

REF:NS:SEC:  
14<sup>th</sup> March, 2018

**National Stock Exchange of India Limited**  
"Exchange Plaza", 5<sup>th</sup> Floor,  
Plot No.C/1, G Block  
Bandra-Kurla Complex  
Bandra (East), Mumbai 400051.

**BSE Limited**  
Phiroze Jeejeebhoy Towers,  
Dalal Street, Fort,  
Mumbai 400001.

**Bourse de Luxembourg**  
Societe de la Bourse de Luxembourg  
Societe Anonyme/R.C.B. 6222,  
B.P. 165, L-2011 Luxembourg.

**London Stock Exchange Plc**  
10 Paternoster Square  
London EC4M 7LS.

**Sub: SEBI (Listing Obligations and Disclosure Requirements), Regulations 2015 -  
Presentations made to the Analyst/Institutional Investor**

This is further to our letter bearing REF:NS:SEC dated 23<sup>rd</sup> February, 2018 wherein we had given you an advance intimation of the upcoming Analyst or Institutional Investor Interaction(s) in terms of Regulation 30(6) of the Securities and Exchange Board of India (Listing Obligations and Disclosure Requirements) Regulations, 2015.

We wish to inform that the Company today hosted the M&M IR Day with Several Funds/Investors/Analysts in Chennai. Enclosed are the presentations made at the event.

Kindly take the same on record and acknowledge receipt.

Yours faithfully,  
For MAHINDRA & MAHINDRA LIMITED



NARAYAN SHANKAR  
COMPANY SECRETARY

Encl: as above

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# M&M IR Day @ MRV

Chennai - 14 March 2018

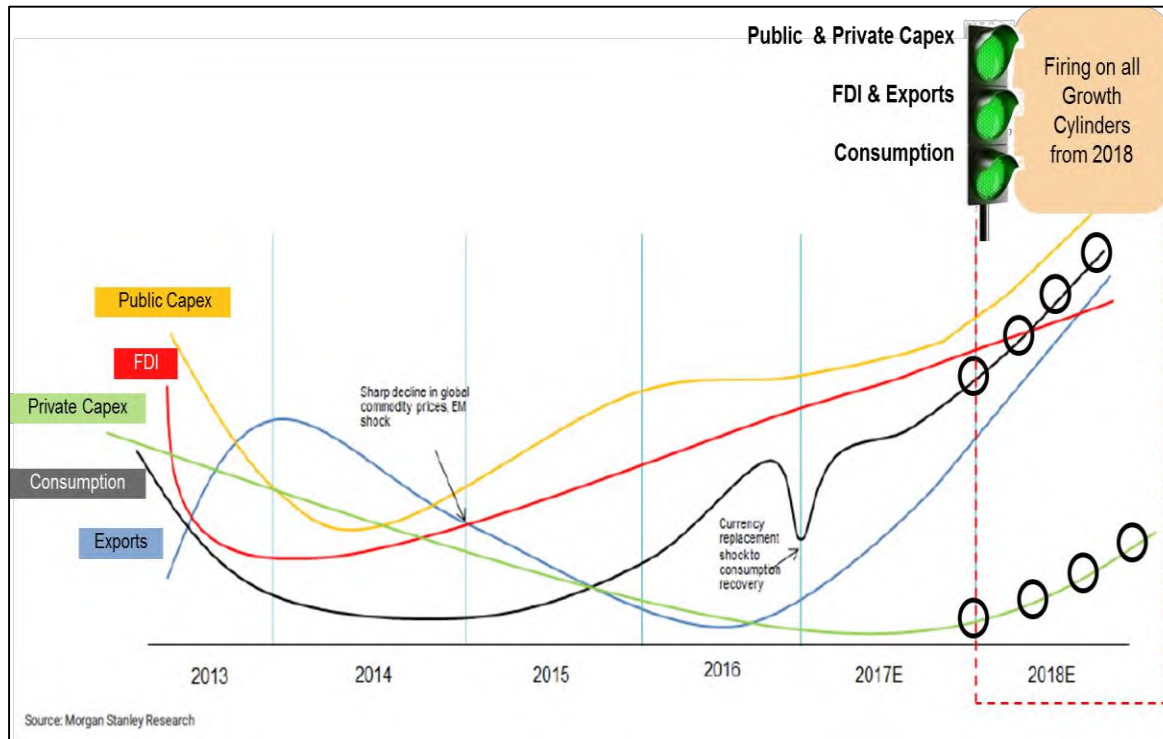
# Automotive Sector

**Rajan Wadhera**

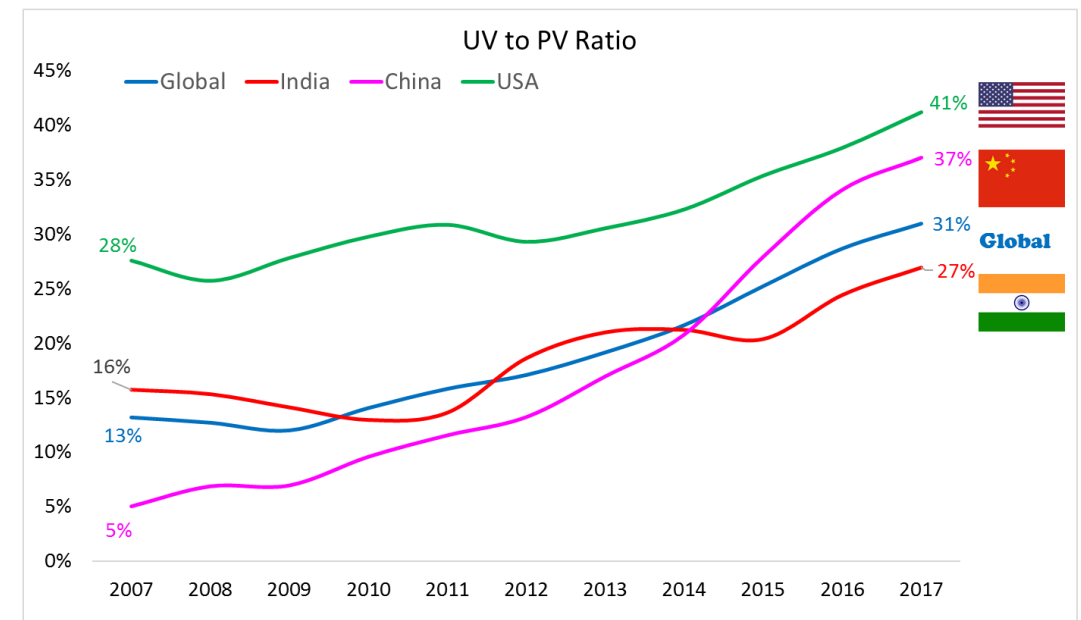
**M&M IR Day @ MRV - 14 March 2018**

# Continuation of SUV Dominance

- India Poised for Synchronous Growth



- SUV Global and Local



In India UVs have grown at CAGR of 14% in last 10 years vs 8% growth by Passenger Vehicles



# We have The SUV Heritage









1945 - 1999




2000 - 2018



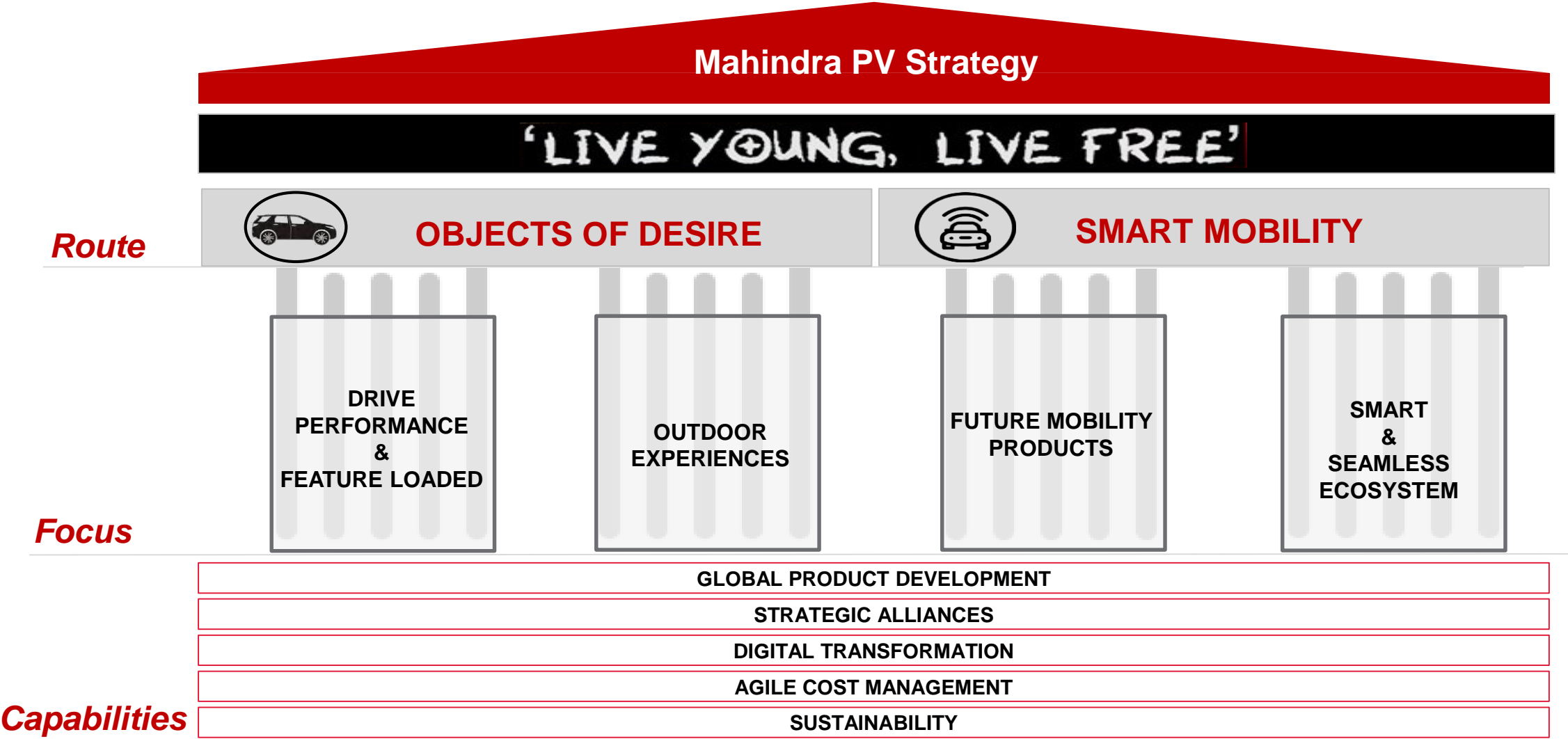
# Portfolio Planning

	Entry (A)	Compact	Mid	Premium
CUV	 <b>KUV</b>	 <b>S201</b>		 <b>XUV</b>
MPV			 <b>U321</b>   <b>Xylo</b>	
SUV	 <b>Bolero</b>	 <b>TUV</b>	 <b>Scorpio</b>	 <b>New G4</b>

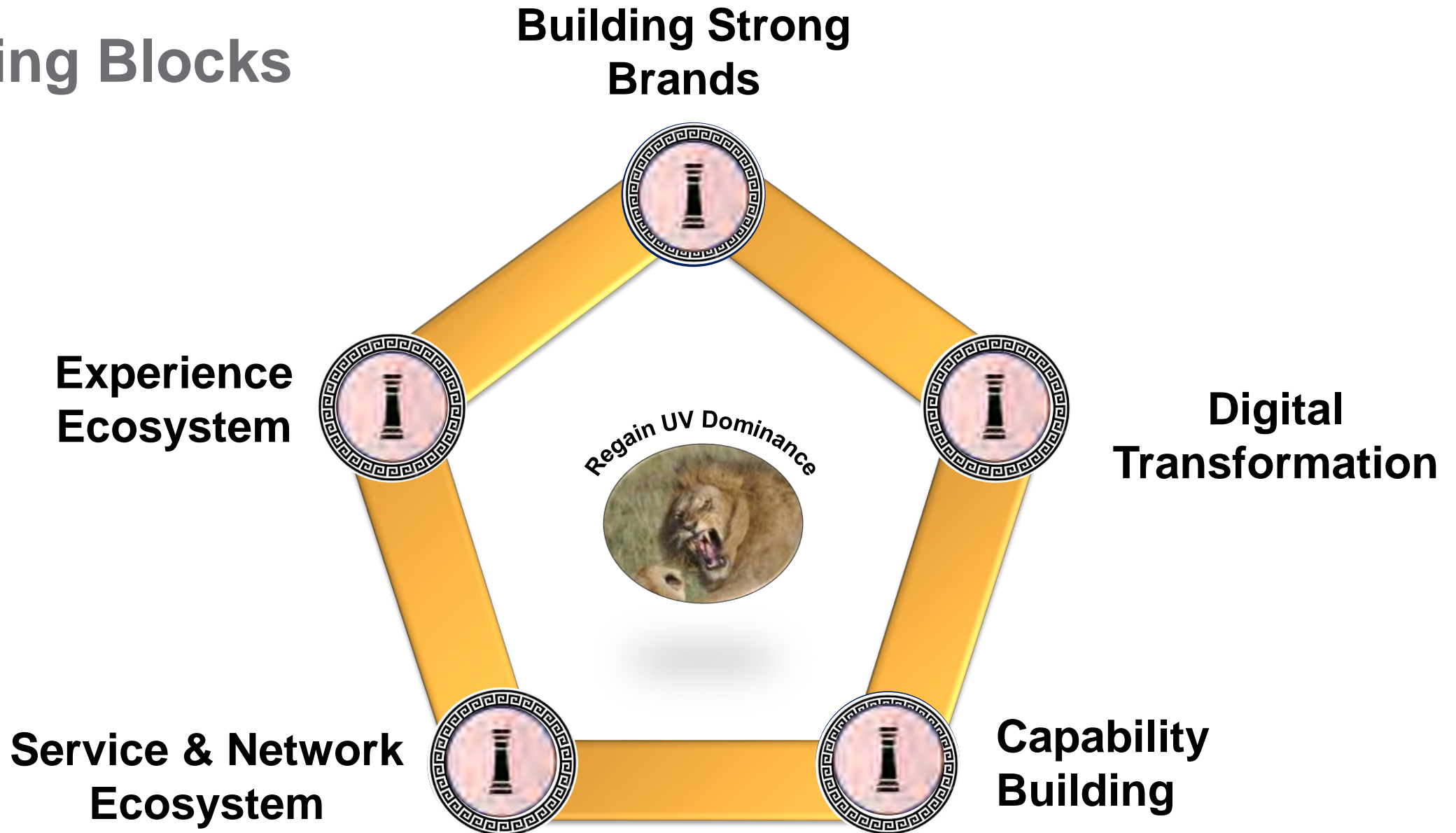
 Current

 Announced

# Right to Win



# Building Blocks





# Digital 3.0-CX

## *Selected for MVP 1*

### Bring the Showroom Home

#### What is it?

- Immersive experiences to allow customers to see different variants, colors and accessories
- **One model to be taken up in MVP 1: KUV**
- A high resolution hybrid re-rendered picture/video + VR app to augment sales visits to the customer's house

#### Benefits

- Differentiated experience – first in India that is designed to "wow" the customer
- Higher engagement for a longer duration with the customers
- Higher ability to upsell accessories (15-30% improvement)



**First time  
in auto in  
India**

# Building Power Brands

Brand





Repositioning   Digital Marketing   Customization

New Format of Dealership



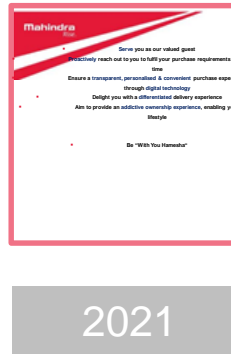
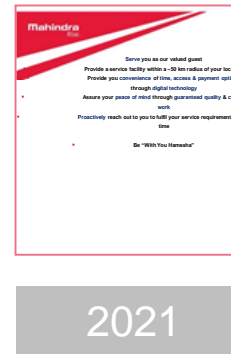



CUBE & SMART

New Promise for Sales & Service

2019


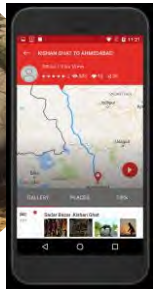
2021

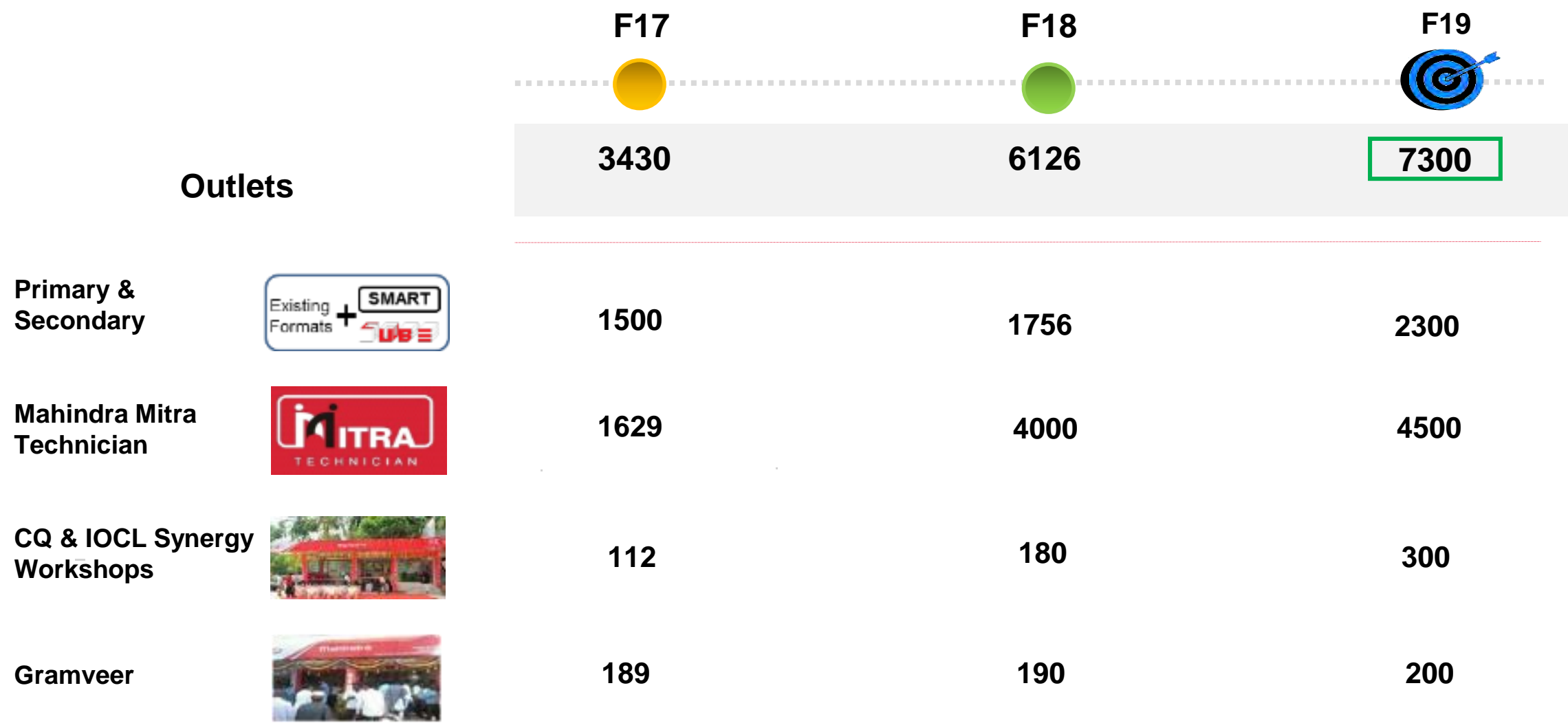
2021

2021

Addictive Experience Ecosystem

# Network Ecosystem Development Roadmap





# Technologies for Tomorrow

## Powertrain



Euro 6 and BS 6

Full Range of  
Gasoline &  
CNG  
Powertrains

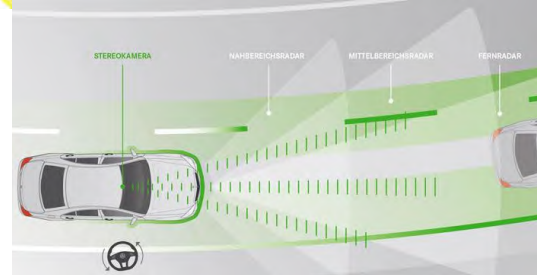


EV,  
Hydrogen

## Safety, Assisted Driving



Bharat New Vehicle  
Safety Assessment  
Program (**BNVSAP**)

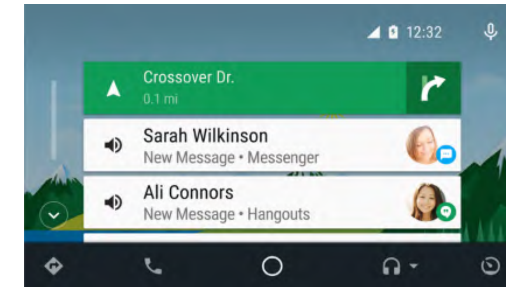


Intelligent &  
Assisted  
Driving



Cross Traffic Alert

## Infotainment, Connected Car



Android Auto

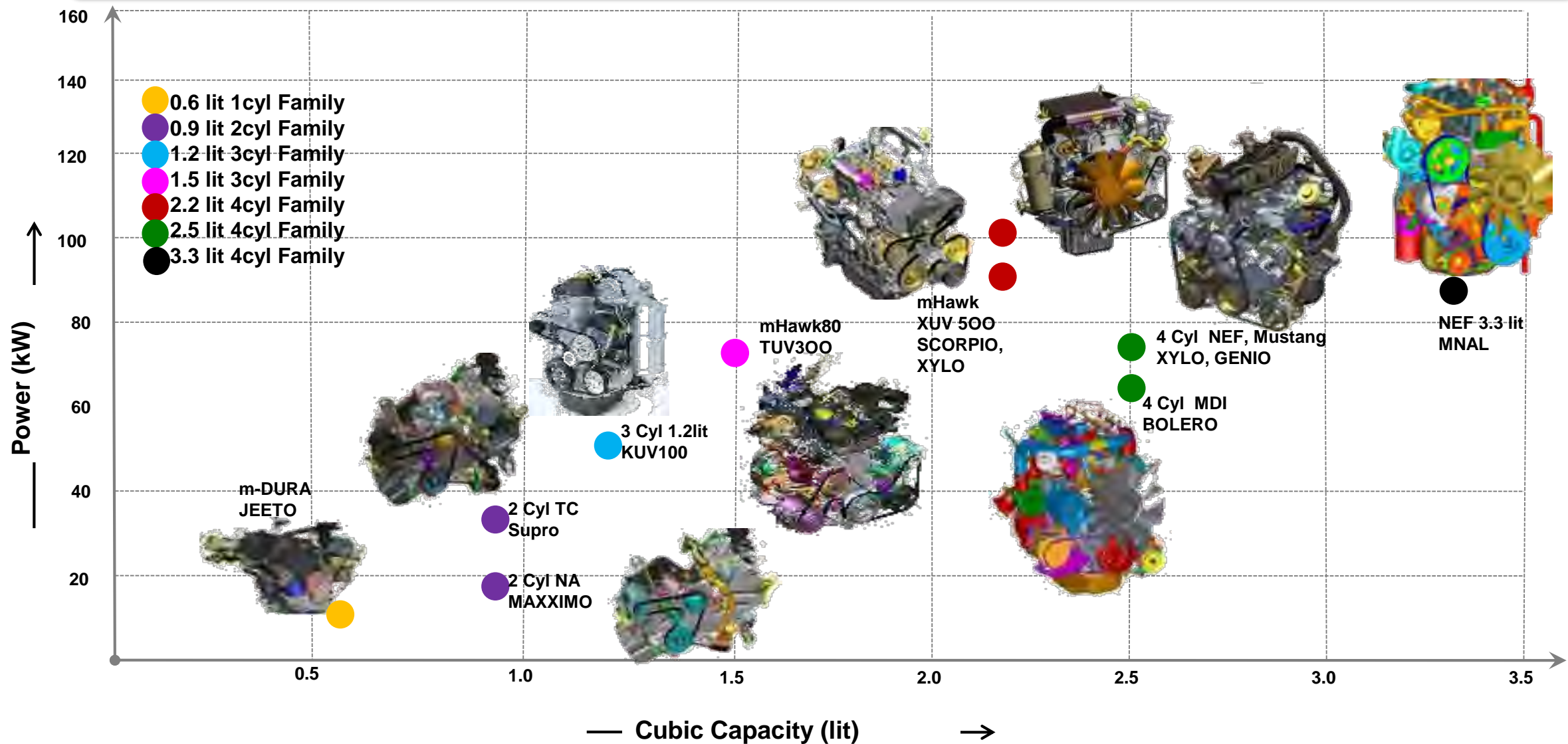


Apple Car Play



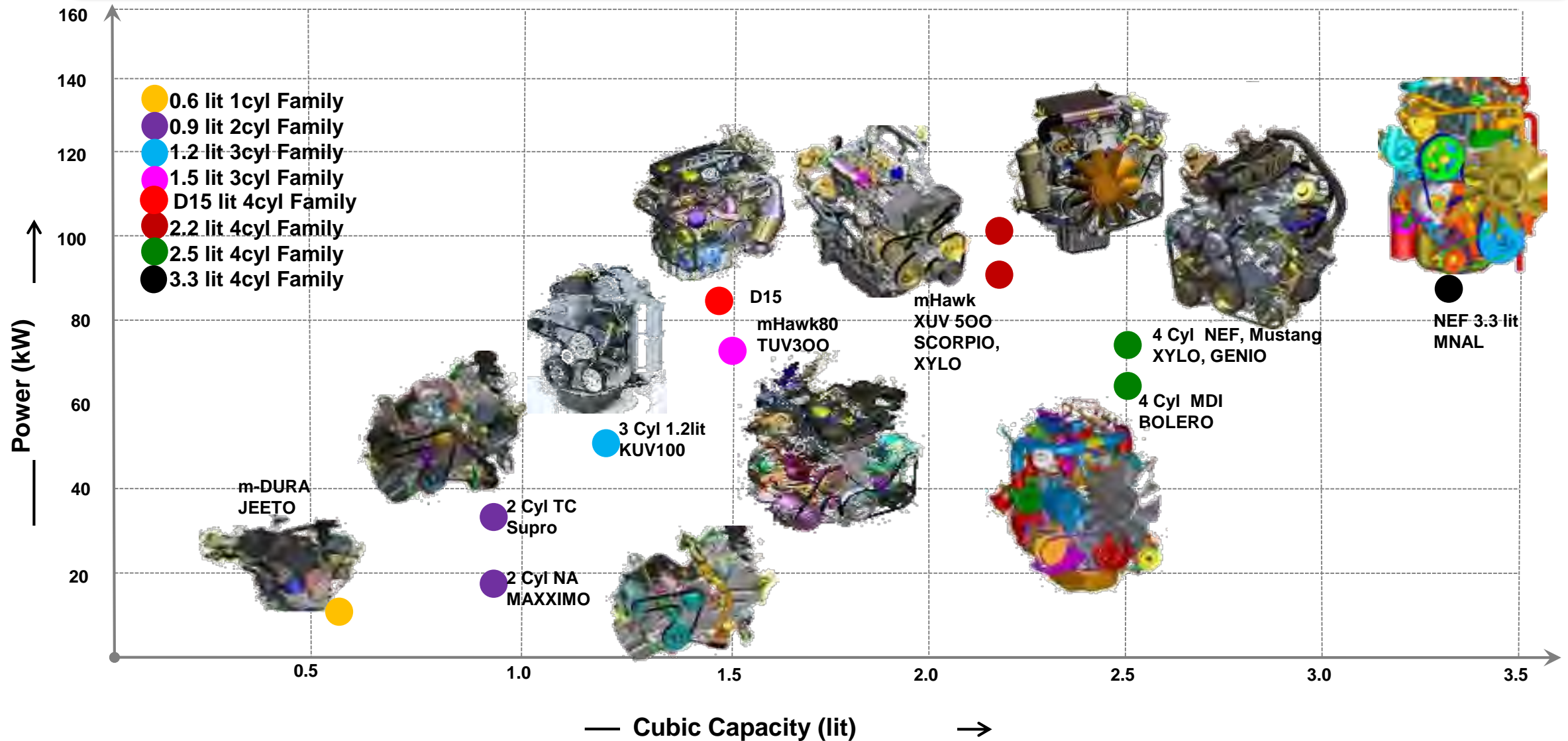
# Engine Platforms

## Current Diesel Engines



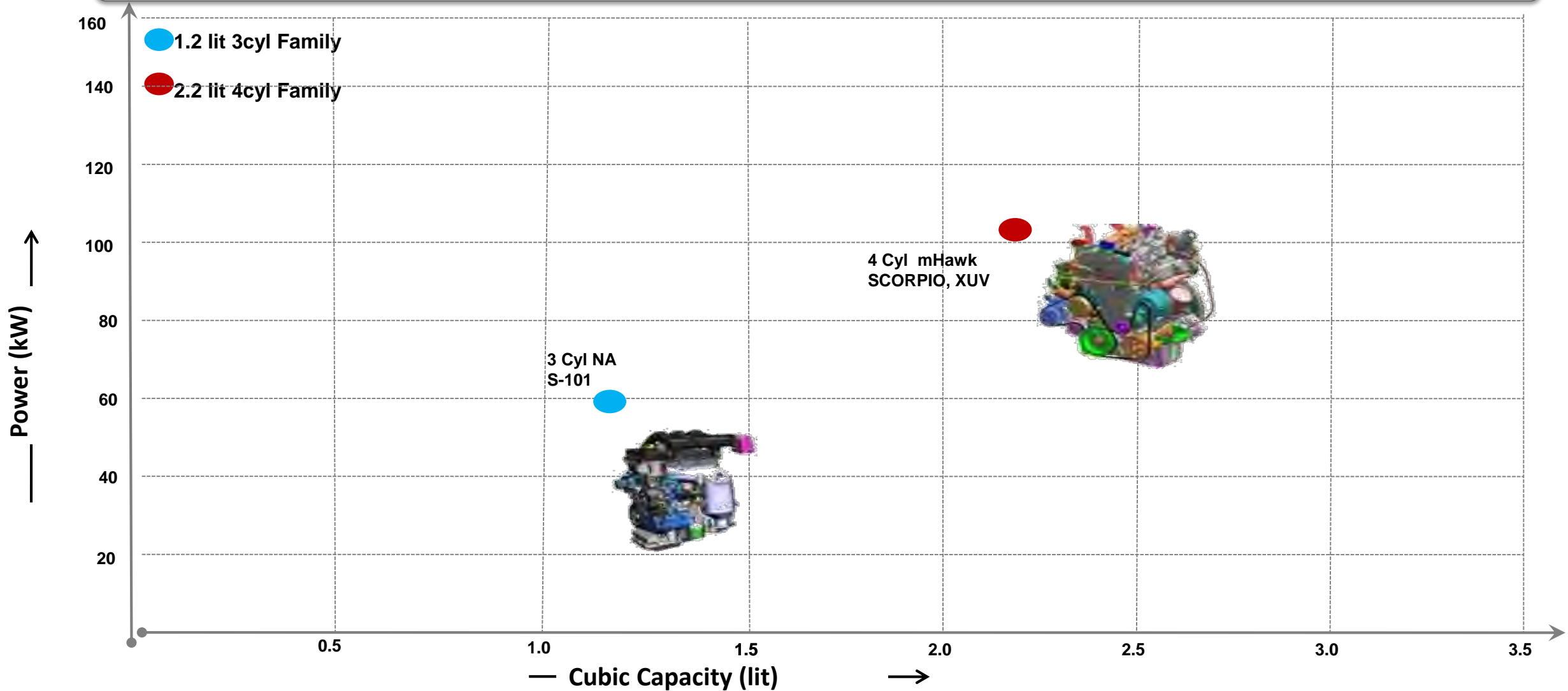
# Engine Platforms

## Future Diesel Engines



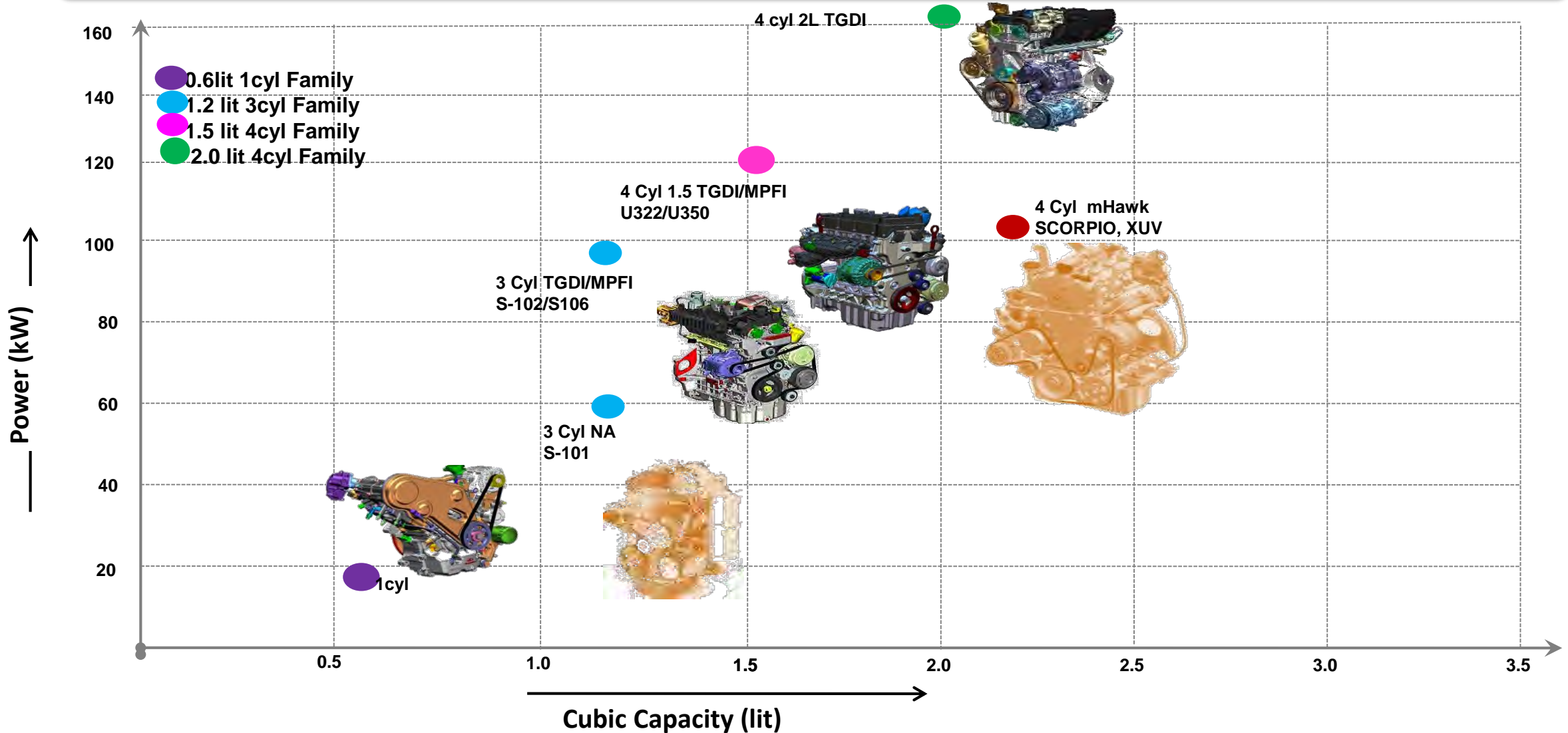
# Engine Platforms

## Current Gasoline Engines



# Engine Platforms

## Future Gasoline Engines



Inhouse Capacities are Fungible Between Diesel & Gasoline Engine

# Strengthen SCV Dominance



# Journey to SCV Leadership



## BMT Plus

Reignited the growth in medium segment through Promise of 1 (one)  
|1m lower TCD || 1 ft longer cargo||+1 kmp mileage|



## Big Bolero PU

Redefined the segment standards with “Baap of Pickups”.  
|highest payload|| longest Cargo||shortest foot print|



## Jeeto

Recreated the Mini segment through Power of Choice’ – 8 Distinct offerings with optimum balance of capability, cost & efficiency

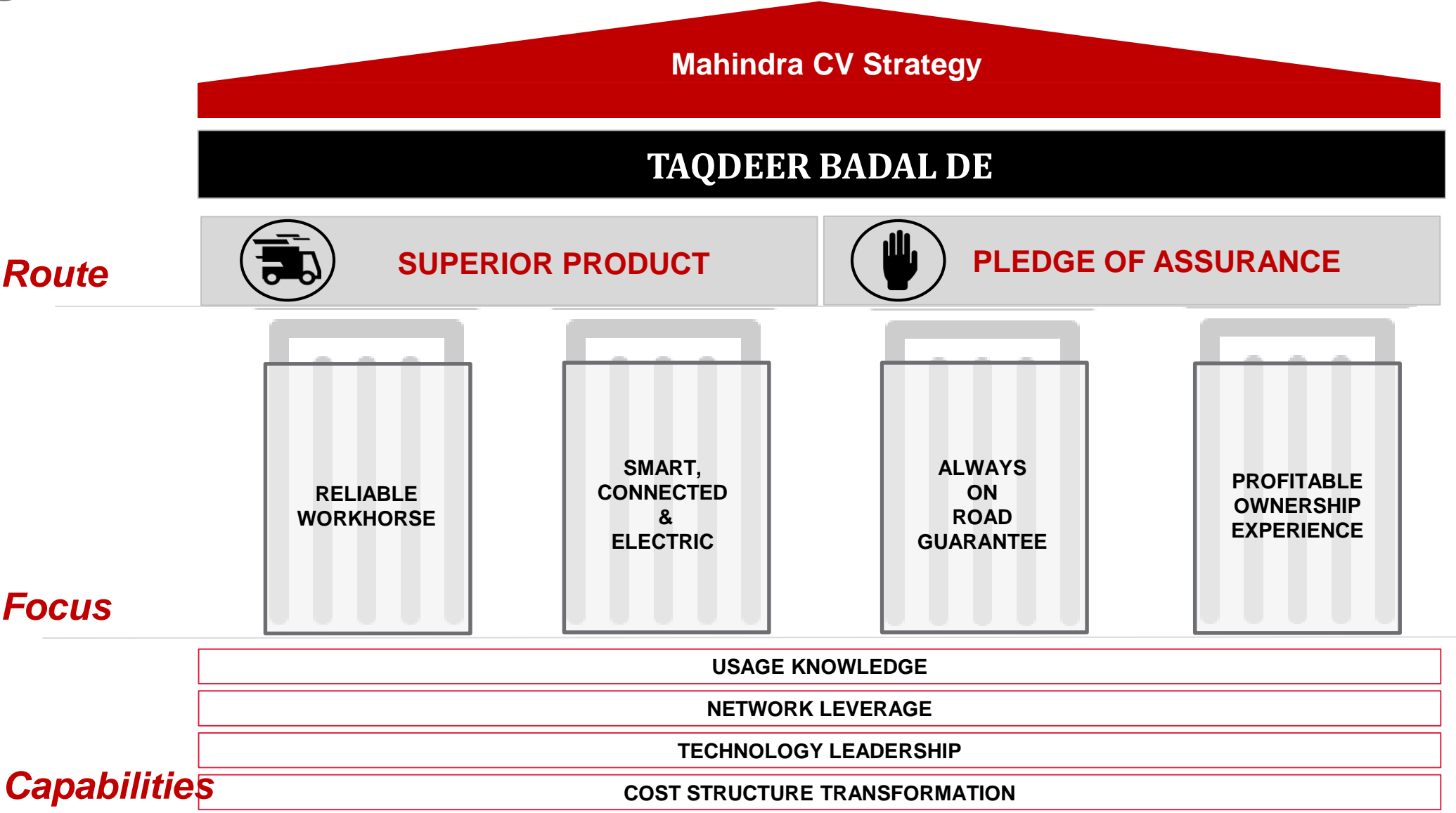


## Supro Maxi / Mini Truck

Revisited Small segment with promise of profit truck with many segment firsts  
|Performance|| Power Steering||AC|

**We are No.1 SCV Player since F14 with MS around 50%**

# Right to Win



# Pickup Guarantee



4 Saal Baad  
Kam Se Kam  
Rs. 4 Lakh  
Me Buyback



2 Saal Tak  
Free  
Maintenance  
Ka Vada



2 Ghante  
Me  
Service  
Ka Vada



2 Saal/ 1 lakh  
kms ki  
Warranty

INDIA'S  
**NO.1 PICK-UP**  
★ GUARANTEE ★

Minimum ₹4 Lakh\* buyback after 4 years  
Free maintenance for 2 years\*  
Guarantee of service within 2 hours\*

**BOLERO**  
PIK-UP FB  
INDIA'S NO.1 PICK-UP

NEW EXTRA STRONG  
**BOLERO**  
**MAXITRUCK**  
**PLUS**  
THE PERFECT CITY PICK-UP

Know More >

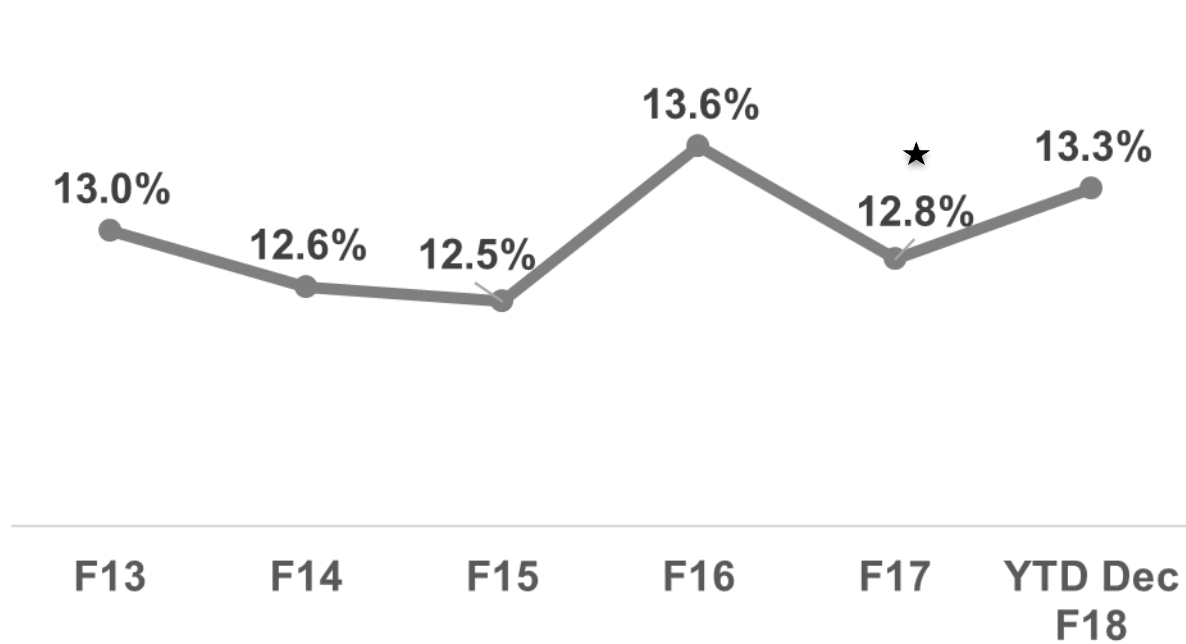


# Manufacturing Footprint

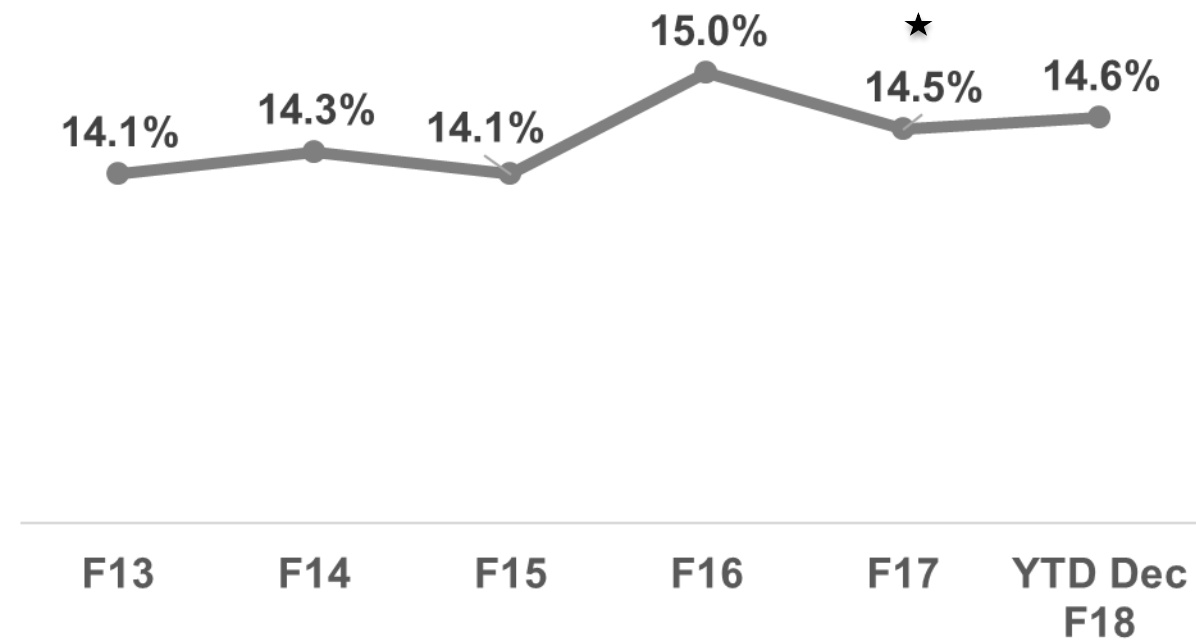
- Will end this years production at 5.4 + Lacs Vehicles.
- Have the Foot Print to reach 1 Million Vehicles.
- Current Installed capacity is 7.5 Lacs Vehicles.

# Auto Sector Margin

## AD+MVML EBITDA Margin



## AD+MVML EBITDA without MTB



★ EBITDA excluding one-time impact of BS III

# In Summary

- Strong & Powerful SCV Portfolio.
- Invested in capacities to manage the short term growth.
- 2 New Product Launches in PV Segment this year (Volume/ Market Share).
- 3 Full Model Changes by 2020.
- Capability to deliver BSVI / New Safety Norms.
- 2<sup>nd</sup> Biggest Channel and aggressively expanding.
- Future models with Gasoline Powertrain options.
- We have been able maintain our OPM.

# Mahindra Trucks & Buses

Vinod Sahay  
M&M IR Day @ MRV - 14<sup>th</sup> March 2018

# Growth of Indian CV Industry

## Economic & Structural Market Growth

- Strong GDP growth
- Government Capital spending in Infra development
- GST, Urbanization, Smart Cities & Digitalization
- India emerging as Export Hub

## Government Regulations & Incentives

- Emission Norms – BSVI by 2020
- Government mandated regulations- Truck Code etc.
- Scrappage Policy
- Overload restrictions – Segment shift to higher tonnage

## Technological Advancement

- Telematics & Real-Time features
- Connected trucks and ecosystem

## Social Factors

- Driver shortage
- Environment Focus

***We Expect Strong Growth To Continue In Commercial Vehicle Industry In The Coming Years***

# Performance Update- YTD Feb 18



## Industry Performance

- HCV : + 31%
- LCV Load : +22 %
- Buses : - 8%



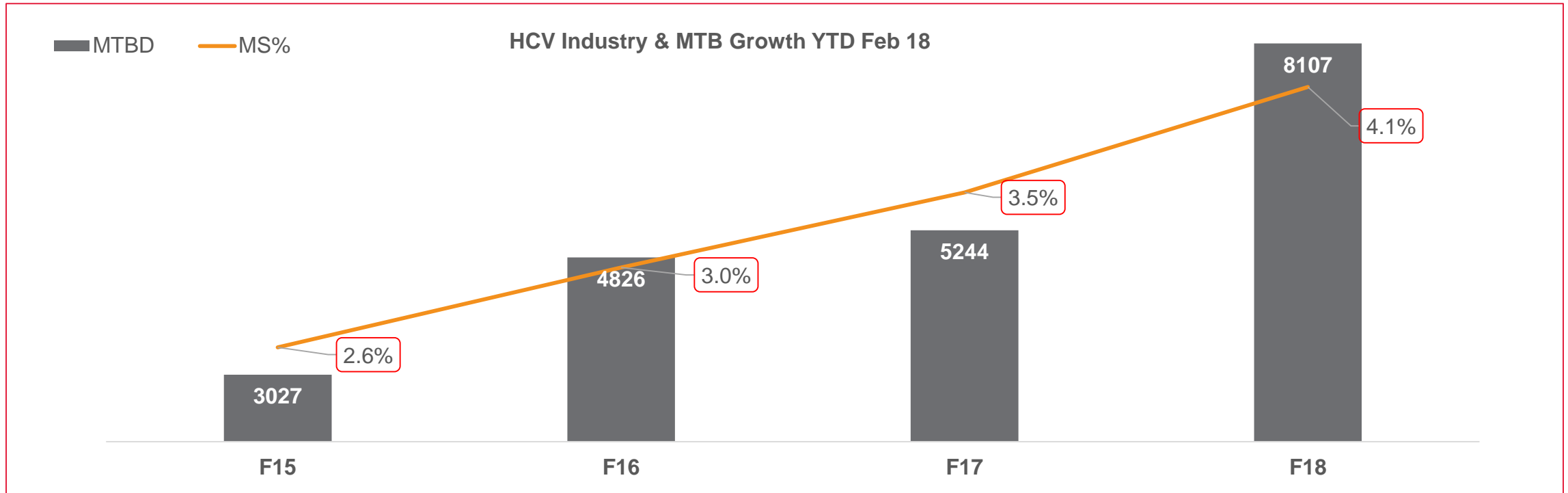
## MTBD Performance

- HCV : + 55% (MS 3.5% => 4.1%)
- LCV Load : + 29% (MS 11.9% => 12.6%)
- Buses : -15% (MS 8.1% => 7.5%)

- **#3 Player** in terms of Mindshare
- **#4 Brand** in overall HCVs segment.
- More than 10,000 BLAZO on road
- **#3 Brand** in the fastest growing Tractor Trailer segment
- 50% Repeat Sales
- 370+ Touchpoints
  - 129 Authorised Service Centres
  - 24 Parts Plaza
  - 92 Dealers

***Fastest Growing Brand In HCVs In CY 18 – YoY Growth of 54% (MTBD)***

# HCV- Growth



- **#4 Brand** in over all HCVs segment.
- **#3 Brand** in the fastest growing Tractor Trailer segment

***Established BLAZO Brand; Enabling Higher Acceptance & realisation from Customers in F19***

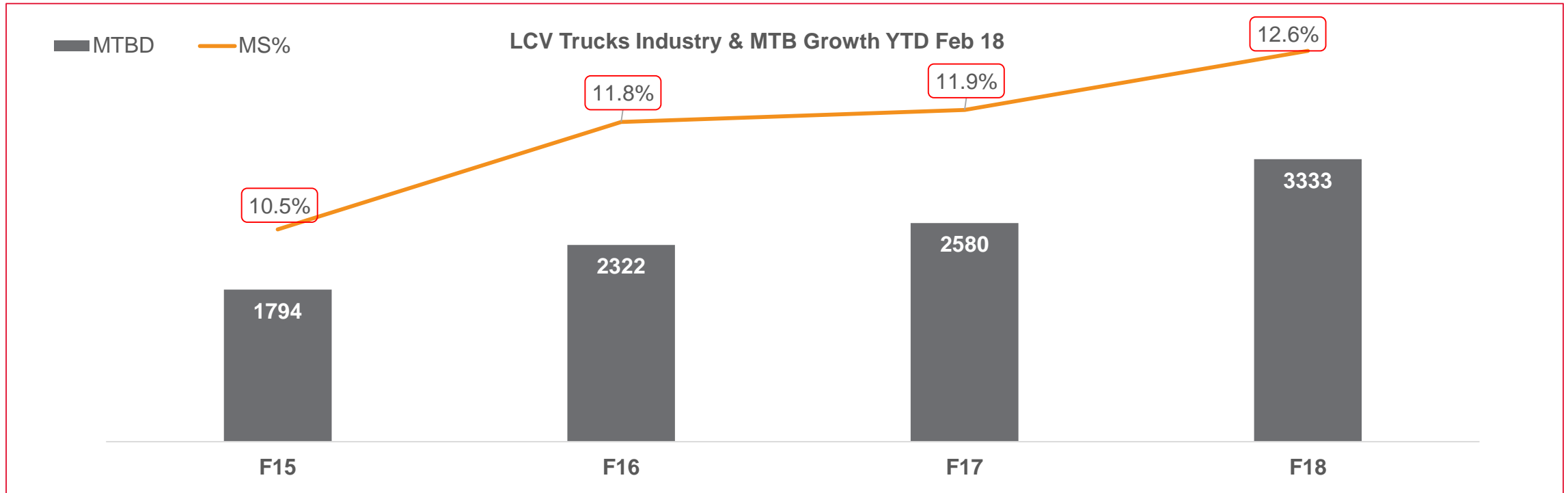
Market Potential

Performance & Growth

Product Strength

Way Forward

# LCV load- Growth



- **#2 Player** in 3.5-6T Segment
- **Switch Karo Campaign** – Fluid Efficiency Guarantee extended to LCV Trucks

***Established FE Guaranteed Has Paved a Strong Growth Path for F19***

Market Potential

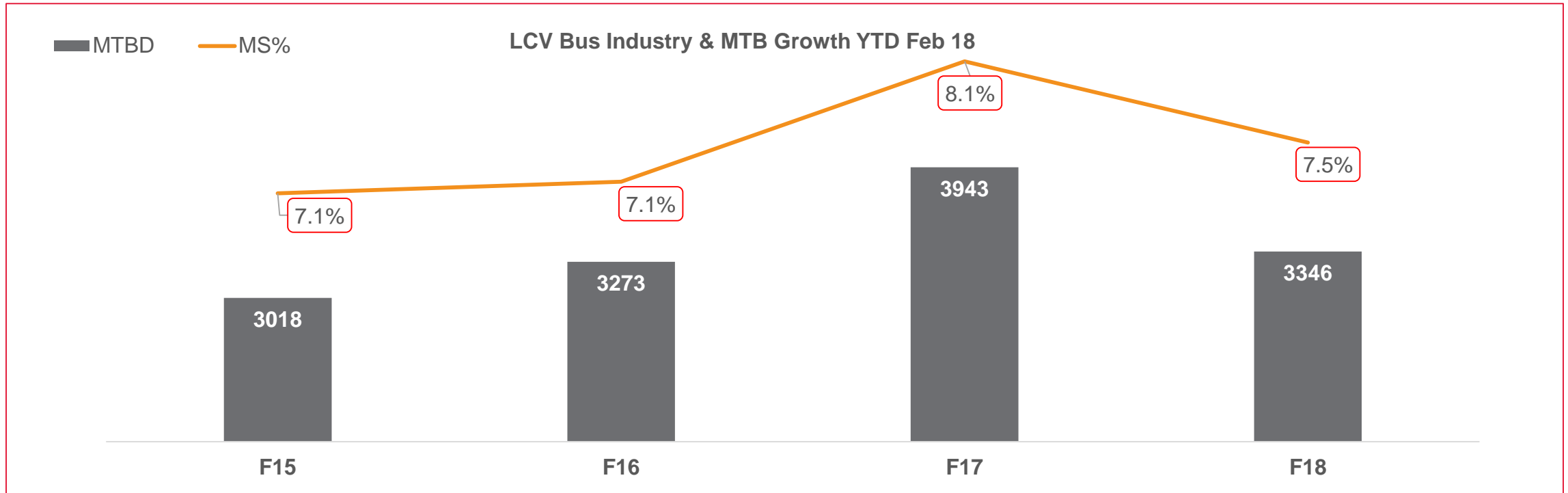
Performance & Growth

Product Strength

Way Forward

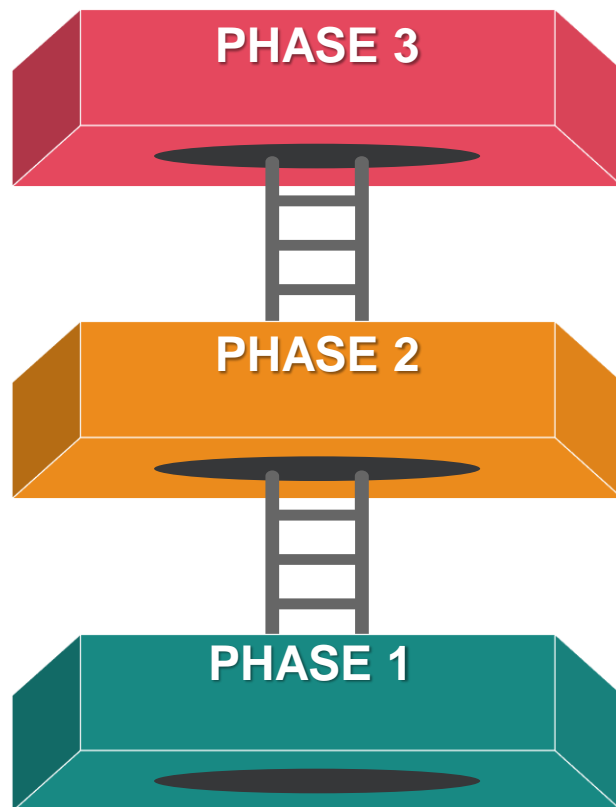


# Buses - Growth



- Bus Industry de-grew by 8% in F18 YoY
- MTBD segment play is currently restricted mostly to only Maxicab (TN) and School Bus
- New segment entry and Vehicle refresh program underway

# Blazo promise - “Har Cheez Guarantee Ke Saath”



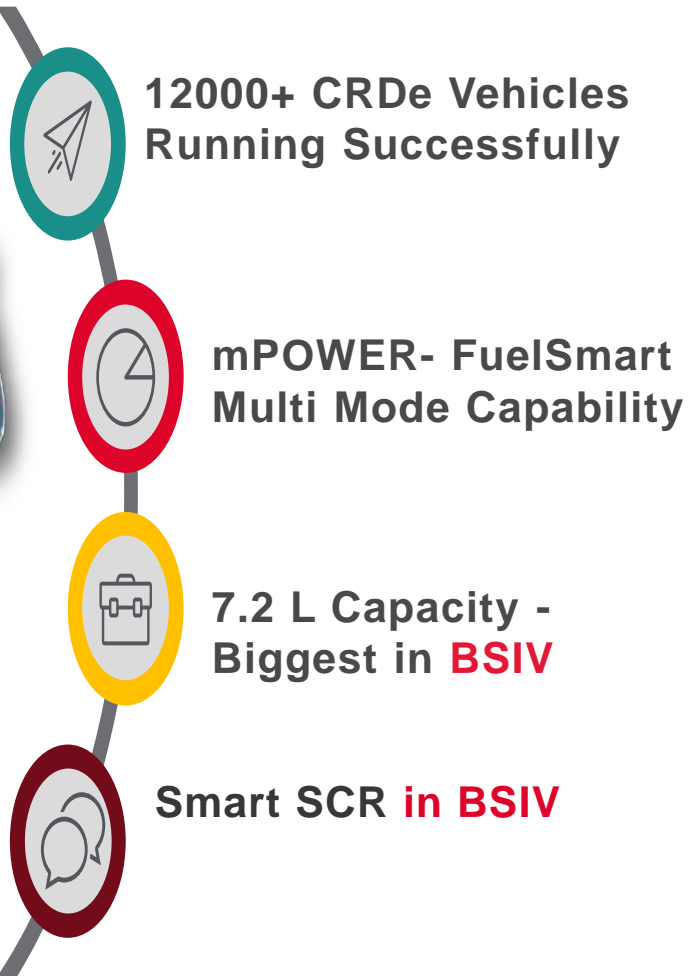
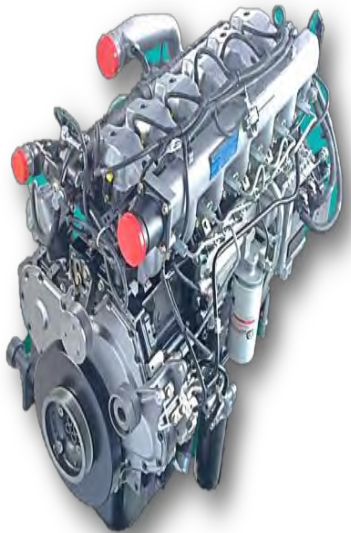
- Improved Oil Drain Interval
- Lowest Oil Prices in the Industry
- Higher Peace of Mind **(6Lacs/ 6 Years)**

- Guaranteed Breakdown Assistance
- Guaranteed Repair Time
- Guaranteed Parts Availability

- Guaranteed Fuel Efficiency
- Guaranteed Fluid Efficiency

***Further Enhancement of BLAZO Value Proposition Underway***

# Product Strength



Comfortable berth



Tilt & telescopic steering



Factory fitted Fan



6S / 9S Gear Box



Best In class Dashboard with driver friendly Instrument Cluster & Driver Information System



3 way Adjustable seat

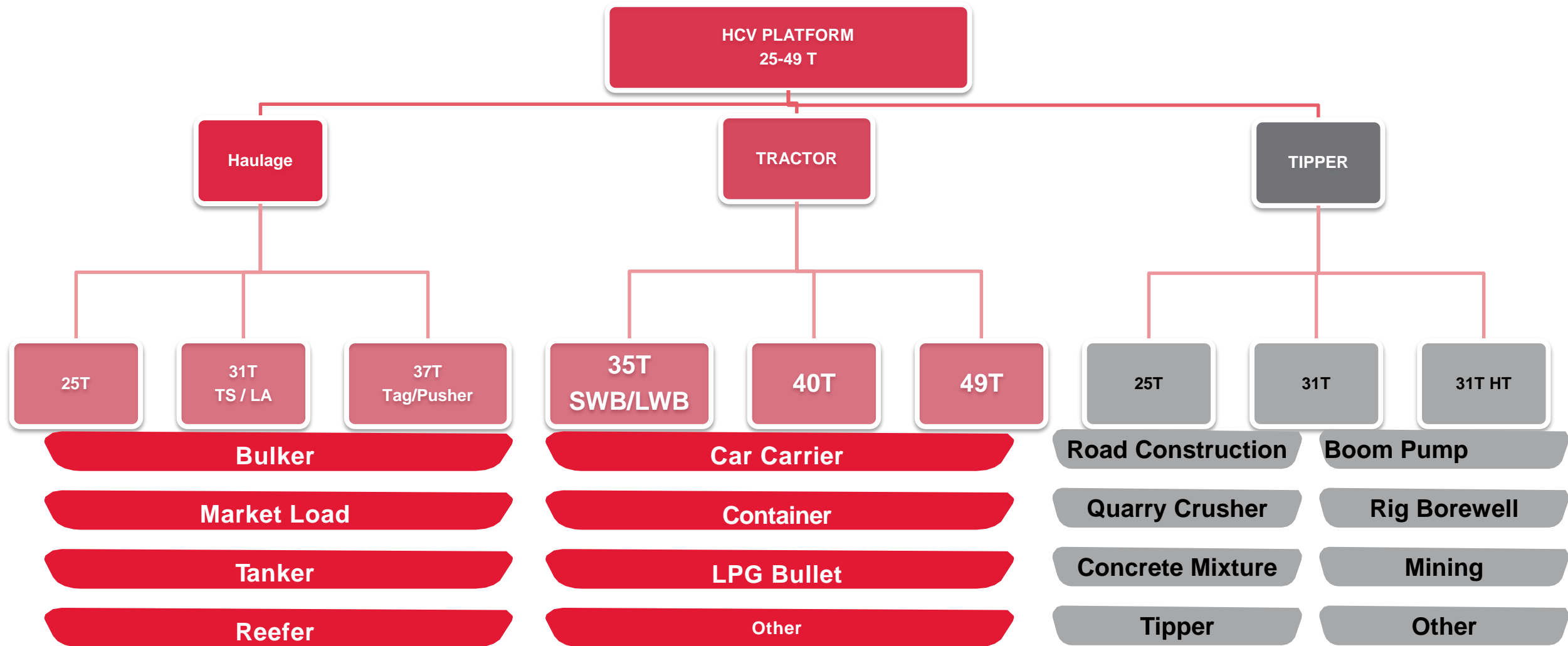
- More than 90% of our trucks sold are with Cabin; Industry is ~50%
- Cabin meeting ECE-29 International safety standard



Stronger aggregates yet one of the lowest kerb weight

***Bigger and Fuel Efficient BSIV Engine, Safest Cabin & Rugged Aggregate Life***

# HCV- Product Portfolio



**Blazo Covers Entire GVW Spectrum in HCVs**

Market Potential

Performance & Growth

Product Strength

Way Forward



# Guaranteed Experience



## Mileage Guarantee

“ZYADA MILEAGE, NAHIN TOH TRUCK WAPUS”

## Parts Guarantee

Ready availability of 150 from MPARTS Plazas, or you get them free!

## Service TAT Guarantee

36 hours Service turnaround at workshops or get Rs. 3000 per day!

## Get back on road Guarantee

Service in 2 hours or Rs. 500 every hour (Delhi-Mumbai Service Corridor)

## Mileage Guarantee

Extended to LCV Load  
Get more mileage or give the truck back

## 6 Lacs/ 6 years

Increased Warranty on HCV Trucks to offer complete peace of mind

“ Har Cheez Guarantee Ke Saath”

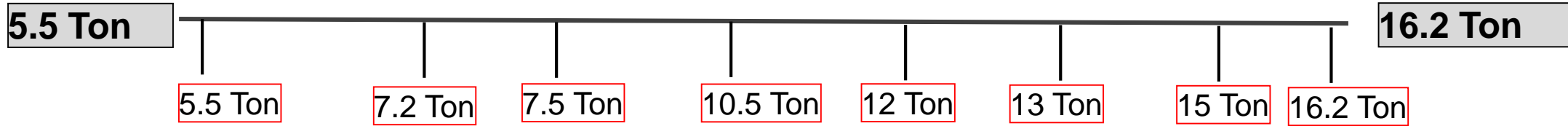
Market Potential

Performance & Growth

Product Strength

Way Forward

# New LCV / ICV and MCV Range



- Modular Platform
- 3 Engines
- 3 Transmission
- 3 Cabs
- AC option
- LD and HD Version
- Various Wheelbases and Load body types

*Completes the range*

# Way Forward- F19

- BLAZO Superiority – Sustaining Best In Class Fluid Efficiency
- HCV/ LCV - New Models and Variants
- Launch of first set of Vehicles of the new LCV/ICV and MCV range in F19 H1
  - 600 Cr Investment
  - Will become a **Full Range Player**
- BS VI development on track
- More Service Corridors & Parts Plaza
- More Guaranteed Experience
- Aggressive Network Expansion and Market Coverage
- Focus on Capability Building

# EV Presentation

**Mahesh Babu**  
**M&M IR Day @ MRV - 14<sup>th</sup> March 2018**



# Vision 2030 Tomorrow's Movement, Today

## A first: Electric vans in most towns soon



Electric vans are set to be introduced in most towns soon. The government is pushing for an all-electric car portfolio, starting from E20 to a Pininfarina designed auto. Mahindra & Mahindra, India's pioneer in the electric car segment, recently committed ₹600 crore to its electric vehicle arm and plans to strengthen its portfolio, starting from E20 to a Pininfarina designed auto. Mahindra & Mahindra, India's pioneer in the electric car segment, recently committed ₹600 crore to its electric vehicle arm and plans to strengthen its portfolio, starting from E20 to a Pininfarina designed auto.

## Auto Cos Step on Gas to Hit the Road

Look to bring out e-variants soon as the govt is pushing for an all-electric car portfolio, starting from E20 to a Pininfarina designed auto. Mahindra & Mahindra, India's pioneer in the electric car segment, recently committed ₹600 crore to its electric vehicle arm and plans to strengthen its portfolio, starting from E20 to a Pininfarina designed auto.

Ketan.Thakkar@timesgroup.com

Mumbai: Signalling a major change in stance, carmakers are advancing plans to make electric cars in India by giving them preference over hybrid versions. Automakers such as Hyundai, Tata Motors and Mahindra & Mahindra are leading the race to roll out electric cars soon.

electric vehicles, Mahindra & Mahindra, India's pioneer in the electric car segment, recently committed ₹600 crore to its electric vehicle arm and plans to strengthen its portfolio, starting from E20 to a Pininfarina designed auto. Mahindra & Mahindra, India's pioneer in the electric car segment, recently committed ₹600 crore to its electric vehicle arm and plans to strengthen its portfolio, starting from E20 to a Pininfarina designed auto.

### Driving Into Green Zone

Maruti Suzuki developing the EV portfolio, wants to see whether consumers are ready for e-cars

Mahindra has a side 600 or ₹ electric vehicle



## 2-Wheelers may 'Electrify' Roads Sooner Than Cars

All major two-wheeler cos in India have scheduled launches of electric vehicles from next year

The Mahindra Electric, Zoomcar to deploy e-vehicles for shared mobility

we have introduced the e20plus on the self-drive platform. This initiative is aimed at



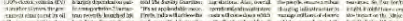
## 'India can be a market leader in electric vehicles'

Experts, however, believe that India will face several challenges regarding infrastructure, clean energy generation and availability of rare earth metals

DELHI: While the government is pushing for an all-electric car portfolio, starting from E20 to a Pininfarina designed auto. Mahindra & Mahindra, India's pioneer in the electric car segment, recently committed ₹600 crore to its electric vehicle arm and plans to strengthen its portfolio, starting from E20 to a Pininfarina designed auto.

### Boost Solar Power

We need proactive public policy to boost solar power charging points for electric scooters in urban areas



## Govt. amends rules to bring in battery-driven vehicles

Incentives offered to taxi operators, especially Ola, Uber

SPECIAL CORRESPONDENT

Battery-driven taxis could soon be seen on city streets, with the State government pushing for the use of electric cars by offering incentives to app-based taxi operators like Ola and Uber.

The Maharashtra Motor Vehicles Rules, 1989 has been amended to include more incentives to battery-operated vehicles with engine capacity of 180cc. The changes were approved in a meeting chaired by Chief Minister Devendra Fadnis on November 22. An existing resolution dated May 8, 2012 will also be amended.

Section 201 of the Motor Vehicle Act, 1989, has already recognised a battery-operated vehicle as a vehicle adapted for use on roads and powered exclusively by an electric motor whose

been made to increase their use. Existing petrol and diesel vehicles can be retrofitted with ease."

The Shiv Sena has been voicing support for battery-operated vehicles. Earlier this month, electric buses were

made to increase their use. Existing petrol and diesel vehicles can be retrofitted with ease."

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## EESL set to issue tender for 10,000 additional EVs

Amrit.Raj@timesgroup.com

NEW DELHI: In what comes as another boost for India electric vehicle programme, state-owned Energy Efficiency Services Ltd (EESL) has said it will float another tender of around 10,000 electric vehicles (EVs) during March-April, much before it expects to complete the current bidding process in June.

"We will come up with another tender for similar number of electric vehicles. Basic specifications for these EVs will remain the same," Sa

EESL, said Wednesday. EESL is a joint venture of the Government of India and the Ministry of Power, New Delhi.

The tender is for the supply of 10,000 electric vehicles (EVs) for the use of the Government of India. The tender is for the supply of 10,000 electric vehicles (EVs) for the use of the Government of India.

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## E-buses may ply early next year; BMTCL to lease vehicles

Cash-Strapped Utility Junks Earlier Plan of Buying Buses

Krishna.Kumar@timesgroup.com

Bombay: Electric buses may ply on city roads early next year, with the Maharashtra Electric Transport Corporation (BMTCL) venturing into leasing from private vendors for the first time.

The BMTCL is planning to lease 100 electric buses from private vendors for the first time. The BMTCL is planning to lease 100 electric buses from private vendors for the first time.

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## Maha Policy on E-vehicles Soon

Govt SOPs Measures include refunding SGST to the manufacturers and offering a subsidy to those buying vehicles

Krishna.Kumar@timesgroup.com

Mumbai: The Maharashtra government is finalising a policy to encourage manufacturing as well as purchase of electric vehicles. According to the draft policy, a copy of which was accessed exclusively by ET, the measures include refunding the state goods and services tax (SGST) to the manufacturers and offering a subsidy to those buying electric vehicles.

The state envisages manufacturing of about one lakh electric vehicles per year in the next three to five years, officials said.

As per the draft policy, which is likely to be cleared within a month according to officials, the state is planning to give a subsidy of 15% of the total price of electric vehicles to the buyers. Moreover, to bring down the retail price of electric vehicles, the state is planning to levy the SGST on the purchase of the vehicles.

The policy aims to encourage the use of electric vehicles for public transport as well. The state is planning a pilot project in the city of Mumbai.

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## INDIA LEAPS AHEAD: TRANSFORMATIVE MOBILITY SOLUTIONS FOR ALL

MITI Aayog

TRANSFORMATIVE MOBILITY SOLUTIONS FOR ALL

MAY 2017

TRANSFORMATIVE MOBILITY SOLUTIONS FOR ALL

TRANSFORMATIVE MOBILITY SOLUTIONS FOR ALL

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TRANSFORMATIVE MOBILITY SOLUTIONS FOR ALL

## ALL CHARGED UP

How manufacturers – and not just of cars – are gearing up for the massive opportunity that's up for the electric vehicles space in wake of the govt's big 2030 dream of only electric cars plying in India

Plugged in

How manufacturers – and not just of cars – are gearing up for the massive opportunity that's up for the electric vehicles space in wake of the govt's big 2030 dream of only electric cars plying in India

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### Mahindra Electric to play key role in EV drive

New Delhi: Mahindra & Mahindra, a leading player in electric vehicles (EV) in India, has now set eyes on electrification of some of the models of its South Korean arm SsangYong Motor, a top company official said.

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## Electric shock for automobile makers

FIRMS' EV PLANS

Parent Suzuki ties up with Toyota to make electric vehicles for India by 2020; also investing in a lithium-ion battery plant in Gujarat

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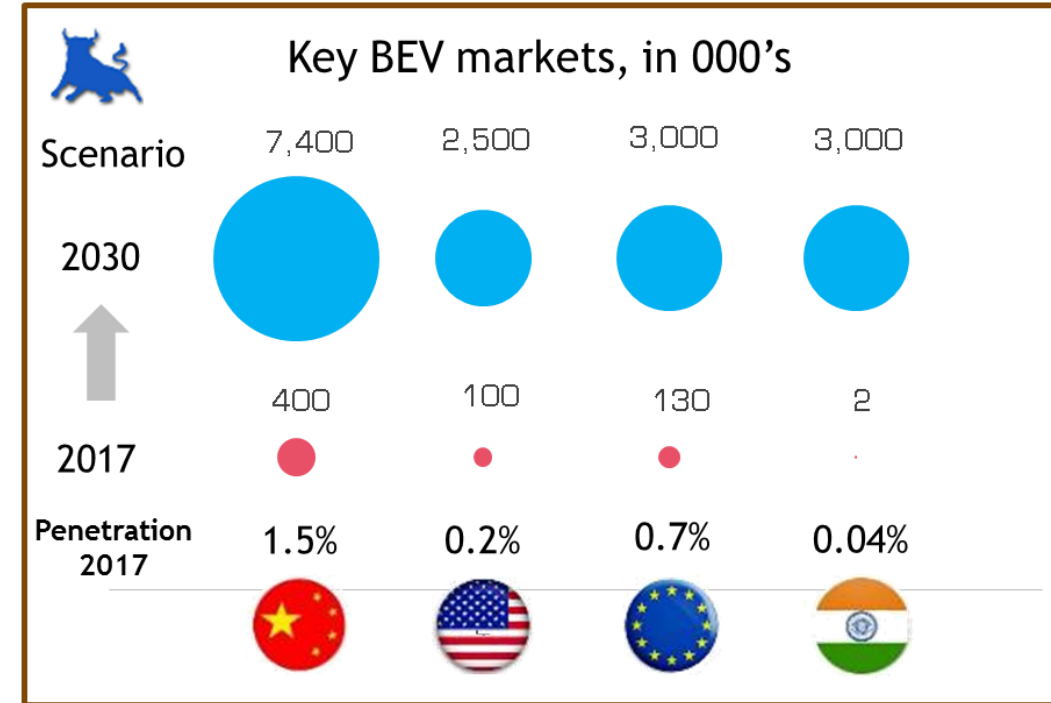
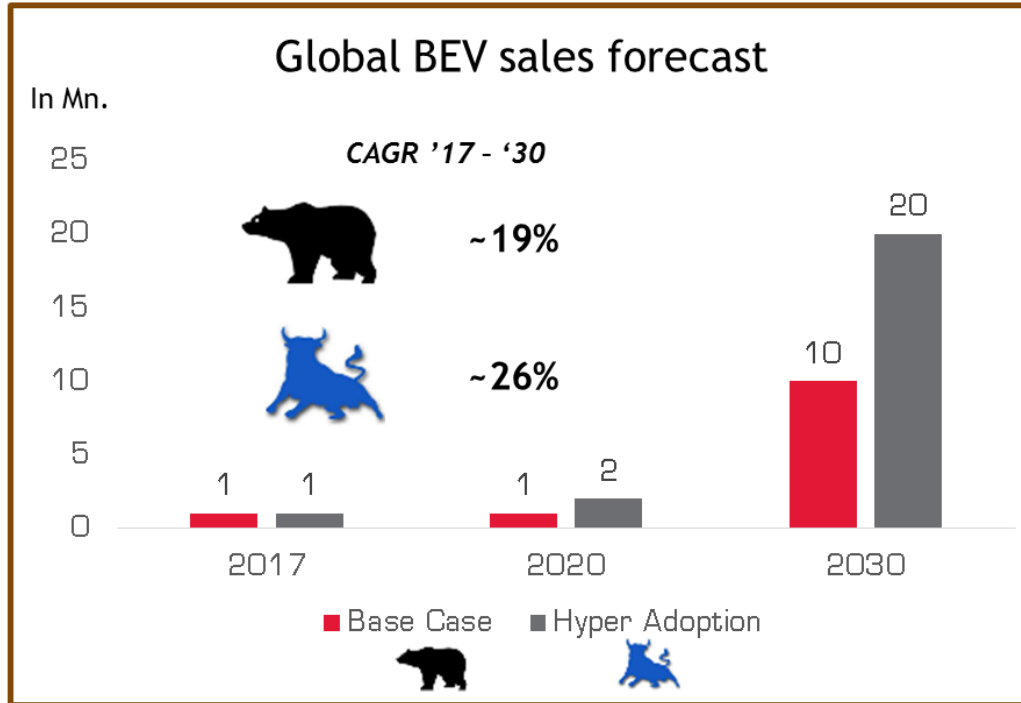
### Maruti will make electric cars in Guj

JV Plan of Suzuki to Develop Batteries

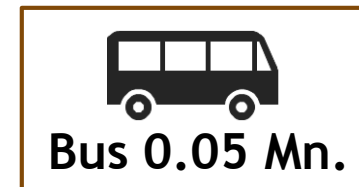


# EV Market potential

## Global 4W EV sales outlook



## Other segments - India EV potential 2030



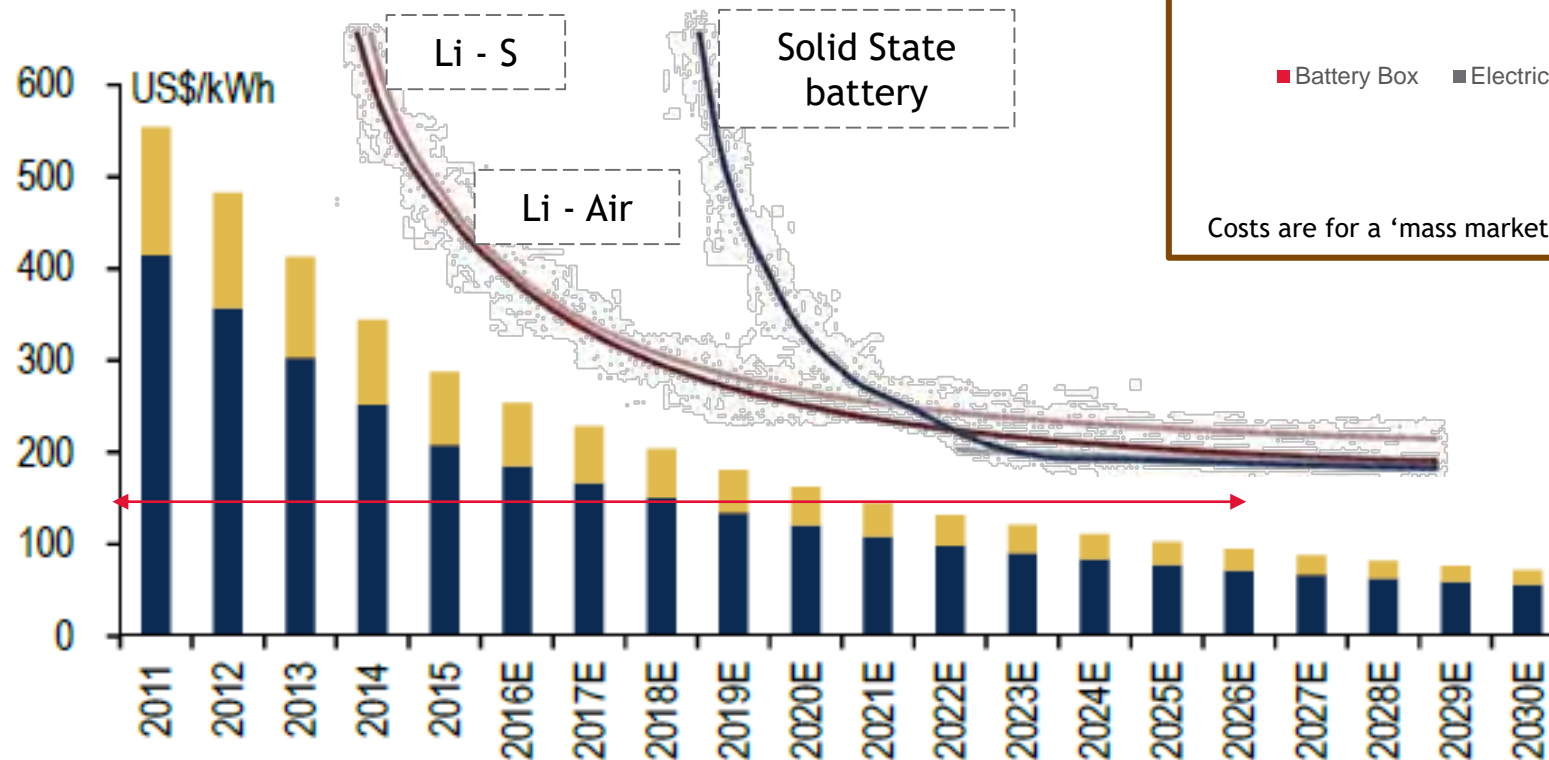
Source: Based on external research reports (Goldman Sachs, BofAML), IHS data and internal estimates

Note: 3WL is a segment expected to be driven to 100% electric by Govt. initiative; We are assuming % electrification of 30% for the remaining segments;

# Technology drivers – Battery cost

Battery costs for current Li-Ion family are expected to reduce through 2030  
Newer chemistries would follow their own cost reduction curve on maturity

*Battery costs are decreasing*



## Battery cost as part of vehicle cost

Cost breakup

39%

4%

8%

49%

Battery Box

Electric Motor

Other electronics + W/H + Charger

Other body + Direct costs

Costs are for a 'mass market EV' - Chevy Bolt, Estimates from UBS report, May 2017

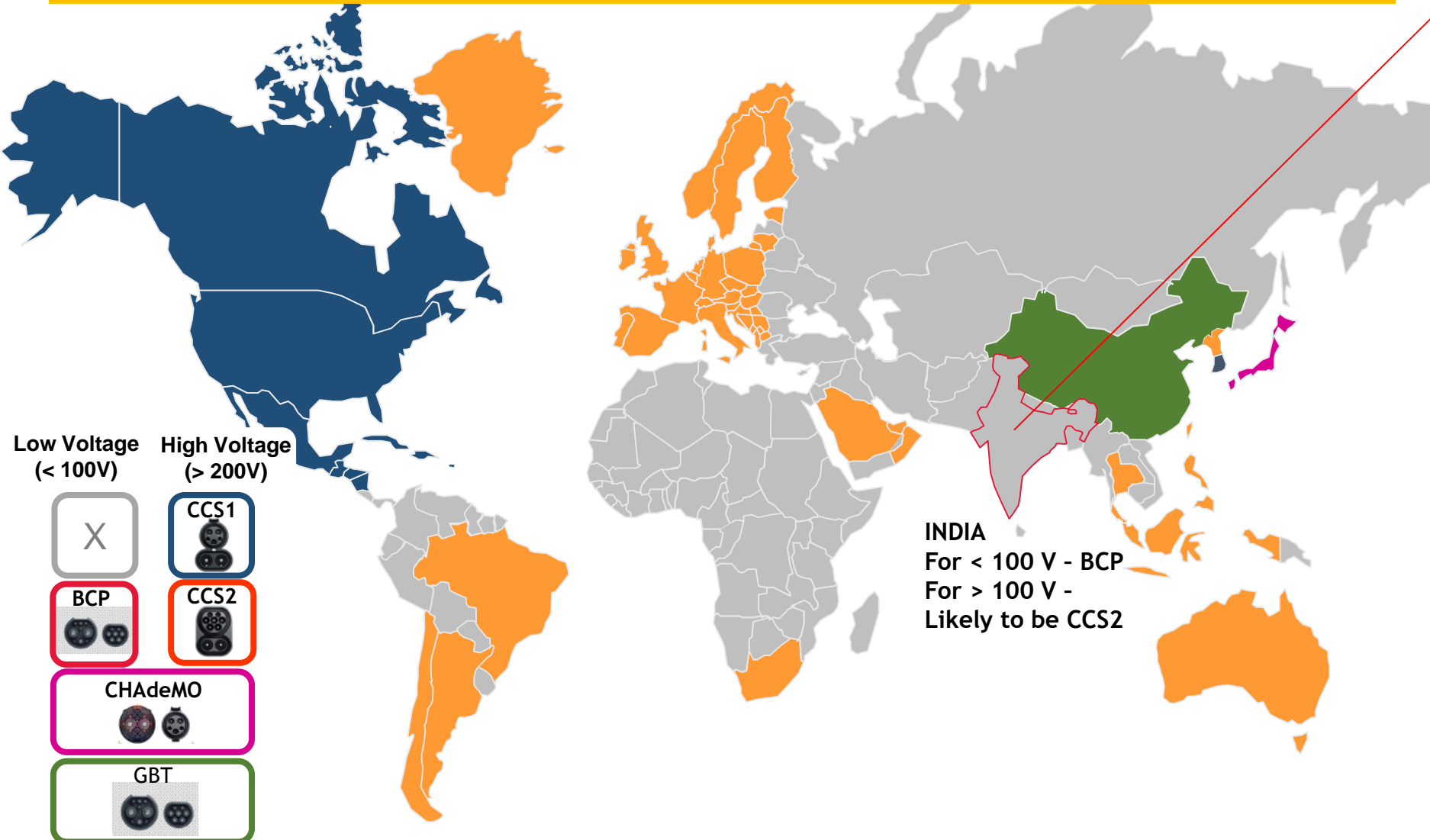
Cell price Pack price

Forecasts for Pack level cost to decline  
to \$100 - 150 / kWh  
by 2021 - 25

Pack costs higher than cell cost  
by around 25 %

# Technology enablers – Charging infrastructure

Globally there is a clear trend towards CCS standard for newer launches



## INDIA HIGHLIGHT



- Currently only low voltage 4W EVs (48/72V) in the market from Mahindra
- Recent new launches also low voltage EVs
- Bharat Charging Protocol recently released for low voltage EVs in India
- Existing network of ~75 DC Fast Chargers pan India
- EESL Tender released for charging infrastructure, State policies like Karnataka EV policy have special incentives for charging infra setup

# Leading the way

## Shared and Mass Mobility

Baghirathi order for 1000 vehicles in Bangalore



OLA - Partnership for shared mobility in Nagpur



Zoomcar launched in Mysore and Hyderabad



Uber and M&M Partnership announced



EESL Tender for 10,000 vehicles



HRTC - Clean Public Transportation



Lithium- Corporate Employee Commuting





# Mahindra first mover advantage

**>68.2 Mn ekms**  
2010 - till date

**4000+**  
vehicles on road

**50+**  
Patents

**10+ years**  
of Li-ion in India

**18+**  
cities across the country

Already invested 600 cr. in EV technology, product, capacity and supplier end investment



## Market penetration

- Brand recognition, 51 experienced dealerships



## Electric powertrain (48V - 650V)

- Technology optimisation for Indian context



## System manufacturing setup

- Low cost localised manufacturing experience. (India)



## Strategic partnerships and pilots

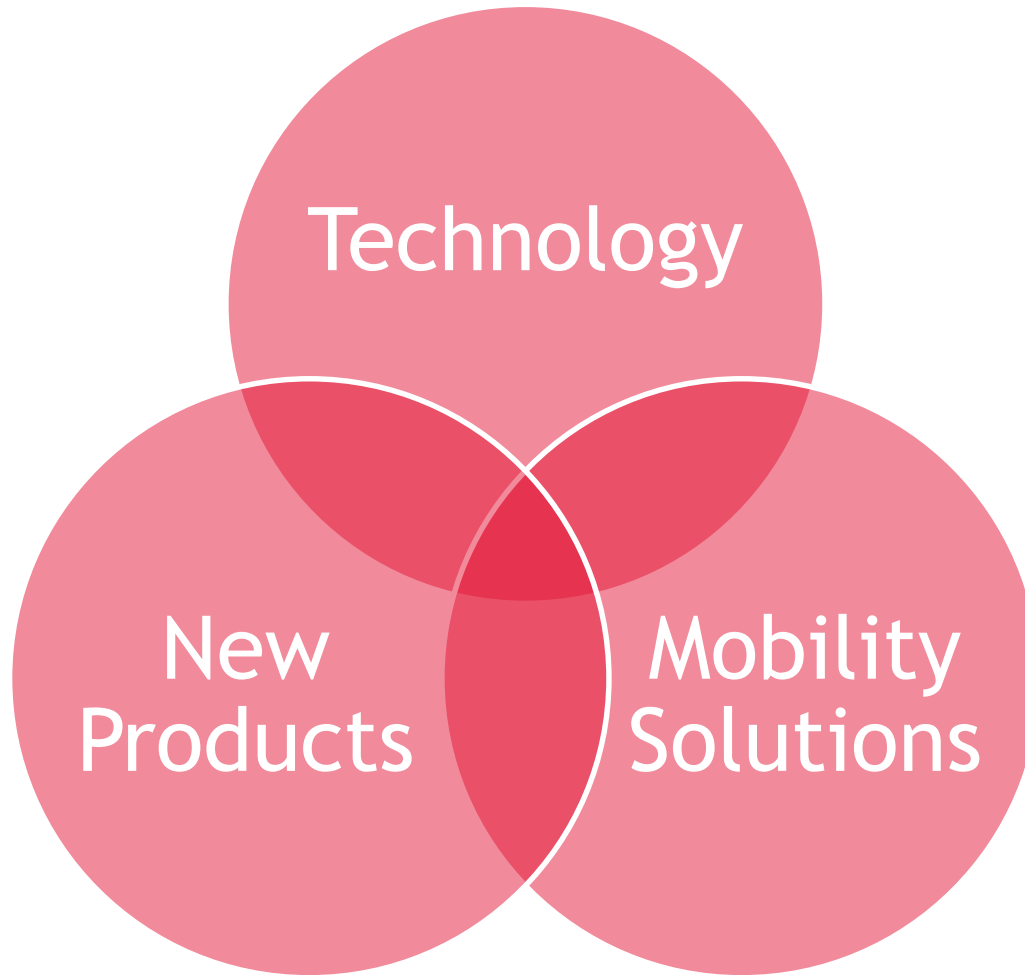
- Global quality suppliers & strategic partners

Faster time to market

High Quality

Cost competitive

# Technology and Product map - EV 2.0

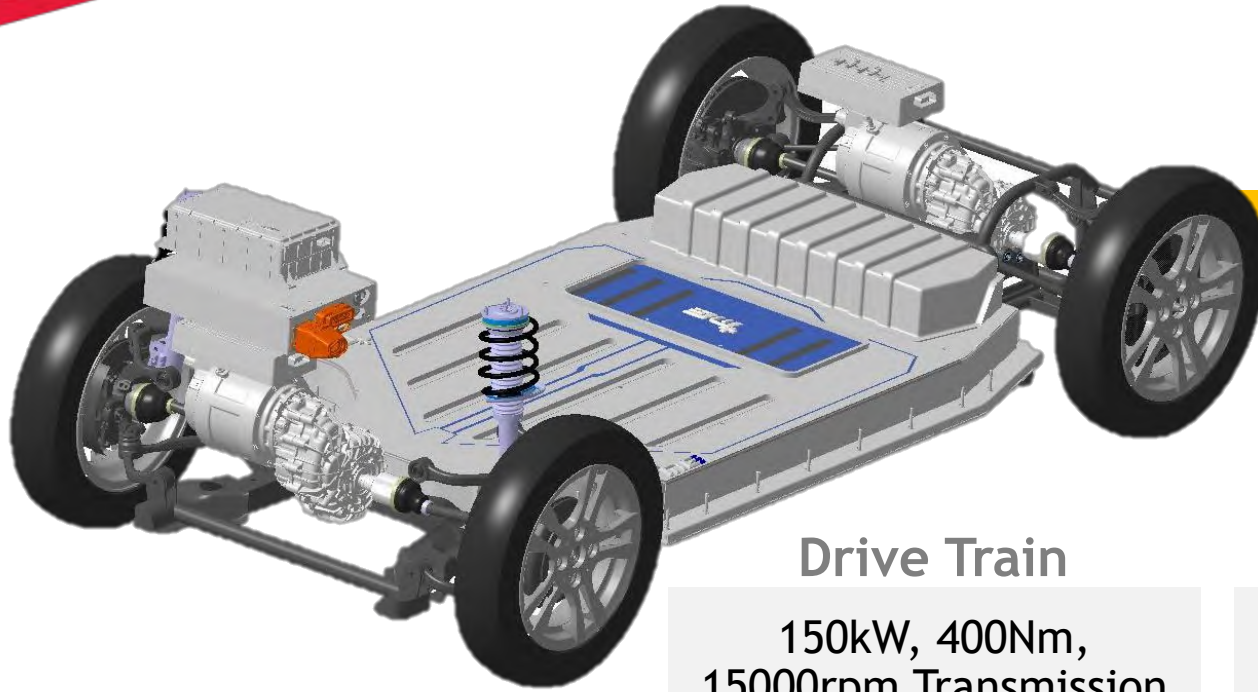


Investments planned

900 cr. in EV technology

Excluding vehicle level  
investment

# Technology



## 380V system at Auto Expo

- Demonstrator of 380V modular platform under development

### Drive Train

150kW, 400Nm,  
15000rpm Transmission  
System

High Efficiency Drive  
Trains over 96% (PMSM  
motor and vector  
controlled drive)

Single & Dual Drive  
Architecture from 90 to  
165 kW

### Battery

48V to 650V systems  
delivering up to 400km  
range with globally  
benchmarked BMS

7x improvement in Pack  
Energy Capacity from  
10kWh upto 70kWh

Energy Density from  
120Wh/kg to 230Wh/kg

### Power electronics

6.6kW On Board Charger  
supporting broad range  
of 183 to 1000W/kg

50kW Integrated DC Fast  
Charging Station with ME  
Authentication

Universal Charge Control  
Module for GB/T,  
CHAdeMO, and CCS



# New Product Portfolio

## LOW VOLTAGE

## HIGH VOLTAGE



Product line-up	eAlfa mini Rickshaw	eRick	TREO Auto	e20Plus Hatchback	e-Supro Minivan	e-Verito Sedan	e-KUV SUV	Model 1 SUV	Model 2 Sedan	eCosmo Bus	Bus 2
Seating capacity	D+4	D+4, D+3		4 Adults	D+7	D+4	D+4	D+4	D+4	D+32	D+40
Range (km)	85 kms	80-100 kms		140 kms	140 kms		120 kms	250 kms	156 kms	100 kms	150 kms
Top speed	25 km/h	25-45 km/h		80 km/h	85 km/h		100 km/h	150 km/h	110 km/h	70 km/h	
Voltage	12 V	48 V			72 V			380 V		650 V	
Battery Chemistry	Lead Acid	LFP						NMC		LFP	
Motor peak power	1.5 kW	< 5 kW		19 kW	30 kW			90 kW	50 kW	165 kW	

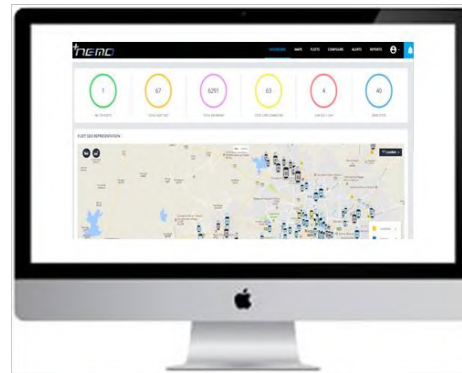
**Current product**  
**Upcoming product**

# Mobility solutions

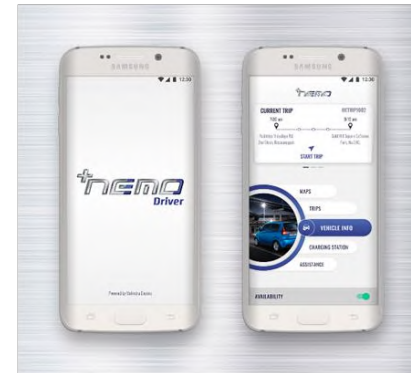


## Platform launched at Auto Expo

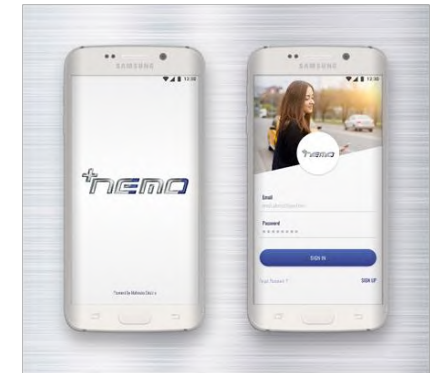
- NEMO is an e-mobility platform based on the cloud that enables a new generation of Electric, Connected and Shared mobility services.
- NEMO, which stands for "Next-Gen Mobility", is designed for the future and allows seamless connection of people and the transportation system.
- The platform uses 'Connected Vehicle' and 'Internet of Things' technologies to provide real time visibility into vehicles (traditional vehicle ownership) or fleet (shared mobility) operations and enables data-driven decision making.



**NEMO Mobility Platform**  
(Fleet Operations)



**NEMO Driver App**  
(Employee Transportation)



**NEMO Passenger App**  
(Employee Transportation)

# Future Direction



JVs & Global  
Partners

EV 2.0  
Drivetrain  
Technology

EV  
Products



# Investment to be future ready

## TECHNOLOGY PARTNERSHIPS

**Technology partnerships for state of the art electric systems**

JV for Application engineering & Production of Motors and Motor controllers

Korean Partner for power electronics

Strategic Alliance with LG Chem for Battery cells and modules for new age chemistries, covering Line setup & Quality process adoption

## CAPACITY EXPANSION

**Plant in Bangalore + New facility in Chakan**

**Phase 2 - Sept 2018**

12k units per annum

Break up - 5k vehicles + 7k kits

**Phase 3 - Oct 2019**

50k units/year

Break up - 15k vehicles + 35k kits

**Phase 4 - March 2020**

70k units/year

Break up - 20k vehicles + 50k kits

## FUTURE FACILITIES

EV Innovation centre



State of the art R&D and test facilities



**Talent Acquisition :**  
Domestic + Global

# Summary – Future Ready

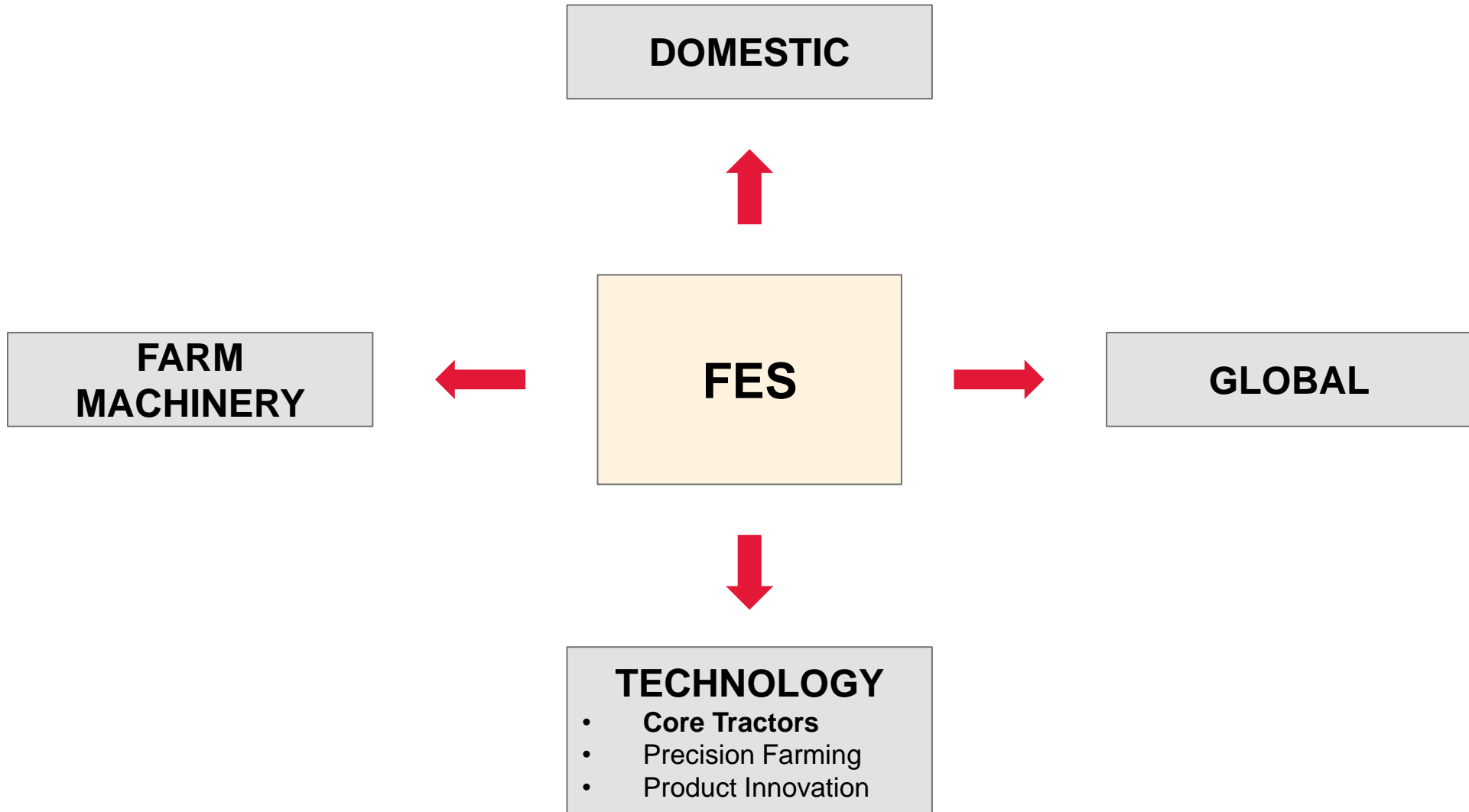
- **Pioneers in Electric Mobility in India**
- **Investment in Technology with global partnership will retain our leadership position**
- **Diversified product Portfolio from mass mobility to Objects of Desire to address market needs**
- **Mobility solutions to leverage electric eco-system development**
- **Future Factory to meet the growing supply demand**

# Farm Equipment Sector

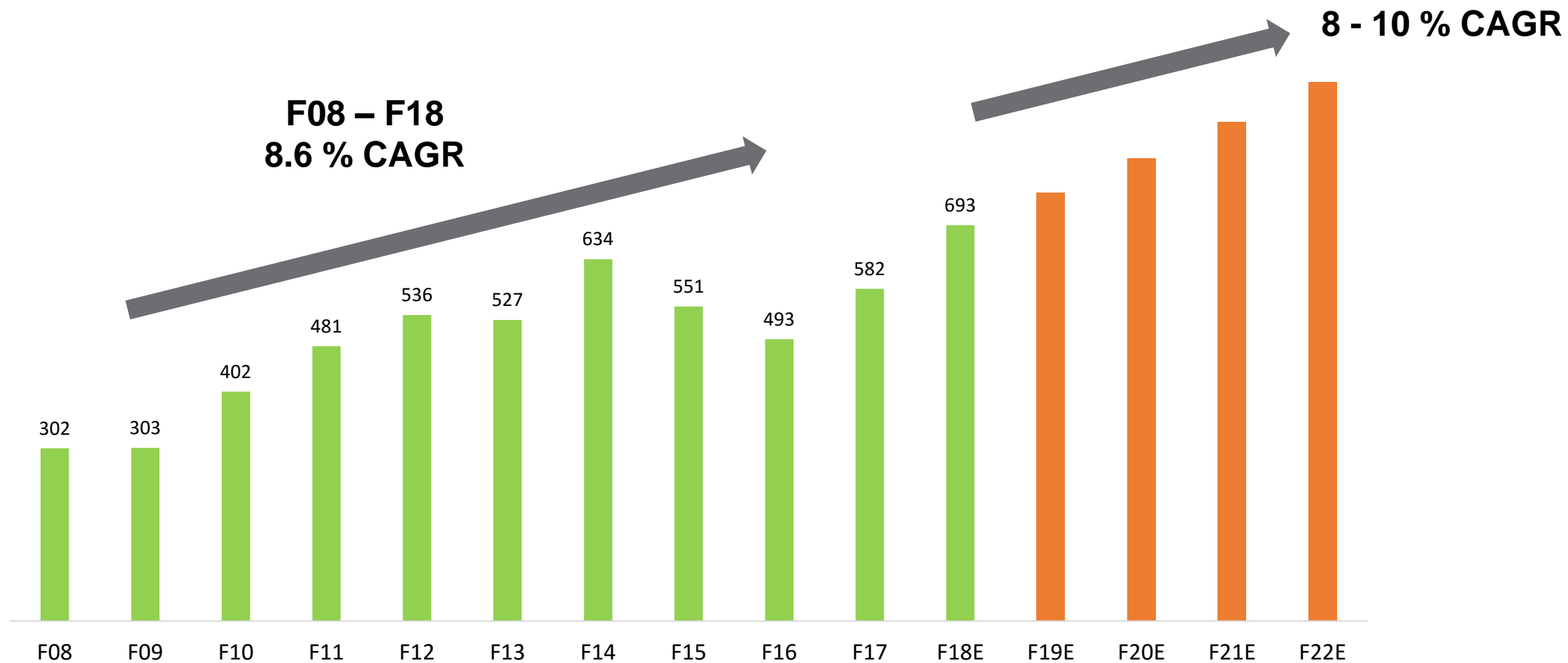
Rajesh Jejurikar  
M&M IR Day @ MRV – 14<sup>th</sup> March 2018



# Farm Equipment Sector



# Domestic Tractor Industry



Tractor industry volume in '000

CRISIL estimate – 8-10% CAGR (F16 – F21)

## Domestic tractor sales to grow steadily over next five years

Domestic tractor sales volume is expected to increase at a good pace between fiscals 2018 and 2022, assuming a normal case scenario which incorporates one or two deficient monsoons. Penetration warrants consistent growth in the long term, and South India will drive growth potential in the coming years.

## Domestic demand to grow 8-10% over next five years

CRISIL Research projects domestic tractor sales to grow at 8-10% compound annual growth rate (CAGR) during fiscals 2018 to 2022. The demand is driven by low tractor penetration in India, government's focus on improving rural infrastructure. The projected growth is based on a scenario to further increase investments in the sector.

## Potential of 8-10% CAGR up to fiscal 2027 in the tractor industry

Growing at 8-10% CAGR, the tractor population would reach the required 13 million by fiscal 2027. CRISIL Research expects domestic tractor volumes to register a healthy growth in 2017-18, as near-normal progress of monsoon is expected to improve farm sentiments. Government support for crop prices and improvement in financing th. Over the long term, tractor sales are expected to increase as increase in expectations of sustained increase in farm income, industry profitability to improve as increase in input costs.

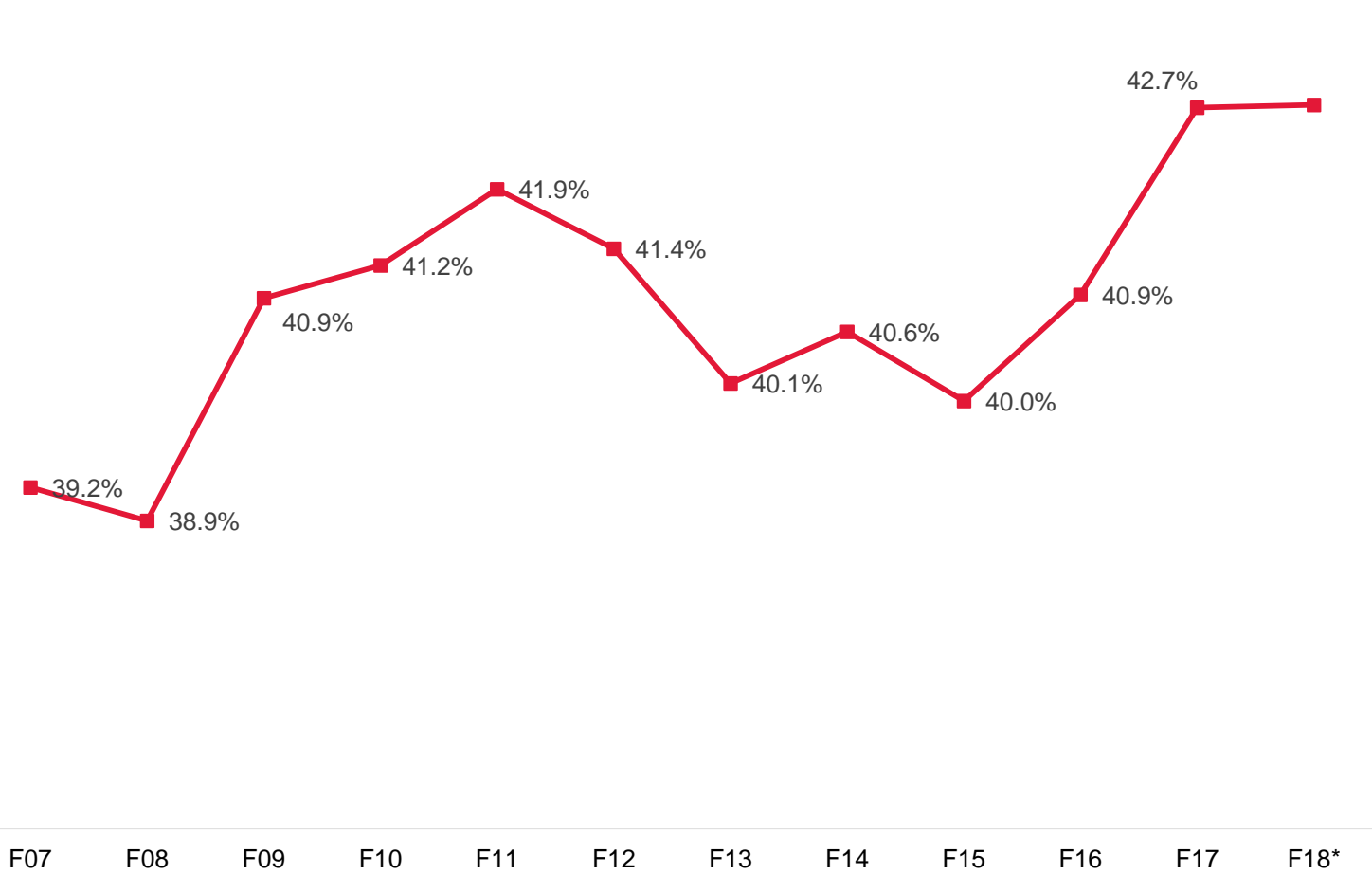
## INDIA'S TRACTOR POPULATION CAN REACH 16 MN

Nearly 13 million tractors required to till India's entire arable area. We estimate the tractor population can reach 16 mn as current penetration is around 10%. We believe tractor demand will be driven by shortage of agricultural labor, rising cost of agricultural labor, need to raise crop yields through multi-cropping and alternative use of tractors for non-agricultural work, increase in multi-cropping and growth follows its historical long-term growth trajectory. We estimate the tractor population can reach 16 mn units in India. Tractor demand will be driven by shortage of agricultural labor, rising cost of agricultural labor, need to raise crop yields through multi-cropping and alternative use of tractors for non-agricultural work, increase in multi-cropping and growth follows its historical long-term growth trajectory. We estimate the tractor population can reach 16 mn units in India. Tractor demand will be driven by shortage of agricultural labor, rising cost of agricultural labor, need to raise crop yields through multi-cropping and alternative use of tractors for non-agricultural work, increase in multi-cropping and growth follows its historical long-term growth trajectory.

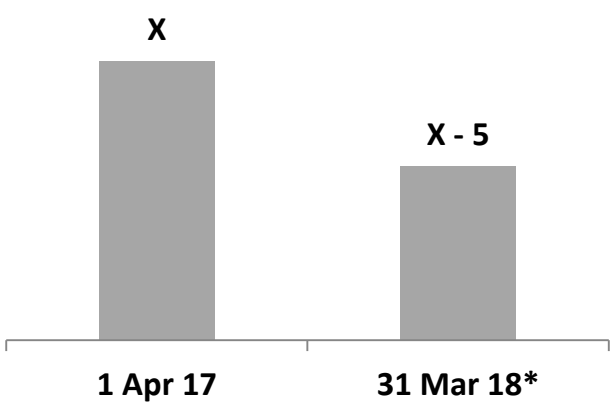
## Cross-country comparison indicates healthy demand potential

# Domestic Leadership

## FES Market Share

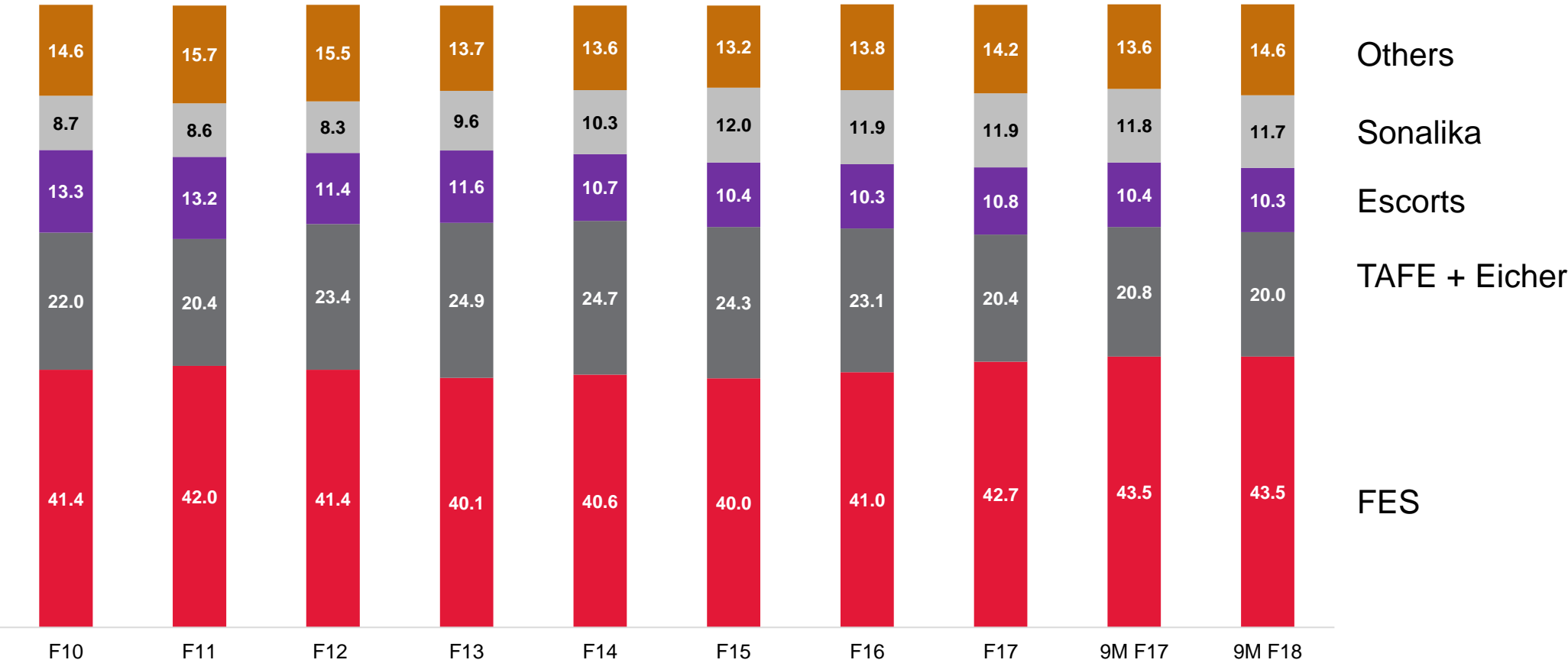


 **Headroom in F19 - Dealer level stock reduction**

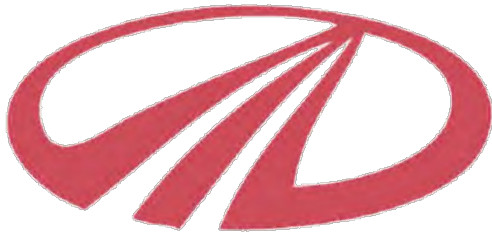


\*Estimates for F18

# Domestic Leadership



# Brands



**Pioneering technology**



**Reliable, Powerful, Authentic**



**Affordable Mechanization**



# Mahindra Tractors - Portfolio

<30 HP

30-40 HP

40-50 HP

>50 HP

Basic



Advanced



JIVO

YUVO

NOVO

Smart



JIVO with DigiSense

YUVO with DigiSense

NOVO with DigiSense

# Mahindra Tractors



**Mahindra**  
**JIVO**  
POWER. PERFORMANCE. PROFIT

- DI Engine with 4WD option
- Best in class lift capacity – 750 Kgs
- Best in class max torque – 86 Nm
- Best in class fuel efficiency - 205 SFC
- Highest PTO HP – 22 HP vs 17 HP



**Mahindra**  
**YUVO**  
MORE. FASTER. BETTER.

- 12F + 3R Gear Speed options
- Planetary drive to minimize power losses
- Best in class lift capacity – 1500 Kgs
- Advanced high precision hydraulics
- Lowest operating speed - 1.45 Kmph
- Best in class ergonomics



**ARJUN**  
**NOVO**  
ZINDAGI KA ANDAAZ BADAL DE

- Advanced synchromesh transmission
- 30 Gear Speed options including Creeper
- Best in class lift capacity – 2200Kgs
- Highest torque and PTO Hp in segment
- Advanced high precision hydraulics

# Mahindra Tractors – Domestic Channel

- Deepest reach – 2000 vs average 1000 locations for competitors
- Average distance to dealership ~ 28 kms
- Largest feet on street ~ 6500 strong sales team

Tabs for selling solutions





# Swaraj Portfolio – Reliable, Powerful, Authentic

<30 HP



717



825 XM



724 Orchard



724 Orchard - NT



724 XM

724

30-40 HP



834



735 FE/XM



735 XT

40-50 HP



841 XM



843 XM



744 FE/XM



855 FE/XM



742 FE



960 FE



963 FE

>50 HP

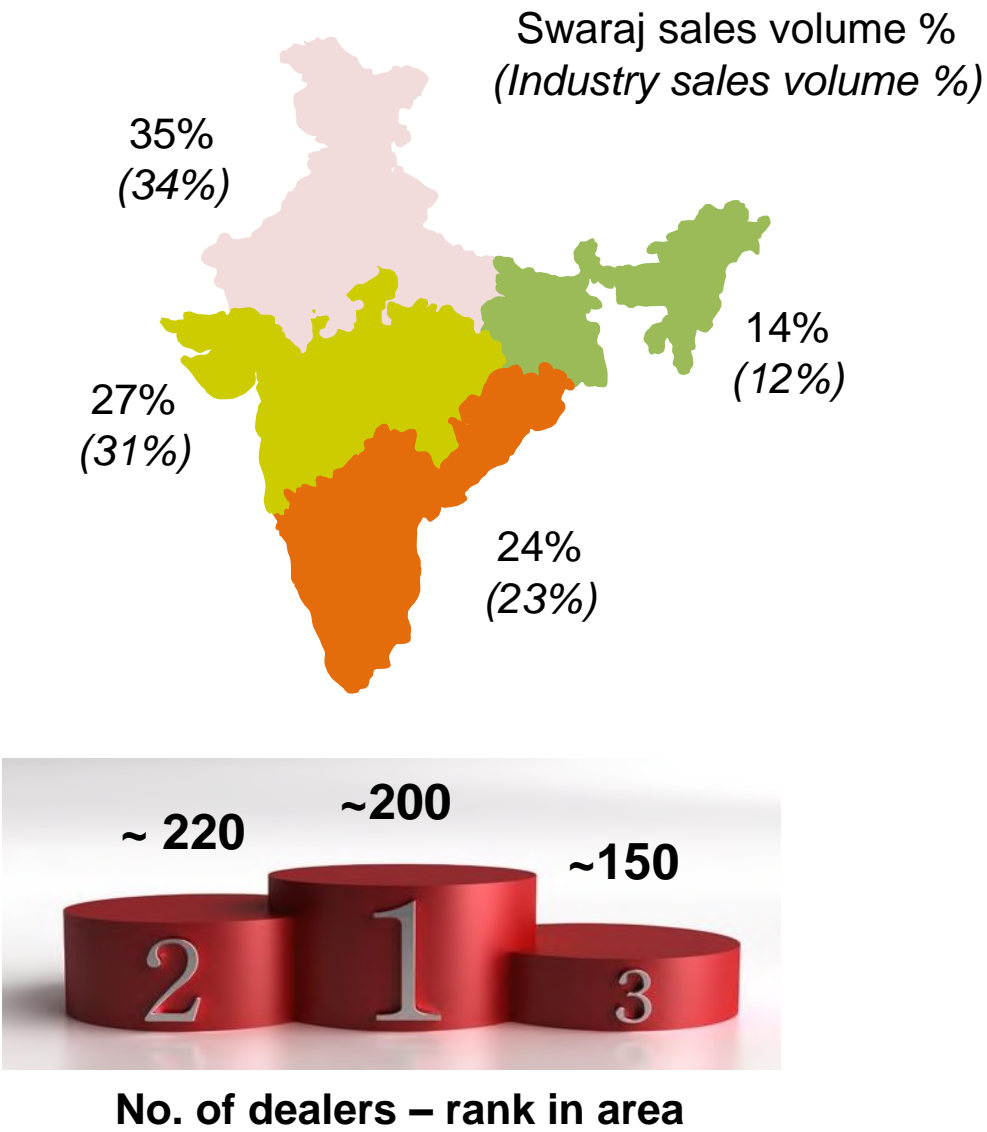
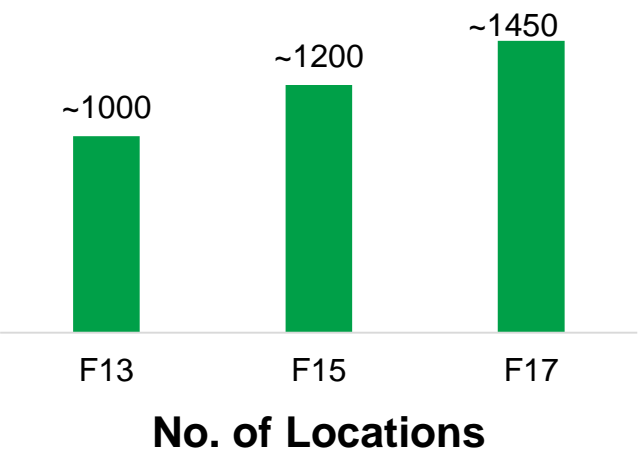
# Swaraj enters 60 Hp segment



- 2200 Kg Sensilift hydraulics – Precision with heavy implements
- Synchromesh transmission
  - Wide speed range (0.5 to 32 kmph)
  - Ease of Gear shifting
- IPTO Clutch - Driver Comfort during PTO applications

# Swaraj – Network

- Increase in channel strength





# Swaraj - Brand



# Gromax



- New corporate brand identity of Mahindra

Gujarat Tractors Limited

- Affordable Mechanization
- Launched new Trakstar brand of tractors in the 30-50 HP category



# TRAKSTAR

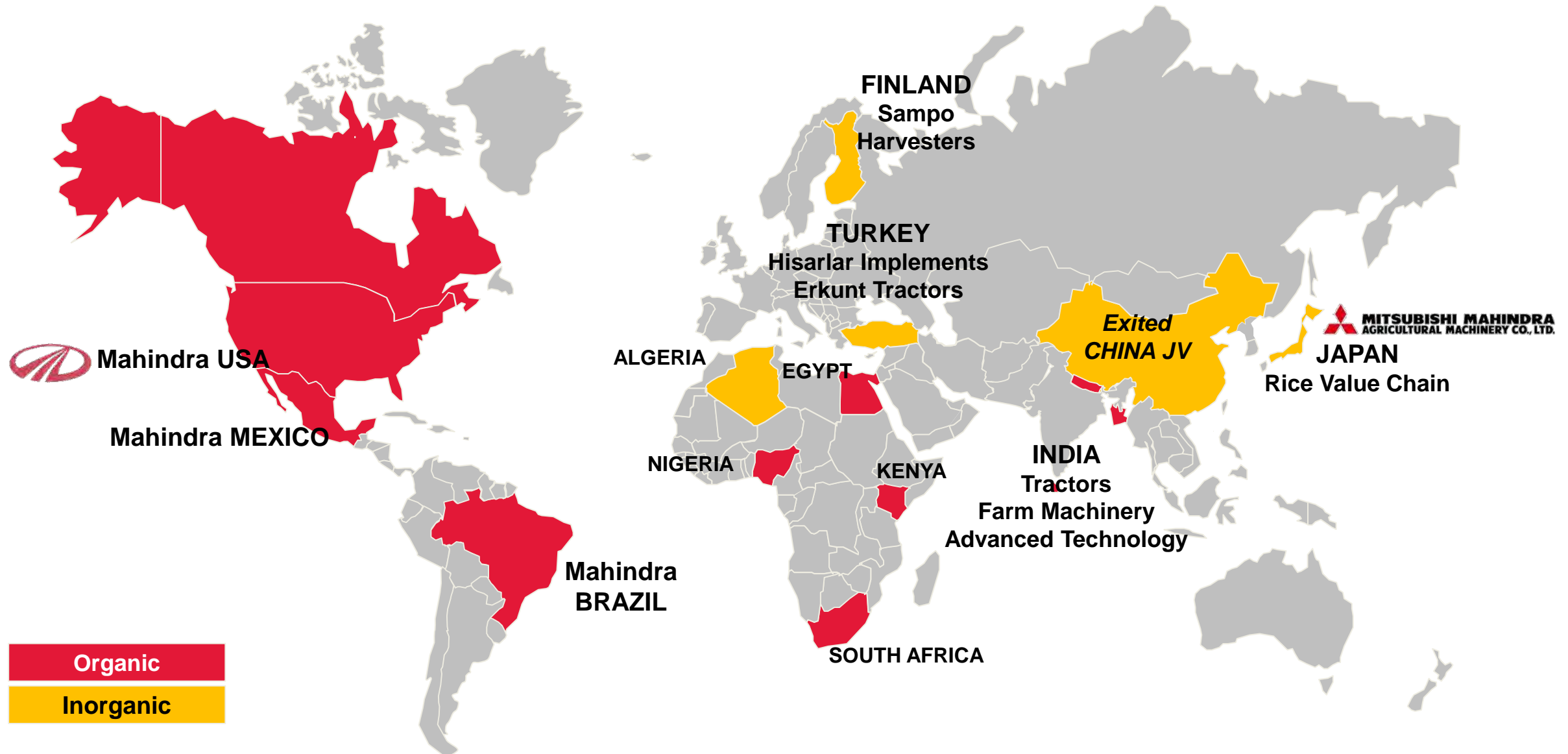
TRACTOR JO BADAL DE LIFE KA TRACK



- 5 hp points covering 80% of industry
- Suitable for farming and supplementary use
- Affordable
- Launched in 5 states
- ~100 dealers with new brand and retail identity



# FES Global Footprint



# Key Parameters

	M&M FES	Other Listed Player
Volume	235,197	55,434
<i>Volume Growth</i>	<i>16%</i>	<i>15%</i>
Revenue	12,088	2,864
<i>Revenue Growth</i>	<i>16%</i>	<i>13%</i>
PBIT %	20.0%	13.1%
ROCE %	100.8%	42.8%

YTD December 2017  
In INR Crores

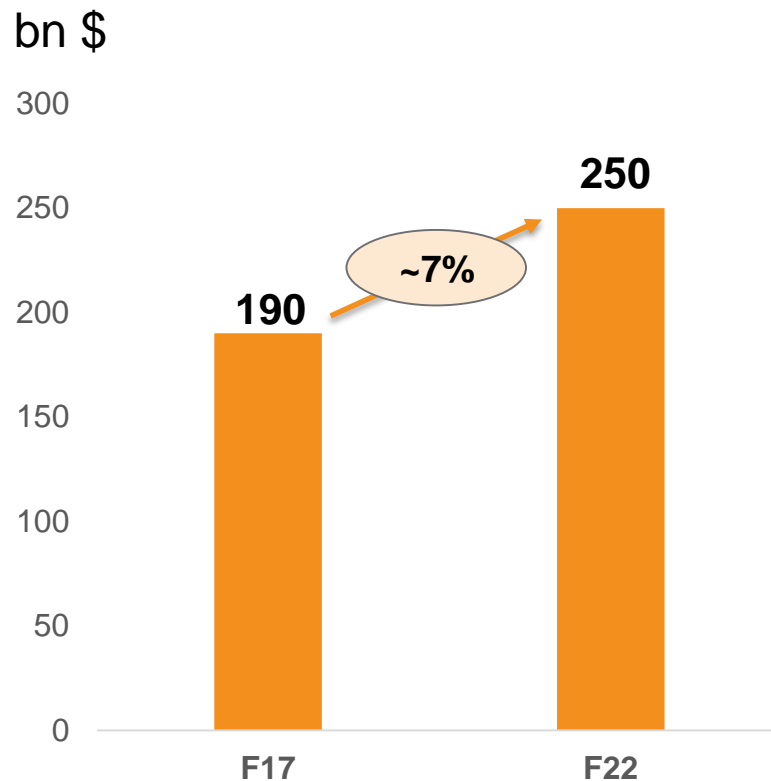
Comparable Segment Considered

# Agriculture Sector

Ashok Sharma  
M&M IR Day @ MRV – 14<sup>th</sup> March 2018



# Industry and Opportunities



# Deliver prosperity to 75 million farmers to help them RISE

Our technology enabled products, services and agri initiatives will deliver solutions to 75 million farmers across the world to empower them, become more prosperous and to **RISE**



By 2019 - 3mn\*

By 2022 - 15mn\*

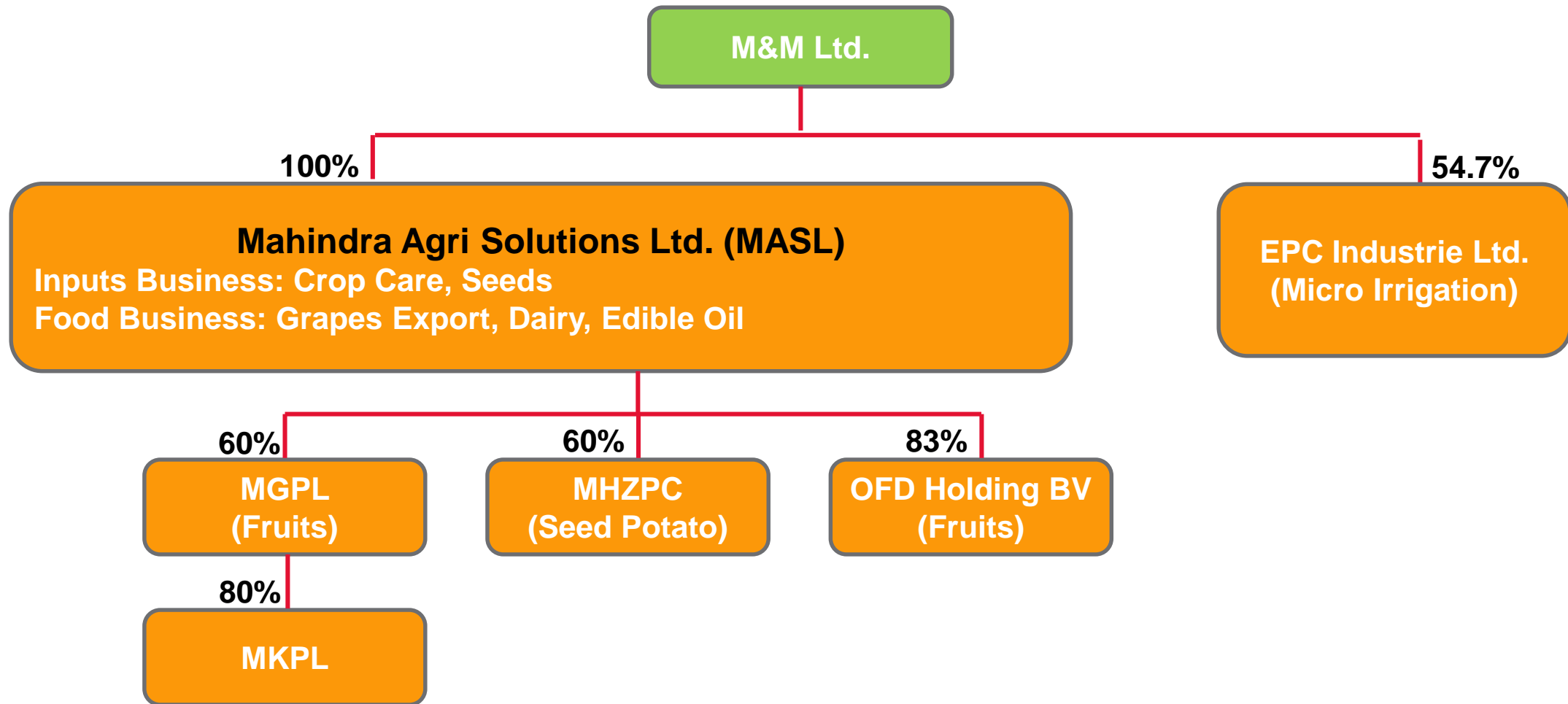
By 2025 - 36mn\*

By 2030 - 75mn\*

## Our BHAG



# Business Structure



Subsidiary

# Our Vision: Farmers' Best Friend

Improving Productivity

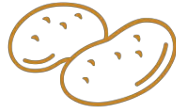
**Samriddhi**  
by Mahindra



Seeds



Crop Care



Seed Potato



EPC

**Samriddhi – FaaS\***



**SAMRIDDHI**

Improving Price Realization

**Integrated Value Chain**



F&V



Dairy

Sourcing

Processing

Branding

Distribution

Retail



**Saboro Health  
Food Café**

\* Farming as a service

# Our Vision: Farmers' Best Friend

Improving Productivity

**Samriddhi**  
by Mahindra



Seeds



Crop Care



Seed Potato



EPC

**Samriddhi – FaaS\***



Improving Price Realization

Integrated Value Chain



F&V



Dairy

Sourcing

Processing

Branding

Distribution

Retail



**Saboro Health  
Food Café**

**SAMRIDDHI**

\* Farming as a service



# Inputs Business



**Seeds**  
(MASL)



**Crop Care**  
(MASL)



**Seed Potato**  
(JV with HZPC)



**Micro Irrigation**  
(EPC Industrie Ltd.)



# Key Drivers

- ✓ **High Quality Differentiated Products**
  - Strong R&D Capability
  - World class facilities
  - Global Partnerships
- ✓ **Leveraging Mahindra Brand**
  - Large user base of tractor customers
- ✓ **Samriddhi as a unique differentiator**
  - Intense farmer engagement
  - Digital Advisory



**Crop Care Formulation Plant @ Ankleshwar**



**Seed Potato Aeroponics Facility @ Mohali**  
World class virus free seeds to farmers

# Samriddhi - Unique Differentiator

Soil Testing

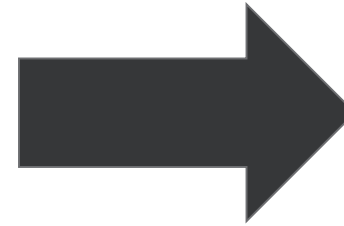
Advisory

Sale of Agri inputs

Recognizing Farmers

Digital Support

Productivity Improvement



**Prosperous Farmer**

- Value chain integrator as a single brand for all inputs
- Integrated village development program – Mahindra Agri Village
- Over 300 touch points across the country



# Impacting Indian Agriculture



8<sup>th</sup> Mahindra Samriddhi India Agri Awards

# Digital Advisory App



- **MyAgriGuru:** Launched at the hands of Hon'ble Union Minister of Agriculture, Sh. Radha Mohan Singh in Feb'17
  - ✓ Over 4,00,000 downloads in one year of launch
  - ✓ 55,000 interactions on our most popular section, AgriBuzz
- Launched enhanced version of the App in March'18
  - ✓ Featuring **India's first agri advisory ChatBot**
  - ✓ Personalized user experience

# Our Vision: Farmers' Best Friend

Improving Productivity

**Samriddhi**  
by Mahindra



Seeds



Crop Care



Seed Potato



EPC

Samriddhi – FaaS\*



**SAMRIDDHI**

Improving Price Realization

**Integrated Value Chain**



F&V



Dairy

Sourcing

Processing

Branding

Distribution

Retail

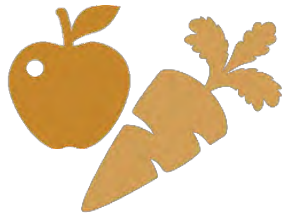


**Saboro Health  
Food Café**

\* Farming as a service



# Food Businesses



**F&V**

(MASL, OFD, JV with  
MGPL)



**Dairy**

(MASL)



**Health Food Café**

(MASL)



# Key Drivers



- ☑ We help to grow the right Quality
- ☑ We select the right Quality
- ☑ We preserve the right Quality
- ☑ We distribute the right Quality
- ☑ We assure the right Quality

***Promise of Quality***



***Product Differentiation***



***Global Partnerships***



# **Business Growth**

**~17X/7**

*Mn \$*

200

180

160

140

120

100

80

60

40

20

0

**2 JVs**  
**3 Acquisitions**

**CAGR = 50%**

F11

F12

F13

F14

F15

F16

F17

F18 Est.



# **Journey to \$1b business**

## **(5X/5)**



**4.8X** growth in Agri Inputs business

\$300 million

(EPC| Crop Care| Seeds| Seed Potato)

**5.4X** growth in Food Business

\$700 million

(F&V| Dairy| Africa| Saboro Health Food Café)

# Key Strategies

## Inputs Business

- Building a **strong product portfolio** through own R&D/inorganically
- Strengthening non-subsidy driven business in EPC
- Focus on **high potential markets**
- Leveraging **Samriddhi** network

## Food Business

- Positioning **Saboro** as **Health & Wellness Partner**
- **F&V:**
  - Further strengthening **grapes export** business – entering new markets, building new sources, developing new varieties
  - Strengthening OFD's presence in China
  - Exploring new fruits for building export value chains (leveraging learnings from grapes export business)
  - Modernizing F&V supply chain through **Distribution Centres**
- **Dairy:** Strengthening business through Value Added Products and geography expansion through organic/inorganic route
- Expanding **Health Food Café** business in Mumbai & other cities

# Africa

Arvind Mathew  
M&M IR Day @ MRV – 14<sup>th</sup> March 2018

# Mahindra's Africa Journey

2004-2014

Established **presence** and **brand** in **South Africa**, the most competitive market in the continent

2004

Identified the big opportunity in Africa. **Started** with the biggest market, **South Africa**. Invested in the continent by establishing a **subsidiary**

2014-2015

Developed a **comprehensive strategy** for all **mobility** and **agri** businesses, with clearly identified **priority areas**

2015-2017

Laid the **groundwork** in line with strategic direction. Will help in explosive future growth



## Restructuring

As part of the strategy roadmap, International Operations was restructured in Africa, with the consolidation of all mobility and agri businesses under one team

# The Economic Crisis

## Global View of Africa 2014

**IMF SURVEY:**  
Strong growth in Sub-Saharan Africa

## The crisis from 2015-2017

	<u>2014-15</u>	<u>2016-17</u>
Kenya	<i>Named Africa's best investment destination</i>	<i>Economy severely impacted by election uncertainty</i>
Nigeria	<i>Overtook South Africa to become Africa's largest economy</i>	<i>Faces serious macroeconomic challenges. First recession in decades</i>
Algeria	<i>Grew at 4% driven by oil and economic expansion</i>	<i>State budget halved due to falling oil prices</i>
Mozambique	<i>Sustained economic growth of 7.5% for a decade and a half</i>	<i>Growth declines to 4.5%. Cut in spending. Devaluation</i>

**E&Y:** Africa's growth will improve after 2016 – the worst year for the continent in nearly 20 years

**McKinsey:** Out of the 15 largest consumption markets in Africa, which constitute 90% of the continent's total consumption, 12 experienced a slowdown in consumption growth in 2015 and 2016

## Global View of Africa 2018

**IMF SURVEY:**  
Strengthening of commodity prices, easing of broad-based slowdown, growth to resume...

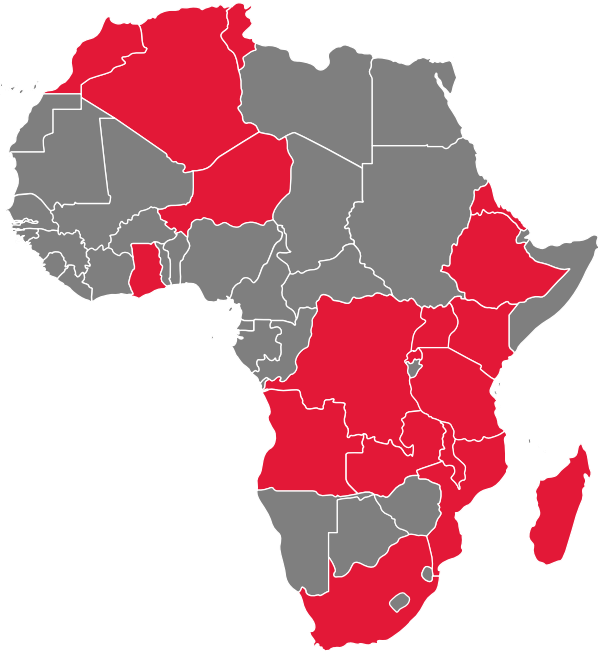
2014

2015-2017

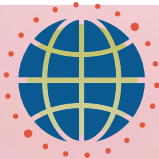
2018



# Then...



**FY 14**



**28** : *BU-Market combinations*

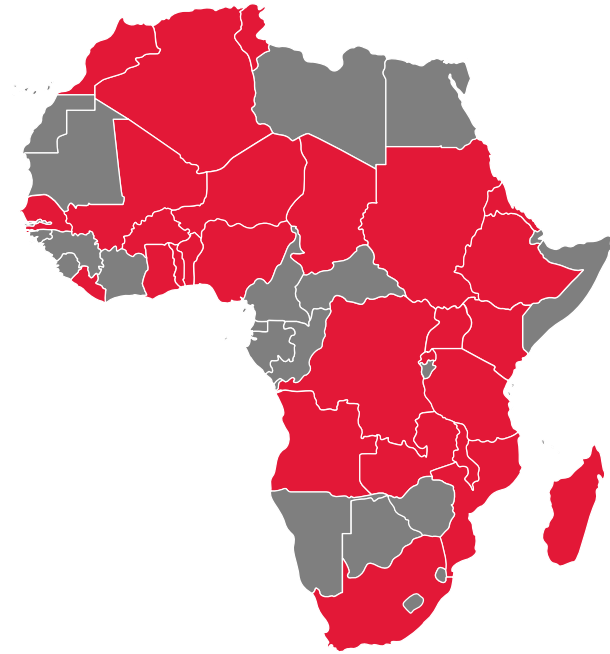


**2** : *Assembly Plants*

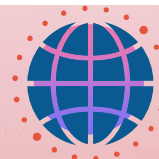


**1 / 34** : *Local Office / Manpower*

# and Now



**FY 18**



**71** : *BU-Market combinations*

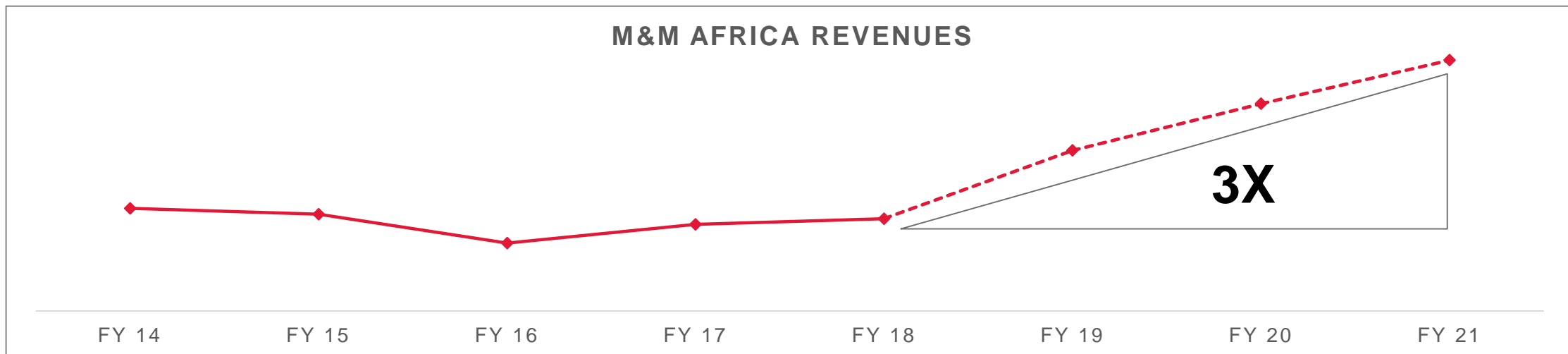


**8** : *Assembly Plants*



**4 / 74** : *Local Offices / Manpower*

# Sailing through tough times, to emerge stronger



## FY 14 – FY 18 (MARKET)

- ↓ **Auto** industry de-grew by **15% - 85%** across countries
- ↓ **Indian tractor exports** to Africa fell by **>50%**. Algeria – largest market outside South Africa, collapsed
- ↓ **Indian 2W exports** to Africa fell by **~30%**

## FY 14 – FY 18 (M&M)

- ↑ Increased share in Indian exports from **15% to 21%** in **Tractors (FY 17)**
- ↑ Reached **Number 2 position** in tractors in **Nigeria** in third year of operations (**33% MS**)
- ↑ Revenue from new businesses\* increased **4X**
- ↑ Grew by **45% in 2 years** in **South Africa (Auto)**, where industry dropped by 10% (2015-2017)

\*New Businesses includes Powerol, Applitrac, Two Wheelers and Construction Equipment

# Approach to 10X Growth



# Powerol Business

M&M IR Day @ MRV – 14<sup>th</sup> March 2018

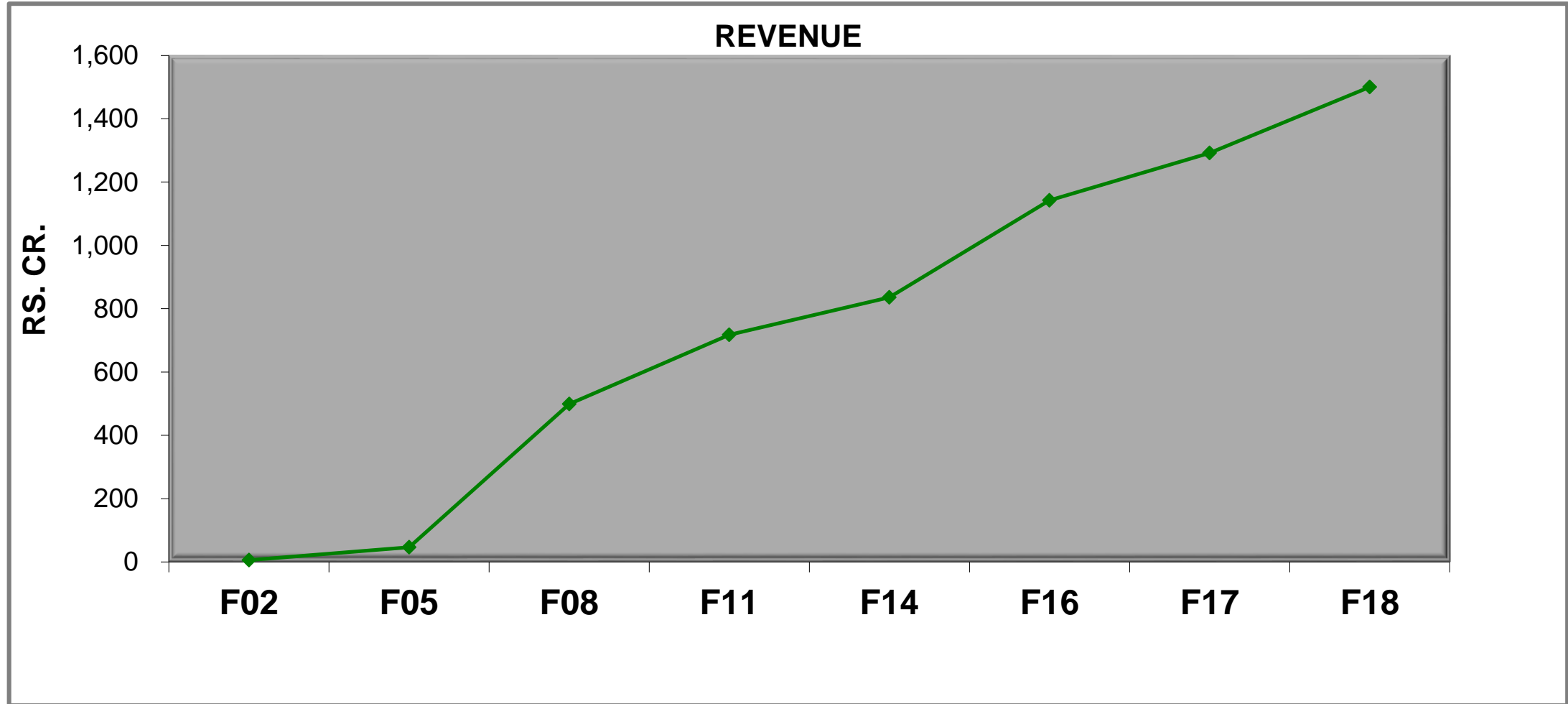


# CONTENTS

- Business Introduction
- Market Overview
- Environment
- Strategy & Way Forward



# Journey so far



**Profitability (%) in double digit**

# Offerings at a glance

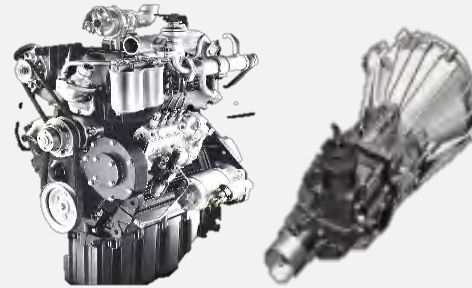
## PRODUCTS



**GENSETS**

LkVA  
(5 kVA to 75 kVA)

HkVA  
(82.5 kVA to 320 kVA)



**POWERTRAINS**

Diesel

Gasoline

CNG



**LI-ION BATTERIES**

## SERVICES



**TELECOM**



**RETAIL**



**INDUSTRIAL ENGINES**

## SOLUTIONS



**Tele Infra  
Management**



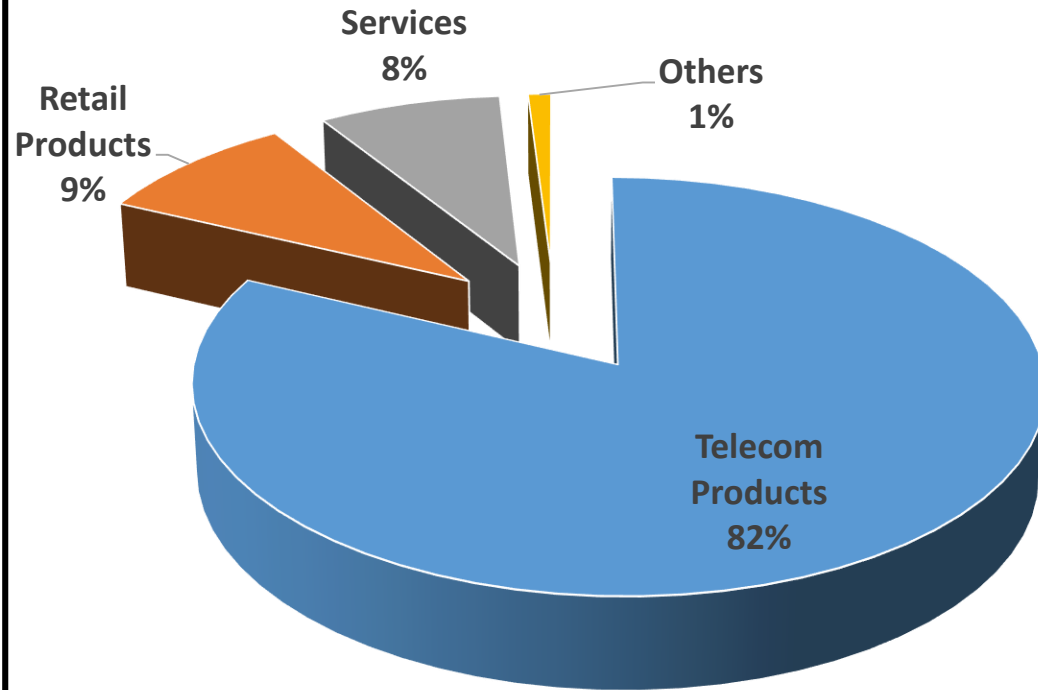
**Energy Management  
Solutions**



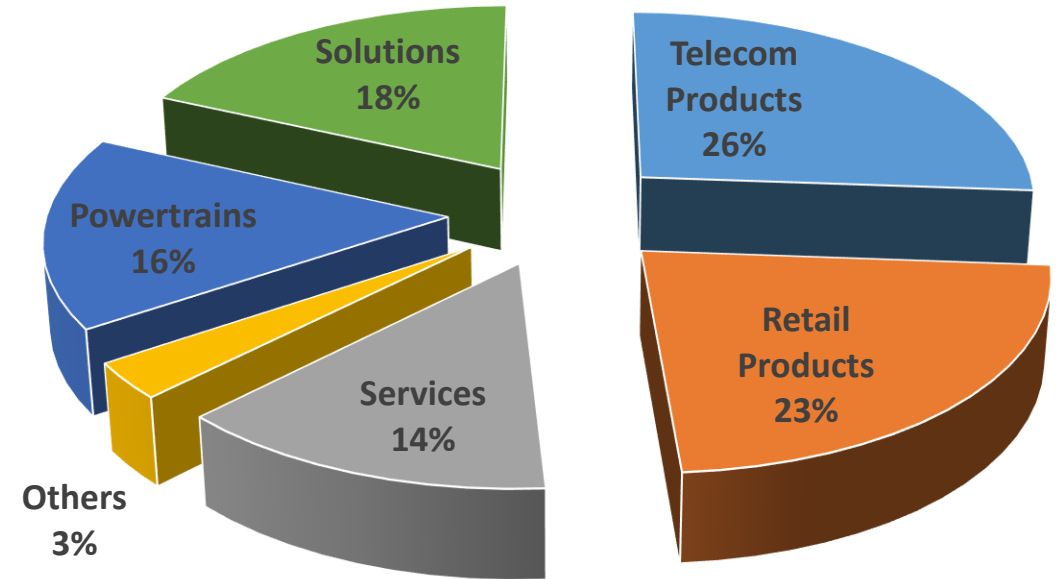
**Waste to Energy  
Management**

# The transformation

Powerol @ 2007



Powerol @ 2018



# The Milestones



2<sup>nd</sup> largest player in Indian Genset market (by volume)

Telecom market share > 60%

27 K+ Units order from a single customer in F18



# Market Overview

## ○ Gensets

- Projected growth rates
  - HkVA → 12%; LkVA → 3%
- Key drivers
  - Infra & Manufacturing growth
  - Urbanization, Telecom and Improving lifestyle

## ○ Tele Infra Solutions

- Drivers – 4 G penetration, Rural broadband and Data Services growth

## ○ Waste to Energy

- Drivers – Bio waste disposal; Swachh Bharat



**Telecom Towers (Representational)**



# Opportunities & Challenges

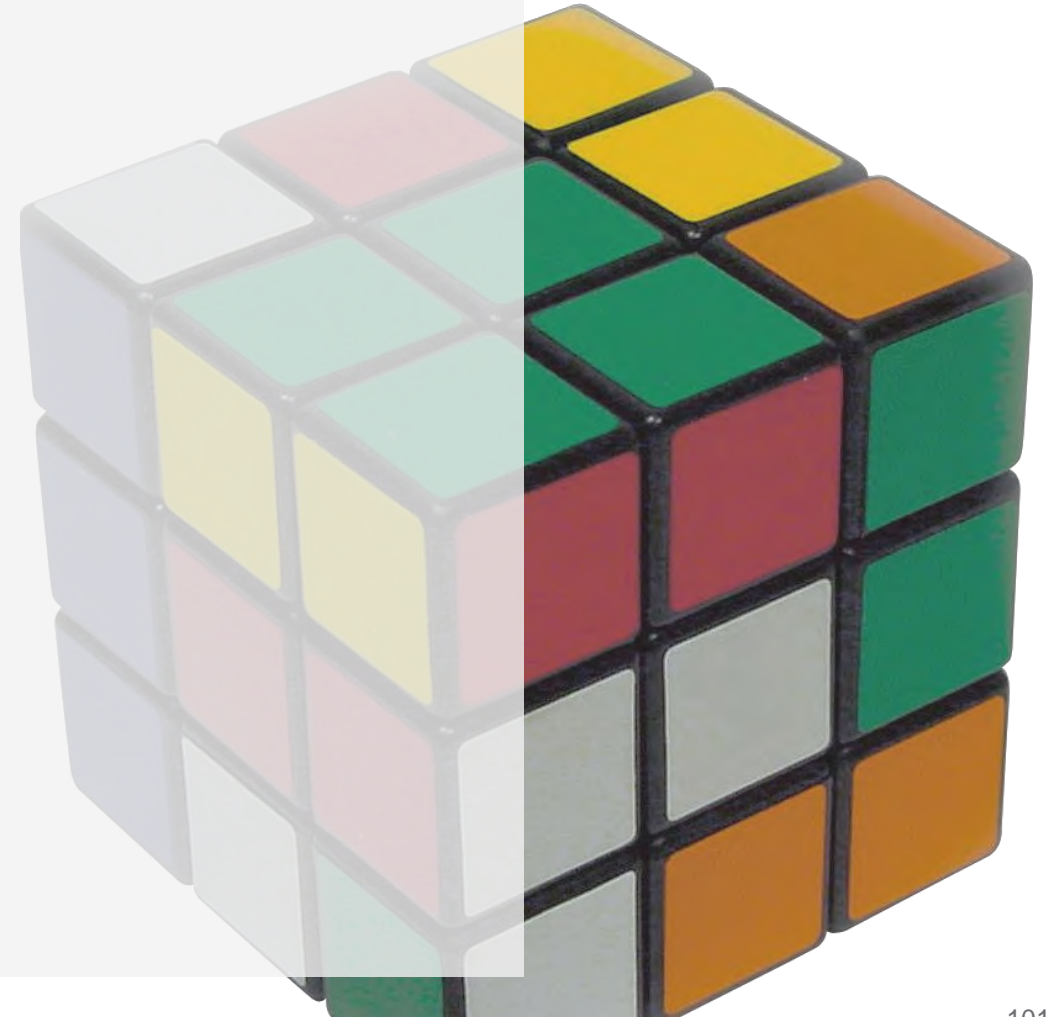
Data services explosion

Big investments in Infrastructure and IT

Increased competitive rivalry in telecom

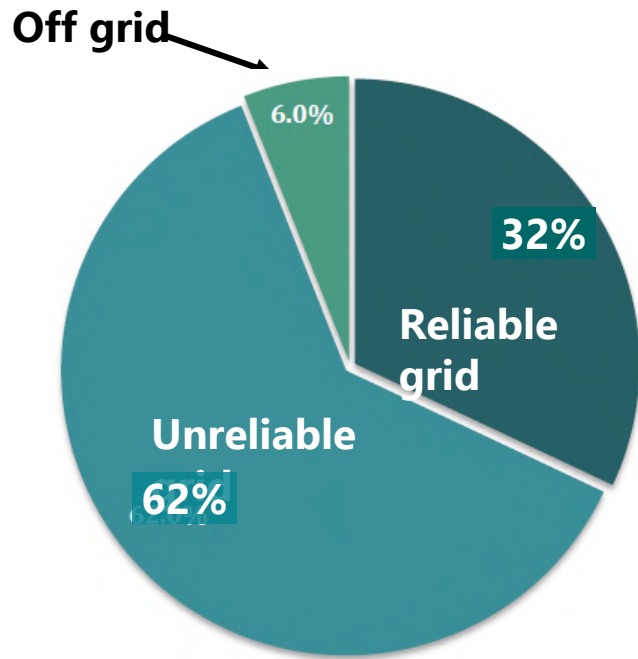
Improving peak power scenario

Environmental concerns



# Emerging Businesses

## Energy Management (Tele Infra) Solutions



**Tower Power Grid Reliability Distribution – F23\***

Addressable Market	
EMS	68% (Unreliable & Off grid)

### Opportunity

- F17 Towers – 470 K\*
- F23 Towers – 550 K\*
- Data Services growth
- Cost Pressures on Towercos
- Integrated Tele Infra Opportunities – TIM / OFC



### Enablers

- Cost competitive Gensets & Li-Ion Batteries
- Solar solutions
- Remote monitoring solutions
- TIM Experience, Capable Manpower and Brand Trust

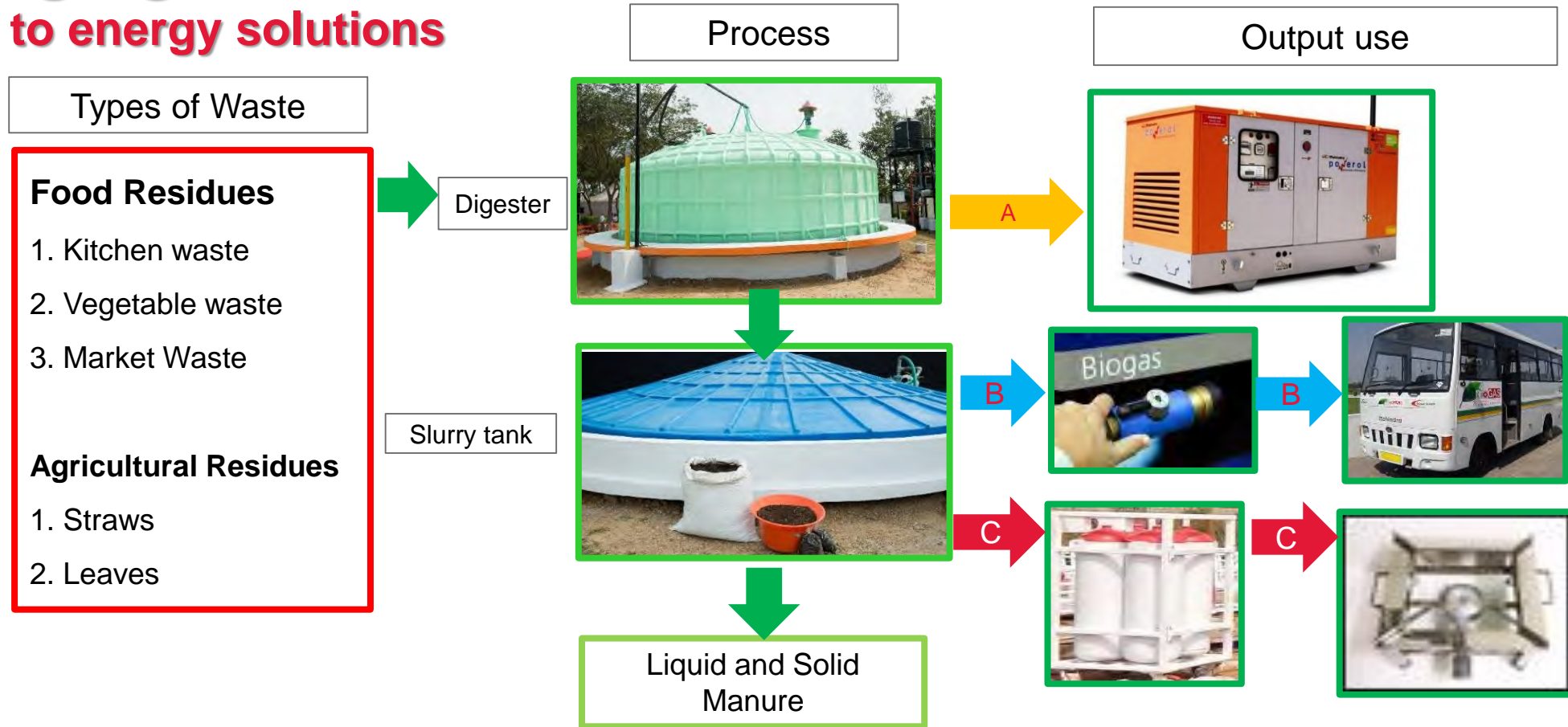
### Plan

- F22 Revenues > Rs 1000 Cr **(5X)**
  - Portfolio expansion
  - OFC Growth

Source - \*6W Research - 2017

# Emerging Businesses

## Waste to energy solutions



### Opportunity size:

- Organic waste: 220 lakh tons
- Meagre 12.5% is treated.

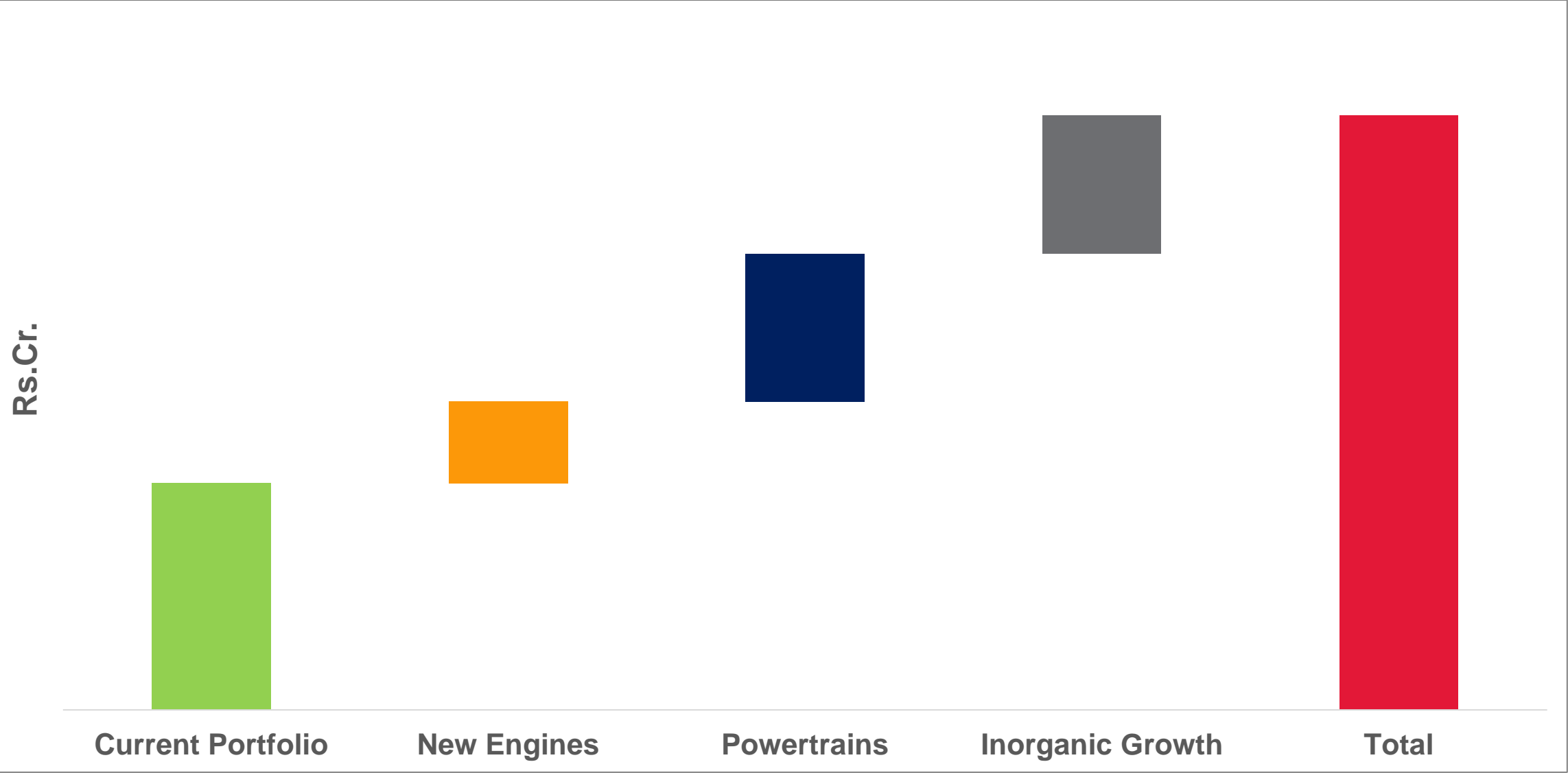
### Competitive advantage:

- Homegrown Patented MRV technology
- End to End Project Management Capability

### Future Plans:

- F19 Expansion to 30 projects

# Path to \$1 Billion



# **Mahindra Research Valley**

## **“Temple of Creativity and Innovation”**

**M&M IR Day @ MRV – 14<sup>th</sup> March 2018**



# Presentation Outline

**Mahindra Research Valley**

**New Technologies**

# Mahindra Research Valley

Temple of Creativity and Innovation

Mahindra Research valley ( **MRV** ) inaugurated by **Dr. A P J Abdul Kalam** on 11<sup>th</sup> April 2012.

One of a kind integrated R&D facility catering Auto & Farm



Total Plot Area : **124 Acres**      Built Area : **22 Acres**

# MRV Objectives



**Enable Mahindra & Mahindra to deliver Innovative Products of World Class Standard, through**

- Synergy of People & Equipment
- World Class Infrastructure
- Creating a Culture of Innovation
- New Technology Development



**Minimize the New Product Development Cycle by**

- Enhancement of People Skills
- Structured e-MPDS Processes
- Crusade 2.0 First time right, Everything right, Delightful Customer Experience



**Make MRV a “Great Place to Work”**

# Mahindra R&D Network



USA



*pininfarina*

ITALY

Mahindra  
Research Valley



**MITSUBISHI MAHINDRA**  
AGRICULTURAL MACHINERY CO., LTD.

JAPAN



**SAMPO ROSENLEW**  
FINLAND



**SSANGYONG**  
South Korea



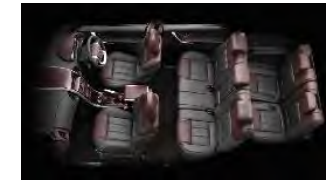
# MRV Global Technology Partners

Collaboration Network for Product Development with State of Art Technology

Arplus<sup>+</sup>  
IDIADA



Crash & Passive safety



Seating system



Engine Design and test facilities



Interior Trims Design



Fuel Management system



Powertrain Design



Ride & Handling performance



# MRV Test Facilities

## Major Laboratories

- PTDC (Power Train Development Center) – Chassis Dyno, Durability, Power Take Off Lab
- NVH Lab
- Oil & Fuel Lab
- Instrumentation Lab
- Electricals & Electronics Lab
- Thermal Lab
- HVAC Lab
- Safety Lab

## Test Track

- Automotive Test Track
- Tractor Validation

## Other Facilities

- Benchmark Center
- Proto Machine Shop
- Proto Assembly Shops

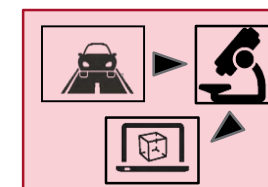


- ✓ Fatigue Lab
- ✓ SEL
- ✓ Fluids Lab
- ✓ Polymer Lab
- ✓ Metallurgy Lab
- ✓ Tractor validation Lab
- ✓ Vehicle Test Cell
- ✓ Engine Test Cell
- ✓ Engine- PTO



## Overseas Certification for Tractors

Testing & Certification process time has been reduced



**First Tractor Company Accredited by VCA UK**

**Focus on Road to Lab and Lab to Laptop Testing**

# MRV Sustainability

1<sup>st</sup> Facility across  
Mahindra Group

1<sup>st</sup> in Tamil Nadu  
9<sup>th</sup> in the Country



750KW Solar (3% Green Energy)



1700 Trees Drip Irrigation



100% LED Office Lighting



Lawns with 100% Sprinklers



# MRV - New Products Developed



**20 Patents  
13 Design**



**13 Patents  
10 Design**



**12 Patents  
08 Design**



**28 Patents  
14 Design**



**29 Patents  
08 Design**



**12 Patents  
02 Design**



**05 Patents  
02 Design**



**20 Patents  
15 Design**

## Intellectual Property Creation





# New Technologies

## Pioneer in the Market – First in India Launches

S.No	Patentable Idea	Application
1	2cyl engine with 4V/cyl and CRDe technology	Maxximo
2	PF pump based Low cost common rail technology	Bolero & Pick ups
3	High power density diesel engine with gallery cooled pistons, dual mass flywheel	XUV
4	Two stage turbocharging for engine capacity less than 1.5lit engine	Quanto, TUV
5	Inline FIP with modulated governing & progressive governing	Arjun 605
6	Meeting TIER IV final without turbocharger and DPF	MUSA
7	Fuel smart technology	Pick ups, KUV
8	Single cyl diesel engine with middle split type crankcase	Jeeto
9	Single cyl diesel engine with over-head camshaft and Hydraulic lash adjuster	Jeeto
10	High pressure die cast Aluminium Crankcase & bedplate	KUV
11	Oil filtration module with integrated thermostat & water pump	KUV
12	Indigenous mechanical governor concept	Yuvraj NXT
13	CRDE for Tractors	Arjun
14	DiGiSENSE for Tractors	Yuvo & Jivo



# Safety Technologies

Pioneer in the Market – First in India Launches



**XUV with 6 Airbags**



**Electronic Stability Program (ESP)**



**Hill Hold / Descent Control**

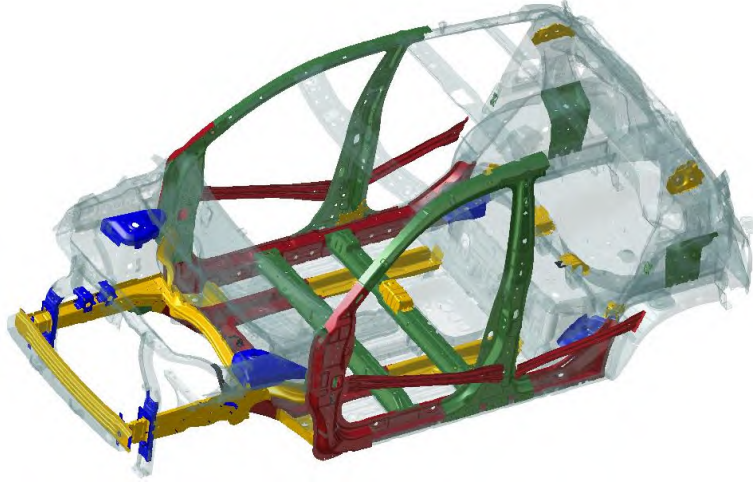


**ABS with EBD Standard**

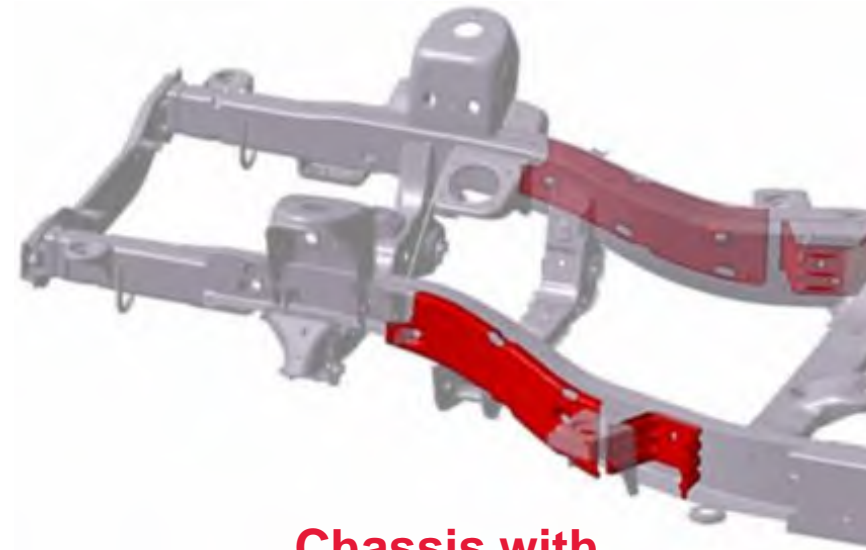


**ISOFIX child seat on KUV100**

# Safety Technologies



**High strength steel**



**Chassis with  
Hydroform features**



**Dual Airbags**



**Seat belt  
Pretensioner**



**Front crash  
sensors**



# Safety Technologies

## M&M Readiness

Regulation	Purpose	Status
Adult	Frontal Protection	✓
	Side Protection	✓
Pedestrian	Pedestrian Protection (Head Impact)	✓
Child	Child Protection	✓
Safety Assist	Active & Passive	✓



**KUV300 / TUV300 / SCORPIO**  
**4 years ahead of time.**



**TUV300**



**KUV100**



**SCORPIO**



# Electrical & Electronics

## Security Technologies

1.6 million+ vehicles & counting...



400 / 400 score



Digital Immobilizer



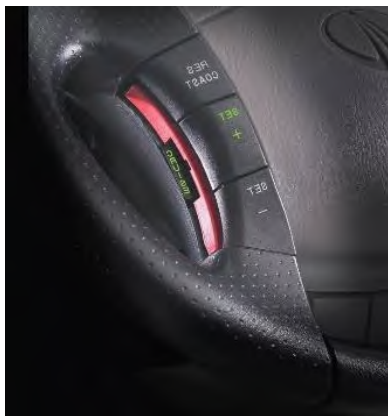
Passive Keyless Entry





# Electrical & Electronics

## Comfort & Convenience Technologies



Steering Wheel Controls Cruise & Audio



TPMS



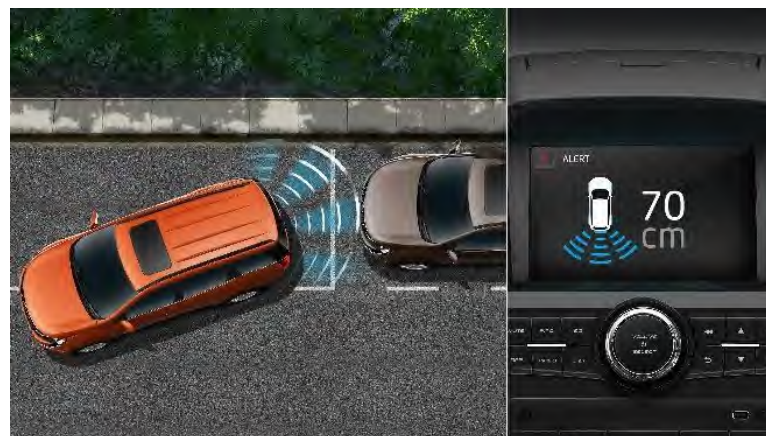
Static Bending Lamp



Logo Projection Lamp



Light sensing headlamps



IntelliPark with Dynamic guide

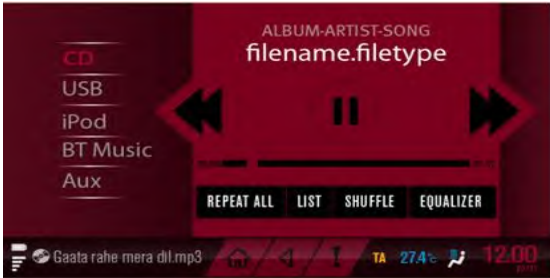


Rain-Sensing Wipers



# Electrical & Electronics

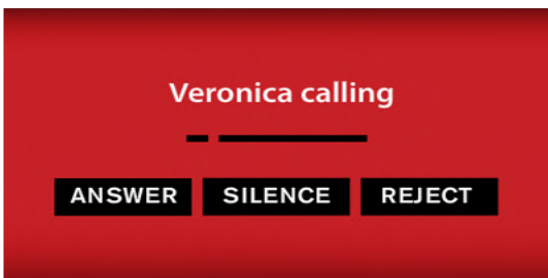
## Infotainment Technology



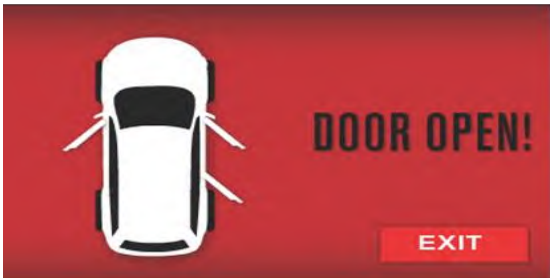
DVD/USB/IPOD/BT Music



Power Up Animation



Make Calls...



Vehicle Alerts



DVD/USB Video



Reverse Park



Vehicle Info



Voice Recognition



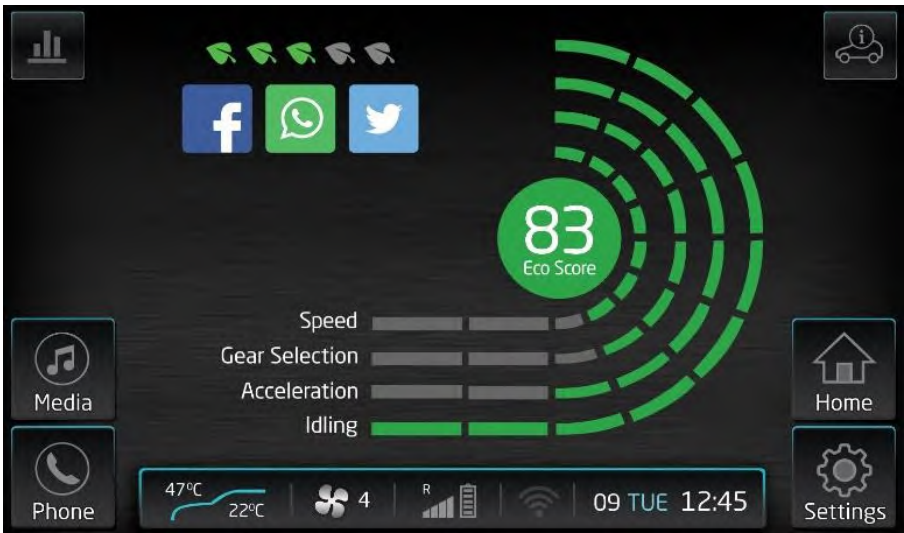
Tire Pressure

# Connected Vehicle Technology

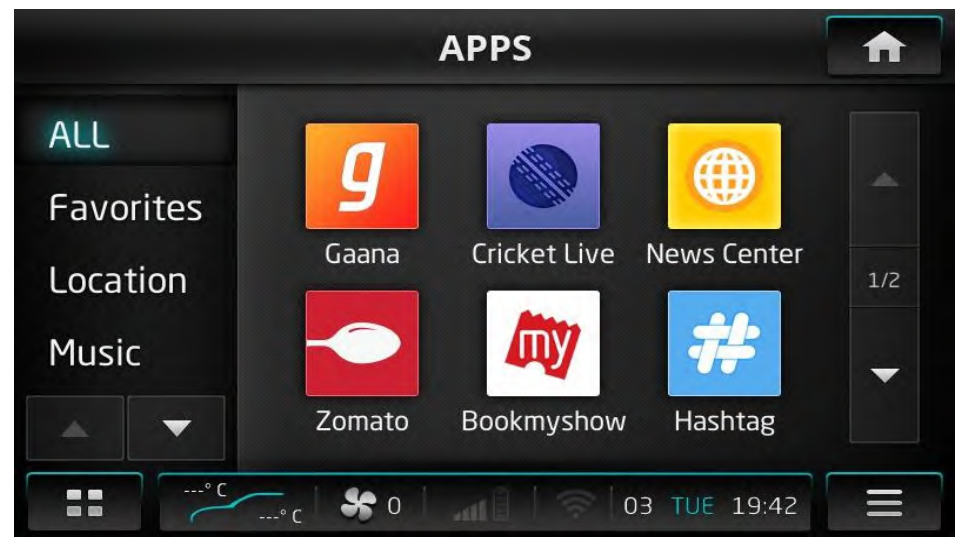
## M&M Market Offerings



## ECO SENSE



## CONNECTED APPS



## EMERGENCY CALL

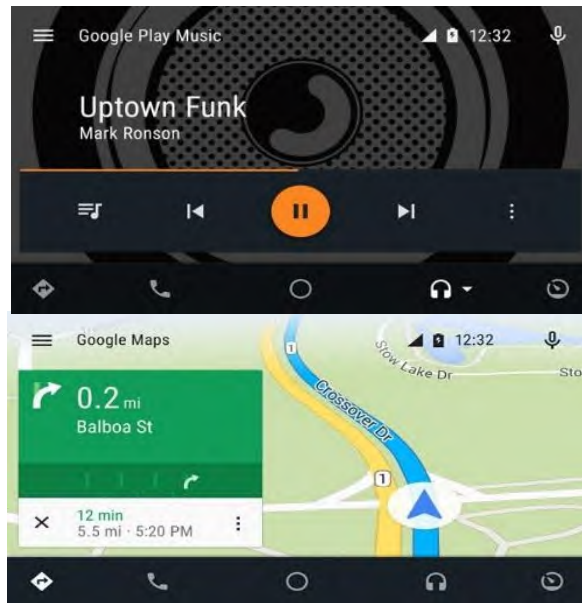




# Connected Vehicle Technology

## M&M Market Offerings

### Android Auto



### Apple Carplay

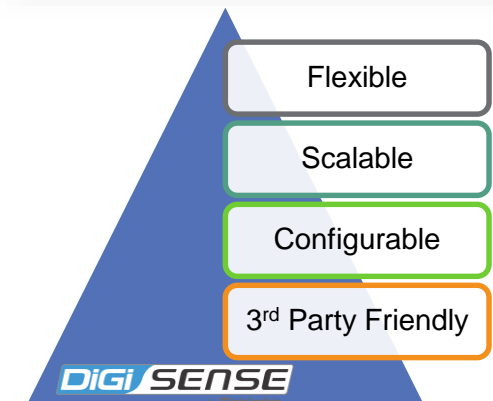
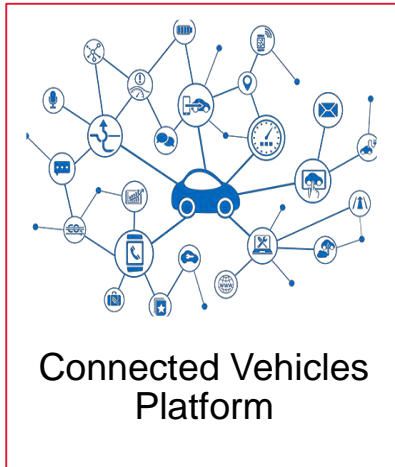
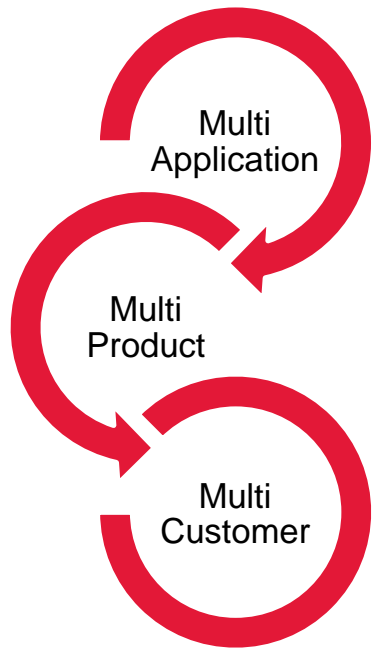


### Smart Watch Controls



# Connected Vehicles: DiGiSENSE

## Platform Solution



**"First time in Mahindra Mobility"**



# Green Technologies

## Hybrid Electric Propulsion



### Micro-Hybrid Start/Stop



### Intelli Hybrid





# Green Technologies

## Hydrogen Propulsion - Leader in India



- H<sub>2</sub>-Diesel Dual Fuel Technology
- Developed 5 Scorpio vehicles ready for demo
- First of its kind in India, Technology addition, Less polluting vehicle with better power and efficiency



- A new 4 cylinder hydrogen engine is developed with 100 % hydrogen substitution
- 2 H<sub>2</sub> Minibus built and demonstrated
- First time Turbo Charged Engine based H<sub>2</sub> vehicles are developed



- Project initiated and completed in collaboration with UNIDO & IITD
- Three wheeled engine is developed for hydrogen operation through injection method
- First of its kind in India

# Tractor Technologies

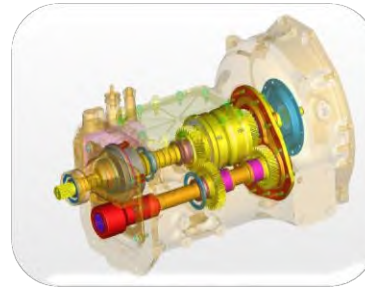
## Implemented



**SMC Hood & Lamps**  
CVP : Stylish hood



**Tilt Steering**  
CVP : Better ergonomics & comfort



**PST & Wet PTO**  
CVP : Fatigue free operation



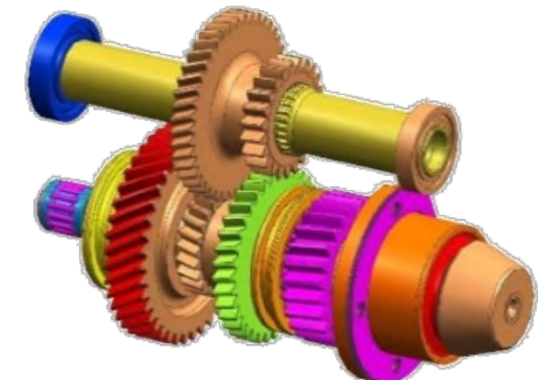
**CRDe**  
CVP : Drivability & Fuel economy



**Futuristic Cabin for MUSA**  
CVP : Comfort & Protection



**DiGiSENSE**  
CVP : Geo fencing, Live tracking of data



**Creeper**



# Tractor Technologies

Upcoming



Front PTO



4WD live axle



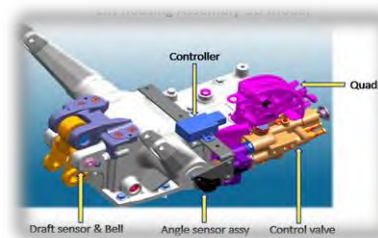
Hydraulic Assisted Clutch



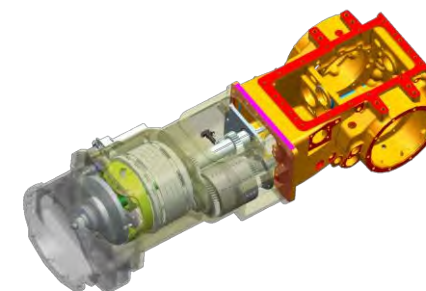
Front Hitch



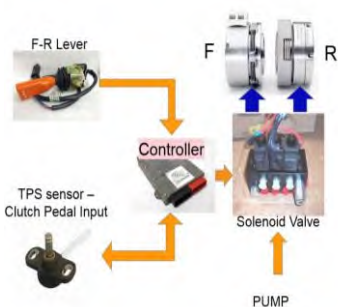
Dual Fuel Tractor



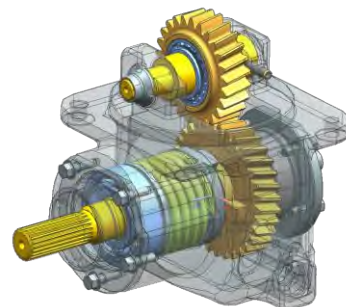
Smart Hydraulics



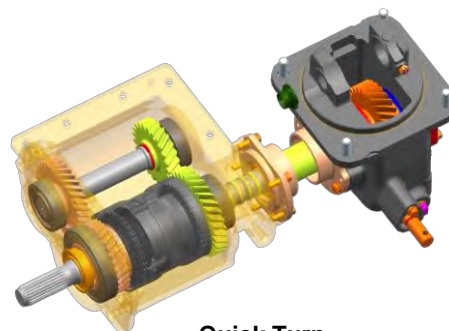
Constantly Variable Transmission (CVT)



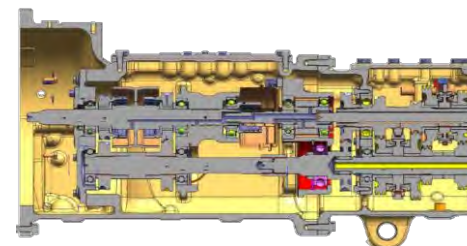
e-PST



e-4WD



Quick Turn



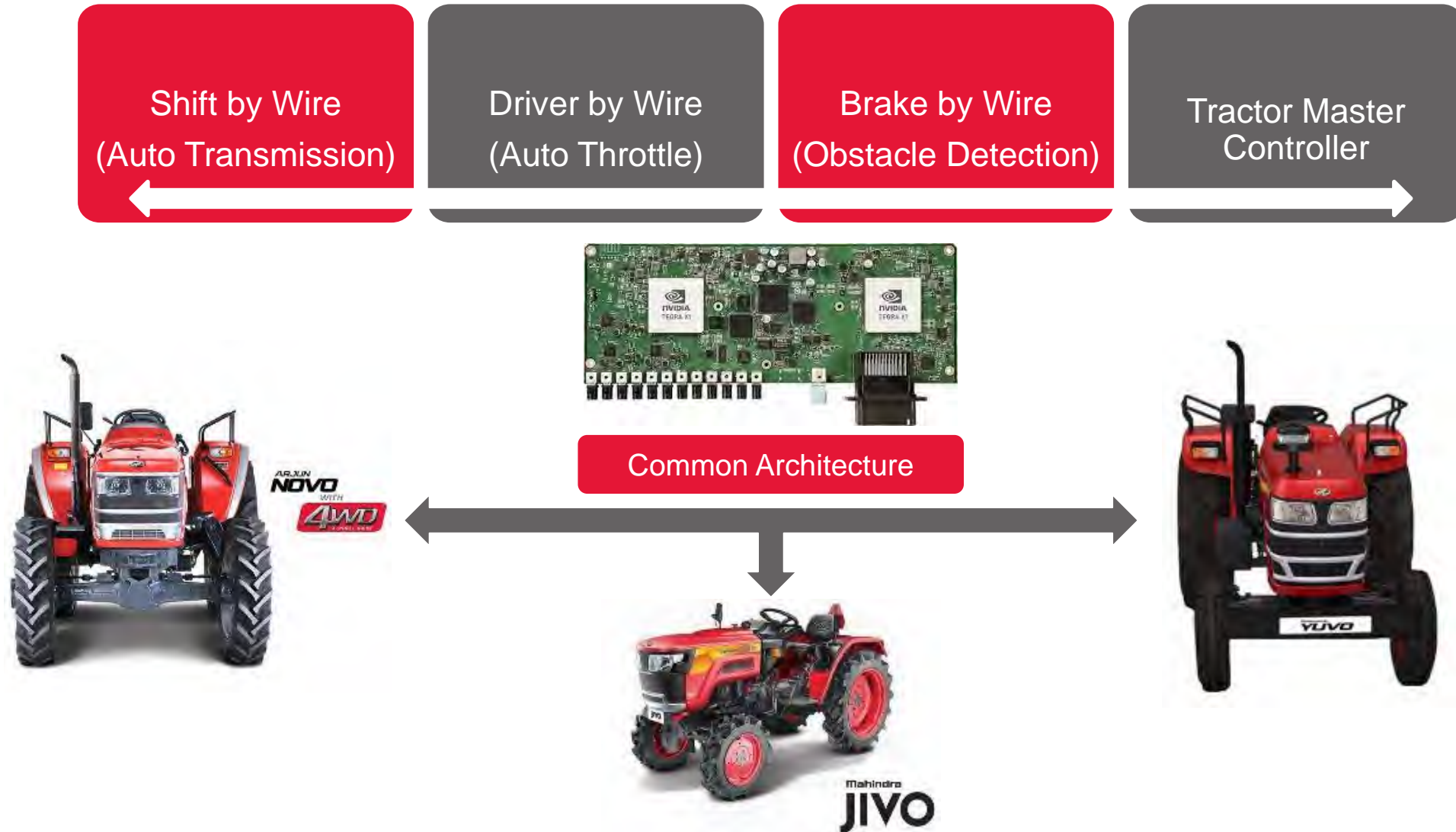
PST & Wet PTO



Power Hi-Lo Transmission

# Autonomous – Driverless Tractor Technology

## Building Blocks



# Autonomous – Driverless Tractor Technology

Different customer offerings have evolved based on initial customer feedback



## Driver on seat (hands free)

- Auto steer
- Auto headland turn
- Skip passing
- Auto Implement lift



## Quasi - Driverless

- Driver on seat +
- Pre-programmed path
- Geo-fence halt
- Obstacle detection
- Brake by wire



## Driverless

- Quasi – Driverless +
- Remote guidance
- Automated route planning
- Obstacle avoidance
- Drive By Wire
- Shift By Wire

INCREASING AUTONOMY



# Thank you

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*Rise.*