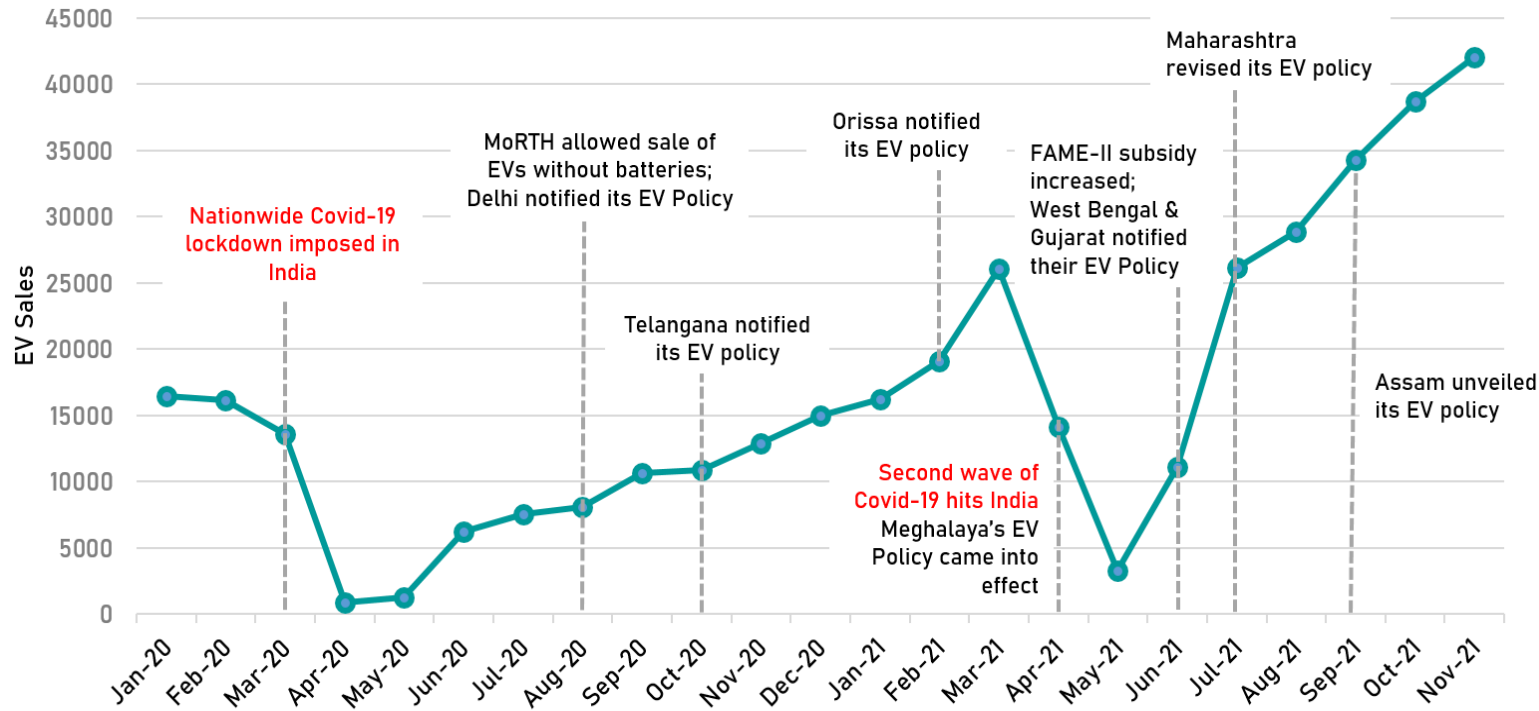








**SMART ELECTRIC MOBILITY:
EV CHARGING SOLUTIONS, ENERGY
STORAGE, GLOBAL EV TRANSITION**

INDIA EV LANDSCAPE

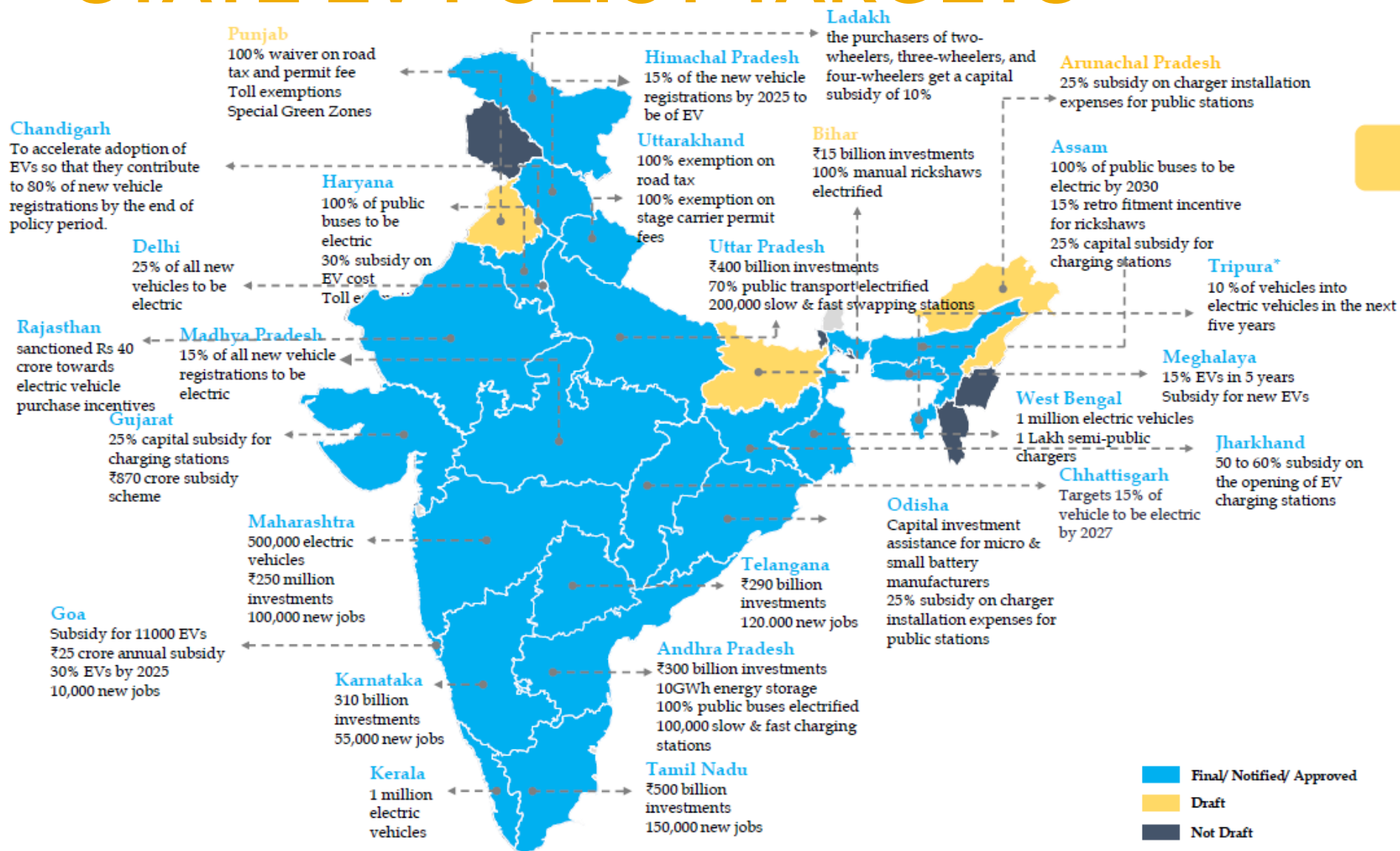


- **96%** of the EV sales in India constitute of **electric two wheelers and electric three wheelers.**
- **157%** increase in y-o-y EV sales in 2022
- Expected to become **\$47 billion** industry by **2026**
- **1.9 million EVs** introduced by end of **2022** spurring start-up ecosystem and innovations in auto sector by demand side policies

Segment wise EV sales penetration

	FY 2022	FY 2023	FY 2030 (Target)
	2%	5%	80%
	47%	53%	80%
	0.5%	1.5%	30%
	9%	6%	40%

STATE EV POLICY TARGETS

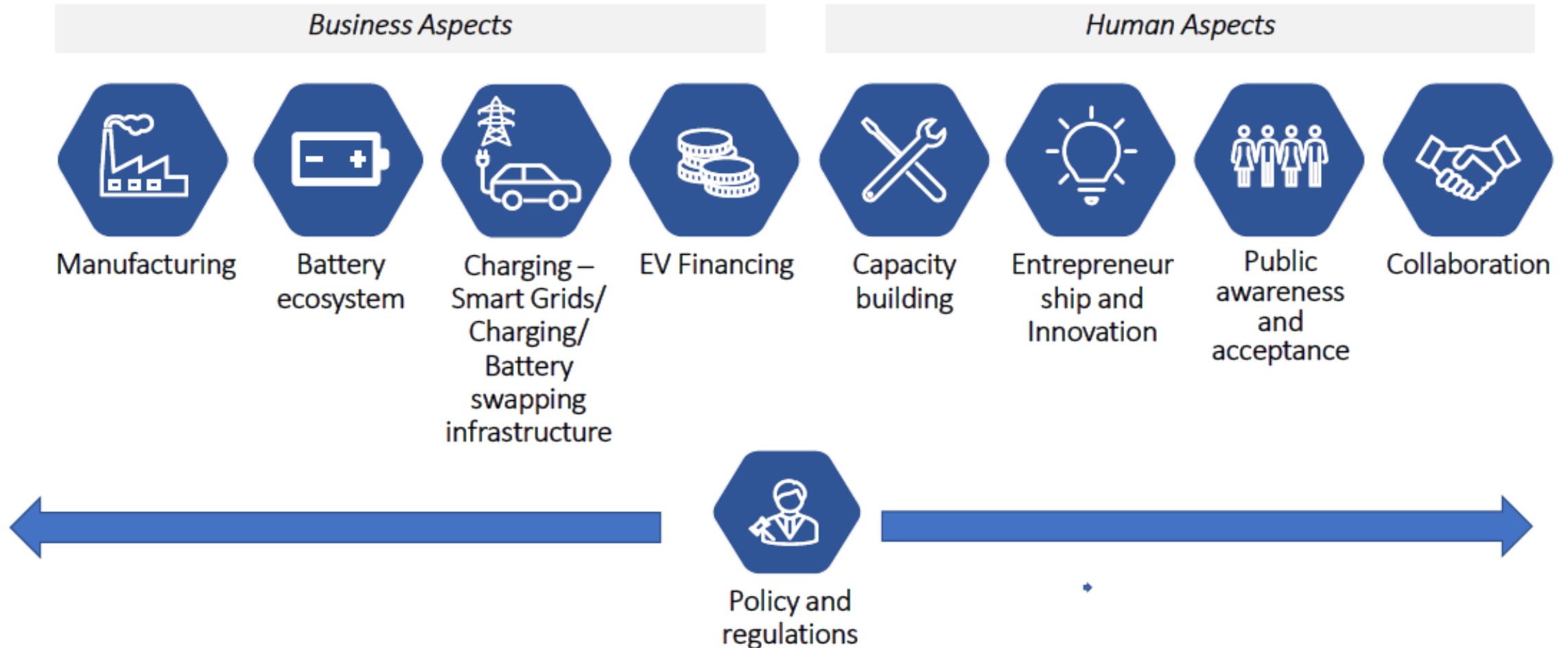


PRIMARY FOCUS AREAS

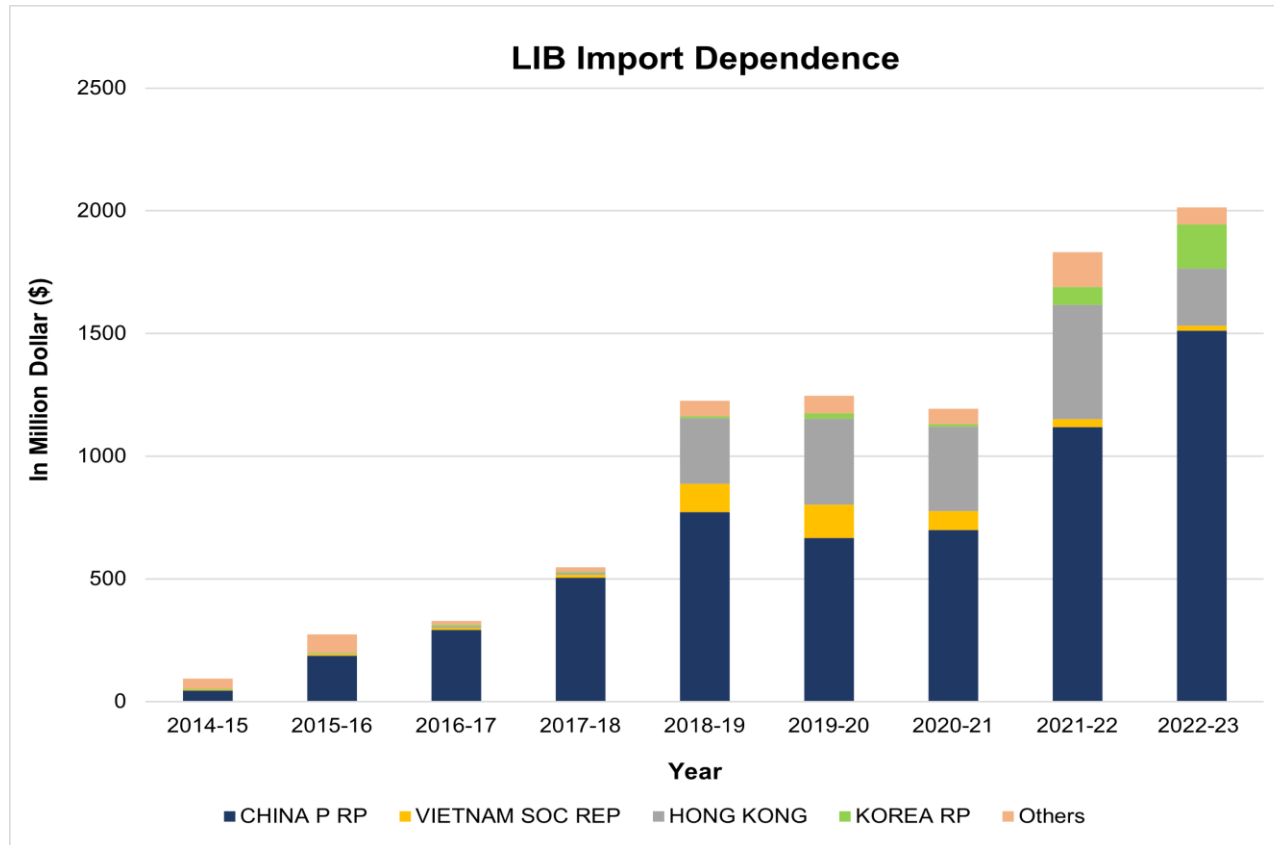
- EV ADOPTION
- INVESTMENT
- PUBLIC TRANSPORT
- SALES
- INCENTIVES & TAX EXEMPTIONS
- OTHER USP's

INTRODUCTION

Ingredients required for any technology revolution to be successful...



BATTERY MANUFACTURING



Source: Ministry of Commerce and Industry, GOI

- China exercises **near monopolistic power** with almost 80% of global Li-ion capacity and **60% global mining and processing capacity**
- India currently imports **70% of Li-ion cell requirements** from China.
- Likely to pose significant **geopolitical (national security) and economic (forex reserves) risks.**

Low active material manufacturing capacity due to unavailability of raw materials

Circularity in battery

R&D in battery manufacturing – Upstream and Midstream

BATTERY MANUFACTURING

Localizing battery components manufacturing



Innovation in battery chemistry to be supplemented with end-to-end manufacturing.

Building capability to engineer and manufacture all battery components domestically is critical for achieving 'Aatmanirbharatha'.

Enabling lifecycle management services



Management of end-of-life batteries is critical to ensure environmental and economic sustainability.

Major opportunity to create a circular economy and establish global leadership.

Reducing dependence on current Li-ion battery chemistry



Li-ion not replaceable in the short run due to performance, cost advantage and existing investments.

Interim strategy could be shifting to variants better suited for Indian conditions & composed of indigenously available raw materials.

Advancing alternate battery chemistries

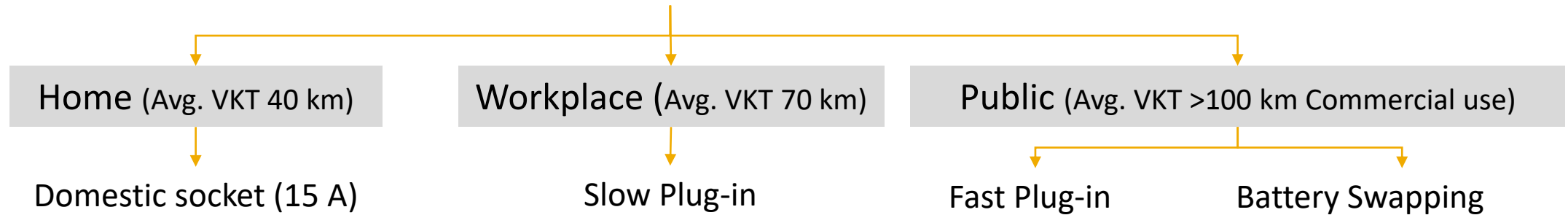


Long-term strategy could involve identifying, innovating and promoting more viable battery technologies.

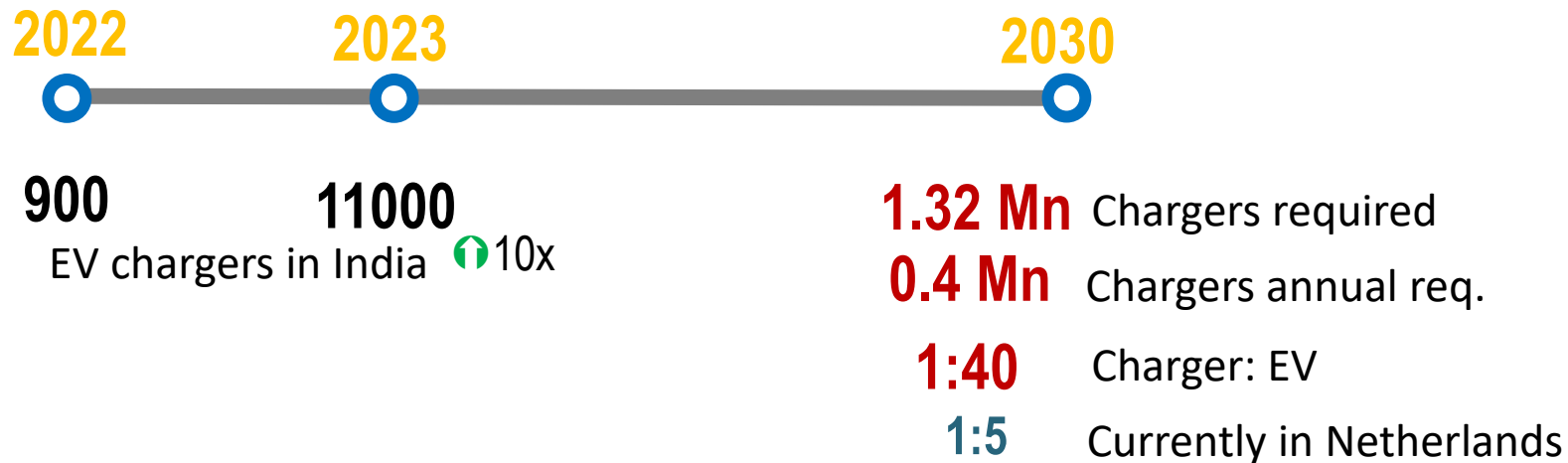
Multiple technologies suited to specific use cases could co-exist rather than a single dominant technology.

EV CHARGING INFRASTRUCTURE

EV CHARGING



EV CHARGING INFRASTRUCTURE IN INDIA



Standardization is key

- Interoperable Charging Infrastructure
- IS/IEC standards by BCA and CHAdeMo

EV CHARGING INFRASTRUCTURE

REGULATION



- Streamlining charging infrastructure approval process
- SPV for charging infrastructure deployment in Tier 1,2,3 cities
- Incentivizing domestic manufacturing of EV charging components

STRATEGY ADOPTION



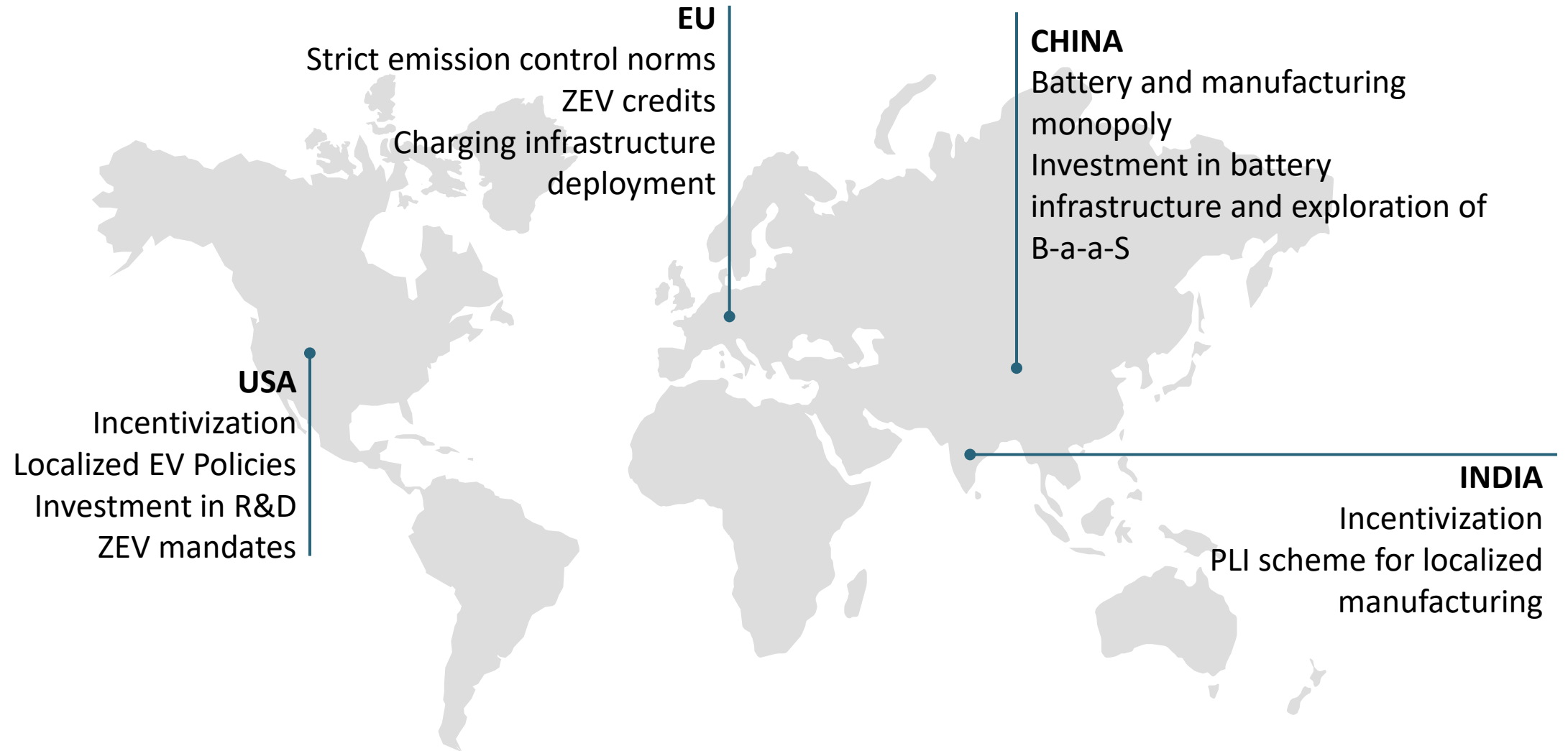
- Alliance for interoperability
- Rationalizing demand charges and management of EV charging load – Active (Time of Use tariff) and Passive (Time of day tariff)
- Identification of prioritized corridors for infrastructure saturation (Use-case basis or geographical coupling)
- Way-side amenity integration
- B-a-a-S can be an option
- Grid integration

RESEARCH AND DEVELOPMENT



- Fast charging connectors
- Charging infrastructure – scope and viability of standardization
- Charging technologies

GLOBAL EV TRANSITION



IMPORTANCE OF CAPACITY BUILDING

CHANGE IN TECHNOLOGY



- Rapid technological change and the dynamic nature of the industry have created the need for new skills.

CHALLENGES IN SCALING UP



- The current in-house skill development model may not be sustainable. Large-scale skill development is required to support the growth of the industry

NEED FOR LARGE-SCALE COST-EFFECTIVE TRAINING



- Internal skill development is expensive for small players. Large-scale training programs led by academic and vocational institutes are required.

IMPACT ON PRODUCTIVITY



- Untrained employees reach optimal productivity after 2–3 months of on-the-job training. Availability of skilled manpower will improve industrial productivity and turn-around time.

ADDRESS FEAR OF CHANGE



- Upskilling employees will counter their fear of job loss by equipping them for new jobs and will make them more receptive to change

PUBLIC AWARENESS AND ACCEPTANCE

1 **Benefits of EVs**
Saving in Opex Cost

2 **Charing Infra**
Availability &
locations of charging
infrastructure

3 **Range Anxiety**
Data based campaign

4 **Vehicle Model**
Available models,
features, pricing etc

5 **Environmental
Impact**
Emission reduction,
air and noise pollution
reduction

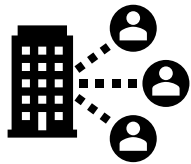
6 **Govt Incentives**
Purchase subsidies,
tax benefits,

WAY FORWARD



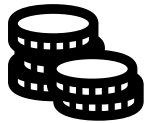
Collaborations

Business and Financial models to increase viability, Govt-Academia-Industry Collab



Infrastructure saturation

Technological, Charging infrastructure and Battery manufacturing



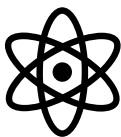
Incentivization

Shift to Performance-based incentives for product reliability



Long-term clarity

Supply/ Demand side mandates, Withdrawal strategy and Alternative fuel clarity



Atmanirbhar Bharat

Localization, Skill Development and Capacity Building

THANK YOU