Transport & Energy Nexus

Different Solutions and Pathways for Countries

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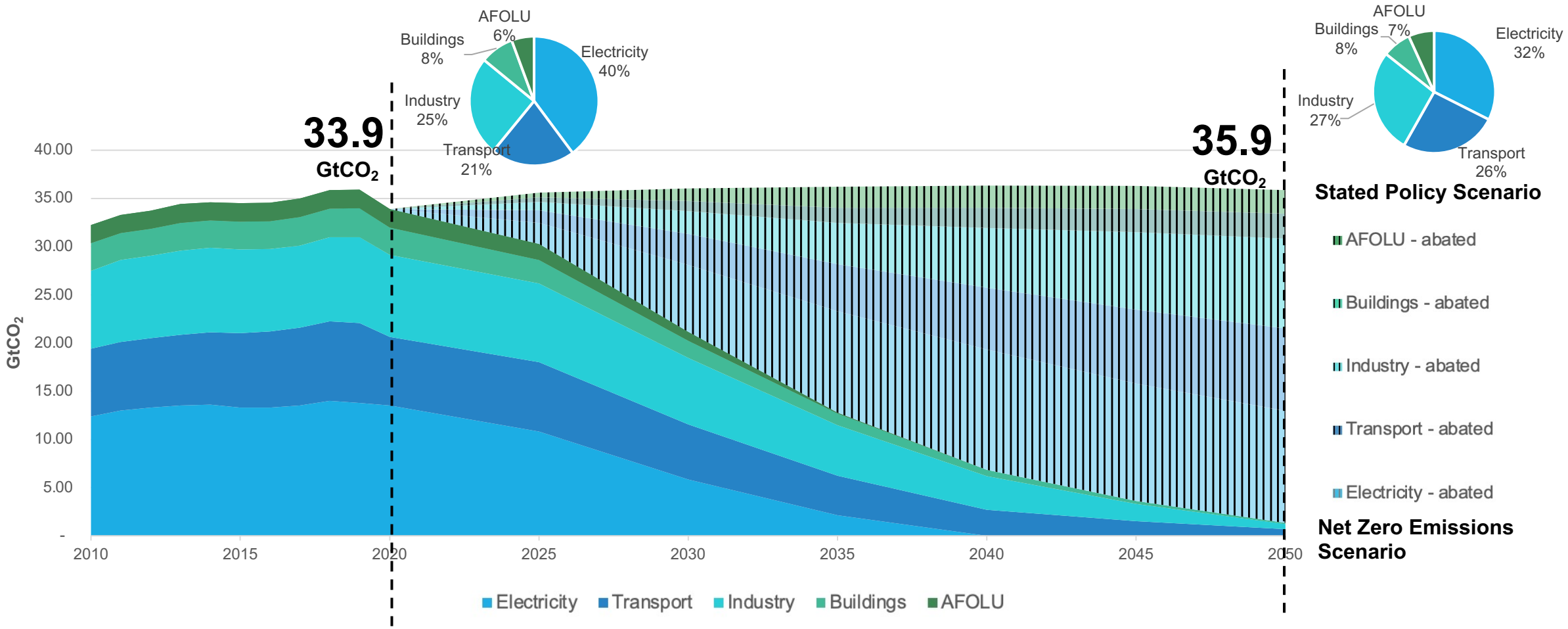
PMANIFOLD
Advancing Net Zero Markets

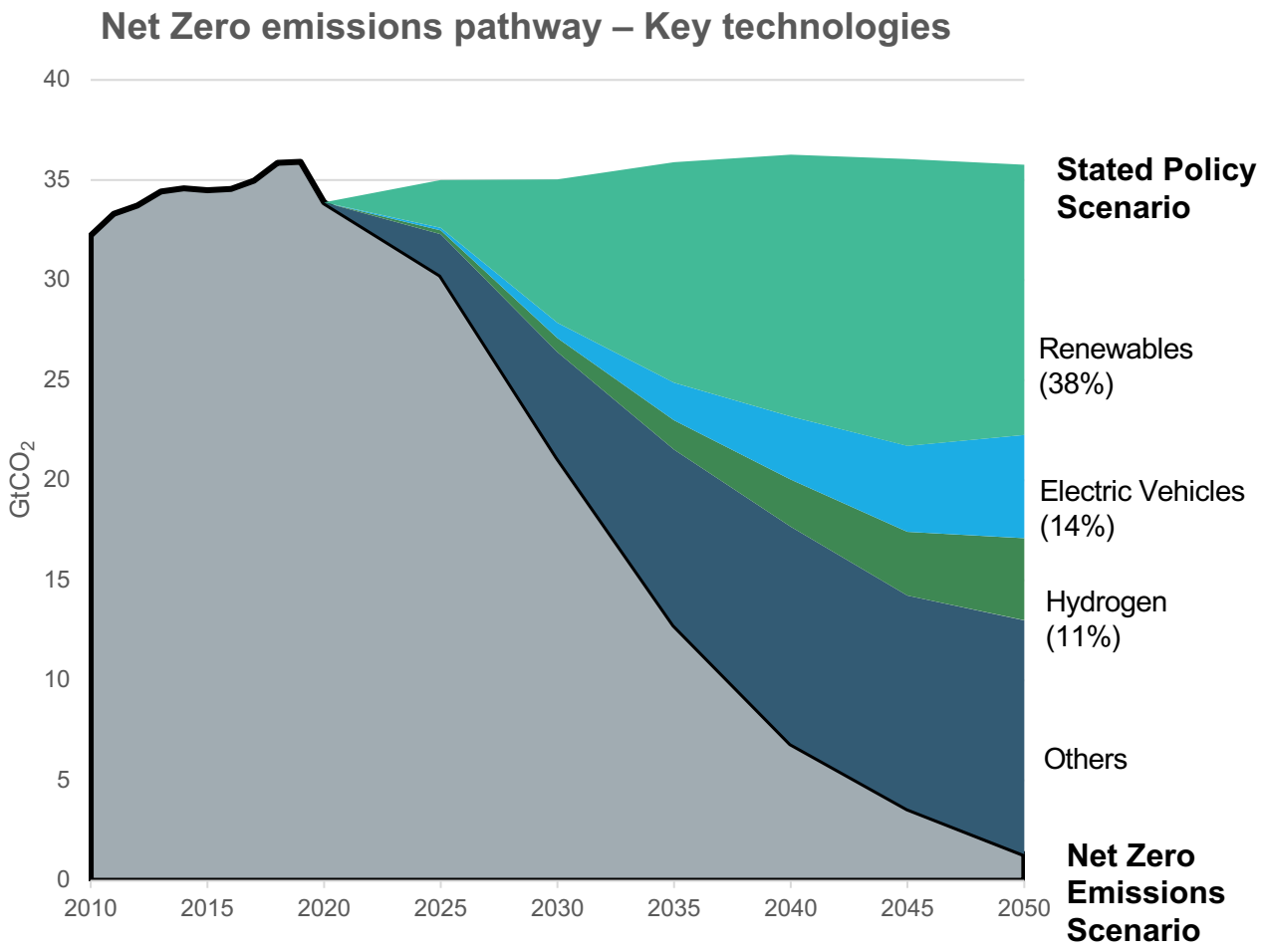
EVACAD
Building e-Mobility Talent

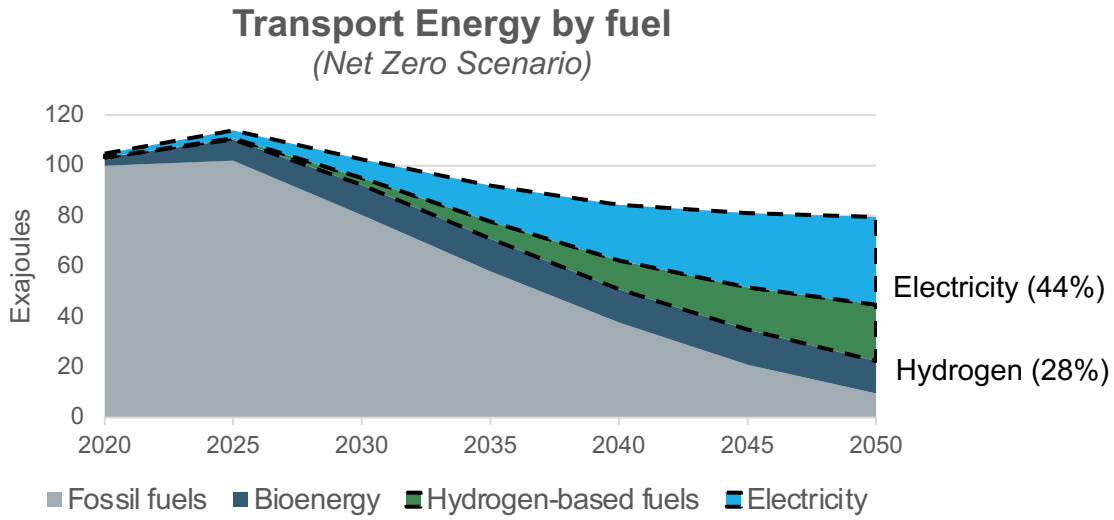
Electricity and Transport sectors combined decarbonization will be crucial to achieve Global Net Zero emissions

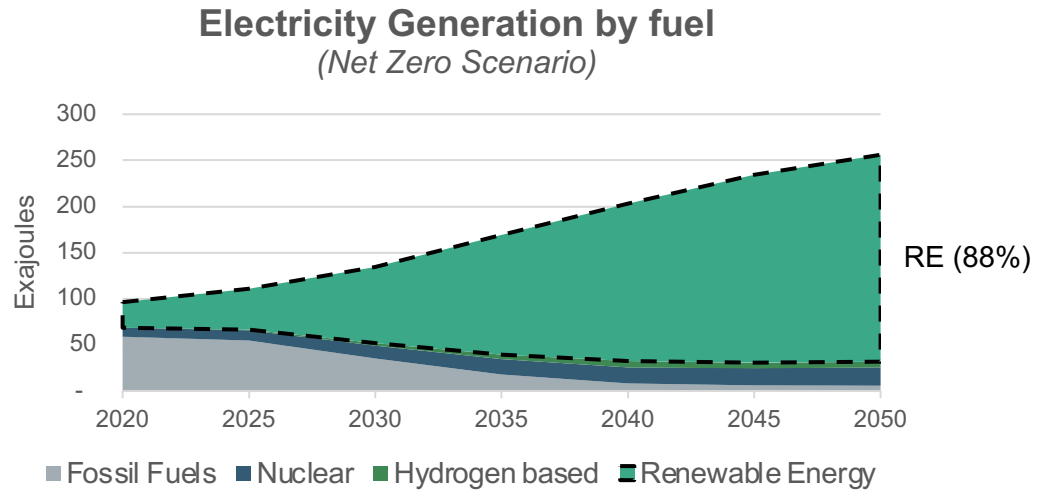


Source: *Net Zero by 2050, IEA (2021); pManifold analysis*

Decarbonization Technologies existing and improving. RE, EVs & Hydrogen combinedly expected to save 63% emissions.





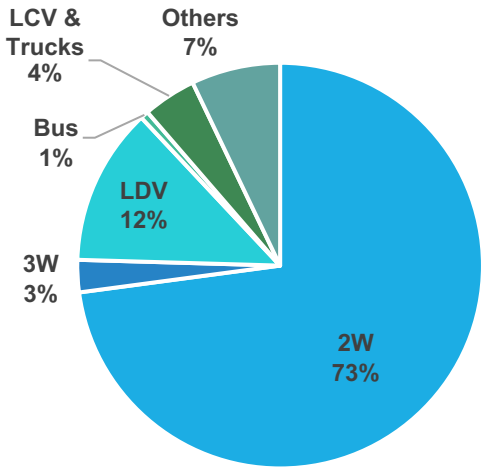


Source: *Net Zero by 2050, IEA (2021); pManifold analysis*

Why are countries standing differently – Transport

India

Population: **1,408 million**
GDP per capita: **$ 2,389**



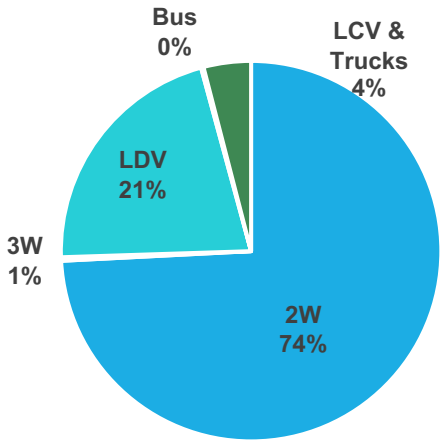
Vehicle stock:
356 M
(252 vehicles/ thousand people)

EV stock:
2.8 M (<1%)

Local manufacturing

Laos

Population: **7.6 million**
GDP per capita: **$ 2,599**



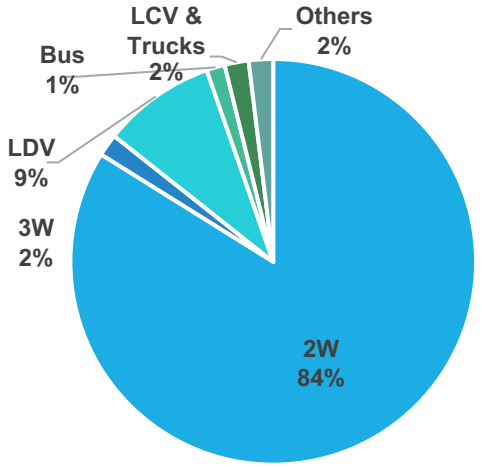
Vehicle stock:
3 M
(394 vehicles/ thousand people)

EV stock:
<2,000

Import dependent

Maldives

Population: **0.5 million**
GDP per capita: **$ 10,964**



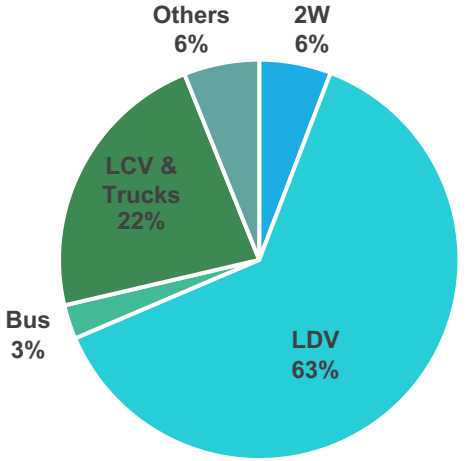
Vehicle stock:
0.2 M
(400 vehicles/ thousand people)

EV stock:
~5,000 (<2.5%)

Import dependent

Mongolia

Population: **3.4 million**
GDP per capita: **$ 4,953**



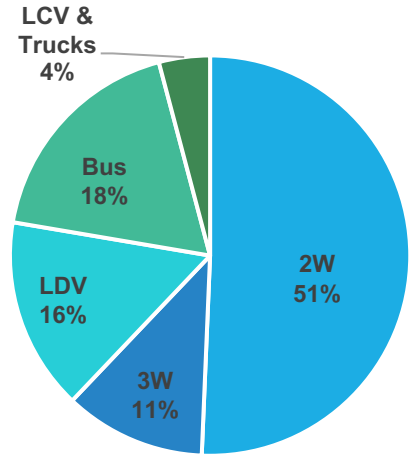
Vehicle stock:
1.2 M
(353 vehicles/ thousand people)

EV stock:
<1,000

Import dependent

Philippines

Population: **115 million**
GDP per capita: **$ 3,623**



Vehicle stock:
13 M
(113 vehicles/ thousand people)

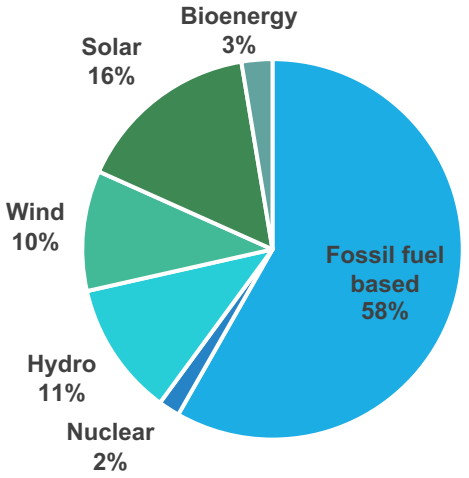
EV stock:
~14,000 (<0.1%)

Local manufacturing

Why are countries standing differently – Electricity

India

Population: **1,408 million**
GDP per capita: **$ 2,389**

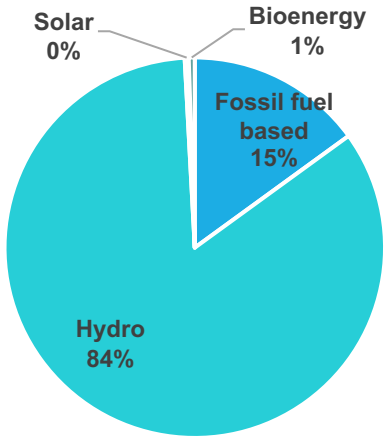


Total Installed Capacity
425 GW

RE (including Hydro)
~ 40%

Laos

Population: **7.6 million**
GDP per capita: **$ 2,599**

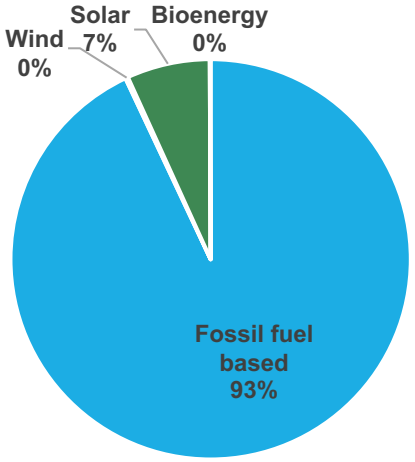


Total Installed Capacity
11 GW

RE (including Hydro)
~ 85%

Maldives

Population: **0.5 million**
GDP per capita: **$ 10,964**

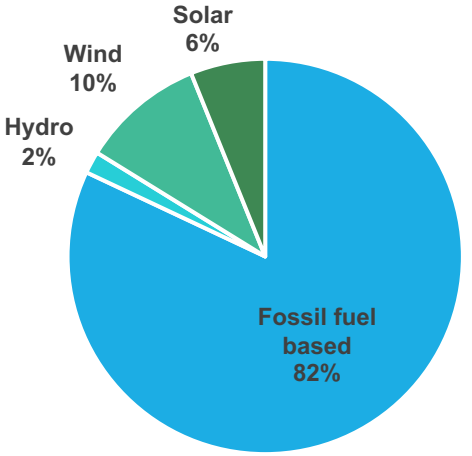


Total Installed Capacity
0.6 GW

RE (including Hydro)
~ 7%

Mongolia

Population: **3.4 million**
GDP per capita: **$ 4,953**

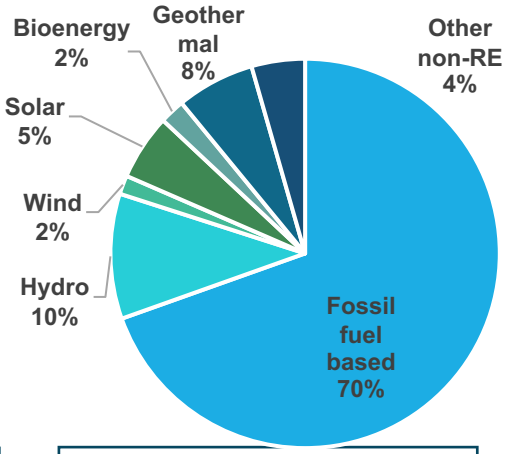


Total Installed Capacity
1.6 GW

RE (including Hydro)
~ 18%

Philippines

Population: **115 million**
GDP per capita: **$ 3,623**



Total Installed Capacity
29 GW

RE (including Hydro)
~ 27%

Why are countries standing differently – Economics

India	Laos	Maldives	Mongolia	Philippines
GDP: **$ 3,500 billion** % imports of GDP: **35%**	GDP: **$ 19 billion** % imports of GDP: **41.5%**	GDP: **$ 6.2 billion** % imports of GDP: **67.8%**	GDP: **$ 16.8 billion** % imports of GDP: **75.3%**	GDP: **$ 404 billion** % imports of GDP: **37.7%**
Fuel: (BS VI) **Petrol: $1.26/ltr** **Diesel: $1.13/ltr**	Fuel: (EURO IV) **Petrol: $1.49/ltr** **Diesel: $1.01/ltr**	Fuel: (EURO V) **Petrol: $0.96/ltr** **Diesel: $0.98/ltr**	Fuel: (EURO-V) **Petrol: $1.41/ltr** **Diesel: $1.32/ltr**	Fuel: (EURO IV) **Petrol: $1.21/ltr** **Diesel: $1.17/ltr**
Electricity cost: **7 – 19 cents/kWh**	Electricity cost: **7 – 13 cents/kWh**	Electricity cost: **17 – 33 cents/kWh**	Electricity cost: **5 – 6 cents/kWh**	Electricity cost: **11 – 16 cents/kWh**

CAPEX and TCO comparisons of EVs to ICEVs

Vehicle Segment	India		Laos		Maldives		Mongolia		Philippines	
	CAPEX	TCO	CAPEX	TCO	CAPEX	TCO	CAPEX	TCO	CAPEX	TCO
2W	1.12	0.48	2.60	0.75	0.52	0.49	1.05	0.58	2.41	1.12
3W	1.57	0.61	1.60	0.63	1.41	0.87	-	-	1.72	0.96
4W Private	1.43	0.70	0.91	0.78	1.27	1.09	1.34	1.19	1.94	1.12
4W Taxi	1.60	0.42	1.20	0.76	1.27	0.88	1.34	0.95	2.08	0.74
Bus	2.34	1.11	3.93	1.49	1.88	1.52	6.13	1.81	3.11	1.76

LCOE of fossil fuel based and solar based electricity generation (cents/kWh):

India		Laos		Maldives		Mongolia		Philipines	
Fossil	Solar	Fossil	Solar	Fossil	Solar	Fossil	Solar	Fossil	Solar
9.04	3.70	7.10	10.71	40.00	11.40	3.49	16.50	7.00	10.06

Source: *Renewable Power Generation Costs in 2022, IRENA(2023); Other Sources; pManifold analysis*

Why are countries standing differently – EV Policies

	India	Laos	Maldives	Mongolia	Philippines
EV Targets:	**2 & 3-wheelers - 80%** Commercial vehicles - 70% Cars - 30% (By sales, 2030)	**2-wheelers and Cars - 30%** (**By stock**, 2030)	2 wheelers - 35% Cars - 30% Buses - 50% (By sales, 2030 under development)	30,000 EVs (By stock, 2030 under development)	**Jeepneys - 100%** **CVs- 100%** Buses - 25% (By sales, 2040)
Demand creation incentives:	**Capital subsidies** (FAME); EV mandates for ride hailing and delivery companies; banks encouraged for lower interest on EVs	**Excise duties and VAT** reduced for EVs; Capital subsidy proposed only for e-Buses	**Custom duty exemption** leading to lower capex in most EV segments	Exemption on road usage fee and road space rationing regulations for EVs;	**Exemption from excise** tax on EVs, Income tax holiday for EVs
Local Industry Development:	Large PLI scheme for **cell & battery manufacturing**; state incentives for EV investments; **lower GST**	Local assembly promoted; EV fleet promoted;	Import dependent	Import dependent	Incentives for e-Tricycle and e-Jeepney local manufacturing
Charging Infra Development:	**Capital subsidies** (FAME); **reduced EV Tariff;** charging standards; **Battery Swapping standards**;	Mostly driven by private players (Ex. EV suppliers/ dealers, ride hailing fleet operators)	Capital subsidies proposed; reduced EV ToU Tariff for Public charging proposed;	Limited public EV chargers in Ulaanbaatar (Private Investments)	**Reduced electricity costs for EV charging, Income tax holiday** for charging infrastructure business
ICEV Phase-out:	**End of life** for ICEVs defined and under enforcement	In process of implementing **ICE phase-out strategy**	Not Existing	Not Existing	Not Existing

Why are countries standing differently – RE Policies

	India	Laos	Maldives	Mongolia	Philippines
RE targets:	65% of capacity by 2030; **75% by 2050**	**84% of Hydro today**	15% of capacity by 2030	30% of capacity by 2030	35% of capacity by 2030
Utility RE incentives:	FITs; **Green Open Access & Banking**, **DISCOM mandates;**		FITs, Tax incentives – low GST	FITs	**Open Access; DISCOM mandates;** FITs (not nationwide, but some local govts. provide)
Solar Rooftop incentives:	Net metering **Easy financing;**	Net metering; Promoting RE for off-grid electrification	Net metering	Net metering	Net metering
Energy storage & Green Hydrogen:	**Energy storage obligation** (1% of solar and wind electricity with storage for DISCOMs and open access consumers); National **Green Hydrogen Mission** (5 million Tons hydrogen capacity by 2030)				Under consideration

Country specific Policy Roadmaps will play key role in achieving Transport Decarbonization Goals

Targets
(To set right vision for achieving country's transport decarbonization goals)

- EV targets across vehicle segments
- Charging Infrastructure targets
- Renewable Energy Targets
- EV production targets

Demand side policy measures
(To stimulate EV demand and drive adoption)

Fiscal:
- Capital subsidy, reducing taxation, repeat taxes, registration charges, subsidy to support for retrofit EVs
- Provision to encourage Banks to finance EV
- Allowance of accelerated depreciation
- **Increase of VAT on ICEVs**
- **Increase of taxes & Reducing subsidies on petrol and diesel**

Non-Fiscal:
- Ease of process of registration, permits, transfers
- Provision of preferential parking, NMT, PT access
- Revision and Redrafting of Building code, land-use plans
- EV mandate for Govt. agencies
- Mandatory periodic pollution test
- Banning/ Limiting ICEVs Import
- Awareness campaigns, drives & Training programs

Supply side policy measures
(To enable and grow local EV industry)

Fiscal:
- Capital subsidy for all types of public charging stations
- Incentives to DISCOMS and GAS/Oil stations to setup EV charging stations
- Reduction of electricity cost through separate EV tariff for public charging
- Capex subsidy for setting up vehicle scrappage and battery re-use/recycle facilities
- TOU tariff

Non-Fiscal:
- Stricter Vehicle emission standards and accompanying fuel standards
- ZEV mandates for automotive OEMs
- Formulation of EVs, charger, battery, retrofitting (re-use recycle) Quality and Safety standards
- Grid management, Expansion, **Increased RE share**
- Promotion of R&D
- Capacity building

Emerging e-Mobility Business Models of high potential

EVs Aggregation model (vehicle and Energy separation)

e-Bus aggregation in India (25-27% less price compared to Diesel and CNG buses, total 16,590 Buses)

e-Car Fleet aggregation for ride hailing companies

(BluSmart 4,000 electric cars in Delhi; Grab's GrabElectric program in Singapore; Gojek's e-GoCar program in Indonesia; Loca in Laos)

e-Car aggregation for Govt. departments

(EESL for few states in India)

EVs for goods delivery and freight

Light EVs (e-2Ws, e-3Ws) for last mile online deliveries:

(Flipkart in India - currently 4.6% EV fleet, 100% by 2030)

EV100+ campaign for M&HDT electrification globally by Climate Group

(Flipkart, JSW Steel, Unilever etc.)

Used EVs import and Retrofits

Used EV imports:

(Inner Mongolia Uplong International Trade Co., Ltd in Mongolia;)

Retrofit of ICE 3Ws and Light trucks to EVs

(Precision camshafts – LCVs, RACE Energy – 3Ws in India; VinFast in Vietnam)

PSUs/ OMCs/ DISCOMs/ Utilities/ driven public charging infra (RE integration)

FAME Charger subsidy via PSUs and OMCs in India

(EESL, IOCL, BPCL, HPCL, others)

RE integrated EV charging in Singapore

(Sunseap's Charge+ Virtual Power Plants integrated EV chargers)

Battery Swapping and Battery Leasing

Battery swapping

(Gogoro; Pilipinas Shell and SUN mobility partnership for e-Tricycles and e-Jeepneys in Philippines; Sun Mobility, Battery Smart in India)

Battery leasing

(Bounce EV, Batt:RE, Sun Mobility in India)

Kerb-side and home charging

Kerb-side EV charging

(Facilitating home charging for residents with no driveways in UK by Connected Kerb, Ubitricity etc.; kerb-e in Netherlands)

Utility backed home charging

(EDF, Monta smart charging in UK; gridio in Estonia; Green Caravan in EU)

Thank You

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