India – One of The world's most exciting EV market

Overview

1. Pollution & Depleting oil reserve - Are we serious about the impending crisis?
2. Evolution of EV- an Indian perspective
3. Is EV the answer? Challenges and Strategic steps to overcome the crisis.
4. Let's check progress in each area
5. Way forward
6. Quote of the day

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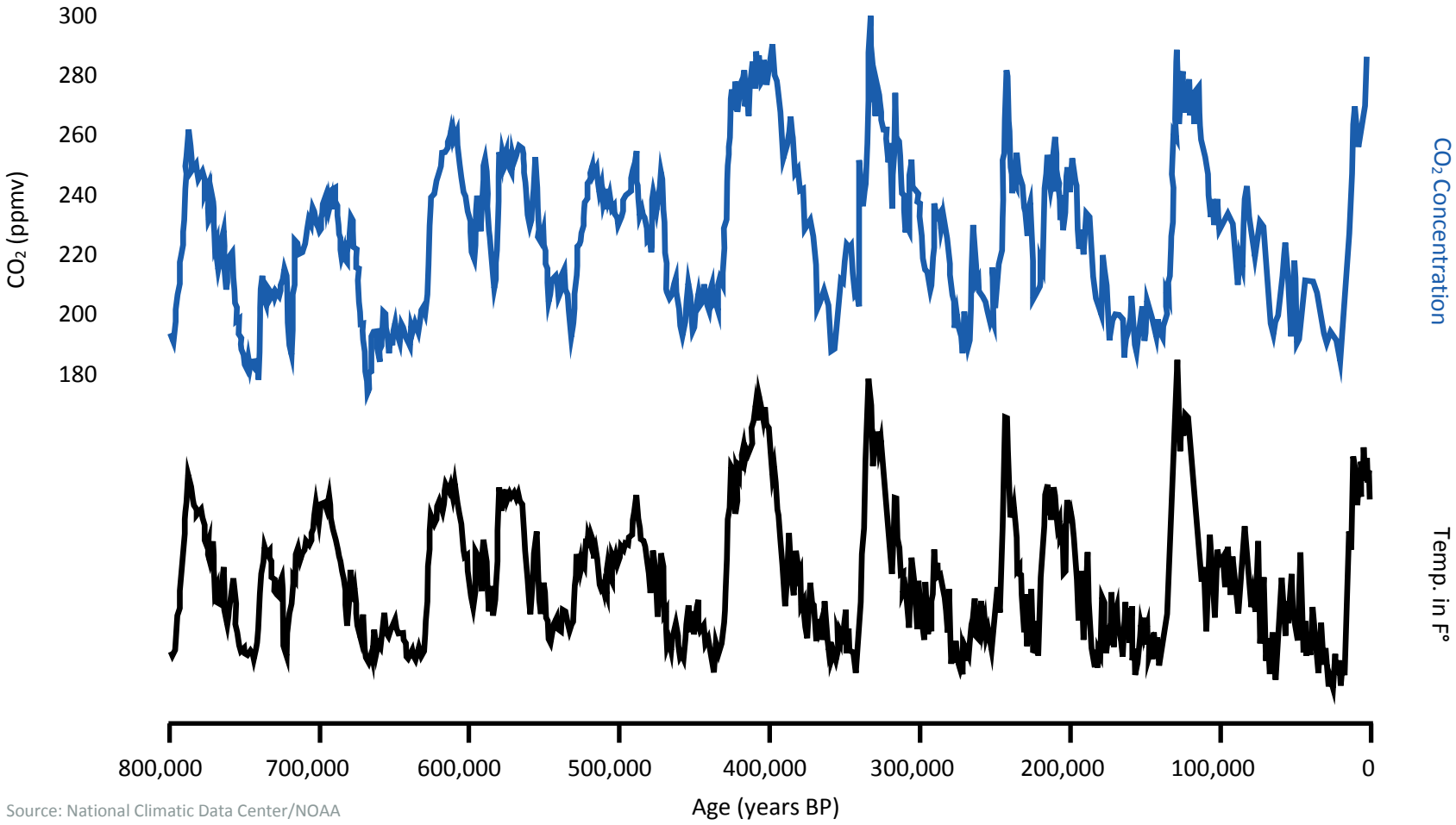
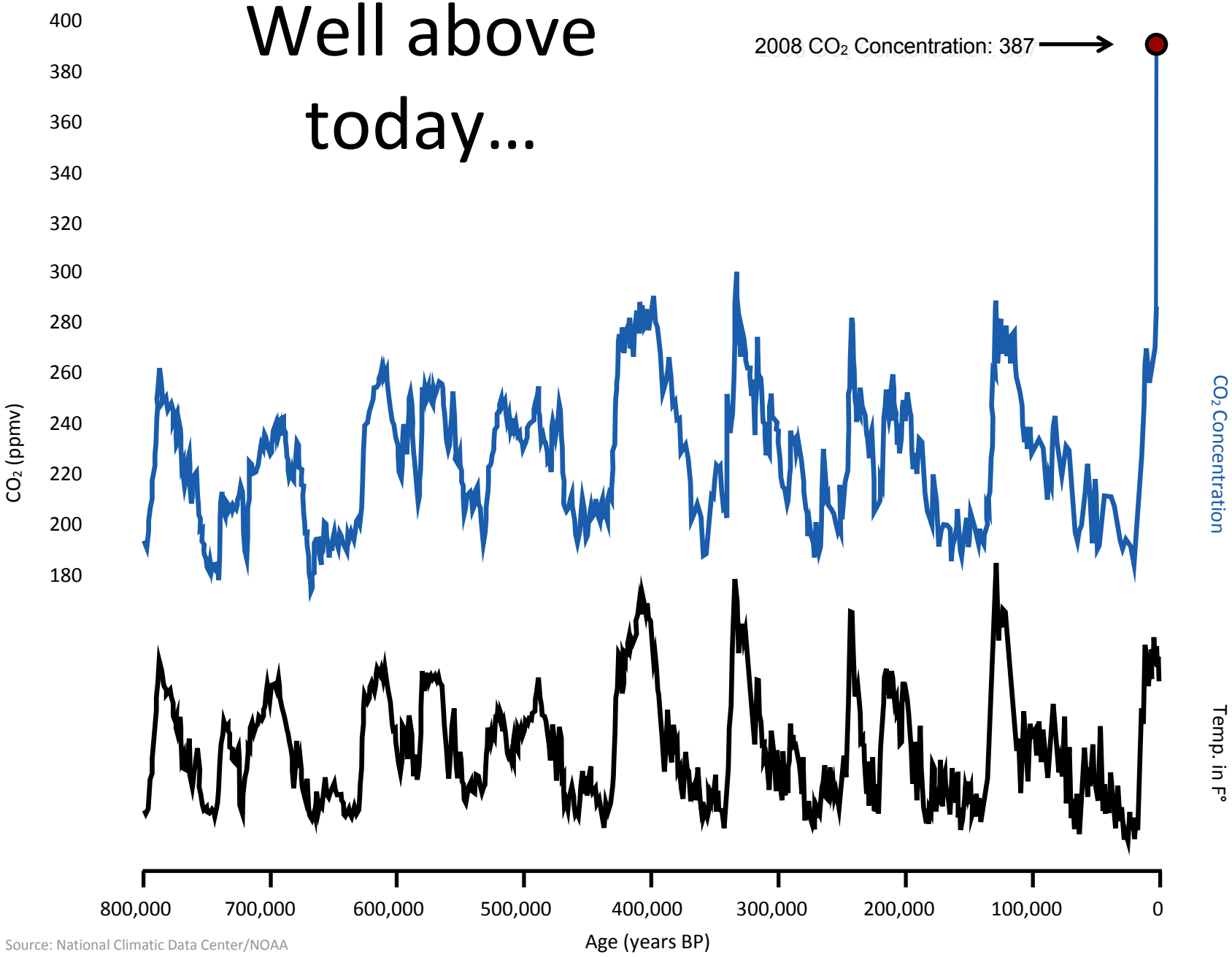
Where Do Greenhouse Gases Come From?
MELTING PERMAFROST
COAL MINING
COAL PLANTS
OIL PRODUCTION
INDUSTRIAL PROCESSES
CROP BURNING
FERTILIZATION
FOREST BURNING
INDUSTRIAL AGRICULTURE
LAND TRANSPORTATION
LANDFILLS

Variations in CO_2 and temperature for last 800,000 years were within a certain band



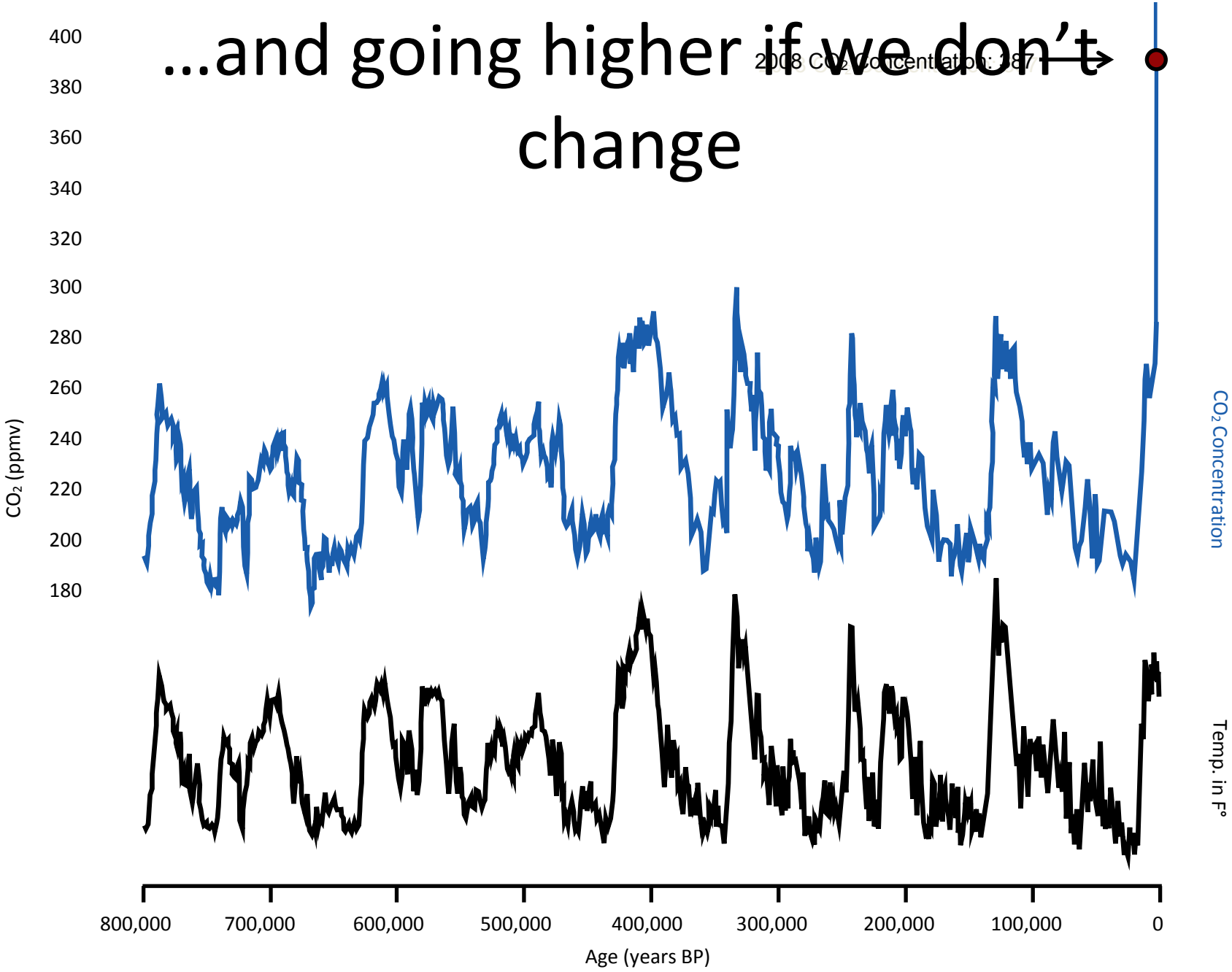
Source: National Climatic Data Center/NOAA

Well above today…



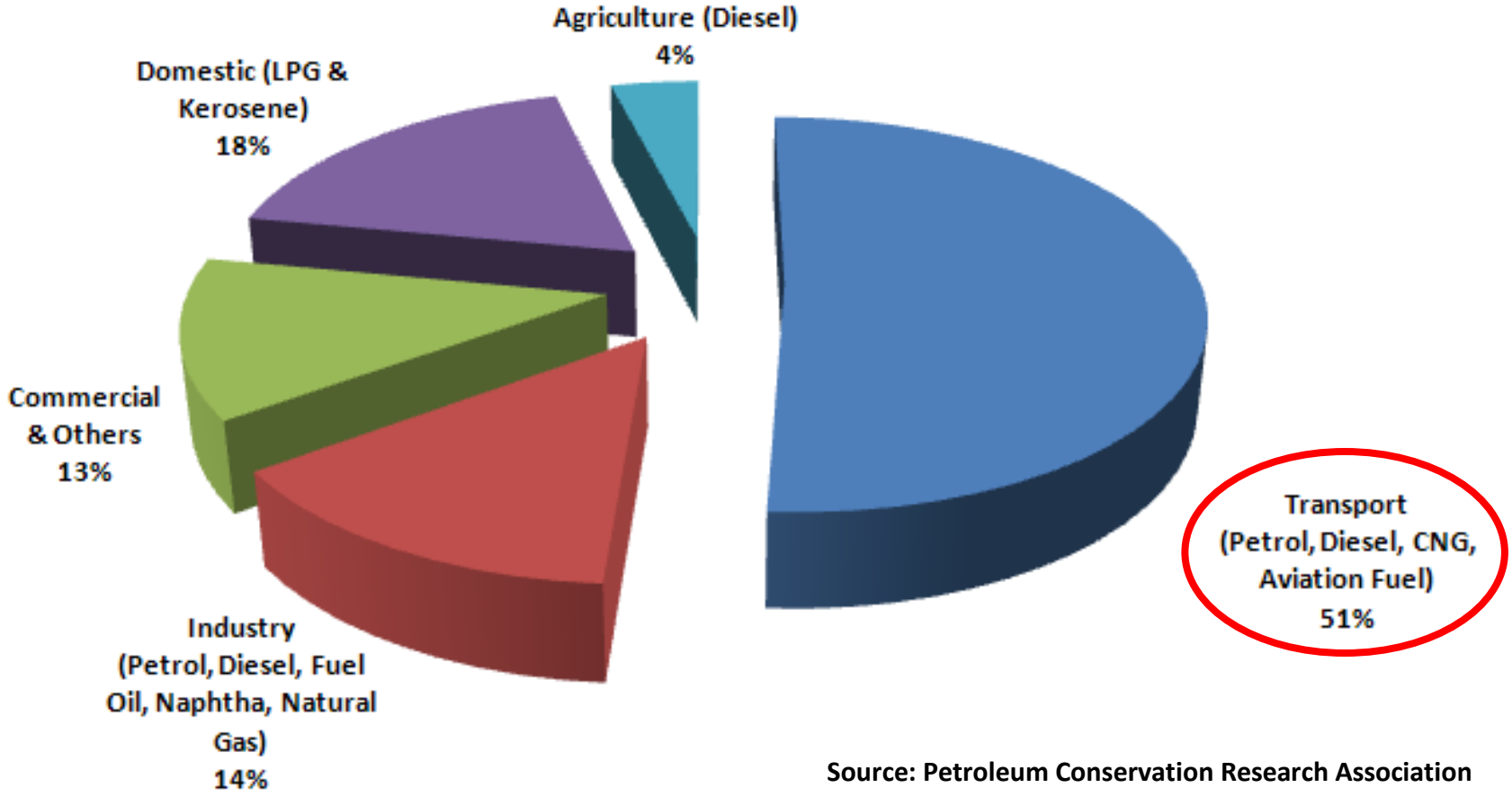
Source: National Climatic Data Center/NOAA

…and going higher if we don't change



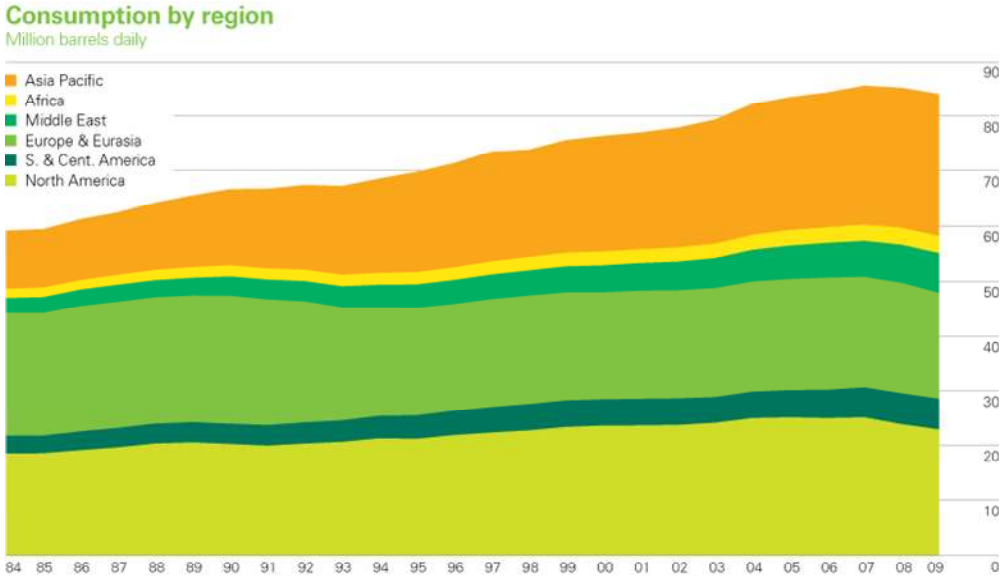
India's Greatest Polluter

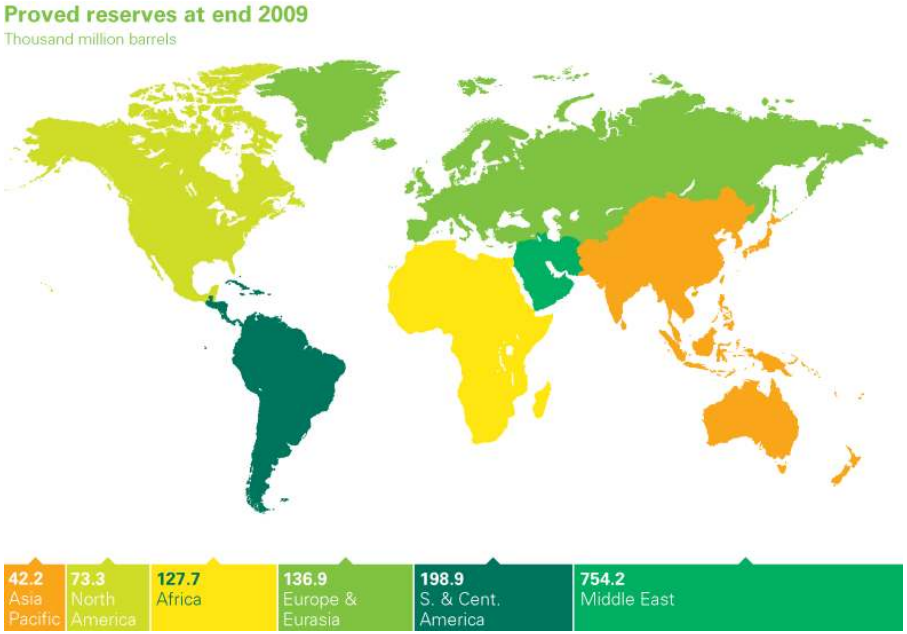
Transportation comprises 51% of pollution in India, and in urban areas, 75-80%!



Source: Petroleum Conservation Research Association

Earth has oil for at most 43 years





Oil reserve now(mn Barrels)	1333200
Daily oil consumption now - (2009 end) mn Barrels	85
We can survive (days)	15685
Yrs we can live on the Proved - Yrs	43

**Assumption: Oil consumption will remain at present level.

*Source: BP research

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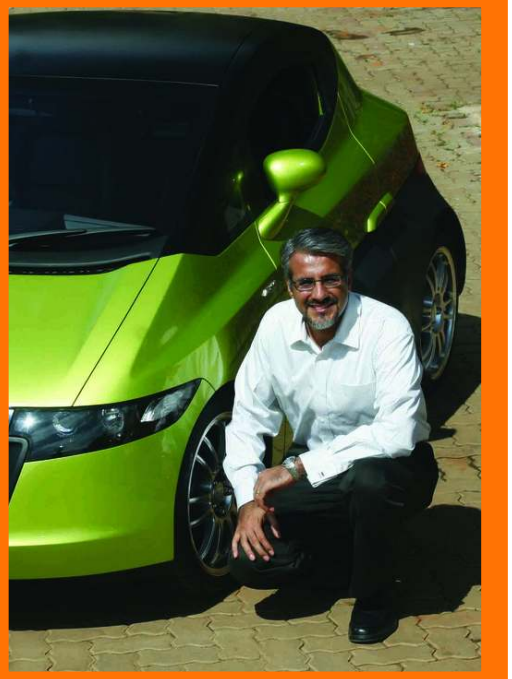
Inspired by Orange to Go Green

The Sun is the inspiration that drives Reva. The Reva Orange captures the omnipresence of that spirit.

- While he was a student at the University of Michigan, **Chetan Maini**'s "Sun-Runner" solar car team finished in top 3 in "World Solar Car Challenge" in Australia

- Chetan's petrol-free race across Australia inspired him to work on delivering **zero-emissions mobility solutions**

- Aiming to create a new paradigm in sustainable mobility via **affordable electric city cars**, Chetan set up the Reva Electric Car Company in collaboration with Amerigon of California



Global EV Pioneer – 18 Years

Mahindra Reva

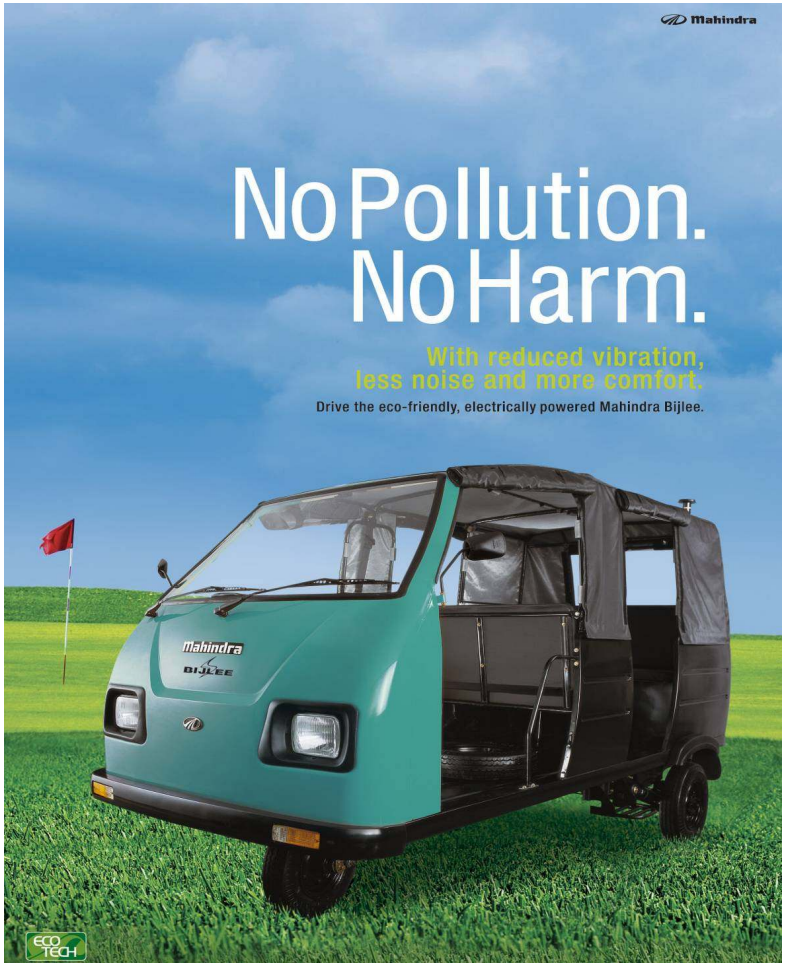
- Reva - founded in 1994
- Launched REVA -2001 in Bangalore and 2004 in London
- Unparalleled experience in EVs:
  - 24 countries, >4,500 vehicles, 180 million customer-driven km
- Strong focus on R&D – over 40% of workforce
- Global patents in energy management, remote diagnostics, battery management
- In May indra

India’s first Electric car is born

REVA

2001

India’s first Electric commercial vehicle (people carrier) is born..



2002

Mahindra

BIJLEE
Kind-To-Man Technology

Sales Numbers……

- Reva Sales 4500 till date since 2001.
  - 2300 in India(1100 in Bangalore, 250 in Delhi)
  - 1200 in UK
- Mahindra Bijlee Sales till date since 2002.
  - 300 in India

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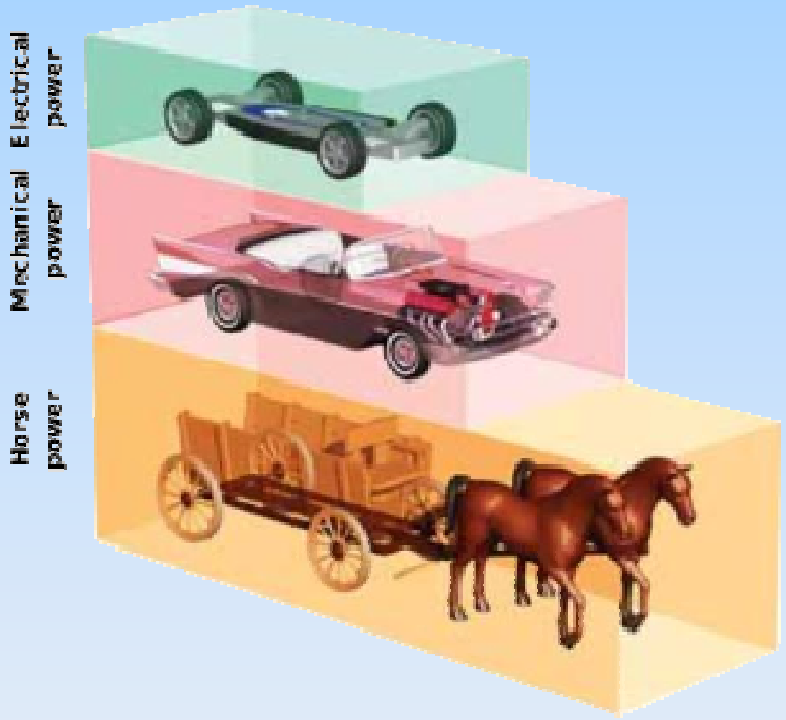
EV

lectric ehicles

Is it the answer??

to zero emissions, cost, infrastructure

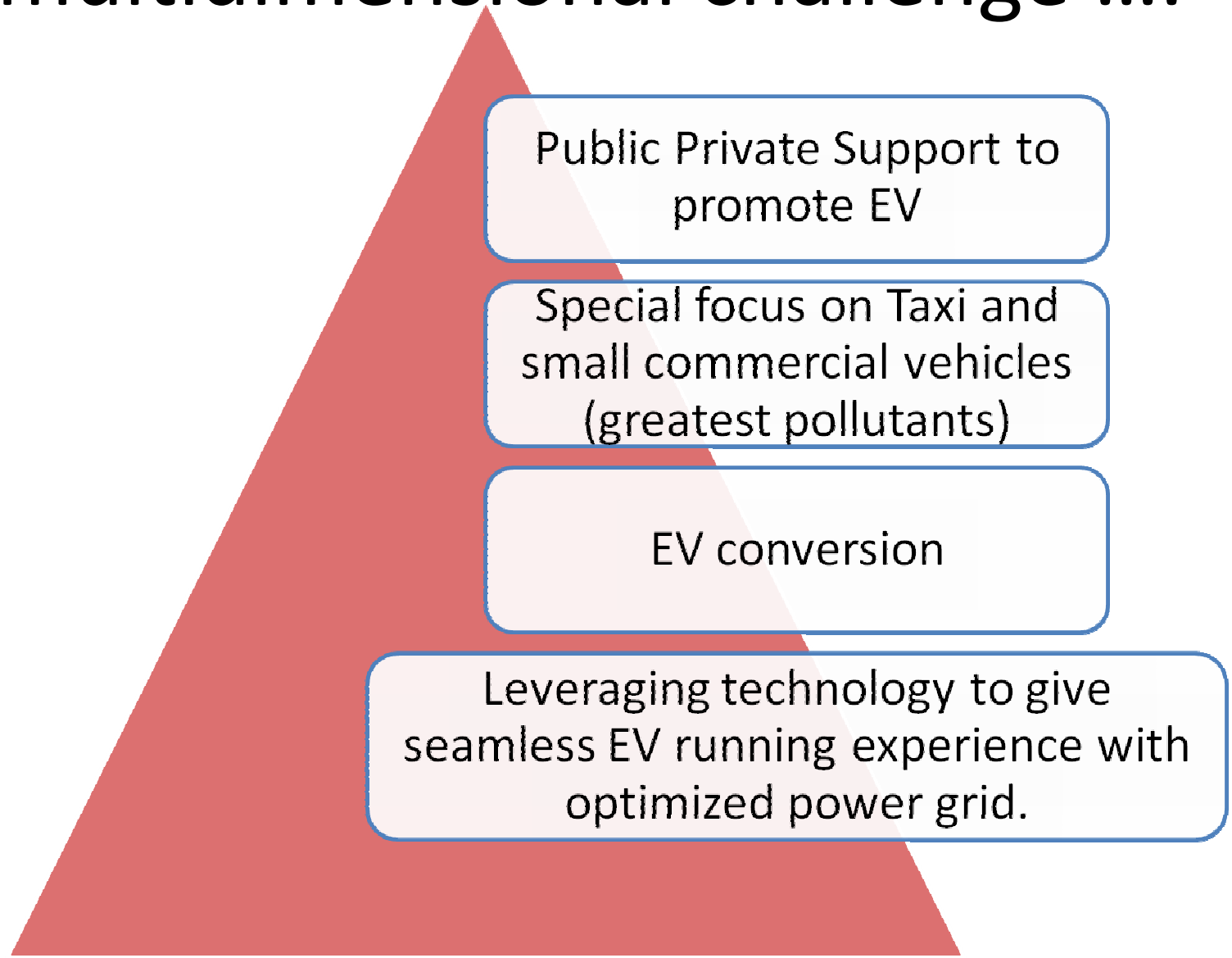


- Solve two major issues: **Climate Change** and **Energy Security**
- **Lower overall energy consumption and emissions**, regardless of source
- Much lower in noise pollution
- Affordable
- Use available power sources

Barriers to greater adoption of Electric Vehicles (EVs)

- Higher cost of EVs
- Challenges in battery technology
- Limited range of EVs
- Lack of infrastructure
- Consumer mindset
- Inadequate government support

Steps to overcome the multidimensional challenge ….



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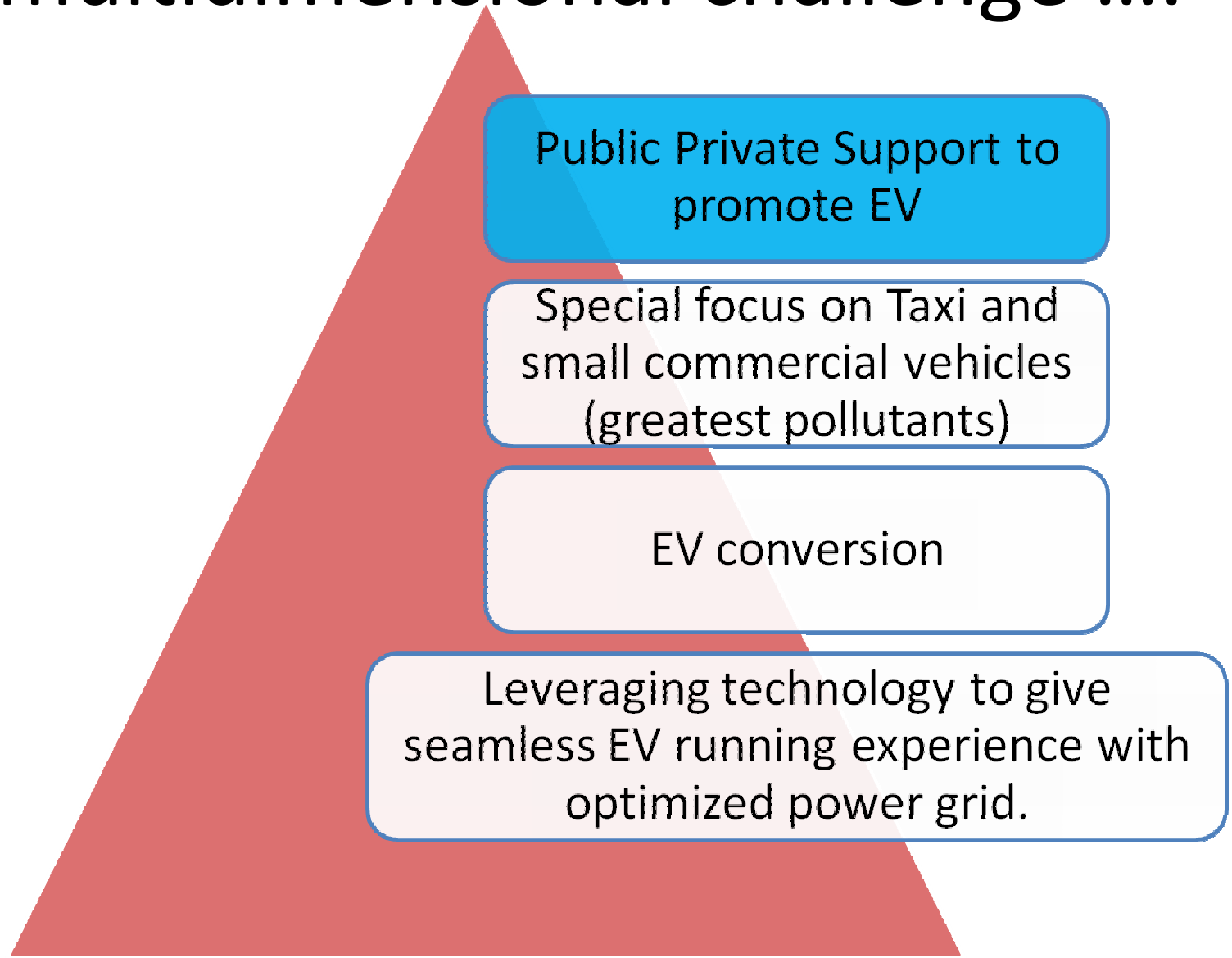


National Subsidies for EVs

- Reduced Excise Duty of 7%
- Ministry of New and Renewable Energy subsidy
- EV infrastructure development in public places (56 in Delhi)
- 80% depreciation on 1st year

TIMES BUSINESS

THE TIMES OF INDIA, CHENNAI | TUESDAY, NOVEMBER 23, 2010

HOWARD STRINGER-LED SONY TO SELL DIGITAL PHOTO PRINTER OPS TO DAI NIPPON

ERIC SCHMIDT-LED GOOGLE SEEKS [illegible] TO MIRAMAX FILMS

Electric vehicle makers to get sops

Govt To Offer Incentives For Green Cars, Bikes; Buyers Will Also Benefit

TIMES NEWS NETWORK

New Delhi: It's focus clean energy for the government. And, it is rolling out incentives to push the sales of electric vehicles in India.

So, if you plan to buy an electric car, you may get a waiver of Rs 1 lakh (if the incentive is passed fully). While for 3-wheelers it could be Rs 60,000, high-powered two-wheelers will get an incentive of Rs 5,000.

The incentive scheme, approved by the ministry of new and renewable energy (MNRE), also got the electric vehicle industry excited. The Society of Manufacturers of Electric Vehicles (SMEV) said it expects electric two-wheeler market to witness 100% growth, following the Rs 95-crore incentive package that will run for the remaining part of the 11th Plan - 2010-11 and 2011-12.

As per the scheme, the government will provide financial incentives for electric vehicles manufactured in India during the remaining part of the 11th Plan. The scheme, effective from November 11, envisages incentives of up to 20% in ex-factory prices of the vehicles, subject to a maximum limit. The cap on the incentives will be Rs 4,000 for low-speed electric two-wheelers, Rs 5,000 for high speed electric two-wheelers, Rs 60,000 for seven-seater three-wheelers and Rs 1 lakh for electric cars.

"This could have an immediate impact on sales of electric two-wheelers. In terms of monthly sales, we expect an immediate doubling of sales," SMEV director Sohinder Gill said. Moreover, those electric vehicle makers, who were getting frustrated, will now feel encouraged to grow the market further, he said.

"We have convened a meeting of our members this week to see how quickly we can pass on the benefits to consumers. Although these incentives are for the manufacturers to carry out R&D activities and to increase capacities, we will surely pass on partial benefits to the buyers," Gill said.

On an average, electric two-wheelers are priced between Rs 35,000 and Rs 40,000, depending on the speed range.

As per the notification by the MNRE, the government will take up "dissemination of two wheelers, three wheelers and four wheelers Battery Operated Vehicles (BOV) and R&D and technology demonstration and other activities in the area of Alternative Fuels for Surface Transportation at a total cost of Rs 95 crore during the remaining period of the 11th Plan".

For this fiscal, the government will support 20,000 units and 10,000 units of low and high speed two-wheelers respectively, while it will be 60,000 units and 20,000 units in 2011-12. The government has also decided to incentivise 100 units of three-wheelers and 140 units of passenger cars in the rest of this fiscal, while it will be 166 units and 700 units in the next financial year.

At present, the Indian electric two-wheeler market stands at about 85,000 units annually. Some of the leading electric two-wheeler manufacturers include Hero Electric, Avon Cycles, BSA Motors and Lohia Auto. In cars, Mahindra Reva is the only player to offer a vehicle, while Mahindra also operates in electric three-wheelers.

Green Drive

- The cap on the incentives will be Rs 4,000 for low-speed electric two-wheelers, Rs 5,000 for high speed electric two-wheelers, Rs 60,000 for seven-seater three-wheelers and Rs 1 lakh for electric cars
- At present, the Indian electric two-wheeler market stands at about 85,000 units annually
- In cars, Mahindra Reva is the only player to offer a vehicle

MFIs or hints at

TIMES NEWS NETWORK

Mumbai: Alarmed by the recent developments relating to microfinance institutions (MFIs), ratings agency Crisil has placed the ratings of 12 MFIs on watch list and has indicated that there could be downgrades. Crisil has put those 12 MFIs on 'rating watch with negative implications', a release from the company said. Six of these MFIs have ratings that are in the 'BB' category or below, the release said.

Roopa Kudva, MD & CEO, Crisil, said that the recent Andhra Pradesh government ordinance has triggered a chain of events that can have a long lasting impact on the MFI sector if not addressed quickly. "MFIs have been choked from both sides. On the one hand, collections are down to about 20% from a high of about 98% a few months ago. Also, under the changed circumstances banks are not giving loans to MFIs, so the funding is also constrained," Kudva pointed out. "But given the situation at the ground level, there is very little time to lose," she said.

India's iron ore exports | RPG co buys US

Ministry of New and Renewable Energy (MNRE)

- Incentives to push the sales of electric vehicles in India
- Incentives will be $89 for low-speed electric 2W, $ 112 for high speed electric 2W
- $1400 for 7-str. 3W and **$2225 for electric cars**

State Subsidies for Evs - India

State	VAT	Road Tax
Rajasthan	Nil	Nil
Maharastra	5%	Nil
Kerala	5%	Same as Non EV cars
Andhra Pradesh	Same as Non EV cars	Same as Non EV cars
Karnataka	5%	4.40%
Delhi	Nil	2%
Chattisgarh	Nil	Nil
Uttar Pradesh	Same as Non EV cars	Same as Non EV cars
Gujrat	Same as Non EV cars	Same as Non EV cars
Tamilnadu	Same as Non EV cars	Same as Non EV cars
Kolkata	4%	Same as Non EV cars

Private Co. Initiative

THE ECONOMIC TIMES

News By Industry

SAP India pays staff for green commute, Reva buyers to get car allowance

Mini Joseph Tejaswi, TNN Mar 17, 2011, 11.26am IST

Tags: SAP Labs India | SAP | Mahindra Reva

Bangalore: In what is perhaps a first for corporate India, SAP Labs India has unveiled a unique and generous green car policy under which employees would be able own an electric car at a subsidized cost and get an attractive allowance to own and run it.

The policy, which is in collaboration with Mahindra Reva which makes the Reva electric car, offers as much as Rs 6,000 a month as car allowance, free car battery charging service on the campus, a dedicated parking slot right at the entrance of the campus, an extended battery warranty of 36 months instead of the standard 24 months, free routine maintenance , service on the campus and charging points at owners' residences.

Sops given to employees by SAP

- Green Allowance of USD 120/ month
- Free car battery charging service on the campus
- Dedicated parking slot right at the entrance of the campus
- Battery warranty of 36 months
- Free routine maintenance
- Service on the campus
- Charging points at owners' residences

Society of Manufacturers of EV (SMEV)

- Common platform for EV Manufacturers and key stakeholders
- formed in 2008

Key Objectives of SMEV

- Take the Indian EV Industry to newer heights
- Authentic industry data (sales, production, inventories, prices, and trends) for the Policy makers
- Certification and regulatory bodies to evolve appropriate safety and engineering standards.
- Best Practice sharing.
- Develop relationships with future customers or suppliers

Present SMEV members

4/ 3 Wheeler EV Manufacturers	
Company	Nature of Business
REVA	**4W Manufactures**
Lohia Auto	**3W Manufactures**
2 Wheeler EV Manufacturers	
Hero Electric	**2W (L) Manufacturer**
Electrotherm	**2W (L) Manufacturer**
Avon Cycles Ltd.	**2W (L) Manufacturer**
Lectrix Motors Ltd.	**2W (L) Manufacturer**
BSA Motors(TI Cycles)	**2W (L) Manufacturer**
Paradise Electro	**2W (S) Manufacturer**
Shuaray Steel Pvt Ltd.	**2W (S) Manufacturer**
Crazye Bikes	**2W (S) Manufacturer**
ACE	**2W (S) Manufacturer**
Sinic Motors Company	**2W (S) Manufacturer**
Genxt Power India Ltd.	**2W (S) Manufacturer**
Kabirdass Motor Co	**2W (S) Manufacturer**
EKO Vehicles Pvt. Ltd	**2W (S) Manufacturer**
Accura Bikes	**2W (S) Manufacturer**
Ajanta Manufacturing	**2W (S) Manufacturer**
Ultra Motors	**2W (S) Manufacturer**
Ampere Vehicles Pvt. Ltd	**2W (S) Manufacturer**
VRLA Manufacturing	**2W (S) Manufacturer**

EV Components Manufacturers	
Exide	**Battery Manufacturer**
Crompton Greaves	**Motors of EV**
Axiom	**EV Chargers**
Hinode Technology Pvt Ltd.	**Simulation**
Fiem Industries	**EV Lights**
Rotomag	**Motors of EV**
NEC	**Semi Conductor**
Texas Instrument	**Semi Conductor**
Tafe	**Battery Manufacturer**
Toshiba	**Battery Manufacturer**
Amaraja	**Battery Manufacturer**
UL India Pvt. Ltd	**Certification & Testing**

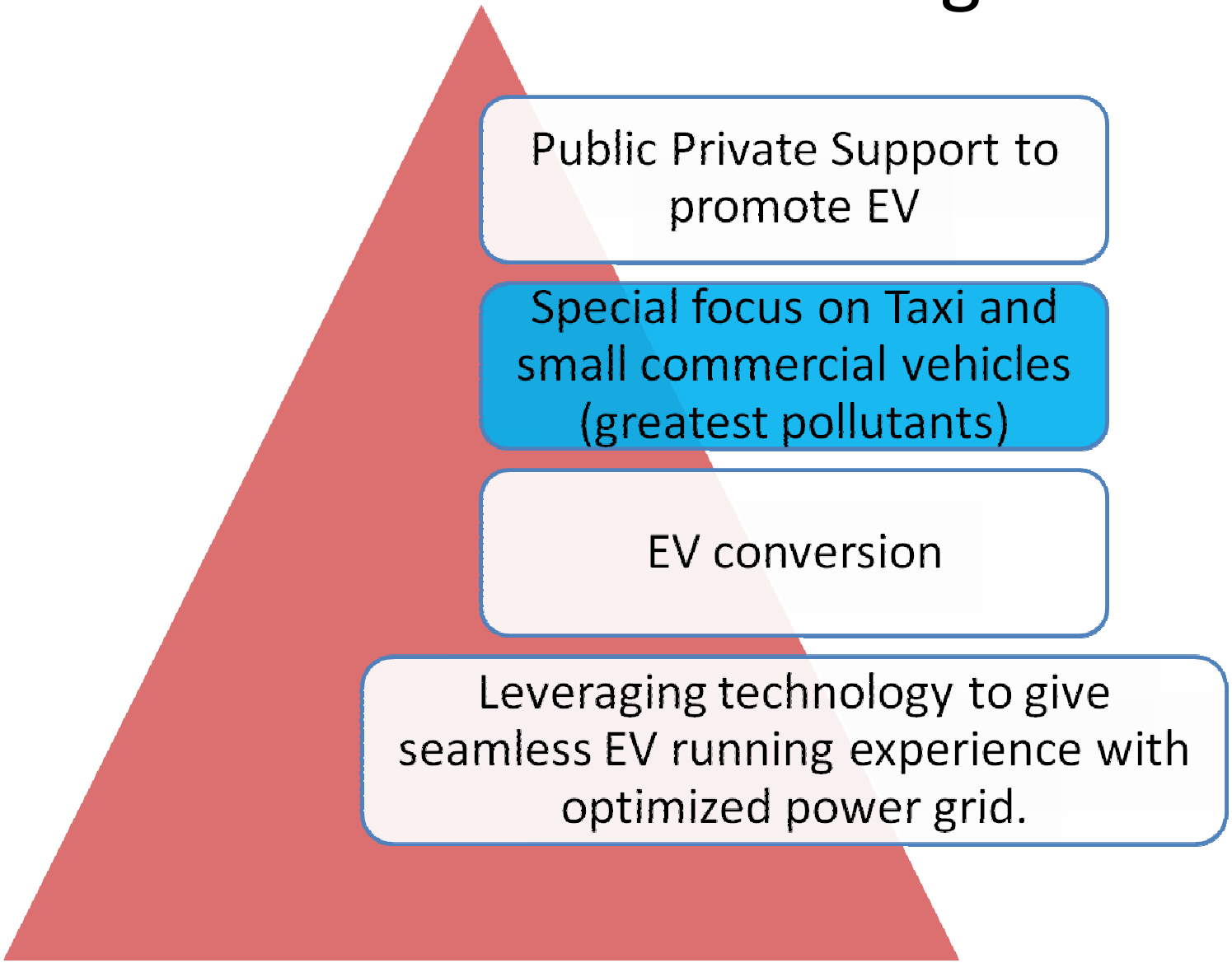
Firm & Definitive futuristic steps by Govt. of India

- Formation of **National Mission for Electric Mobility** (NCEM)
- National Board for Electric Mobility - Recommendations
- The National Automotive Board - Technical advisor for both the NCEM and NBEM
- Promote electric mobility and manufacturing of electric vehicles in India
- Booz & Company has been roped in to chart out a roadmap
- The plan is **going to be announced soon** by Govt of India.

Why National Mission for Electric Mobility

- Continued government intervention/support
- Adoption of **mission mode** for fast decision making
- Collaboration amongst various stakeholders
- Long term strategy with clearly defined short term and long term objectives
- Ministers , eminent representatives from the industry and academia and will be chaired by the Minister (Heavy Industries & Public Enterprises).
- **Plan 2020**

Steps to overcome the multidimensional challenge ….



Can small commercial vehicles (Spoke transportation) and the taxi market embrace EVs?

Small Commercial Vehicles – High impact low effort area

13K

4K

17K

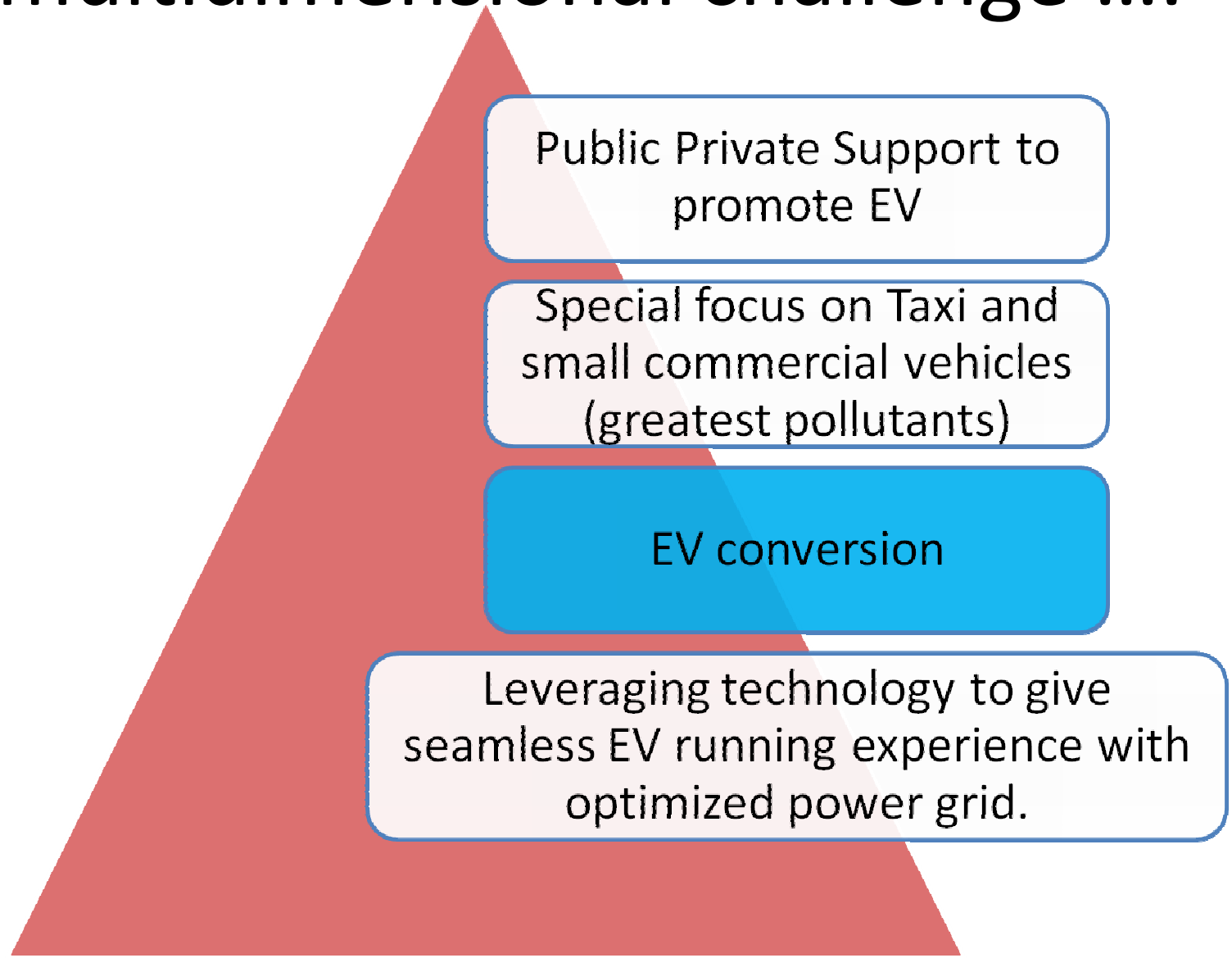
16K

- Load capacity 0.5T to 1 T Passenger/Load carrier
- **Many short trips for last mile distribution – Short Hauls**
- Daily run of 100-150 Km – **Single Charge is enough for a day.**
- Market size of approx 50K/month in India

Taxi Market - Future potential EVs

- 2% vehicles produce 20% pollution in major cities.
- Better place started EV taxis in Tokyo
- EV Taxi started in Sanghai
- **City Taxi w**ill popularize in India with increase in Charging Infra
- Govt Policy may change scenario (City Taxis in Mumbai, Delhi are allowed to run on CNG only).
- **large aged fleet**

Steps to overcome the multidimensional challenge ….



How do we sustain the rising oil cost and depleting oil reserve?

- Reduce travel – Possible ???
- Using public transport – Possible ???
- Scrap old car and buy a new electric car. Present world car population is 800mn and 70mn vehicles are sold in a year - Possible???
- Are there enough '**mass production**' electric cars available @ the right price???

What's next ?

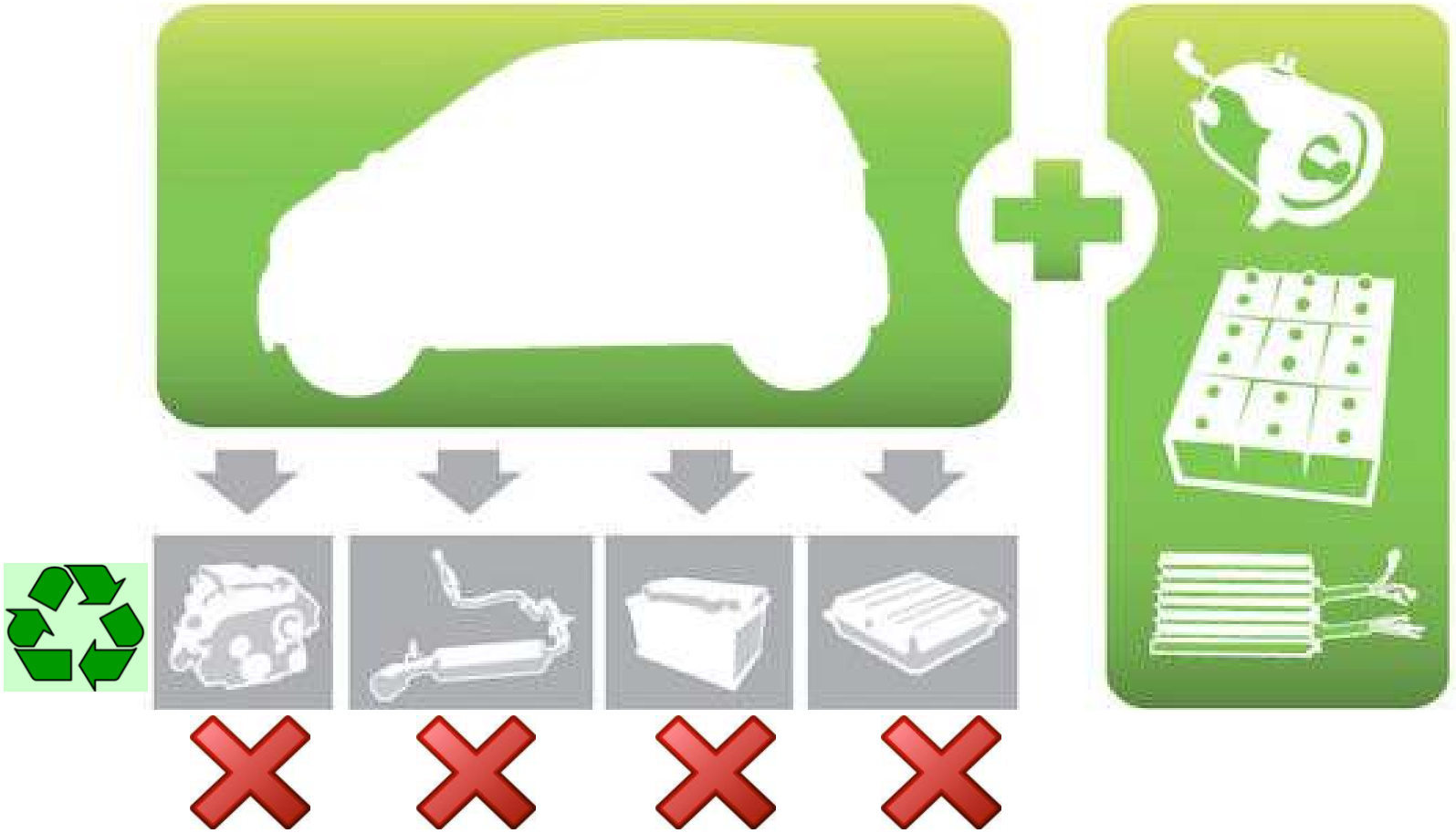
Mahindra

EV conversion …

- **Reduce**
  - Use of oil
  - Emissions
  - Braking loss, transmission loss, Engine loss, Standby/idle loss.
- **Reuse**
  - Existing vehicles without burning oil
  - Oil infrastructure
- **Recycle**
  - Used components from old automobiles

Mahindra

Conversion Fossil Fuel Guzzlers to Electric …..



Conversion of an used Car

Battery cost with tax	2222
Controller+Motor+Connections	2222
Profit+Warranty(25%)	889
Franchisee Margin	222
Registration Expenses	111
Total On-Road Price	5666

EV acquisition + running cost equals fuel expense of ICE Vehicle

Savings of $14 per month for EV!

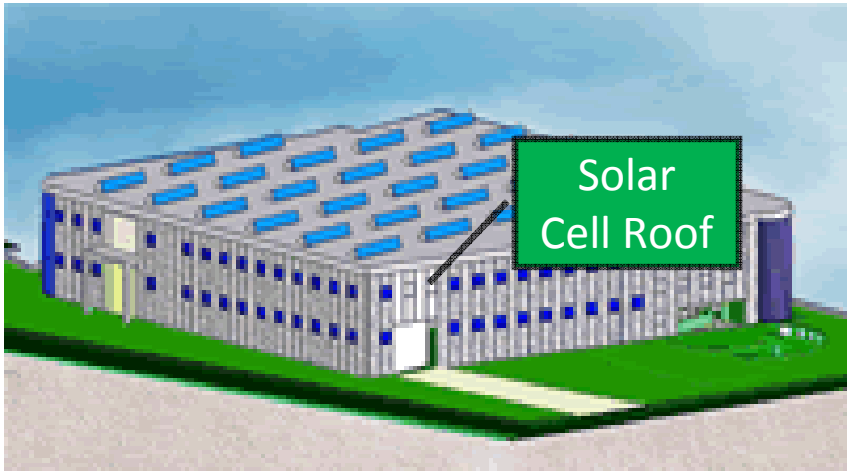
Km per day	50
No of days	30
Total km run /month	1500
Petrol Consumed (@14kmpl)	107
Petrol cost	133
Maintenance cost/month	22
Running cost with IC Engine / month	**155**

IC

Total On-Road Price	5666
Down payment(20%)	1133
Funding amount	4533
IRR	15%
Tenure(months)	48
EMI	**125**
Units required/day	3
Cost / unit	0.18
Charging Cost	16
Running Cost with EV / month	**141**

EV

EV conversion Plant ….



•**Automated line for Any Car** rapid conversion
•**Solar cell** powered plant (roof /side)
•Parking space (Solar Cell shed for CLEAN CHARGE) **– BORN GREEN**
•Segregation of metals from discarded engines, GB, exhaust system and old battery and **recycle to feed main factory.**

Who are potential Customers ..



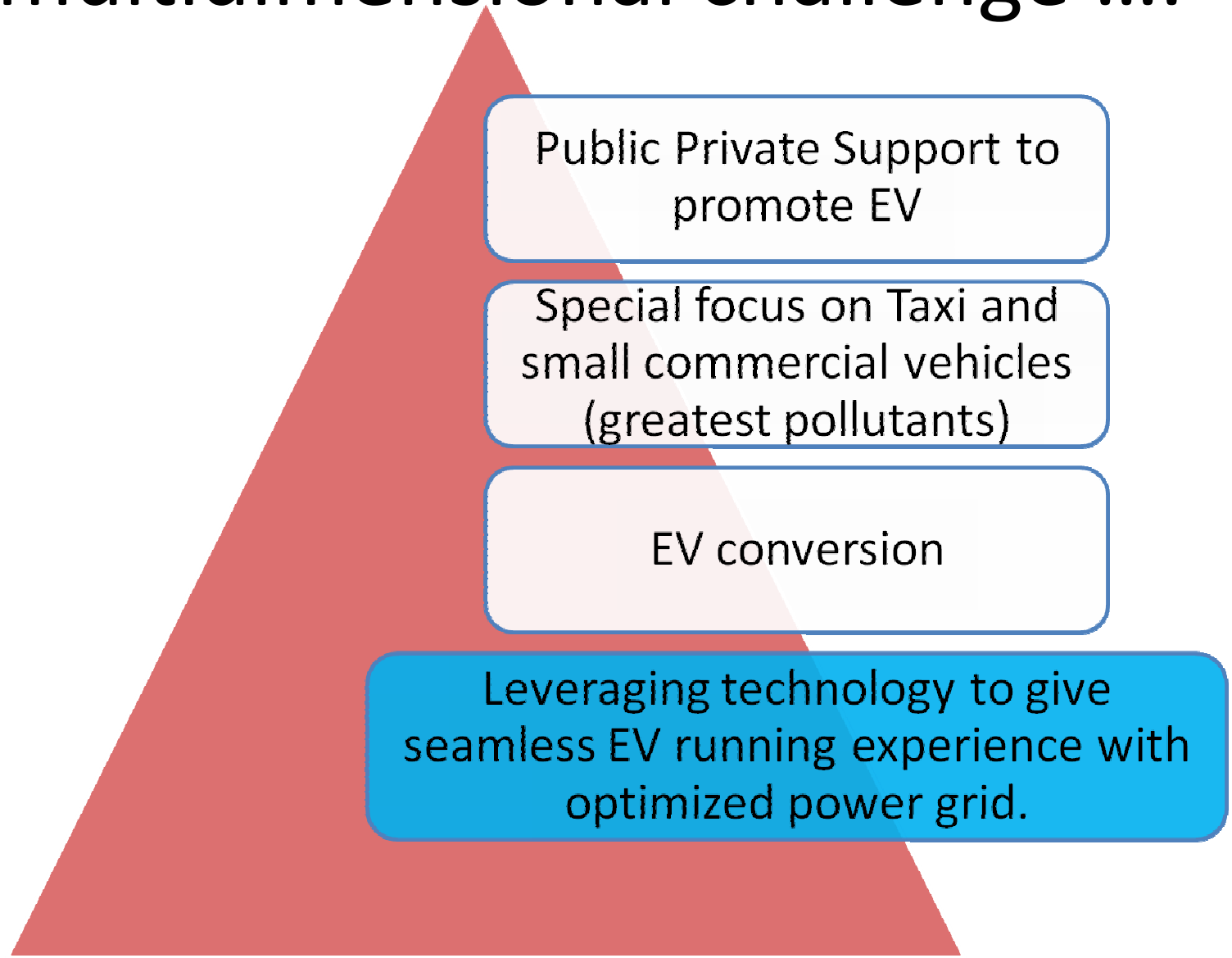




On 2020 ……

- **If 1 million** conversions take place.
- Total revenue of **$6 bn** for conversion
- Profitability of **$1 bn**
- Saving of Oil (1000000vehX107L/159Lper bbl) =**6,73,000bbl/month**.
- Saving of CO**2** (100gX1000000vehX50km/day)= **5000T/day**

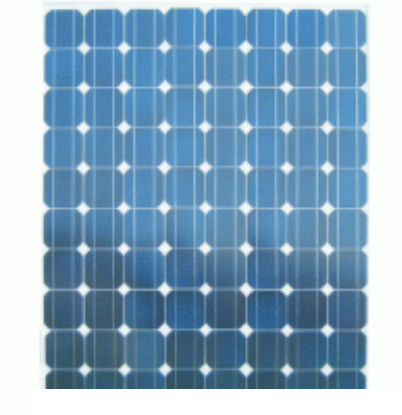
Steps to overcome the multidimensional challenge ….

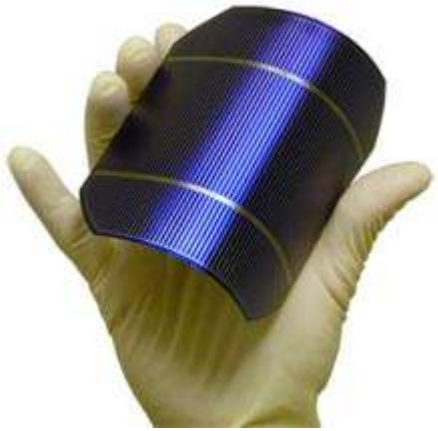


Leveraging technology in future

-seamless EV running experience

Solar Cell stickers on EVs for charging Battery





Hybrid – Electric +Solar

Solar Chargers….

Envision Solar International, Inc. - **CleanCharge**, a solar-powered electric vehicle charging station for GM

Mahindra

Ultra-fast charge for fast charging….

- Charging of minutes
- 480 V
- Possible for Li-Ion battery (not possible for alkaline batteries)

Battery Replacement & Charging centres ….

**Usage of Oil Network

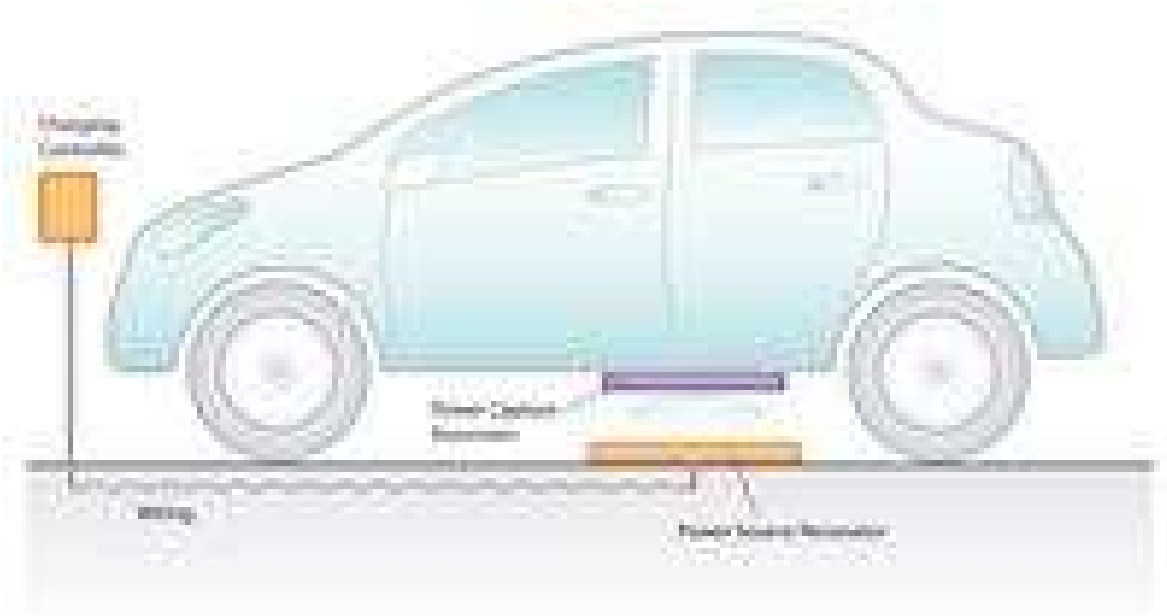
Mahindra

Towable range extender(PRU) ….

- Extends range **10 times**
- Can be taken on rent for long distance travel
- EMAV, Indiana developed it
- 1st commercially available **Power Regeneration Unit (PRU)**

Mahindra

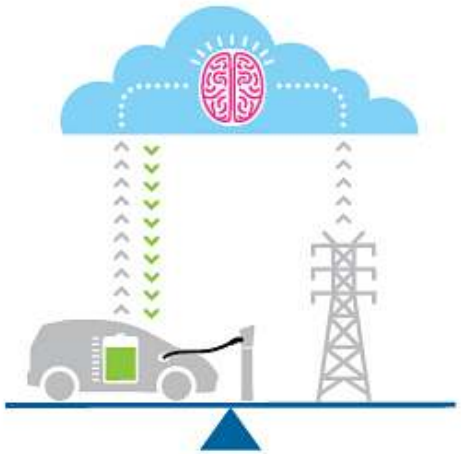
Wireless charging …… Delphi-WiTricity



- No plugs or charging cords.
- Park EV over a wireless energy source on garage floor
- Magnetic coupling
- Charge running vehicles.

Grid Optimization – IBM, American Honda Motor Co., Inc. and Pacific Gas and Electric Company (PG&E)

- Layer of agility to the EV charging process
- Communication between electric vehicles (EVs) and the power grid
- Charging based on the grid condition and the vehicle's battery state
- Effectively manage charging during peak hours



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Lets take Charge ….

*Let's make our cities **smoke free***

*Let's live **healthy life***

*Let Auto Makers make **green profit***

*Let's give a **cleaner tomorrow** to the next generation*

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Quote of the day!

See what others see ;
think what none thinks!
-Anonymous