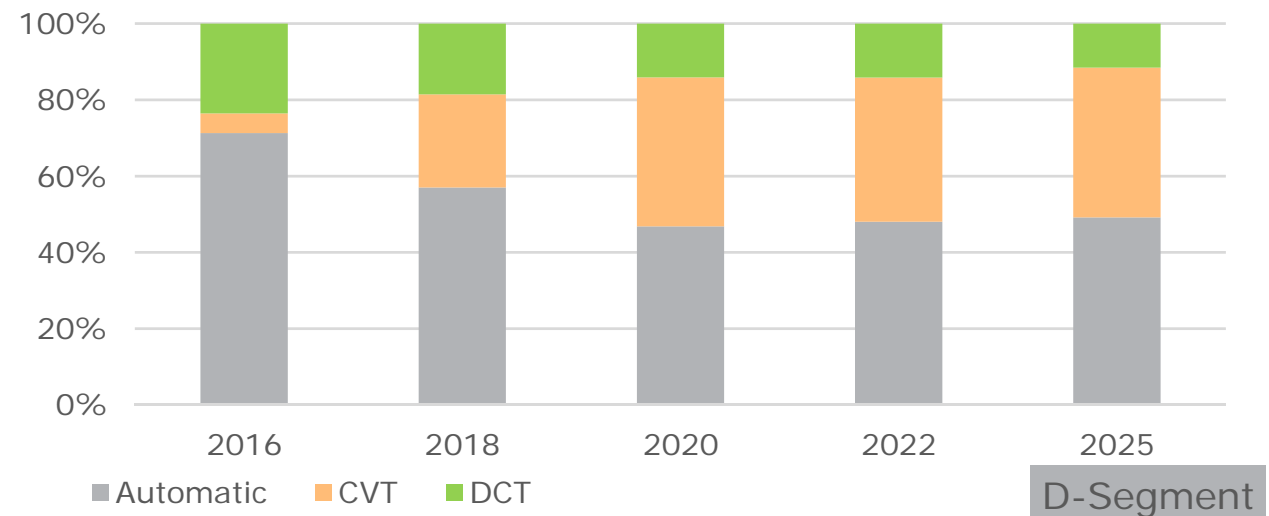
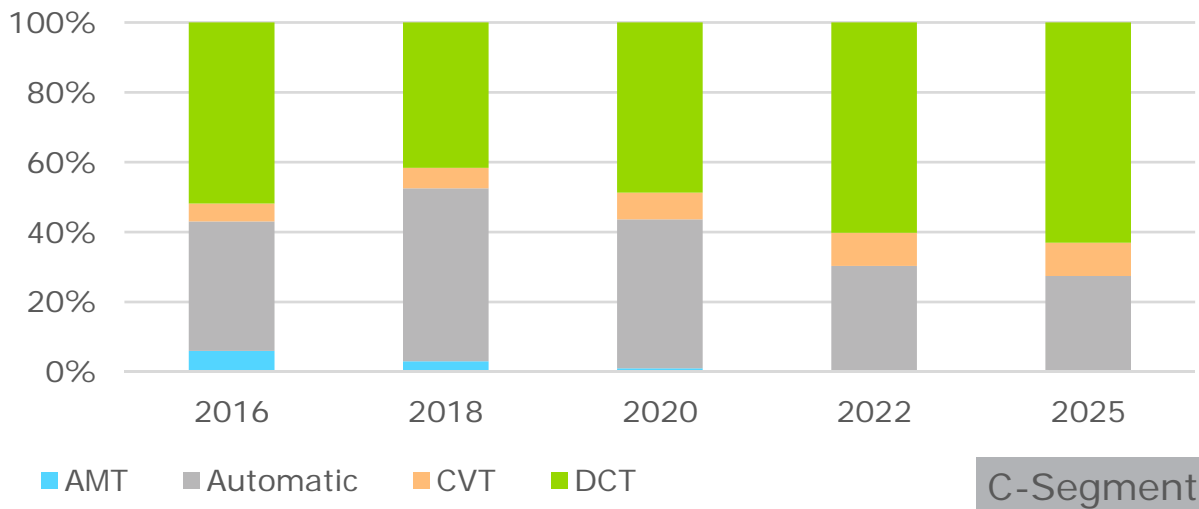
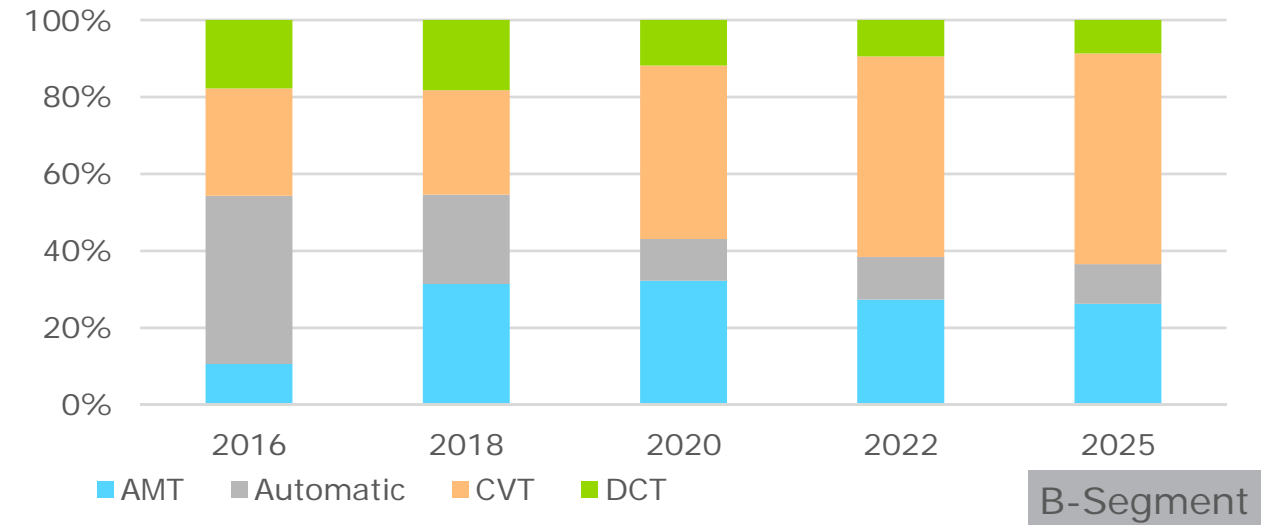
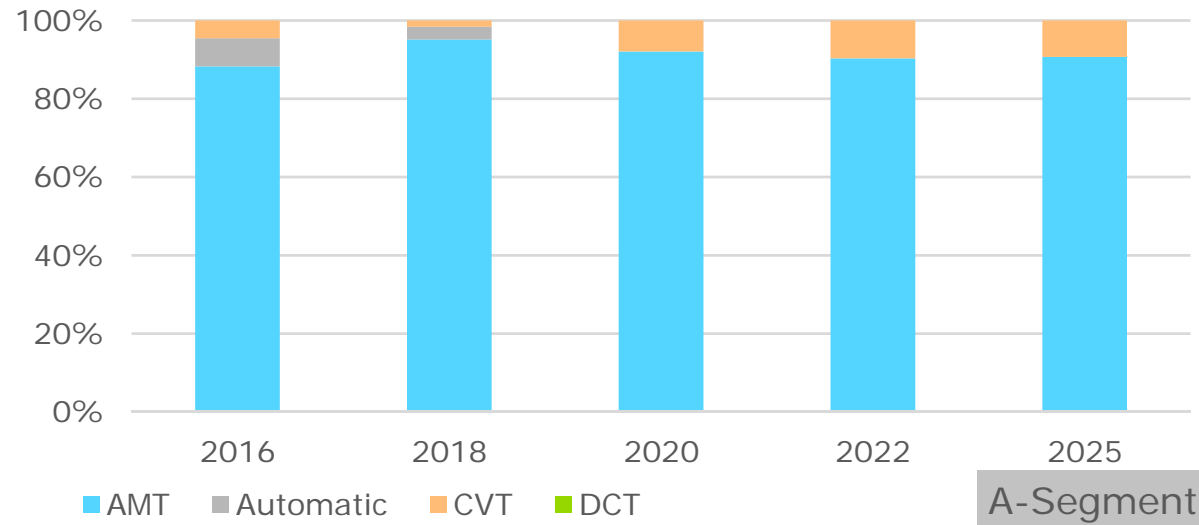
Manual vs Auto



- Affordable price.
- Fuel economy at par with MTs.
- Urban traffic congestion.

- Increasing ‘first-time’ drivers.
- Increasing female drivers.

Consumer Evolution – Indian customer tasting auto-shift



Implementation Challenges

Suraj Ghosh, Manager, South Asia Powertrain Forecasts,
+91 8861077100, suraj.ghosh@ihsmarkit.com

Implementation Challenges – OEMs

OEMs:



Opportunity



	Global OEMs	Domestic OEMs
Technology	Indigenize	New development
Suppliers	Developed	New collaboration
Investment	Localization	New set-up



Huge opportunity for global suppliers of fuel injection systems, after-treatment devices, EGR systems, ISG systems etc.

Implementation Challenges – Government

Test Cycle

Finalize, Clarity & Strict implementation



Urea/AUS32

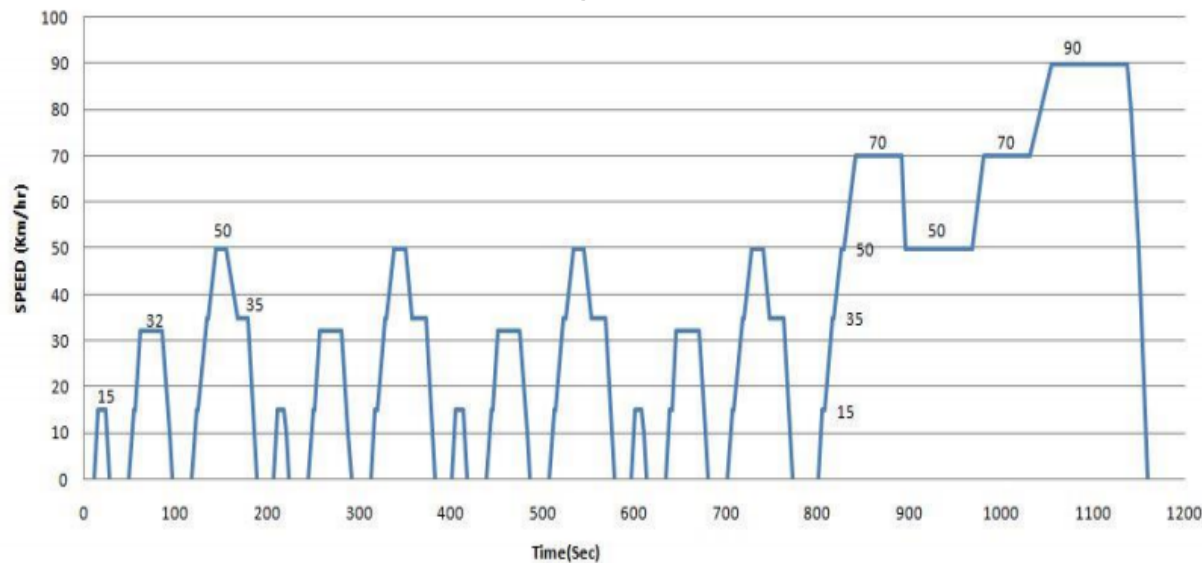
Supply & Refill network



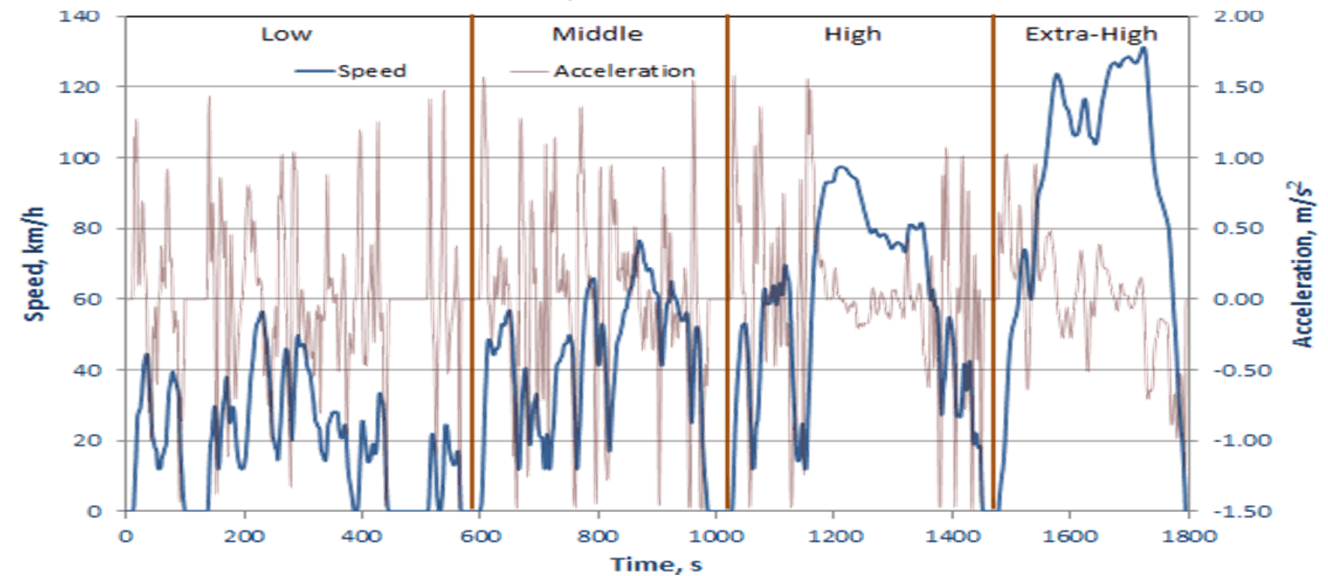
Ground execution

Awareness, Education, Execution

MIDC



WLTC



RDE – Under discussion, implementation?

Implementation Challenges – Oil Companies

FCC Naphtha Hydro-treating for ULSG & Distillate Hydro-treating for ULSD.

Expand throughput capacity of existing processes.

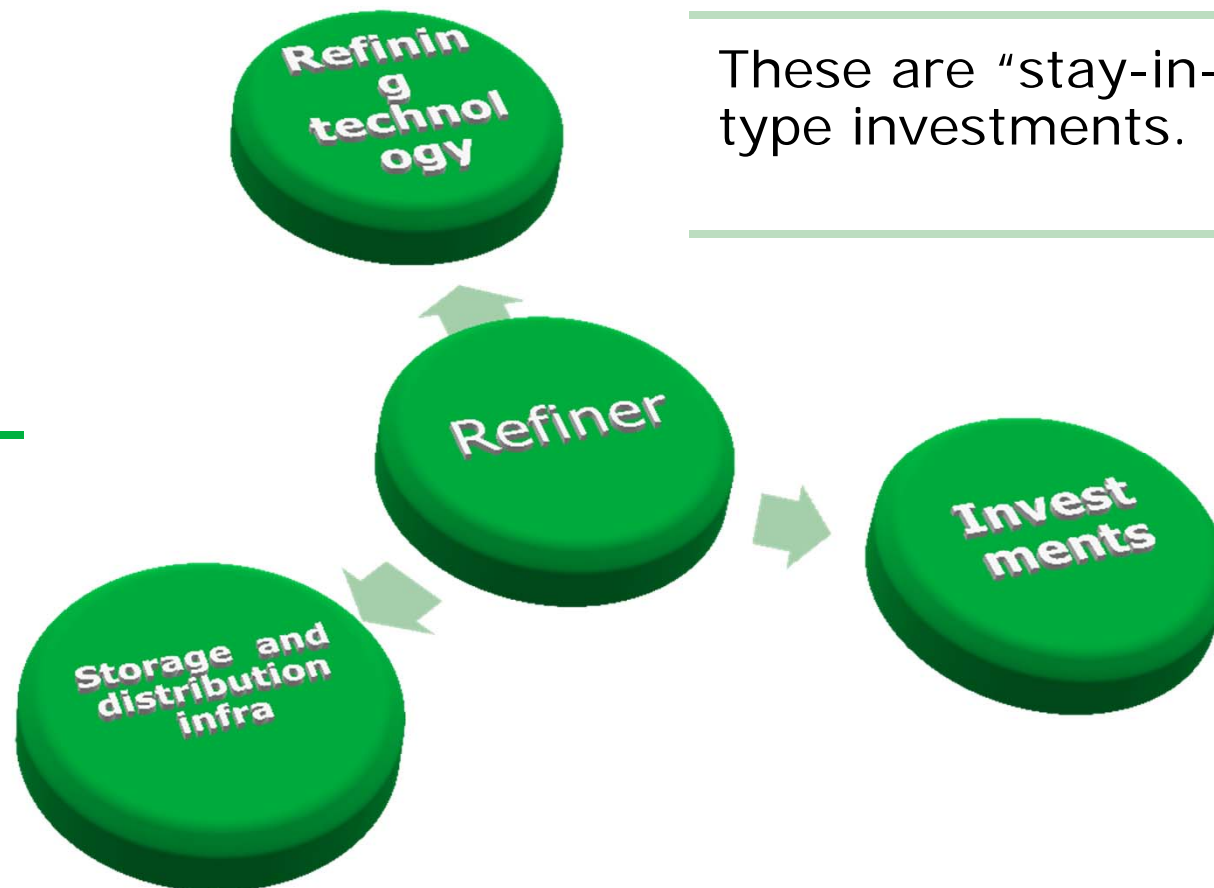
Retrofit existing units.

Proper mechanism needs to be in place for smooth transition from BS4 to BS 6 in 3 years.

Fuel availability across country.

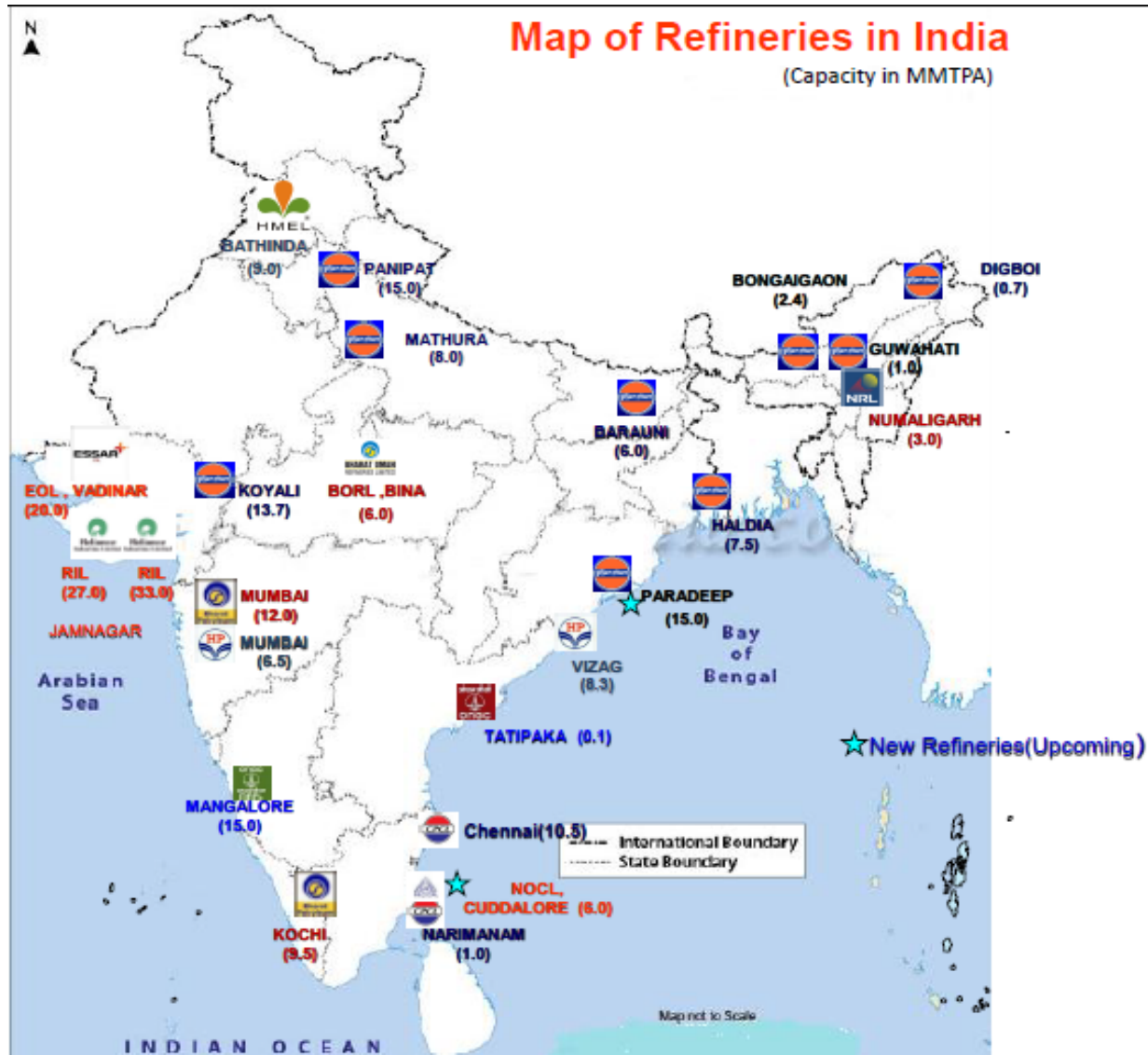
Investments of about INR 40000 Cr (USD 6 billion) required.

These are “stay-in-business” type investments.



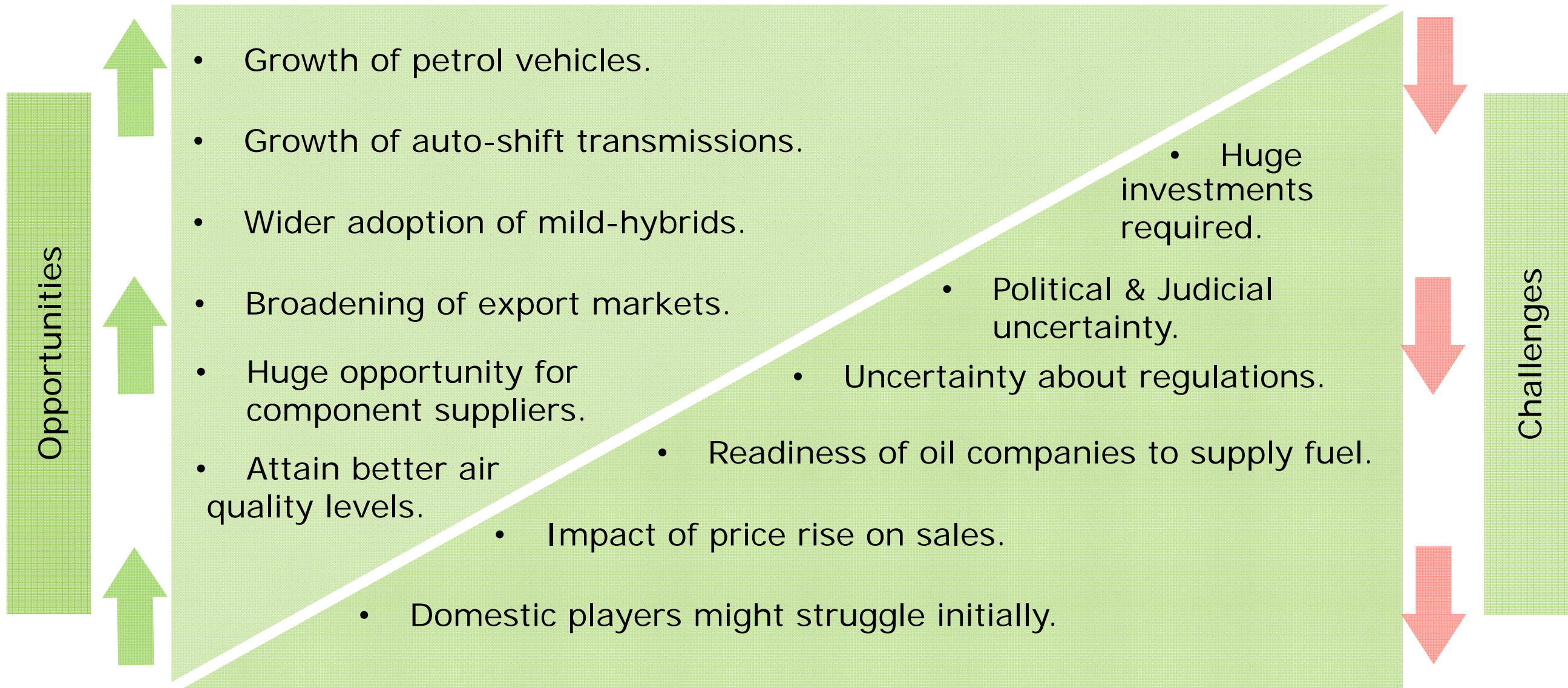
Implementation Challenges – Oil Companies

Refineries & Capacities



Companies	Capacity (MMTPA) As on 1 st April 2015
IOCL	54.2
HPCL	14.8
BPCL	21.5
CPCL	11.5
NRL, Numaligarh	3.0
ONGC, Tatipaka	0.07
MRPL, Mangalore	15.0
BPC, BORL-Bina	6.0
HEMEL, GGSR	9.0
RIL, Jamnagar	60.0
EOL, Jamnagar	20.0
Total	215.1

Key takeaway



Appendix

Pollutants table

Pollutants	CO	HC	HC + NOx	NOx	PM	PN
Units	mg/km					#/km
Gasoline						
BS III	2300	200	-	150	-	-
BS IV	1000	100	-	80	-	-
BS V	1000	100	-	60	4.5	-
BS VI	1000	100	-	60	4.5	6x10 ¹¹ *
Diesel						
BS III	640-950	-	560-860	500-780	0.05-0.10	-
BS IV	500	-	300	250	25	-
BS V	500	-	230	180	4.5	-
BS VI	500	-	170	80	4.5	6x10 ¹¹

Appendix

Incentives

	Segment	Incentive (₹)	
		Level 1	Level 2
Length < 4m (P<1200cc/D<1500cc)	Strong HEV (Advanced battery)	59000	71000
	Plug-in HEV (Advanced battery)	98000	118000
	BEV (Advanced battery)	76000	124000
Length > 4m	Strong HEV (Advanced battery)	58000	70000
	Plug-in HEV (Advanced battery)	98000	118000
	BEV (Advanced battery)	60000	138000

Appendix

Definition of Level1 and Level2

Fuel Economy Improvement Ratio	Mild-Hybrid		Strong-Hybrid		PHEV	
	Level 1	Level 2	Level 1	Level 2	Level 1	Level 2
	10%	15%	20%	30%	33%	50%

Electric Range	BEVs	
	Level 1	Level 2
	70km	105km

IHS Markit Customer Care:

CustomerCare@ihsmarkit.com

Americas: +1 800 IHS CARE (+1 800 447 2273)

Europe, Middle East, and Africa: +44 (0) 1344 328 300

Asia and the Pacific Rim: +604 291 3600

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