Idam Infrastructure Advisory Pvt. Ltd.

Designing an optimum feebate structure for Light duty vehicles (<3500 Kg) in India)

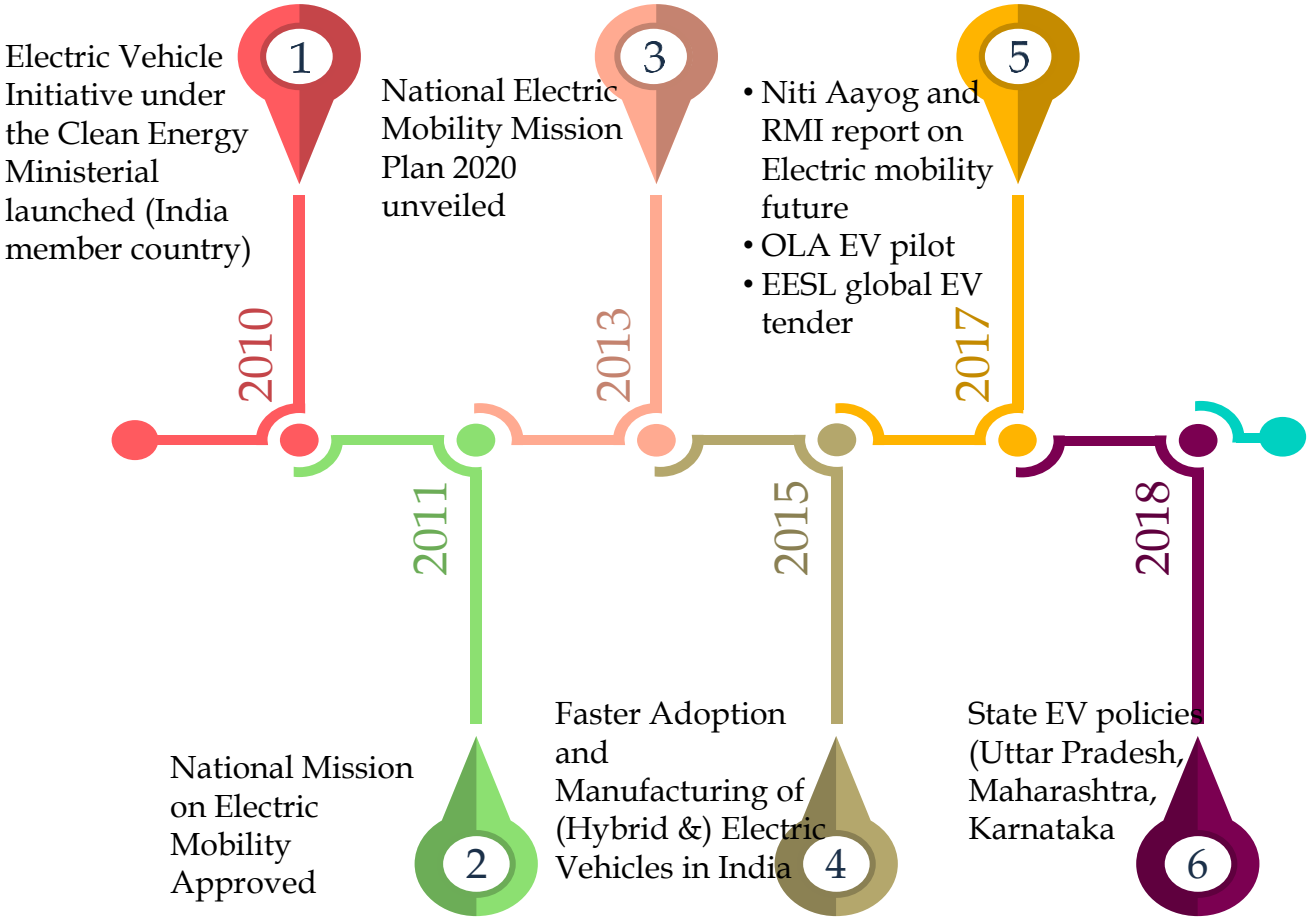
Asia Clean Energy Forum

7th June 2018

EVs - a new consumer on the grid

- **Automotive industry on verge of disruption on four key technology driven trends**
  - Electrification,
  - Shared mobility,
  - Connectivity, and,
  - Autonomous driving
- **Stricter emission regulations, decreasing battery costs, political commitments for sustainable mobility will drive a strong momentum for the adoption of Evs**
- **India is committed to increasing share of EVs in the transportation fleet – NEMMP 2020**
- **EV would have several benefit for Indian Electricity grid**
  - Source for additional demand
  - Better utilization of stranded assets
  - Effective integration of RE in the grid
  - Potential ancillary services

Indian electric vehicle landscape



State Policies providing slew of incentives to manufacturers, consumers and charging infrastructure developers

Maharashtra - subsidy of 25 percent or 10 lakh, whichever is less, on the first 250 charging stations

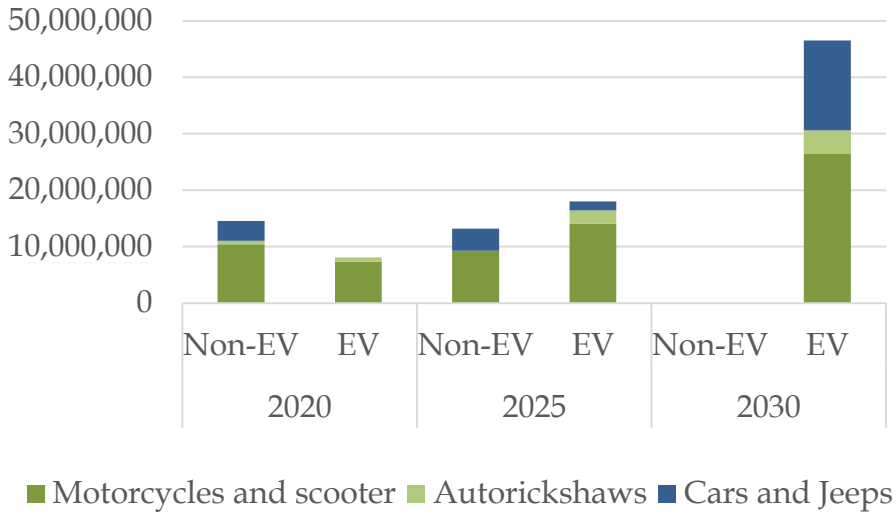
Karnataka – attract investment of 31000 crore

Uttar Pradesh (Draft) – emphasis on EV manufacturing

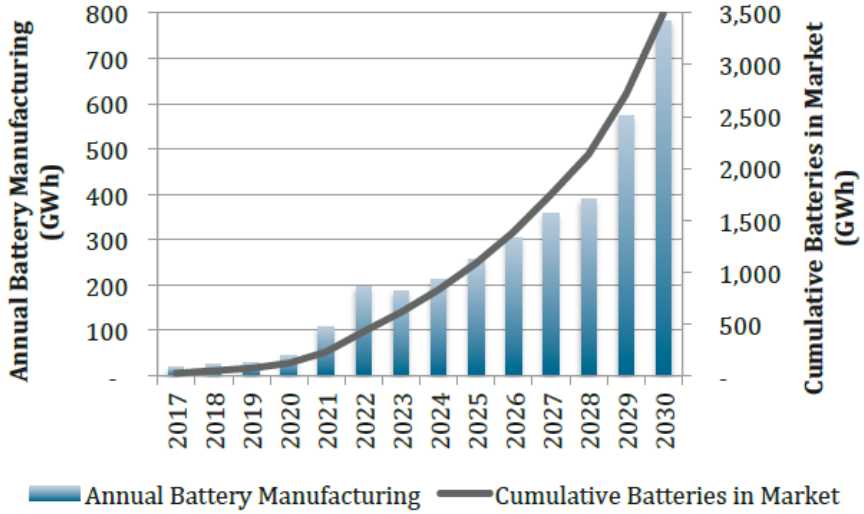
EV Market is shaping up with firm policy support

Projected market size and potential

- EV market in India to be around 8Mn vehicles by 2020 and approximately 50Mn by 2030
- Overall EV market for storage in India is likely to be 4.7 GW in 2022 (IESA, Enicon research)
- Energy use is expected to be in range of 8 – 25 BU by 2020 (2.5% of current energy consumption), corresponding to 2000-5500 MW of power capacity.
- EV charging market is expected to be in range of INR 1,200 – 3,300 Crore
- Lithium ion Battery prices expected to come down from current average INR 19,500/kWh (2017-18), to INR 9,945/kWh8 by 2022-23.



Annual market sizes under a shared mobility paradigm
(Source: FICCI, RMI report)



Annual and cumulative battery requirements
(Source: Niti Aayog, RMI)

Regulatory Incentives for EVs

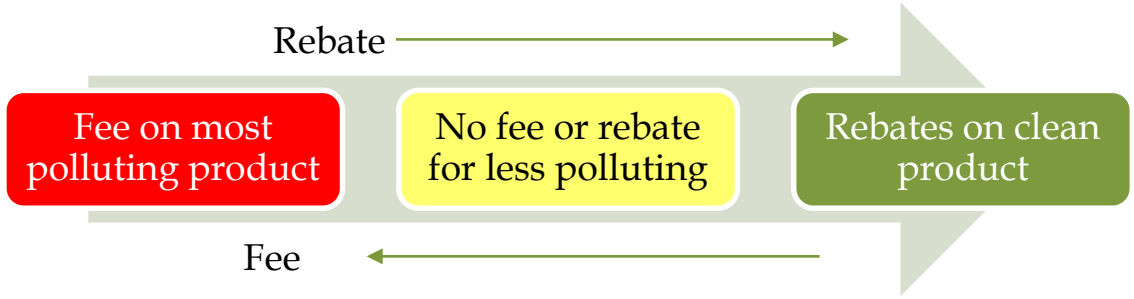
- **Monetary and non-monetary incentives needed to drive EV demand and supply**
  - Demand Incentives available under FAME India Scheme till Sep 2018. Extension?
  - Few States offer VAT and Road tax waivers
  - Lower electricity tariff for EVs. Long-term sustainability?

- **Need for incentive structure that would operate across EV/ICE**
- **Incentives still insufficient to drive the demand and supply**
- **Taxing conventional high emission vehicle becomes important**
- **A carrot and stick model needed for achieving the ambitious targets**
  - Feebate / Bonus malus system

- **India would need a Feebate system to drive adoption of EVs in future and meeting its electric mobility commitments**

Feebate system

- **Based on Polluter pays principle**

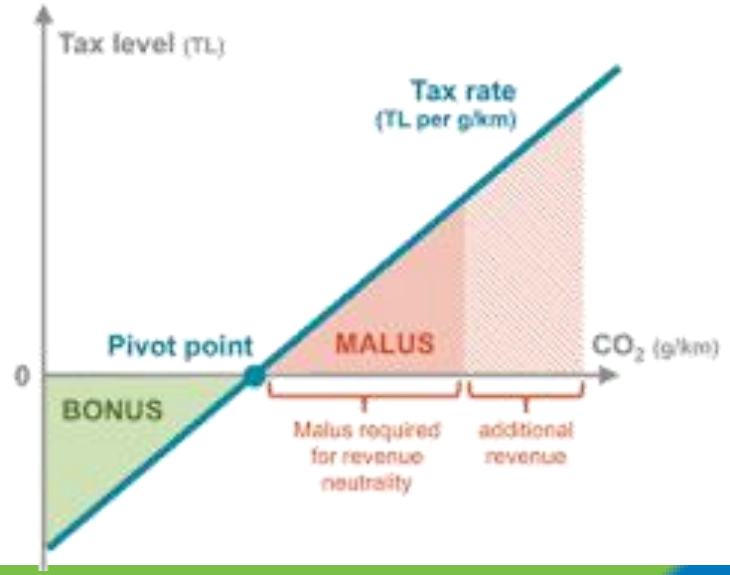


- Low- or zero-emission vehicles (ZEVs) benefit from lower operating and maintenance costs. Feebate can accelerate ZEVs to reach upfront cost parity with ICEs.

- Feebate
  - Self financing mechanism.
  - Different from typical tax as the fees can be entirely avoided by greener product choices.
  - Influences vehicle-buying decision of the consumer based on the upfront cost rather than the complex calculation of present value of future fuel savings.

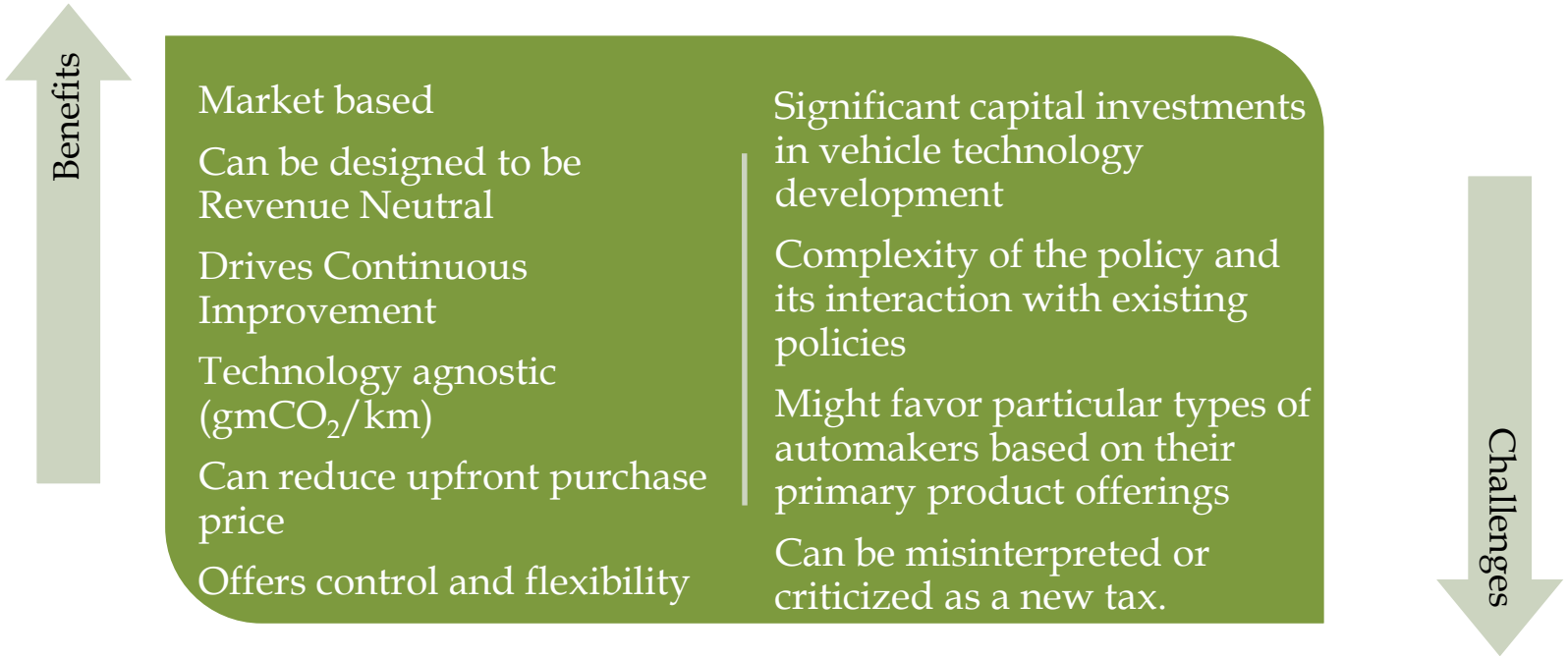
Feebate Components and Characteristics

- Efficiency criterion for comparing vehicles (Eg gCO2/km)
- Benchmark point: To define which vehicles pay fees and which ones receive rebates.
- Functional form and rate parameter: To determine the magnitude of the fee or rebate for each incremental difference from the pivot point.
- Transaction Point and manner of transaction: Which defines the party that will levy fees and remit rebates at one or more specific point(s) in the vehicle transaction process.



- **Feebate system is a longer-term manufacturer response**
- **The effectiveness is determined by the feebate rate**
- **Discontinuities and step functions reduce its effectiveness**
- **The pivot point has almost no impact on the effectiveness of the program.**
- **A feebate program is a "transfer", not a "tax"**

Benefits and challenges for Feebate System



- **Factors that Work for India**
  - Commitment to electric mobility with little to no use of public funds
  - Direct Benefit Transfer (Aadhar) for easy transactions
  - Low rate of private vehicle ownership
  - Price-sensitive consumers

Overview of feebate (like) systems in various countries

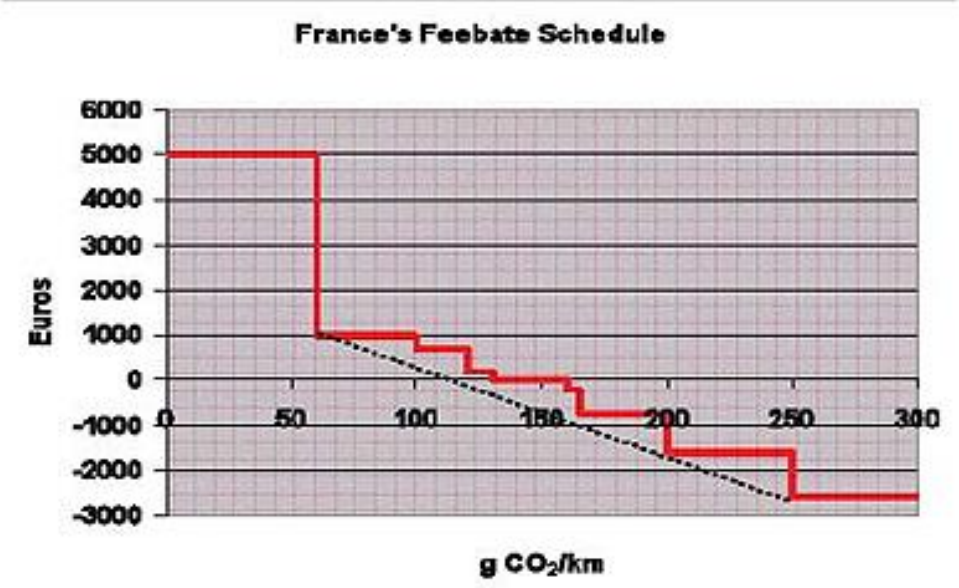
	Type of system	Feebate metric	Attribute adjustment	Feebate function	Vehicle coverage	Estimated effectiveness
France	Feebate on purchase tax	gCO_2/km	None	(uneven) Step-based: 10 categories	60 to 250 g/km	5-6% reduction in emission factor
Netherlands	Feebate on purchase tax	Energy Label	None, but implicit attribute = Vehicle size	(uneven) Step-based: 7 categories	20% more fuel-efficient to 30% less fuel-efficient	0.2–1% reduction in emission factor new vehicles
Germany	Fee-only system on ownership tax	2 metrics: cc and gCO_2/km	Engine type: 2 categories (for the cc metric)	Linear fee function with zero-slope element	CO2-based metric: 120 g/km or more	1.1% reduction in emission factor new vehicles
Sweden	Fee-only system on ownership tax	gCO_2/km	Fuel type: 3 categories	Linear fee function with zero-slope element	117 g/km or more	0.3% reduction in emission factor new vehicles
Ireland	Fee-only on purchase and ownership tax	gCO_2/km	None	(uneven) Step-based: purchase fee 11 categories, ownership 12 categories	Purchase: 80–225 g//km Ownership: 0-225 g/km	Unknown. Switch to diesel cars

France

Policy
- Step function with 9 levels
- Central "doughnut hole" having no taxes/rebates (45% of vehicles)

Outcome
- Market shares for efficient models doubled and fell by 2/3rd for least efficient models

Shortcomings
- Incomplete coverage and disproportionate incentives
- Step function

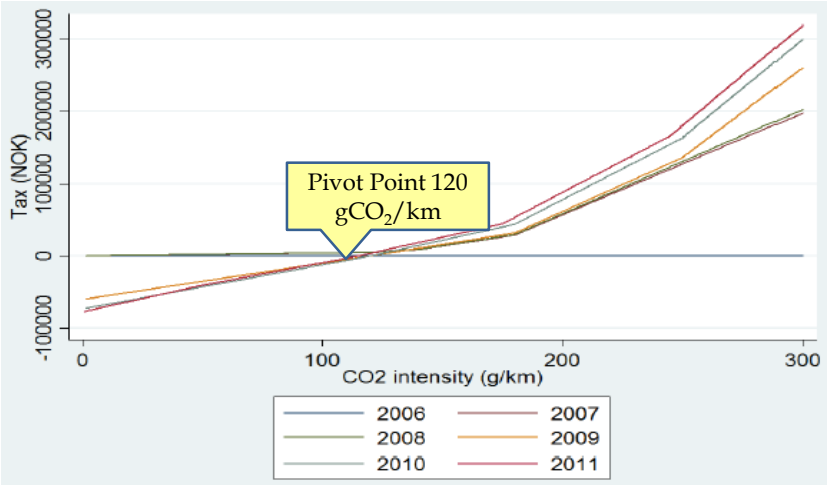


Norway

Policy
- Continuous - 4 line segment with varying slopes
- Taxes have higher slopes

Outcome
Sales weighted average emissions of new vehicles reduced by 15% in 3 years

Shortcomings
- Tax and rebates do not connect.
- Net Revenue negative



Private Sector Concerns for Feebate in India

Challenges	Private Sector Concern
Opposition from the automotive industry	Non-consideration of long product cycles and capital-intensive operations
Complexity of design and confluence with existing policies	Several independent policies create confusion and sub-optimal results • Corporate Average Fuel Consumption • BS VI by 2020 • State level taxes • Road tax and • Registration Fees • State EV policies
Design of pivot point and shape of the function and metric	Asymmetric policies for tax and rebates, non-linear function, low magnitude of incentives and taxes

Key takeaways for India

- Design continuous, linear, revenue neutral feebate structure
- Readjust pivot point, fees and rebates over time as vehicle efficiency improves to make the system self-funding.
- Efficiency criterion such as mileage would be more suitable as Evs would see high variability in emissions depending upon the generation mix

Thank You

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Failures – Ireland, Germany

Ireland

Policy

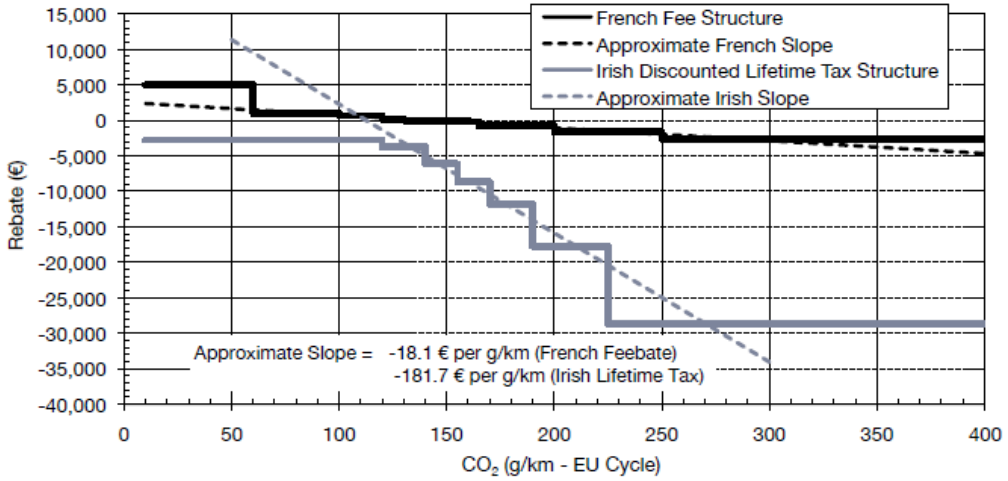
- Tax-only program with a (uneven) step-based fee function

Outcome

- Share of diesel cars more than doubled; from 25 to 57% (Sales data 2010)

Shortcomings

- Tax only programme with no incentives for manufacturers to develop more efficient cars



Vs.

Germany

Policy

- Revised registration taxes to include CO_2, different tax slabs for spark ignition and compression engines

Outcome

Median registrations decreased by approx. 9,500 vehicles

Shortcomings

Due to a large difference in diesel and petrol fuel taxes higher affinity for diesel cars caused problem with policy introduction