

# EVs Global Outlook and Policy Framework in Pakistan

Promotion of Electrical Vehicles in SAARC

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Gas vehicles, much like steam engines, will look cool only in museums!

*Elon Musk- August 2019*

5 weeks later →

**Daimler abandons internal combustion engine development to focus on EVs**



The new Mercedes-Benz EQC. (Credit: Mercedes-Benz)

In a rather surprising announcement, German automaker Daimler has revealed that it will be stopping its internal combustion engine development initiatives as part of its efforts to



# Electric Vehicles

# History

- Among the earliest automobiles, and contrary to common belief, Electric Vehicles (EVs) actually **predate** the Internal Combustion Engine (ICE) vehicles
- First mass-produced EVs appeared in USA in **early 1900s**- at one point in history they **out-sold the gasoline-powered** vehicles
- Held many vehicle **land speed and distance records** in the early 1900s



Edison and a 1914 Detroit Electric model 47

Courtesy: National Museum of American History

But then happened..

- New **highway networks**;
- **Oil discoveries** in Texas, Oklahoma and California; and
- **Henry Ford**

# Reintroduction

- EVs made a brief reintroduction towards the **end of 1990s** with manufacturers like GM, Ford, Chrysler, Honda and Toyota producing **limited numbers of EVs** in California
- GM's EV1 particularly got very popular...but then was **suddenly** discontinued!
- A **mystery** which has even been subject of a movie '*Who Killed the Electric Car?*'

# Modern EVs

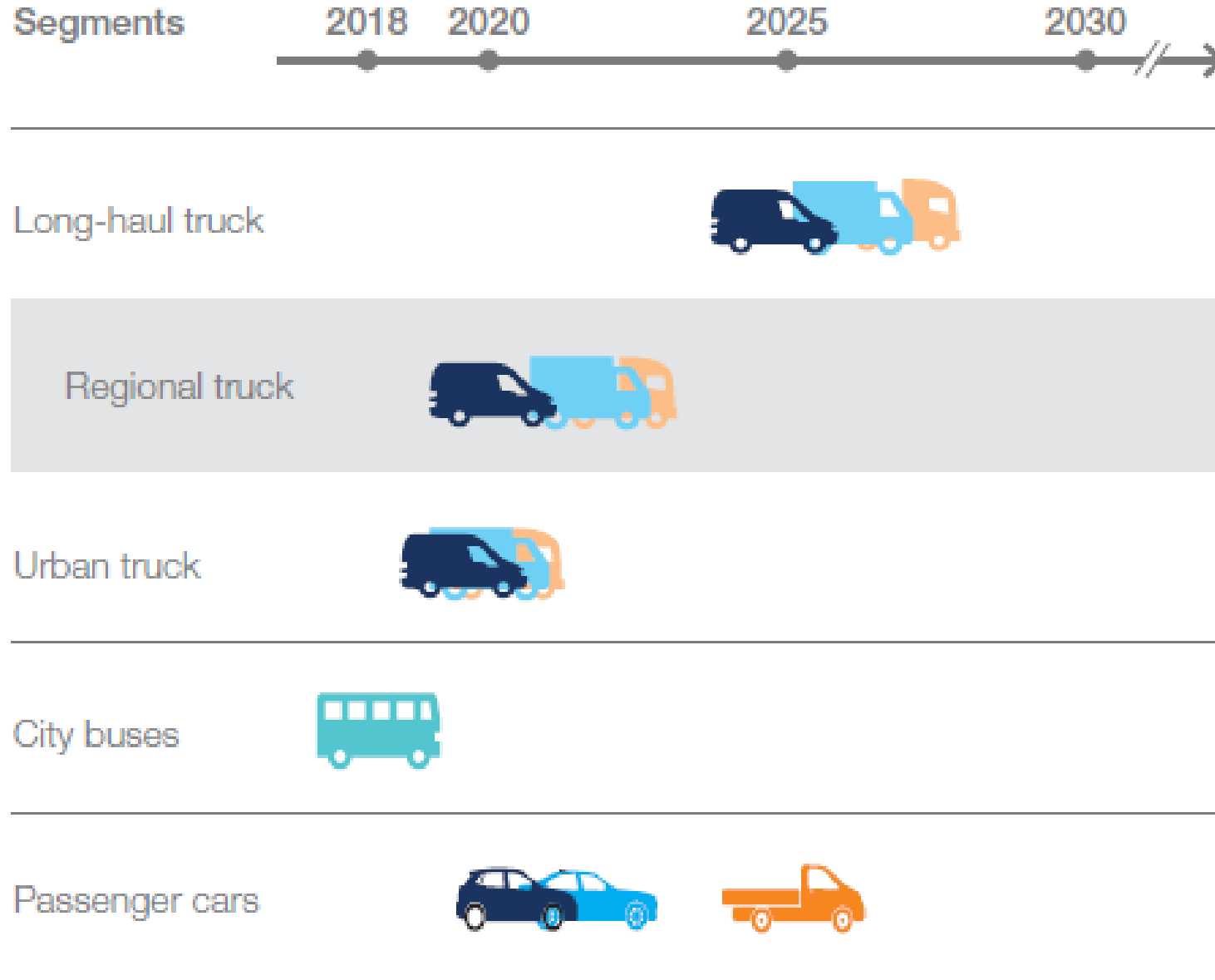
- The **renewed interest** in EVs has been caused by;
  - Fear of peak oil
  - Climate change
  - Efficient batteries
- Today, almost all **top automobile players** are launching or have already launched **electric versions** of their vehicles
- More than **100 EV makers** in **China**
- And then, of course, there is **Tesla**...



# Why EVs?... Why not?

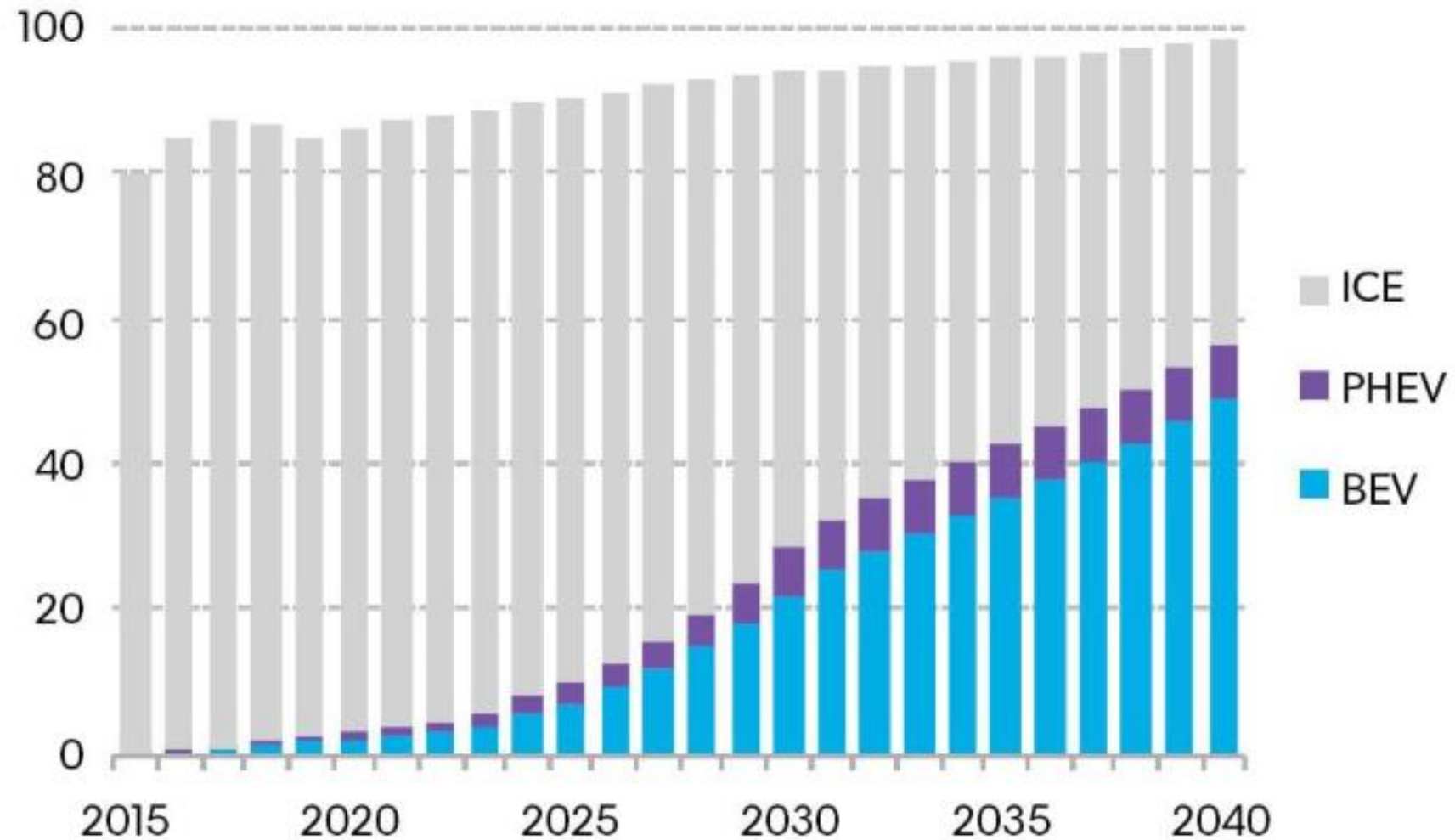
- On per km basis, EVs are up to **10x cheaper** than conventional vehicles
- A typical EV has around **18** moving parts vs **2,000+** moving parts in CE vehicles
- Next to **zero maintenance** cost!
- Latest EV models promise anywhere between 500,000 to **1,000,000mile** life.....~**4x more** than those of gasoline vehicles
- **De-carbonization** of transport sector
- Cutting down of **air** and **noise pollution**

# Timing of cost-parity of electric vehicles with fuel vehicles, based on TCO in the EU



# Global long-term passenger vehicle sales by drivetrain

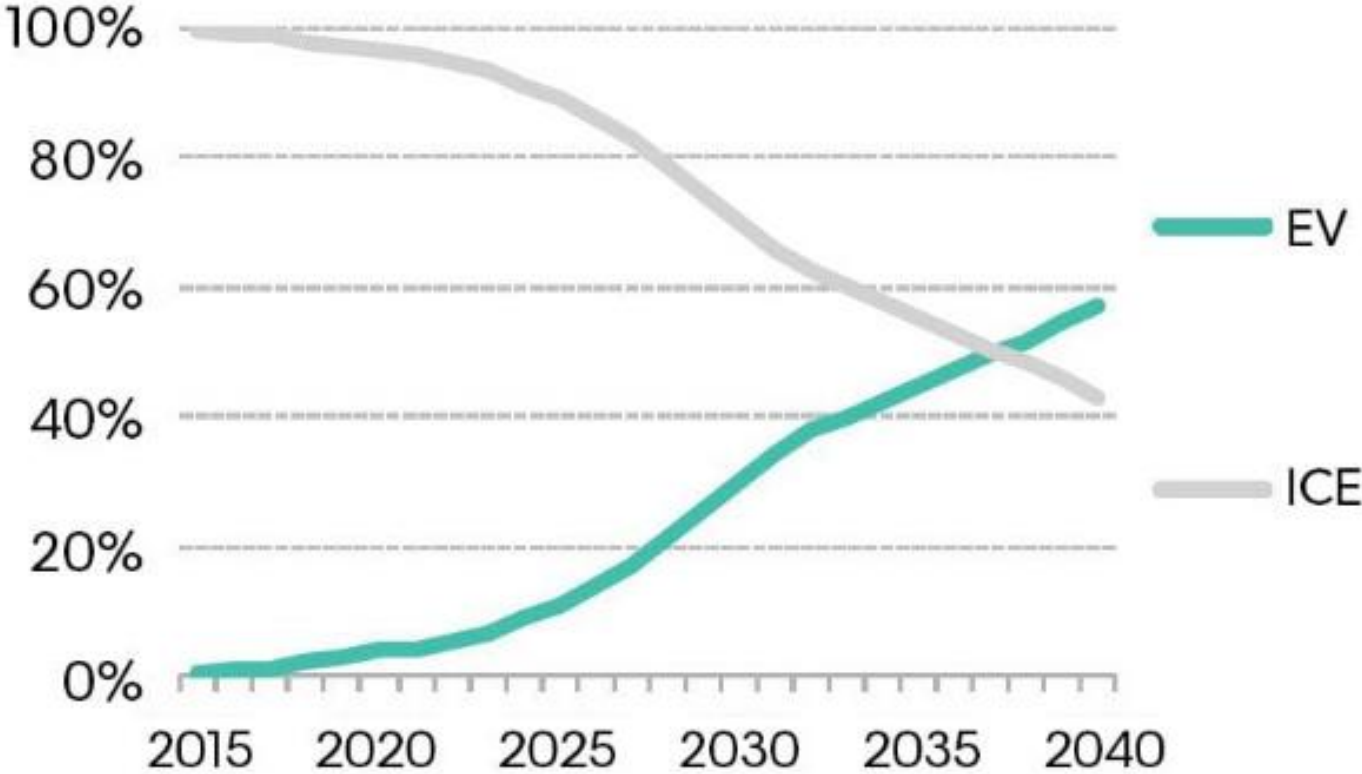
Million vehicles



Source: BloombergNEF

# Global EV and ICE share of long-term passenger vehicle sales

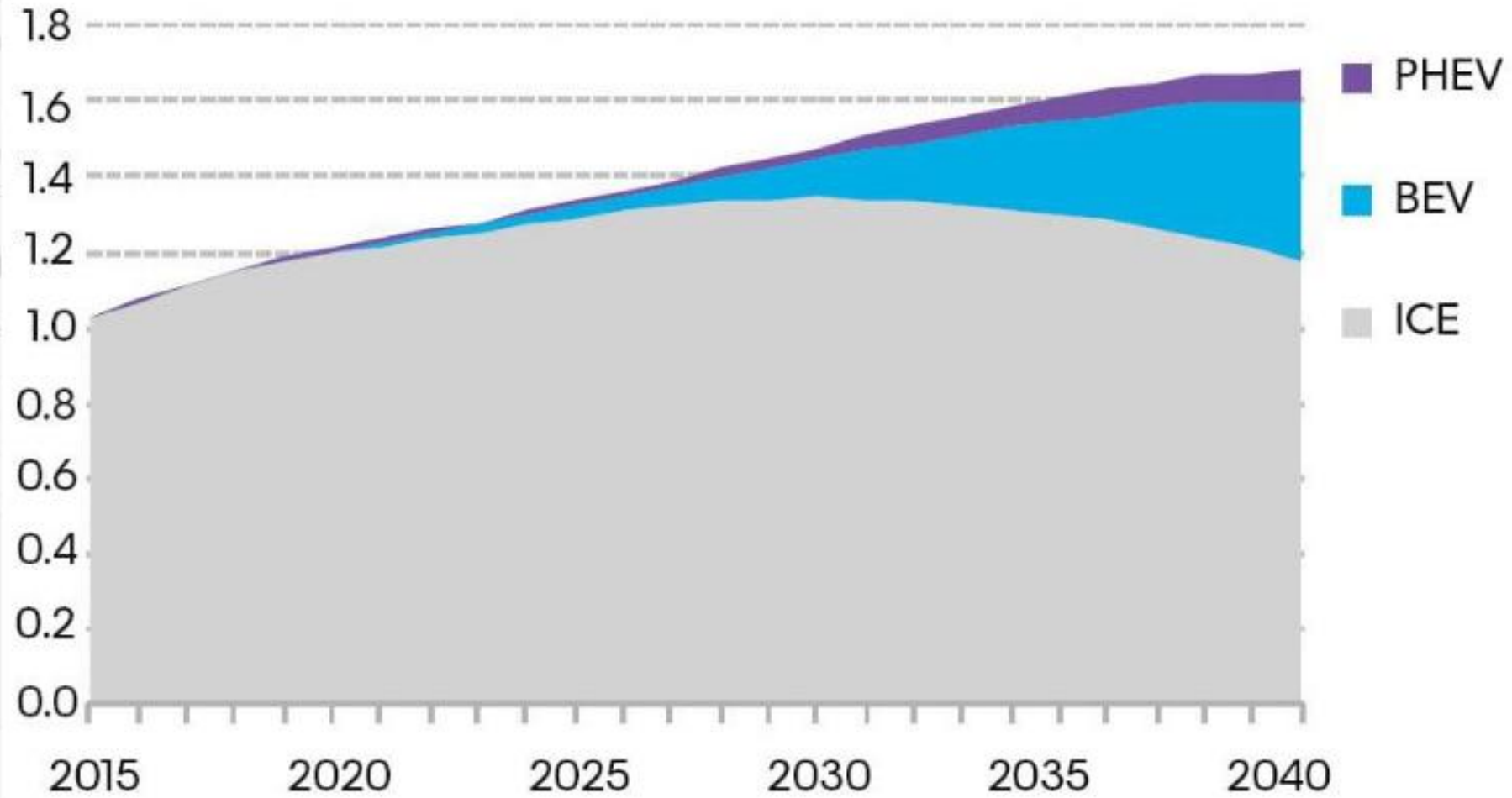
Share of annual sales



Source: BloombergNEF

# Global long-term passenger vehicle fleet by drivetrain

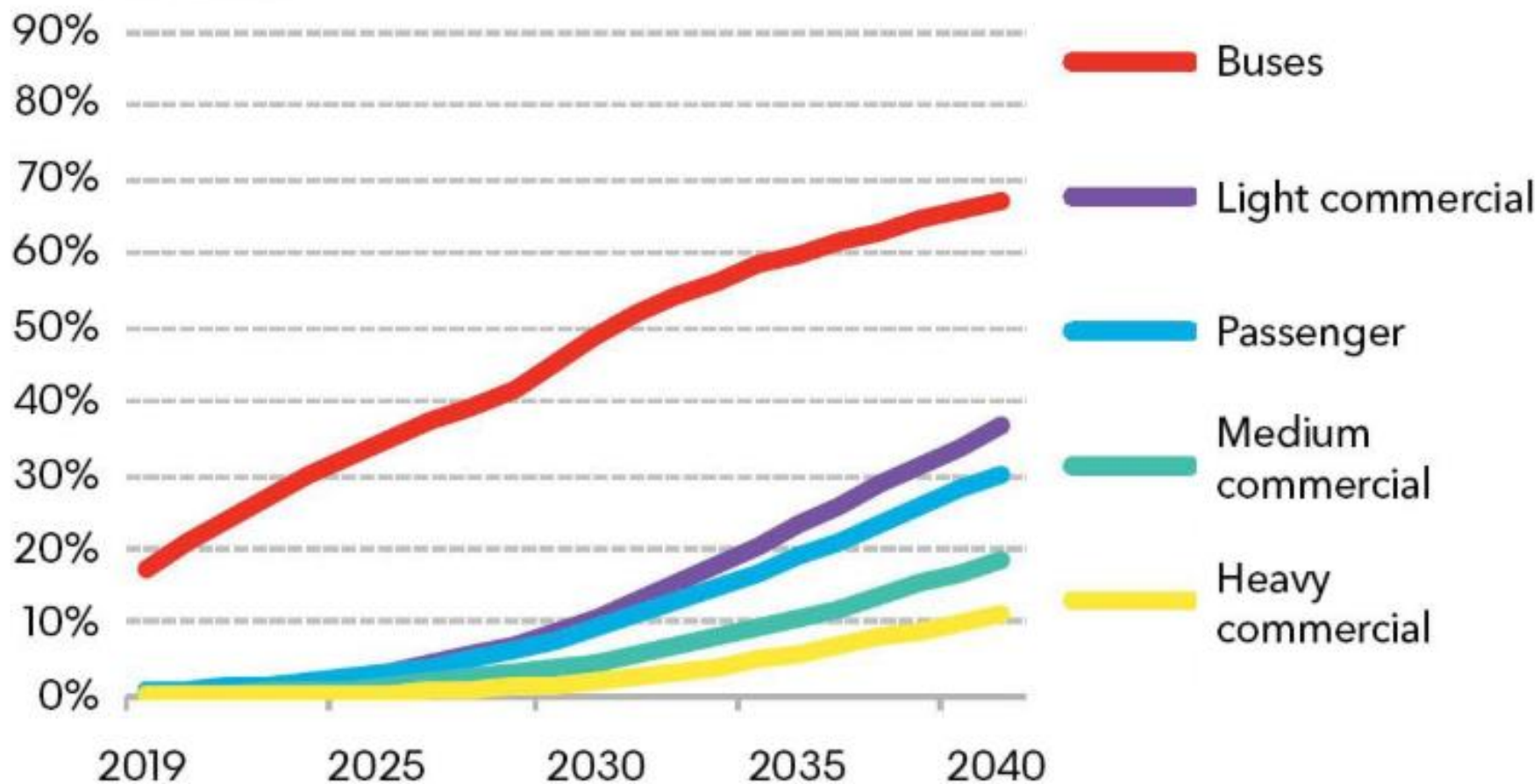
Billion vehicles



Source: BloombergNEF

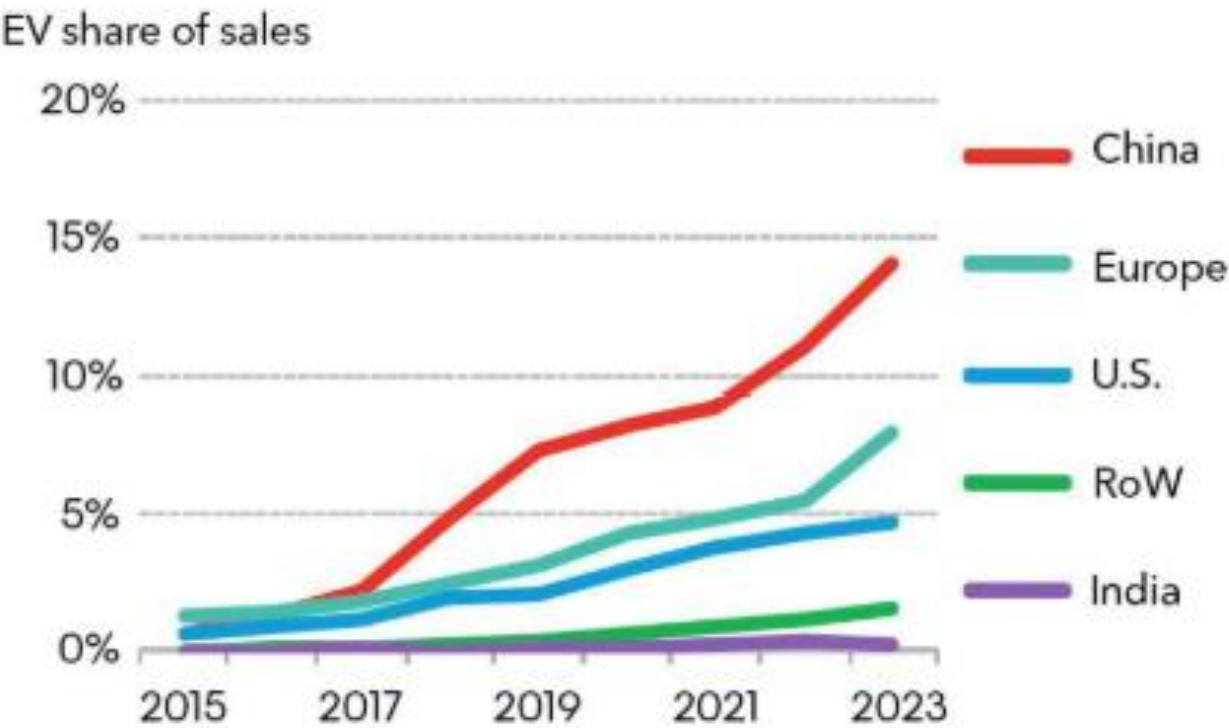
## EV share of global vehicle fleet by segment

Share of fleet

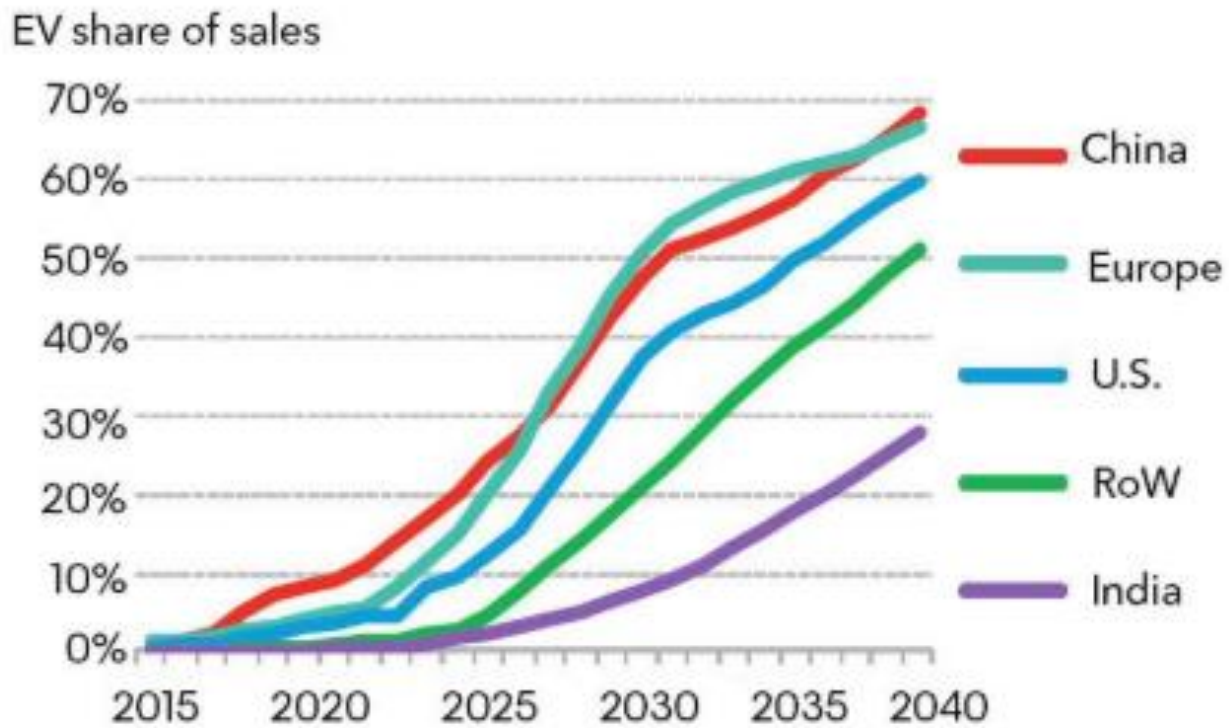


Source: BloombergNEF. Note: Commercial vehicle adoption figures include the main markets of China, Europe, and the U.S.

### Global short-term passenger EV adoption by region



### Global long-term passenger EV adoption by region



Source: BloombergNEF. Note: Europe includes EU + EEA + Switzerland.

# National Electric Vehicle Policy 2019



# NEVP 2019- Objectives

- Climate change & carbon emissions
  - 43% of the airborne emissions in Punjab are from transport sector- almost **twice** as much as developed countries
- Reduce oil import bill
  - Annual savings of **Rs 100bn+** expected by year 5
- Use idle power generation capacity
  - Will actually help **reduce** the electricity tariffs!

# EV Penetration Targets



**Till 2025**

100,000

**Till 2030**

30% of New Sales

**Till 2040**

90% of New Sales



500,000

50% of New Sales

90% of New Sales



1,000

50% of New Sales

90% of New Sales



1,000

30% of New Sales

90% of New Sales

# Fiscal Incentives- General

- All **existing incentives** under Auto Development Policy 2016 shall **remain intact**
- Only **1% GST** (for the next 7years)
- **Exemption** from **registration fees** and **annual token taxes**
- Reduced **custom duty** on imports
- Permission to import **used EVs**
- **Subsidized financing** rates for EV leasing

# Special Measures

- The government shall **purchase 1,000 all-electric buses and trucks** and will ask **commercial operators to operate** them for a concessionary period.
- **Metro buses and BRT routes** in Lahore, Islamabad/Rawalpindi, Multan and Peshawar will be prioritized for electrification of buses.
- The Policy also covers **charging infrastructure** and **allied EV industries** (like LIBs etc.). Similar fiscal incentives will be provided to these industries
- The charging stations will be rolled out along **main highways, motorways** and in city centers so as to minimize **range anxiety** associated with EVs

# EVs- Impact on National Grid

# EVs- Aligning mobility with grid flexibility..

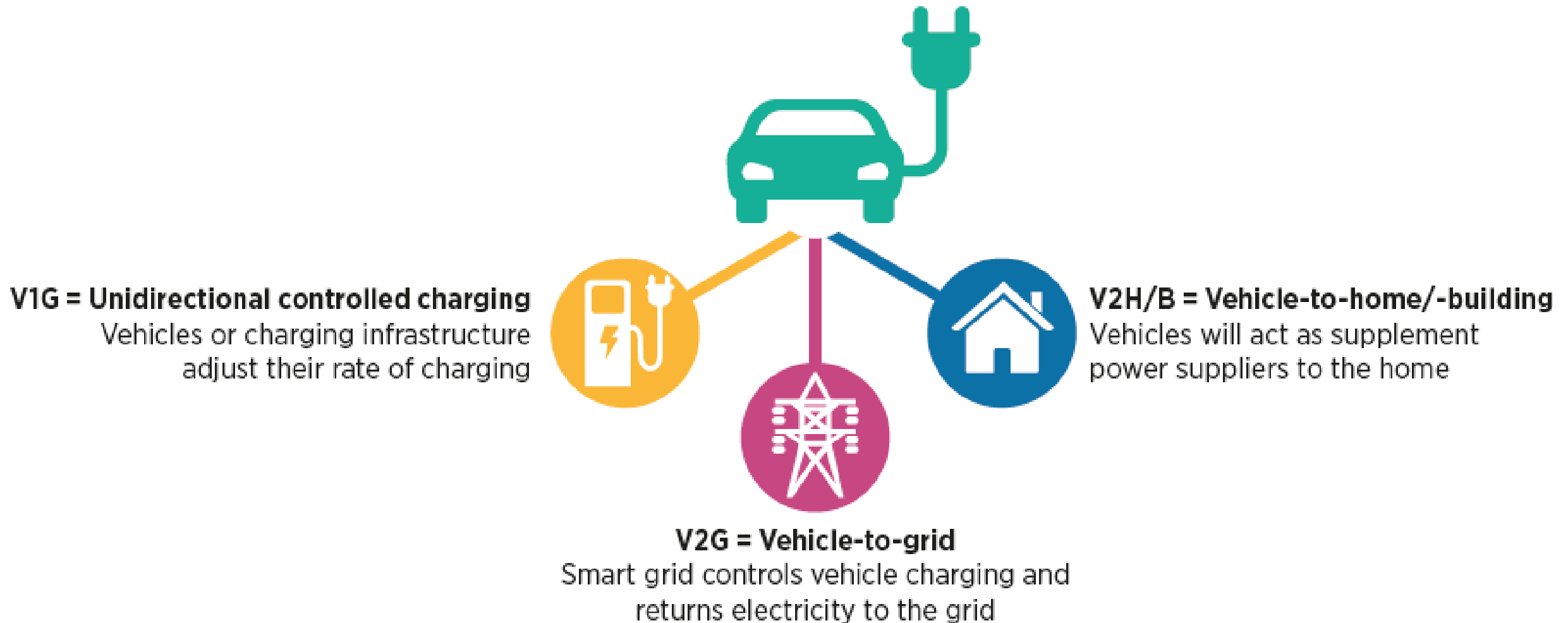
- EVs- while primarily a **mobility solution**...increasingly being viewed as a **grid flexibility solution** too!
- Cars typically spend about **95% of their lifetime parked**....this idle time (combined with battery storage capacity) has an opportunity for grid flexibility
- Important to view EVs as '**battery banks on wheels**'
- **Alignment**, thus, a **MUST**

# Grid boon or bane?

- Optimal EV integration will be a function of **charging patterns/habits** of EV owners and **energy mix** of the grid
  - Energy mix changes- more of a medium/long term measure
  - Charging patterns relatively **easier to control**
    - Time of use pricing- peak/offpeak tariffs
    - Direct control mechanisms
    - Dynamic pricing
- Smart Charging

*Smart charging- the difference between **grid flexibility** and **grid nightmare!***

# Smart Charging





# Smart Charging- How does it help?

- Shaves peak demand
- Fills load valleys (remember Duck Curve?)
- Grid load balancing by adjusting charging levels
- Manages grid congestion
- Helps customers better utilize their existing infrastructure
- Increases renewable power self-consumption (both for customers and grid)

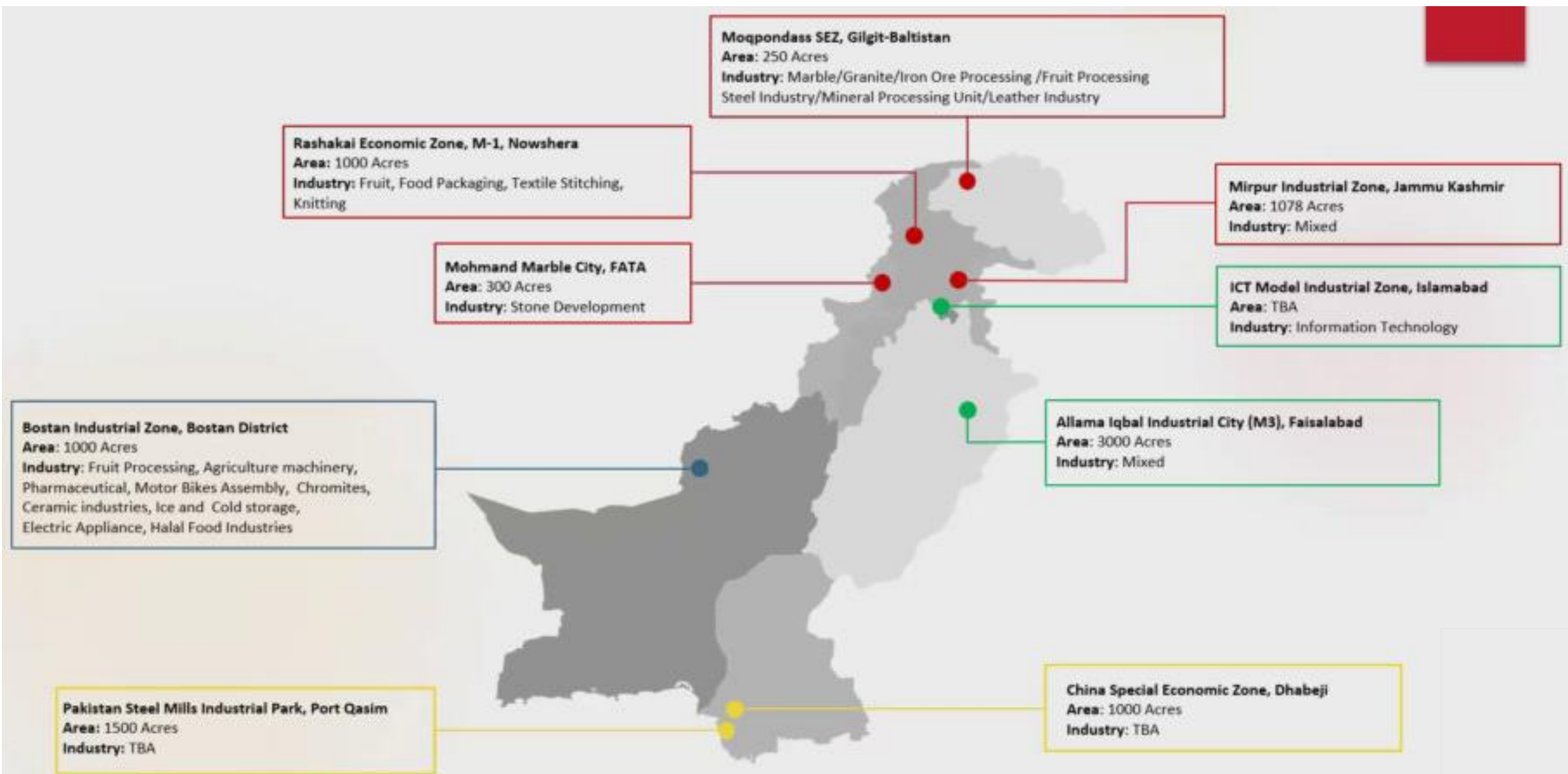
# Other EV Challenges for Grid!

- **Slow charging** (mostly for home & office charging) suits the grid, **Tariff, infrastructure and range**
- But **mobility needs** are different and will require fast or **ultra-fast charging**...
- Imagine 50 EVs getting **fast charged** (each at 50kW-150kW) at Jinnah Super Market in **peak hours!!**
- **DISASTER!**

# Managing impending disasters...

- Peak-time stress can be managed by;
  - Battery swapping
  - Charging stations with buffer storage
  - Night time charging for EV fleets
- Broader regulatory framework must be flexible to generate timely price signals and implement dynamic pricing regimes and CTBCM implementation is great hope !

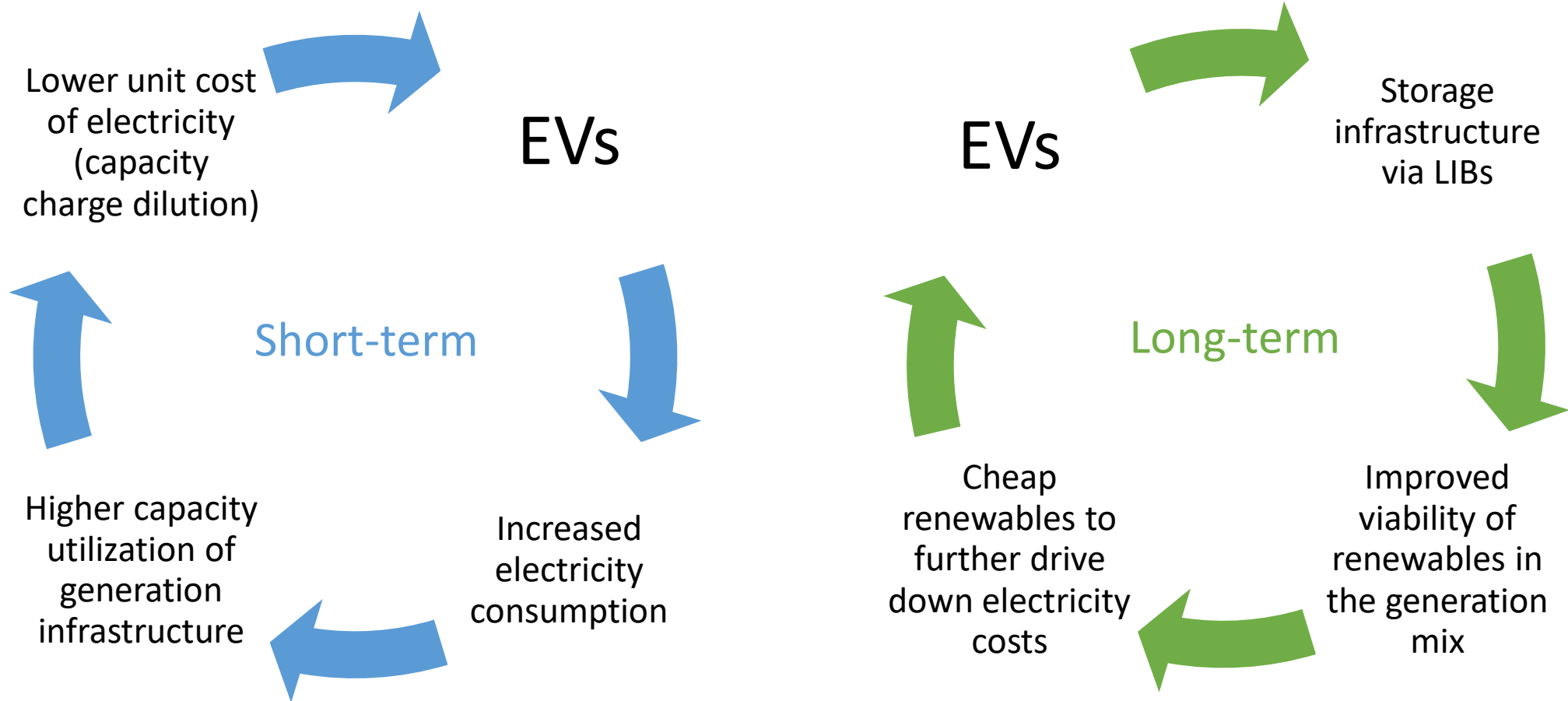
Leveraging CPEC



# Generous incentive package...

- One-time customs duties **exemption** on plant and machinery
- Income tax **exemption** for 5-10years
- Gas, electricity and other utilities provided in the Zones
- Captive power generation allowed
- **Accessibility** to major highways, motorways, dry ports and airports

# The Green Loop



Thank you

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