



**SAARC Energy Centre, Islamabad
Pakistan**

THE REPORT



Webinar On “Promotion of Light Electric Vehicles”



Session 1: 17th March, 2020

Session 2: 7th July, 2020

Organized by
SAARC Energy Centre Islamabad

**March 17, 2020
July 7, 2020**

**SAARC Energy Centre
697, Street 43, Sector E-11/4 (NPF),
Islamabad, Pakistan
www.saarcenergy.org**



Proceedings of First Webinar – 17th March 2020

Introduction

1. SAARC Energy Centre, Islamabad under its approved Programmes for the year 2020 successfully conducted a Webinar on “Promotion of Light Electric Vehicles” on Tuesday, 17th March 2020. Webinar Agenda is available at Annexure -I.
2. Focus of the webinar was to highlight and promote the numerous benefits that the use of light Electric Vehicles (EV) brings to the common consumer and the governments. The webinar shared specific economic and environmental benefits, relevant case studies and provided participants with information on how to achieve large scale adoption. Areas discussed were: Overview of Light EVs in India and the Policy Support extended by the Government; EV Charging Strategy and Implementation; Global EV Outlook; and Policy Framework in Pakistan.

Participation

3. The webinar was attended by 131 professionals representing public sector organizations, academia, private sector, and other stakeholders within and outside SAARC region. The experts from Germany, India, and Pakistan shared their knowledge pertaining to government policies, existing practices, and international experience with regards to promotion of light electric vehicles and its charging infrastructure. The participants list is available at Annexure-II.

Description

4. The webinar was started with welcome remarks by Program Coordinator, Mr. Muhammad Umar Mukhtar, Research Fellow (Energy, Transport & Environment) of SAARC Energy Centre. Afterwards, he invited Dr. Shoaib Ahmed, Deputy Director SEC to deliver the welcome note on the behalf of Director SEC. After the welcome note, the Program Coordinator

read out the agenda of the technical session. The technical session comprised of presentations by the expert speakers. Each presentation was followed by a brief Q & A session. The Program Coordinator read out conclusions, which were gathered during the webinar. Before closing the webinar, the Program Coordinator from SAARC Energy Centre offered remarks of appreciation to all the participants and presenters.

Technical Proceedings

5. Two resource persons from India and one each from Germany and Pakistan delivered presentations in the webinar. The presentations delivered during the webinar are available at SEC's website. Details of Resource Persons are available at Annexure-III and their Presentations at Annexure-IV. A brief information on the content of the delivered presentations is as follows:

Presentation 1 – Light Electric Vehicles – Charging Strategy & Implementation

Mr. Suddhasatta Kundu, Senior Manager (Technical Advisory) at India Smart Grid Forum, India.

6. Mr. Kundu has over 10 years of experience working in the Indian energy sector. He is currently working for India Smart Grid Forum (ISGF), which is a Public Private Partnership initiative of Ministry of Power, Government of India responsible for accelerated development of smart grid technologies in the Indian power sector. Mr. Kundu has worked closely on a number of public EV projects in India. In his presentation, he discussed the EV charging strategy and its implementation in the context of India. He also covered in detail the government initiatives to introduce charging infrastructure all over India, and described the key drivers for the charging infrastructure development for light electric vehicles.

Presentation 2 – 2W and 3W Electric Vehicles Demand Projection in India

Mr. Hemal Thakkar, Associate Director – Execution at CRISIL Research, India.

7. Mr. Hemal Thakkar – currently working as Associate Director (Execution) at CRISIL Research, India – has over 10 years of consulting experience in the automotive and logistics industry. His areas of focus are identifying market potential, competitive benchmarking, traffic assessment, cost competitiveness and regulatory aspects to name a few. Mr. Thakkar apprised the participants about different types of light electric vehicles that exist in India and briefed them about their benefits as well as demand projections in the context of current government policies. He apprised the participants of the beneficial effects of the Government of India subsidies and policy support on the fast uptake of light EVs. In the end, he also discussed various business models for electric two wheelers and three wheelers.

Presentation 3 – Smart Charging for Electric Vehicles: International Experiences

Ms. Arina Anisie, Associate Programme Officer – RE Innovation at IRENA, Germany.

8. Ms. Anisie has been working in IRENA since 2017, and she supports the innovation work stream in IRENA, focusing on innovations for integration of renewable energy in power systems, and electrification of end-use sectors. The focus of her presentation was to present

the recent IRENA analysis on the impact of EV smart charging on the integration of variable renewable energy. She explained the energy transformation and accompanying electrification of transport sector that will take place by 2050, with a focus on South Asia. Moreover, she explained the market structure and regulations that would enable vehicle-to-grid smart charging. She also discussed specific case study of Hamburg city, and described a number of innovative charging station business models, especially for light electric vehicles.

Presentation 4 – EVs Global Outlook and Policy Framework in Pakistan

Mr. Gul Hassan Bhutto, Head of Engineering & Operations at Omni Power, Pakistan.

9. Mr. Gul Hassan Bhutto is a renowned energy professional in Pakistan and has over 16 years of professional experience in the fields of power generation, policy, planning, maintenance, operations, performance, and contract management. He has worked with Caterpillar and General Electric (GE) in Pakistan in various capacities including engineering, services management and leadership roles. Besides his engineering activities, he is an energy sector keynote speaker, panellist, analyst and technical writer as well and publishes regularly on critical issues in energy and power sectors. In his presentation, Mr. Bhutto discussed the global outlook of EVs and summarised the EV Policy Framework in Pakistan.

10. Mr. Bhutto apprised the audience about the general fiscal incentives as well as the specific measures announced in the draft policy. To emphasize the importance of EVs in Pakistan, he presented how the CPEC projects and especially the Special Economic Zones (SEZs) could be leveraged for kick-starting the light EV manufacturing in Pakistan. He also described the impacts of EV charging on the national grid and discussed how the grid challenges could be managed.

Wrap up and Conclusion

Mr. Muhammad Umar Mukhtar, Research Fellow (Energy, Transport & Environment), SAARC Energy Centre

11. Mr. Muhammad Umar Mukhtar thanked everyone for attending the event. The following conclusions were drawn from the discussion held in the webinar. He informed the participants that there is great potential for the use of light electric vehicles in all SAARC countries. Following are the main conclusions:

- a. Introduction of charging infrastructure is very important to reduce range anxiety of light EV users. Various types of business models could be adopted for the charging infrastructure.
- b. As the cost of EVs is very high as compared to internal combustion engine vehicles, therefore, SAARC governments may study and adapt the policies of Government of India as it introduced FAME-I and FAME-II policies for subsidizing the purchase of light electric vehicles, and resultantly, there has been significant sale of commercial 3-wheeler EVs such as e-rickshaws in India.

- c. Battery management is an important aspect to promote use of light EVs, and business models such as battery swapping models will play a positive role in its promotion.
- d. It is important that all SAARC Member States take necessary action to promote and localize the production and regional trade of EVs. SAARC Energy Centre has always played its role to facilitate and encourage regional cooperation and will continue to do so by arranging events to allow deliberation on crucial aspects of regional cooperation.

Closing of Webinar

Mr. Muhammad Umar Mukhtar, Research Fellow (Energy, Transport & Environment), SAARC Energy Centre

12. Mr. Muhammad Umar Mukhtar informed all the participants that the presentations and recording of the webinar proceedings will be available on SAARC Energy Centre's website (www.saarcenergy.org). He requested the participants to submit suggestions/comments for any further improvement of these webinars and suggest topics to SEC using the feedback survey form. He closed the webinar with a thank you note to everyone attending the Webinar.



Proceedings of Second Webinar – 7th July 2020

Introduction

1. Given the importance of this topic, SAARC Energy Centre Islamabad successfully organised a second webinar on “Promotion of Light Electric Vehicles” on Tuesday, 7th July 2020. Webinar Agenda is available at Annexure -I.
2. Focus of the webinar was to highlight and promote the numerous benefits that the use of light electric vehicles brings to the common consumer and the governments. The webinar shared specific economic and environmental benefits, relevant case studies and provided participants with information on how to achieve large scale adoption. Areas discussed were: Overview of Light EVs in India and the Policy Support extended by the Government; EV Charging Strategy and Implementation; Global EV Outlook; and Policy Framework in Pakistan.

Participation

3. The webinar was attended by 108 professionals from various public and public sector organizations, research centres, academia, and other stakeholders within and outside SAARC region. The experts from India and the SEC shared their knowledge pertaining to government policies, existing practices, and international experience with regards to promotion of light electric vehicles and its charging infrastructure. The participants list is available at Annexure-II.

Description

4. Program Coordinator, Mr. Muhammad Umar Mukhtar, Research Fellow (Energy, Transport & Environment) of SAARC Energy Centre began the webinar with his welcome remarks. The technical session comprised of presentations by two expert speakers from India and one presentation by the Program Coordinator. Each presentation was followed by a brief Q & A session. The Program Coordinator read out conclusions, which were gathered during the

webinar. Before closing the webinar, the Program Coordinator from SAARC Energy Centre offered remarks of appreciation to all the participants and presenters.

Technical Proceedings

5. Two resource persons from India and the Program Coordinator shared their knowledge in the webinar. The presentations delivered during the webinar are available at SEC's website. Details of Resource Persons are available at Annexure-III and their Presentations at Annexure-IV. A brief information on the content of the delivered presentations is as follows:

Presentation 1 – Light Electric Vehicles – Charging Strategy & Implementation

Mr. Suddhasatta Kundu, Senior Manager (Technical Advisory) at India Smart Grid Forum, India.

6. Mr. Kundu has over 10 years of experience working in the Indian energy sector. He is currently working for India Smart Grid Forum (ISGF), which is a Public Private Partnership initiative of Ministry of Power, Government of India responsible for accelerated development of smart grid technologies in the Indian power sector. Mr. Kundu has worked closely on a number of public EV projects in India. In his presentation, he discussed the EV charging strategy and its implementation in the context of India. He also covered in detail the government initiatives to introduce charging infrastructure all over India, and described the key drivers for the charging infrastructure development for light electric vehicles.

Presentation 2 – 2W and 3W Electric Vehicles Demand Projection in India

Mr. Hemal Thakkar, Associate Director – Execution at CRISIL Research, India.

7. Mr. Hemal Thakkar – currently working as Associate Director (Execution) at CRISIL Research, India – has over 10 years of consulting experience in the automotive and logistics industry. His areas of focus are identifying market potential, competitive benchmarking, traffic assessment, cost competitiveness and regulatory aspects to name a few. Mr. Thakkar apprised the participants about different types of light electric vehicles that exist in India and briefed them about their benefits as well as demand projections in the context of current government policies. He apprised the participants of the beneficial effects of the Government of India subsidies and policy support on the fast uptake of light EVs. In the end, he also discussed various business models for electric two wheelers and three wheelers.

Presentation 3 – EV Policy Framework in Pakistan

Mr. Muhammad Umar Mukhtar, Research Fellow (Energy, Transport & Environment) at SAARC Energy Centre, Pakistan.

8. Mr. Muhammad Umar Mukhtar has been working at SAARC Energy Centre since 2018. He has done his MSc in Renewable Energy & Clean Technology from the University of Manchester (United Kingdom) in 2014 on the prestigious Commonwealth Scholarship. Before joining SEC, Mr. Mukhtar was working at an energy consultancy Reenergia-Enhar, and provided consultancy to various clients such as French Development Agency (AFD), Asian Development Bank (ADB), International Finance Corporation (IFC) and include B.V. Prior to that, he worked as Production and Project Engineer in Coca Cola Pakistan, and was involved in

the commissioning of their \$100 million greenfield plant. Mr. Mukhtar gave a detailed presentation on the recently approved EV Policy of Pakistan, and apprised the audience about the general fiscal incentives as well as the specific measures announced in the policy. He presented specific economic benefits of light EVs for Pakistan, and explained that introduction of only 100,000 electric 2-wheelers will result in foreign exchange savings of \$11 million per annum for Pakistan in lieu of fuel imports. He discussed the case of 30% electrification of 2-wheeler segment in Pakistan and apprised the participants of potential savings and extra electricity requirements. He concluded his presentation with specific recommendations on the EV Policy Framework of Pakistan.

Wrap up and Conclusion

Mr. Muhammad Umar Mukhtar, Research Fellow (Energy, Transport & Environment), SAARC Energy Centre

9. Mr. Muhammad Umar Mukhtar thanked everyone for attending the event. The following conclusions were drawn from the discussion held in the webinar:

- a. Over its lifetime, light EVs including both electric 2 and 3 wheelers lead to significant savings in fuel cost, and are beneficial from both consumer, government and environmental point of view.
- b. Government support in the form of subsidies in the initial phase is required to offset the high cost of purchase of the light EVs. In this regard, guidance may be taken from FAME-I and FAME-II policy guidelines of India regarding setting up a subsidy structure, especially for commercial users of light EVs.
- c. Political will and devising an implementation mechanism for introducing EV charging infrastructure will help promote the uptake of light EVs in SAARC region.
- d. It is important that all SAARC Member States take necessary action to promote and localize the production and regional trade of EVs. SAARC Energy Centre has always played its role to facilitate and encourage regional cooperation and will continue to do so by arranging events to allow deliberation on crucial aspects of regional cooperation.

Closing of Webinar

Mr. Muhammad Umar Mukhtar, Research Fellow (Energy, Transport & Environment), SAARC Energy Centre

10. Mr. Muhammad Umar Mukhtar informed all the participants that the presentations and recording of the webinar proceedings will be available on SAARC Energy Centre's website (www.saarcenergy.org). He requested the participants to submit their feedback by sending an email to rfete@saarcenergy.org. He closed the webinar with a thank you note to everyone attending the Webinar

Annexures

Webinar Agenda
First Webinar on
“Promotion of Light Electric Vehicles”
Tuesday, 17th March 2020

1100 – 1105	Introduction
1105 – 1115	Opening remarks <i>Dr. Shoaib Ahmed (Deputy Director, SAARC Energy Centre)</i>
1115 – 1140	Topic: Light Electric Vehicles – Charging Strategy & Implementation <i>Presenter: Mr. Suddhasatta Kundu (Associate Director – India Smart Grid Forum)</i>
1140 – 1145	Q & A session
1145 – 1210	Topic: 2W and 3W Electric Vehicles Demand Projection in India <i>Presenter: Mr. Hemal Thakkar (Associate Director – Execution, CRISIL Research)</i>
1210 – 1215	Q & A session
1215 – 1240	Topic: Smart Charging for Electric Vehicles: International Experiences <i>Presenter: Ms. Arina Anisie (Associate Programme Officer – RE Innovation, International Renewable Energy Agency)</i>
1240 – 1245	Q & A session
1245 – 1310	Topic: EVs Global Outlook and Policy Framework in Pakistan <i>Presenter: Mr. Gul Hassan Bhutto (Head of Engineering & Operations – Omni Power)</i>
1310 – 1315	Q & A session
1315 – 1320	Conclusions and Recommendations
1320	Closing of Webinar

Information for the participants:

1. All times mentioned in agenda are according to Pakistan Standard Time (PKT). The participants from other Member States may attend Webinar by following their own national time. The time conversion for all Member States is given below for reference:

Country	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Sri Lanka
Local time	(PKT-00:30)	(PKT+01:00)	(PKT+01:00)	(PKT+00:30)	PKT	(PKT+00:45)	(PKT+00:30)

2. The participants can ask questions to presenters by typing questions or clicking to the raised hand option into the Attendees pane of the main window of GotoWebinar software. You may send in your questions at any time during the presentations; we will collect these and address them during the Q&A session at the end of each presentation.

3. All participants can also submit comments/views and/or observations on webinar to SAARC Energy Centre through email to Mr. Muhammad Umar Mukhtar, Research Fellow (ETE) (rfete@saarcenergy.org) by 20th March, 2020.

Webinar Agenda
Second Webinar on
“Promotion of Light Electric Vehicles”
Tuesday, 7th July 2020

1100 – 1105	Introduction
1105 – 1130	Topic: Light Electric Vehicles – Charging Strategy & Implementation <i>Presenter: Mr. Suddhasatta Kundu (Associate Director – India Smart Grid Forum)</i>
1130 – 1135	Q & A session
1135 – 1205	Topic: 2W and 3W Electric Vehicles Demand Projection in India <i>Presenter: Mr. Hemal Thakkar (Associate Director – Execution, CRISIL Research)</i>
1205 – 1215	Q & A session
1215 – 1240	Topic: EV Policy Framework in Pakistan <i>Presenter: Mr. Muhammad Umar Mukhtar (Research Fellow – SEC)</i>
1240 – 1245	Q & A session
1245 – 1250	Conclusions and Recommendations
1250	Closing of Webinar

Information for the participants:

1. All times mentioned in agenda are according to Pakistan Standard Time (PKT). The participants from other Member States may attend Webinar by following their own national time. The time conversion for all Member States is given below for reference:

Country	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Sri Lanka
Local time	(PKT-00:30)	(PKT+01:00)	(PKT+01:00)	(PKT+00:30)	PKT	(PKT+00:45)	(PKT+00:30)

2. The participants can ask questions to presenters by typing questions or clicking to the raised hand option into the Attendees pane of the main window of GotoWebinar software. You may send in your questions at any time during the presentations; we will collect these and address them during the Q&A session at the end of each presentation.

3. All participants can also submit comments/views and/or observations on webinar to SAARC Energy Centre through email to Mr. Muhammad Umar Mukhtar, Research Fellow (ETE) (rfete@saarcenergy.org) by 12th July, 2020.

List of Participants in First Webinar

S. No.	First Name	Last Name	Email address
1.	Roshelle	Pinnock	roshelle_pinnock@yahoo.com
2.	Daniela	Almeida	daniela@psr-inc.com
3.	Maynara	Aredes	maynara@psr-inc.com
4.	Amanda	Fernandes de Oliveira	amanda@psr-inc.com
5.	Saba	Intizar	saba.intizar12@gmail.com
6.	Raluca	Anisie	raluca.anisie@responsability.com
7.	Bogdan	Oprescu	bogdan.oprescu@oxera.com
8.	Ihsan	Marwat	rfee@saarcenergy.org
9.	Junaid	Tariq	junaidt@gmail.com
10.	Noman	Khan	engrnoman33@gmail.com
11.	inam	ullah khan	iukhan48@gmail.com
12.	shoaib	ahmad	ddcoord@saarcenergy.org
13.	Utsav	Pradhan	utsavpradhan4@gmail.com
14.	ARAVINDAKSHAN	RAMANAN	aravindakshan.ramanan@giz.de
15.	Ryan	Carvalho	carvalhor@un.org
16.	Sudhanshu	Mishra	sudhanshu.mishra@giz.de
17.	Umar	Mukhtar	rfete@saarcenergy.org
18.	Athar	Rashid	athar.gs@gmail.com
19.	Aayush	Anand	aayushanandpathak@gmail.com
20.	kashish	shah	kashish.shah@giz.de
21.	Laura Isabel	Gutiérrez	laura.gutierrez@giz.de
22.	Indradip	Mitra	indradip.mitra@giz.de
23.	Hemlal	Bhattarai	b.hemlal@gmail.com
24.	Muhammad Khayyam	Ilyas	khayyam.ilyas@gmail.com
25.	Gayathri	Nair	gayathrinairs@gmail.com
26.	Gayathri	Prakash	gprakash@irena.org
27.	Ahsan	Javed	ahsan@saarcenergy.org
28.	Zubair	Aslam	aslam@smartlab-gmbh.de
29.	Wajeha	Tauqir	wajehatauqir@neeca.gov.pk
30.	Bilal	Hussain	bhussain@irena.org
31.	Shahzad	Qamar	engr.shahzad13@gmail.com
32.	Ashutosh Kumar	Jha	aashutoshjha101@gmail.com
33.	Asad Tariq	Muhammad Tariq	atariqueep18.ces@student.nust.edu.pk

S. No.	First Name	Last Name	Email address
		Bhatti	
34.	Saad	Latif	saad.latif@ke.com.pk
35.	Bimal	Gyawali	bimal.gyawali07@gmail.com
36.	Rameez	Rehman	rameezrehman408@hotmail.com
37.	zeeshan	jamil	chzeeshan046@gmail.com
38.	Waqas	Arshad	swaqas016@outlook.com
39.	Abdul	Wahab	wahab.saarc@gmail.com
40.	Abeer	Tariq	abeer.tariq@wwindea-pk.org
41.	Faheemullah	Shaikh	engrfaheemshaikh@gmail.com
42.	Shariq	Bin Aleem	shariqaleemm@gmail.com
43.	Waseem	Malik	info@energyrating.org.uk
44.	Aysha	Ahmed	ahmed.aysha@gmail.com
45.	Aijaz	Ahmed	aijsiddiqi@yahoo.com
46.	Tasneem	Chowdhrey	tchowdhrey@hotmail.com
47.	Syed faizan	Ali	faizan_alishah@hotmail.com
48.	Syed Zohaib	Ahmed	szahmed@meconsultonline.com
49.	shaukat	qureshi	gmms99@gmail.com
50.	Rehan	Liaqat	rehanliaqat@gcuf.edu.pk
51.	Shweta	Kalia	shweta.kalia@giz.de
52.	TULA	POUDEL	poudeltula123@gmail.com
53.	Nasir	Hayat	nasirhayat@uet.edu.pk
54.	Dr Raza Ul	Munem	munemgrace@gmail.com
55.	Syed Haider	Ali Rizvi	syedhaideralirizvi98@gmail.com
56.	Bilal	Haider	bilal.icet@pu.edu
57.	Ateeq	Rehman	ateeq215@gmail.com
58.	Salman	Manzooe	salmanmanzoor1996@outlook.com
59.	Jaweria	Baloch	b874584@gmail.com
60.	Faraz	Ahmed	farazahmedsoomro12@gmail.com
61.	zahid	shah	zahid.englit@gmail.com
62.	Malik	Arsan	malik.arsan@lums.edu.pk
63.	Salman	Afsar	ctdm@uaf.edu.pk
64.	Dr. Muhammad	Atiq	dratiq1@yahoo.com
65.	Elena	Ocenic	eocenic@irena.org
66.	Sufiana	Khaton	sufianak1@gmail.com

S. No.	First Name	Last Name	Email address
67.	Syed	Daood	sdaood.icet@pu.edu.pk
68.	Saira	Shabbir	saira.shabbir@ue.edu.pk
69.	Faheem	Akhter	faheem.akhtar@iba-suk.edu.pk
70.	Umair	Ali	umair@cecos.edu.pk
71.	Muhammad	Idrees	idreees575@gmail.com
72.	Muhammad Aurangzeb	Alamgir	aurangzebmzai@gmail.com
73.	Tasadaque	Shah	tasadaque.shah@iba-suk.edu.pk
74.	Abubakr	Javed	abubakr.javed@lums.edu.pk
75.	Muhammad	Hafeez	hafeez.tunio@iba-suk.edu.pk
76.	Huzaifa	Rauf	huzaifa.rauf@lums.edu.pk
77.	Muhammad Huzaifa	Qasmi	huzaifaqasmi2011@gmail.com
78.	Naveed	Arshad	naveedarshad@lums.edu.pk
79.	Carlos	Espinosa	franciscoboshell@gmail.com
80.	Muhammad	Rizwan	muhammad.rizwan@kics.edu.pk
81.	Fida	Khan	fida@mail.au.edu.pk
82.	Ahmad Hussain	Safder	ahmad.hussain@kics.edu.pk
83.	Hafiz Muhammad Waqas	Badar	hafizwaqasbadar@gmail.com
84.	Zeeshan	Siddique	eengineeer786@gmail.com
85.	shahzaib	aslam	shahzaib.aslam883@gmail.com
86.	Saadiya	Akhtar	saadiya@uet.edu.pk
87.	MUHAMMAD	JAVED	mtayyebjaved@gmail.com
88.	mirza arfan	yawer	mirza.yawer@ue.edu.pk
89.	Mukhtiar	Ahmed	mukhtiarahmed786@gmail.com
90.	Tassadaq	Hussain	tassaduq.hussain@riphah.edu.pk
91.	Hashim	Khan	hashimkhan0579@gmail.com
92.	Engr.Ahsan	Zafar	msahsanazafar@gmail.com
93.	Dr Ashraf	Iqbal	ashraf_zahidi@yahoo.com
94.	Sayed	Tanweer	tanweer.ahmed@iba-suk.edu.pk
95.	Farhan	Shahzad	farhanshahzad@iba-suk.edu.pk
96.	Iftikhar	Ahmed	iftikhar_ahmed@iba-suk.edu.pk
97.	Javaid	Ahmed	vc@mail.au.edu.pk
98.	Jawad	Sahibzada	jawad092@gmail.com
99.	Tahir Mahmood	Khalid	tahir.mahmood@mail.au.edu.pk

S. No.	First Name	Last Name	Email address
100.	Aamer	Sharif	aamirsharif120@gmail.com
101.	Umer	Farooq	Maill2umer@gmail.com
102.	Syed Hashim Ali	Kazmi	hashimalishah791@gmail.com
103.	saba	Iftkhar	saba.iftkhar@numspak.edu.pk
104.	Hassaan	Maqsood	hassaanmaqsood000@gmail.com
105.	Syed Muhammad	Ali Shah	smalishah@gcuf.edu.pk
106.	Aisha	Mahmood	ash_prof@lumsalumni.pk
107.	Zeashan	Khan	engrzee@gmail.com
108.	Kifayat	Ullah	kifayat@cecos.edu.pk
109.	Afzaal Ahmed	Khan	afzaal.khan@mail.au.edu.pk
110.	Dr. Saima	Batool	saima.batool@niu.edu.pk
111.	Suresh	Kumar	engrkhat79@gmail.com
112.	Milabh	Shrestha	milabh@fncci.org
113.	Mehnaz	Gardezi	cs@saarcenergy.org
114.	faridullah	sharafmal	faridullah.sharafmal87@gmail.com
115.	Bhaskar	Pradhan	plet@saarcenergy.org
116.	Huma	Kamran	soniahuma2005@gmail.com
117.	Tanvir	Ahmad	pltt@saarcenergy.org
118.	Kulbhushan	Kumar	kulbhushan.kumar@pwc.com
119.	Namgay	Namgay	n.namgay950@drukgreen.bt
120.	Kinley	Drukpa	k.drukpa1606@drukgreen.bt
121.	Mohd Rezaul	Hoq	reza.electricity@gmail.com
122.	Shankar Singh	Dhami	dhamishankar37@gmail.com
123.	S M Mohibur	Rahman	mohib9@gmail.com
124.	Ahmad	Talha	rftt@saarcenergy.org
125.	Amin	Kazimi	sayed.amin.kazimi@gmail.com
126.	Bhim	gautam	journalistbhim@gmail.com
127.	Abian	Marasini	marasiniabian10@gmail.com
128.	Engr Majid	Ali	engr.majidali.baig@gmail.com
129.	Nisha	Bhatta	nishabhattera5@gmail.com
130.	Taimur	Zaman	taimurzaman8@gmail.com
131.	Yousuf	Jamal	yousuf.jamal@iese.nust.edu.pk

List of Participants in Second Webinar

S. No.	First Name	Last Name	Email address
1.	Saad	Latif	saad.latif@ke.com.pk
2.	Afzal	Haque	afzal_haque@hotmail.com
3.	Ayaz Ali	Jamali	jamaliayaz039@gmail.com
4.	Muhammad Saad	Ejaz Khan	saadiikhan29@gmail.com
5.	Ahmad	Nadeem	ahmad.nadeem@lums.edu.pk
6.	Paras	Gupta	pargup@um.dk
7.	Mutayab	Khalid	mutayabkhld@gmail.com
8.	Suresh	Shrestha	saudakur@gmail.com
9.	Mohammed Naeem	Qureshi	powergenconf@gmail.com
10.	Yeonju	Jeong	yeonju.jeong@un.org
11.	Ihsan	Marwat	rfee@saarcenergy.org
12.	Chandra	Kumar	uckumar2@gmail.com
13.	Hannan	Akhtar	hannan_akhtar@ffc.com.pk
14.	Malik	Arslan	malik.arslan@lums.edu.pk
15.	Anjum	Ahmad	aahmad2@worldbank.org
16.	Abdul	Wahab	wahab.saarc@gmail.com
17.	Faisal	Abbas	faisalabbas4513@gmail.com
18.	Waleed	Ahmad	w_ahmad10@yahoo.com
19.	Shisher	Shrestha	shisher.shr@gmail.com
20.	Areasha	Irfan	areeshairfan2017@gmail.com
21.	Muhammad Arif	Saeed	arifsaheed05@yahoo.com
22.	Zulfiqar	Ali	zulfiqar32862@gmail.com
23.	sangar	shanthanam	sangar@eng.jfn.ac.lk
24.	Saba	Intizar	saba.intizar12@gmail.com
25.	Qandeel	Rehman	Qandeelrehman@gmail.com
26.	Muhammad Faraz	Qasim	hi2faraz@gmail.com
27.	Dr. Iftikhar	Ahmed	Driahmed@cuilahore.edu.pk
28.	Akhtar	Ali	akhtarali1949@gmail.com
29.	Kamran	khan	kamran.suit123@gmail.com
30.	Muhammad Shuzub	Gull	17030036@lums.edu.pk

S. No.	First Name	Last Name	Email address
31.	Partik	Kumar	pkiitjee@gmail.com
32.	Umar	Aslam	umaraslam66@hotmail.com
33.	Søren	Kannik	sorkan@um.dk
34.	Shawkat	Ali	engrshaukatswati@gmail.com
35.	Fatou	Diabate	fatou.diabate@un.org
36.	Namgay	Tenzin	namyeltenzin@gmail.com
37.	Mitra	Rai	raimitra16@gmail.com
38.	Ahsan	Javed	ahsan@saarcenergy.org
39.	Namgay	Namgay	n.namgay950@drukgreen.bt
40.	Shahid Ali	Khan	shahidalikhan414@gmail.com
41.	Chu Donatus	IWEH	chu.iweh.stu@uenr.edu.gh
42.	Cheku	Dorji	chekudorji.cst@rub.edu.bt
43.	Engr. Umair	Iqbal	umair.iqbal482@gmail.com
44.	Kashif	Tanveer	kashif.tanveer@hunarfoundation.org
45.	Sheraz	Khan	sheraz@dea.com.pk
46.	Mehnaz	Gardezi	cs@saarcenergy.org
47.	Abdul	Razzaq	razzaq.abdul37@gmail.com
48.	Engr Majid	Ali	engr.majidali.baig@gmail.com
49.	Avishek	Neogi	avishek.neogi@crisil.com
50.	Mohiuddin Ahmed	Sarker	ronju.ahmed@gmail.com
51.	Samten	Samten	samtendorji1986@gmail.com
52.	Madiha	Qayyum	engrmadiha15@gmail.com
53.	Sana	Wasi	sana85.wasi@gmail.com
54.	S M Mohibur	Rahman	mohib9@gmail.com
55.	Pratibha	Manandhar	mdrpratibha@gmail.com
56.	Sumit	Kumar	sumit@chitkara.edu.in
57.	Jayesh	Patil	jayesh.patil1@crisil.com
58.	Jane	Akumu	akumu@un.org
59.	Ugyen	Chophel	ugyenchophel@bpc.bt
60.	Khurram	Shabbir	khurram.shabbir@live.com
61.	Mohsin	Hamid	mohsinhamid66@gmail.com

S. No.	First Name	Last Name	Email address
62.	shoaib	ahmad	ddcoord@saarcenergy.org
63.	Muhammad Farooq	Siddique	farooqsiddique.mech@gmail.com
64.	Bhaskar	Pradhan	plet@saarcenergy.org
65.	Shabbier	Alam	shabbir.alam@hunarfoundation.org
66.	Iftikhar	Khan	iftikharjadoon@gmail.com
67.	IHTISHAM	UL HAQ	ihtishamulhaq.eep@uetpeshawar.edu.pk
68.	Bhim	gautam	journalistbhim@gmail.com
69.	Hemlal	Bhattarai	hemlal.jnec@rub.edu.bt
70.	Ahmed Ammar	Yasser	ammar312@gmail.com
71.	Ahmad	Hassan	ahmadhassanuethr@gmail.com
72.	Tula	Poudel	poudeltula123@gmail.com
73.	Shah	Haider	szhaider1234@gmail.com
74.	Naveed	Ahmad	naveed.ahmad@insa-lyon.fr
75.	Roshan	Chhetri	roshanchhetri@yahoo.com
76.	Mohd Rezaul	Hoq	reza.electricity@gmail.com
77.	Khalil	Ur Rehman	Khalil9t6@gmail.com
78.	Milabh	Shrestha	milabhivanovic@gmail.com
79.	Haider	Asfandiyar	haiderasfandi@gmail.com
80.	Dr. Imran Ali	Shah	coaltechnology@gmail.com
81.	Sankara	Narayanan	kongusankar@rediffmail.com
82.	Engr. Ahsan	Zafar	ahsanuethp@hotmail.com
83.	Mrinal	Aggarwal	mrinalanand24@gmail.com
84.	Dr. Muhammad Kashif	Shahzad	cto@pitc.com.pk
85.	Ashutosh	Pathania	ashutosh.pathania@crisil.com
86.	SYED AMMAR	RAZA	ammar.raza@hunarfoundation.org
87.	Manish	Patil	manishpatilus@gmail.com
88.	Mohua	Mukherjee	mohuam@gmail.com
89.	Ram Gopal	Lageju	lageju@gmail.com
90.	Farman	Marwat	acctt.asstt@saarcenergy.org
91.	Prakash	Gyawali	gyawaliprakash01@gmail.com
92.	Muhammad Soban	Shaukt	msobanshaukat@gmail.com

S. No.	First Name	Last Name	Email address
93.	MATOULEIBI DEVI	Chingsubam	chingsubam.matouleibi@gmail.com
94.	Biraj	Khanal	biraj@sunfarmer.org
95.	Ujjwal	datta	ujjwal.datta@live.vu.edu.au
96.	Masood	Amanzai	masood.amanzai@gmail.com
97.	k v kiran	kumar	kv.kumar@unido.org
98.	Inayat	Ullah	inayat.ullah@uetpeshawar.edu.pk
99.	Bilal	Saif	bsaif44@gmail.com
100.	Tanvir	Ahmad	pltt@saarcenergy.org
101.	Abdul	Wahab	saarcec@gmail.com
102.	Ammar	Hassan	coo@saarcenergy.org
103.	Ronaldo	Jaleel	mrronj@hotmail.com
104.	Asad	Mahmood	asadm_46@yahoo.com
105.	Muhammad	Daud	daudjankhan66@gmail.com
106.	Sana	Zakir	szakir593@gmail.com
107.	UMER	FAROOQ	UMERFAROOQTORU@GMAIL.COM
108.	Mohyuddin	Khan	khan49137@gmail.com

List of Presenters/Resource Persons in First Webinar

S. No.	Name	Designation	Organization	Email address
1.	Mr. Suddhasatta Kundu	Senior Manager	India Smart Grid Forum	s.kundu@indiasmartgrid.org
2.	Mr. Hemal N. Thakkar	Associate Director	CRISIL India	hemal.thakkar@crsil.com
3.	Ms. Arina Anisie	Associate Program Officer	IRENA, Germany	aanisie@irena.org
4.	Mr. Gul Hassan Bhutto	Head of Engineering & Ops	Omni Power	eocenic@irena.org

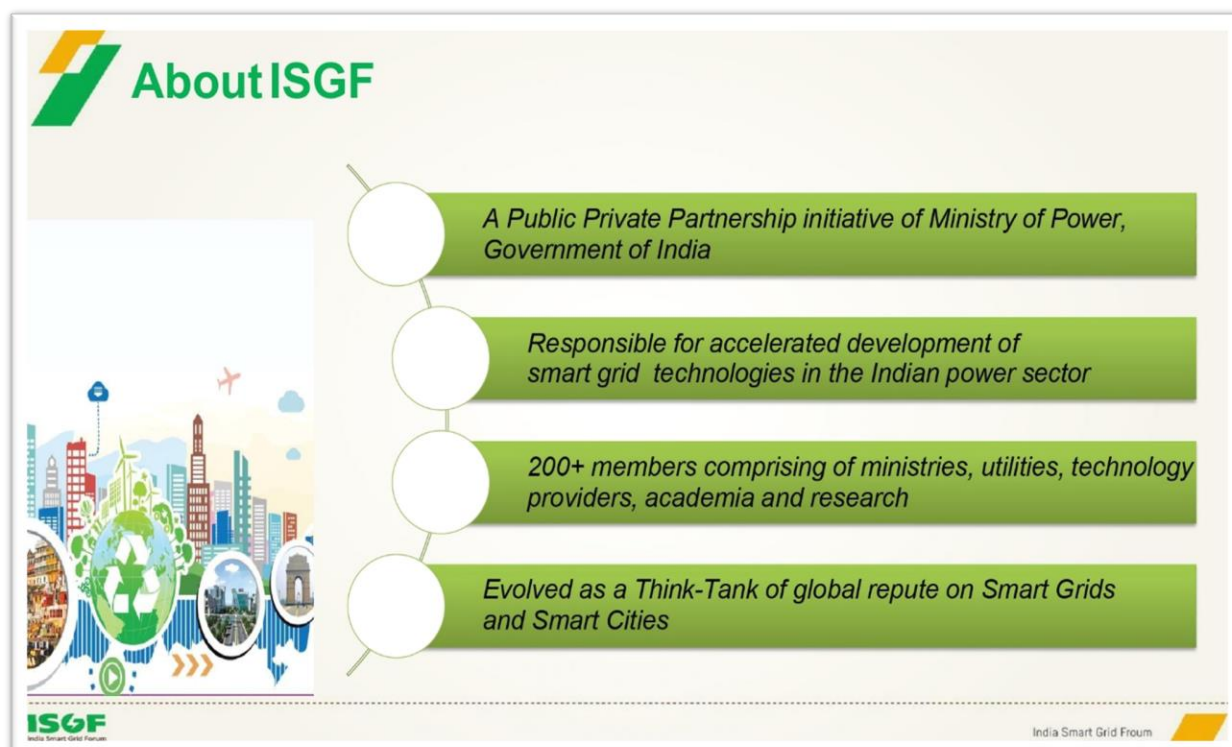
List of Presenters/Resource Persons in Second Webinar

S. No.	Name	Designation	Organization	Email address
1.	Mr. Suddhasatta Kundu	Senior Manager	India Smart Grid Forum	s.kundu@indiasmartgrid.org
2.	Mr. Hemal N. Thakkar	Associate Director	CRISIL India	hemal.thakkar@crsil.com
3.	Mr. Muhammad Umar Mukhtar	RF (ETE)	SAARC Energy Center	rfete@saarcenergy.org

Presentations Delivered During the Webinars

1. “Light Electric Vehicles – Charging Strategy & Implementation” by Mr. Suddhasatta Kundu

Senior Manager (Technical Advisory), India Smart Grid Forum (ISGF).



Key projects – Electromobility

1. Establishment of Charging Infrastructure for Deployment of Electric Buses in Kolkata
2. Planning Electric Vehicle Charging Infrastructure in Bangalore City
3. Study on Infrastructure and Enabling Environment for Road Electric Transport in SAARC Member States
4. Implementation Roadmap for Electrification of Public Transportation in Kolkata
5. Conducting a Feasibility Study on Introducing Electric Vehicles in the Indian Sundarbans
6. Preparation of RFP and Operators Agreement for WBTC for Procurement of Electric Buses
7. Study of Smart Grid and Electric Vehicle Market Scenarios in India
8. Electric Vehicle Charging Stations Business Models for India
9. Study report on Electric Vehicle Policies and Electricity Tariff for EV Charging in India

Which should come first ??

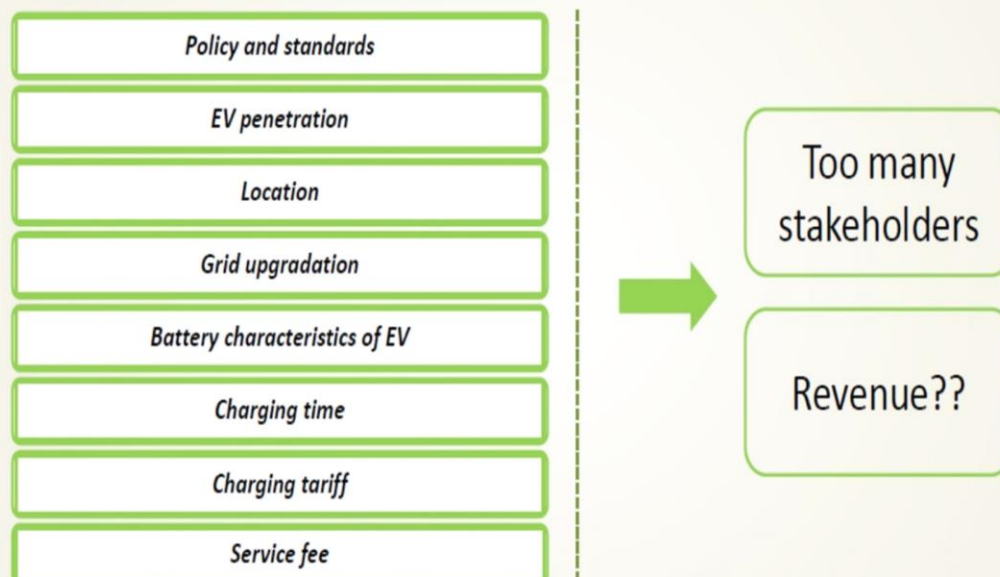


or



Key push factors – Consumer preference, Electrical network, Charging requirement, Charging tariff – Need for public charging station

Charging infrastructure development – Key drivers



Government initiatives

2636 charging stations in 62 cities

14 states have EV policies and more than 13 states have special tariff for EV charging

Charging station at every 100 km on each side of highways

20% parking space for EV charging

Charger Type	S. No.	Charger Connectors*	Rated Output Voltage(V)	No. of No. of Connector guns (CG)	Charging vehicle type (W=wheeler)
Fast	1	Combined Charging System (CCS) (min 50 kW)	200-750 or higher	1 CG	4W
	2	CHArge de MOve (CHAdeMO) (min 50 kW)	200-500 or higher	1 CG	4W
	3	Type-2 AC (min 22 kW)	380- 415	1 CG	4W, 3W, 2W
Slow/ Moderate	4	Bharat DC-001 (15 kW)	48	1 CG	4W, 3W, 2W
	5	Bharat DC-001 (15 kW)	72 or higher	1 CG	4W
	6	Bharat AC-001 (10 kW)	230	3 CG of 3.3 kW each	4W, 3W, 2W



EVSE Planning Tips

Right Location: Choosing the right location to minimize capex (grid upgrades, right of way), convenience of customers, maximizing revenue, minimum land cost, expansion capabilities

Right Sizing: Choosing correct size of EVSE – aligned with the charging needs and battery characteristics of the EVs in region

Planning Studies: Need to conduct detailed modelling studies on the grid to assess the impact of EVSE before granting new connections to Bus Depots and Public Charging Stations (PCS)

Right Business Model: Utility owned charging station, fleet operators, PSUs, bundling with highway cost or toll, provision for ancillary services etc.



Thank You

Suddhasatta Kundu
s.kundu@indiasmartgrid.org
+91-9674446886

2. **“Smart Charging for Electric Vehicles: International Experiences”** by Ms. Arina Anisie
Associate Programme Officer – RE Innovation, IRENA



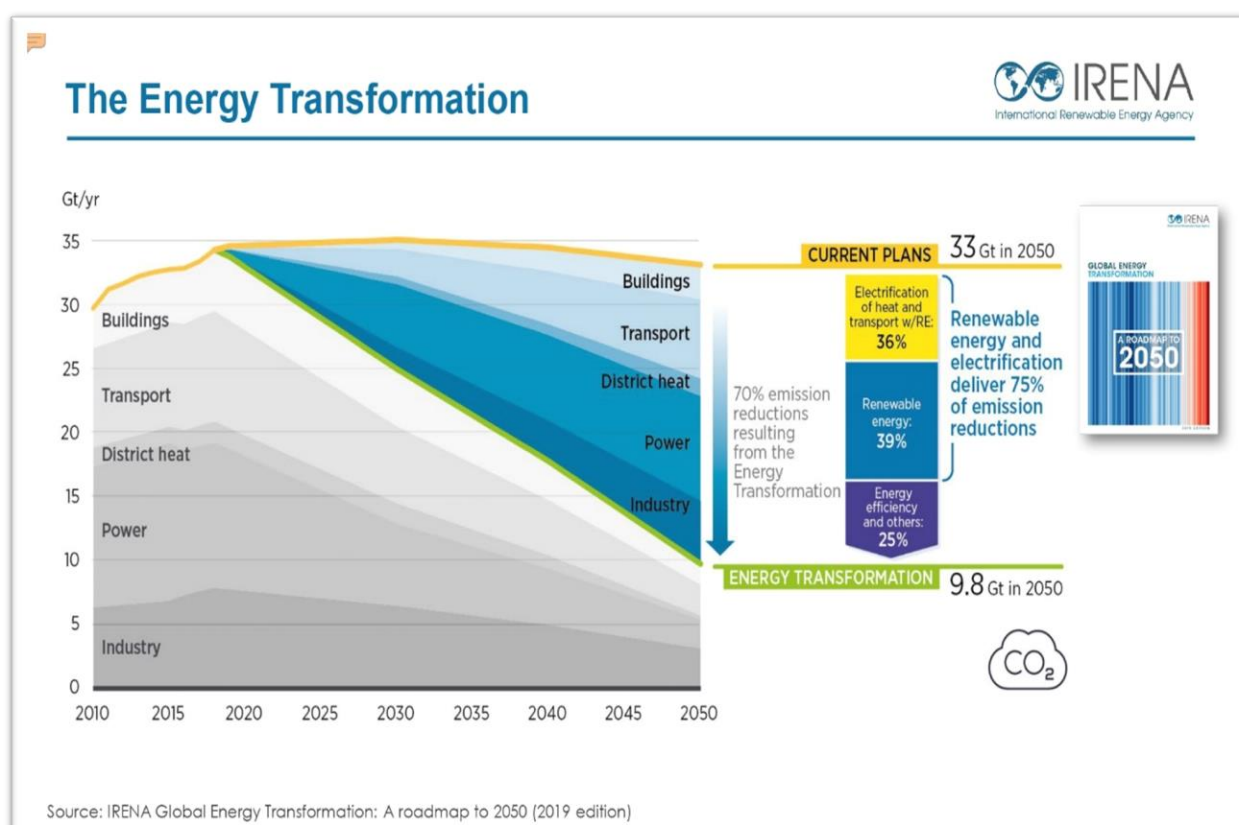


Smart Charging for Electric Vehicles

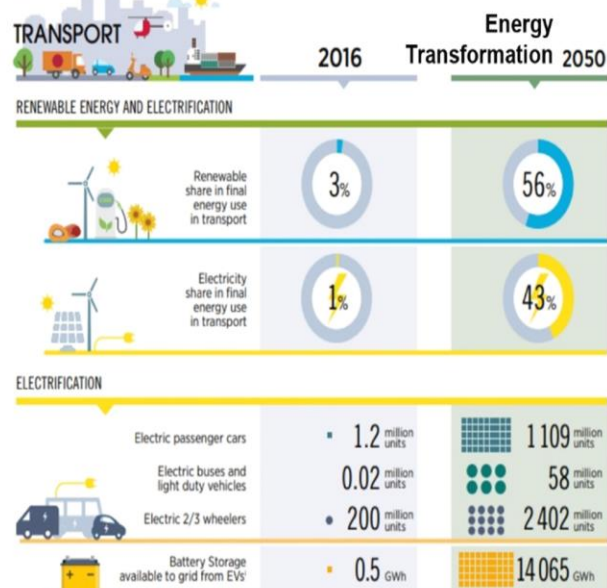
International experience

ARINA ANISIE

Promotion of Light Electric Vehicles in SAARC
17 March 2020



Electrification of the transport sector



Source: IRENA Global Energy Transformation: A roadmap to 2050 (2019 edition)

Source: IRENA's upcoming "Global Renewables Outlook: Energy Transformation 2050"



By 2050, potential storage capacity to provide grid services:

~ 14 TWh EV batteries vs ~ 9 TWh stationary batteries

The Energy Transformation in the Central, Southern and Western Asia

Energy Transformation Benefits

Reduced local air pollution and emissions and improved health

Energy independence and universal access to clean energy sources

Economic and sustainable development



Electrification of Transport Benefits

Reduced air pollution and noise in cities

Reduced dependency on imported oil for transport sector

2 and 3 wheel EV are better suited with the purchase power of people

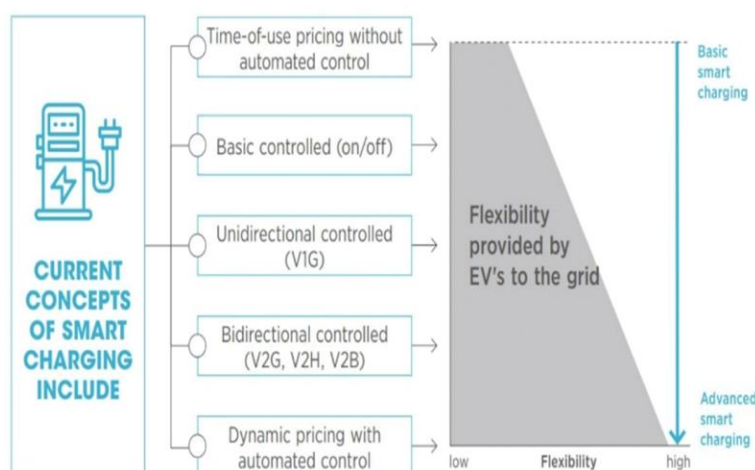
Source: IRENA's upcoming "Global Renewables Outlook: Energy Transformation 2050"

EV Smart charging



Smart charging means adapting the charging cycle of EVs to both the conditions of the power system and the needs of vehicle users.

This facilitates the integration of EVs while meeting mobility needs.

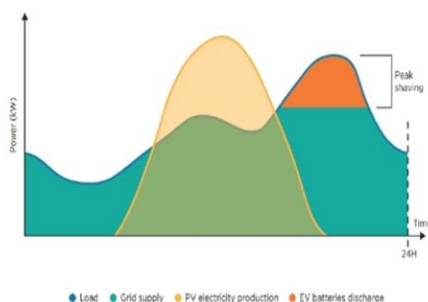


Source: IRENA (2019) Innovation Outlook: Smart charging for Electric Vehicles

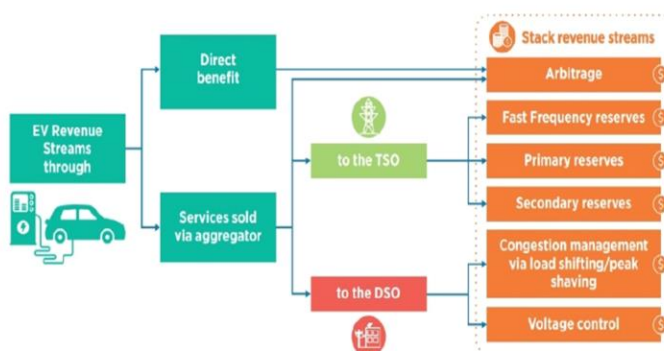
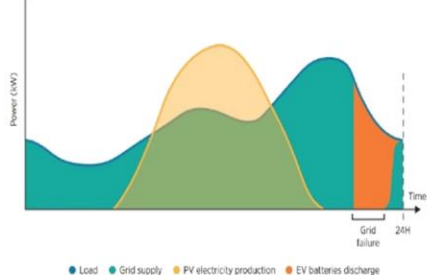
5

Vehicle-to-grid Smart Charging

EV battery used for peak shaving



EV battery used as a back-up for the grid



Market structure and regulation that enables V2G charging

Impact of smart charging on grid infrastructure

Case study: EVs impact on Hamburg's distribution grid

Stromnetz Hamburg assessment: 9% EV share (60.000 EVs) would cause bottlenecks in 15% of the feeders in city's distribution network

90% grid investment savings with smart solution



Option A: Grid reinforcement solution

- Reinforcing ~ 10 000 km of 0.4 kV cable lines, replacing transformers
- Construction works for many months, closing of roads
- Estimated investment: **20 million EUR**



Option B: Smart digital solution

- Decrease the simultaneity. All charging points need to be visible by the DSO
- A real-time communication system enables DSO to reduce charging points loads.
- Estimated Investment: **2 million EUR**

Source: IRENA (2019) Innovation Outlook: Smart charging for Electric Vehicles

Charging infrastructure

How?

- Slow charging - better for smart charging
- Fast and ultra fast charging - priority for mobility sector
- But, Fast charging increasing stress on local grids - Battery swapping, charging stations with buffer storage might be necessary

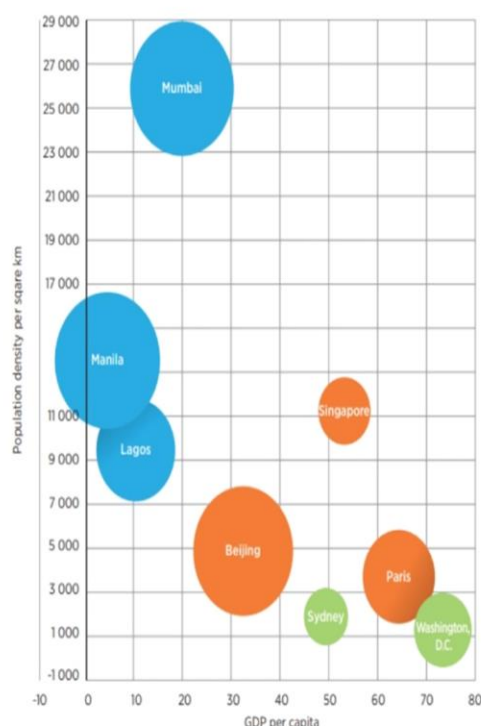
	Electricity demand	Peak demand	Distribution grids
Slow charging, uncontrolled	+	++	++
Slow charging + smart charging	+	+	+
Fast charging	+	++	++
Fast charging with batteries	+	+	+

	Privately owned cars	Shared mobility	Public transport	Two-wheelers	Prevailing type of charging
Low-income, dense metropolitan areas			++	++	Public charging, hubs for buses
High-income suburban sprawl	++	+	+		Home charging
High-income, dense metropolitan areas	+	++			Charging hubs, more fast charging

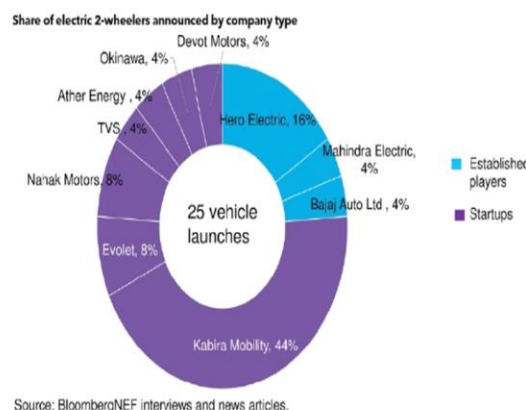
Where?

- Location of slow charging points - at home/workplace to be considered at planning

Transport patterns in cities determines EV infrastructure development



Two-wheelers dominate India's electric vehicle market



Public charging
for 2/3 wheelers,
Hubs for buses,

Charging Hubs, fast
charging private cars –
shared mobility

Home charging,
private cars

9

Innovative charging stations business models

India gov has approved a program for establishing 2 636 charging stations for EVs throughout the country - 62 cities

Kiara Charzer Start-up in India:

- station costs just Rs 10,000 (USD \$ 135)
- owners will set their own prices through the app and receive 100% of the revenue from their charging stations
- Up to 2h charging time for scooters
- Solar connection is planned
- 470 charging stations ordered in the pilot stage



Source: pv magazine India(2020) and <http://charzer.com/>

10

Battery swapping

Battery-swapping stations already exist for buses (mostly in China and South Korea) and two-wheelers

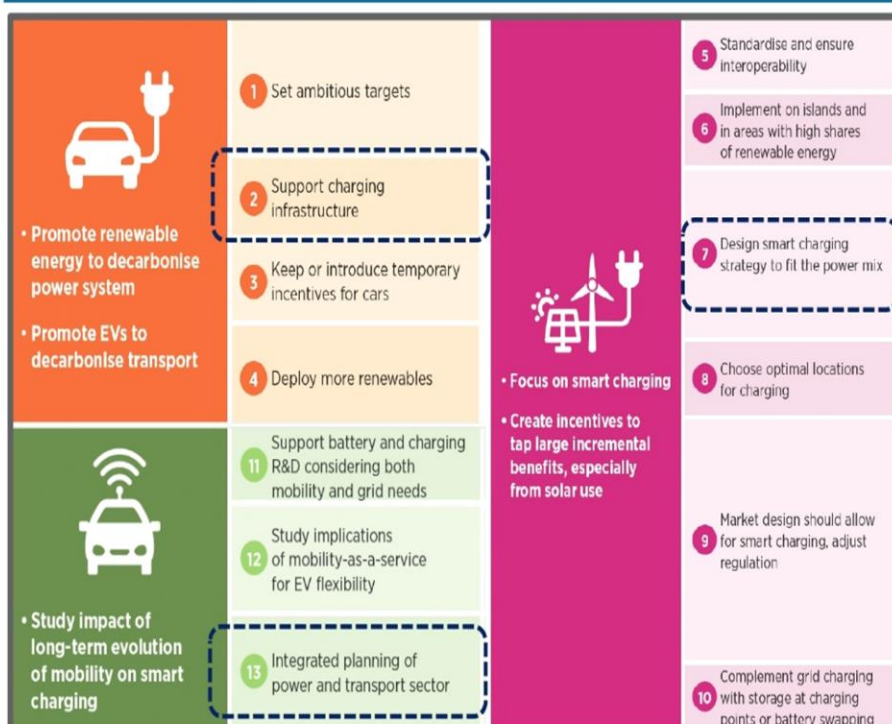
Advantages	Drawbacks
- Very fast refuelling time, whatever the battery size (typically 5-10 minutes) - Batteries stored in the swap hubs can be used to balance the grid	- No standardised batteries: heavy logistics for cars - Battery swap network must be deployed at once: high capital expenditure - Cars still need conductive charging "just in case": more complexity, more parts

In Taiwan, Gogoro Smartscooter's Swapping stations GoStations run on solar power



11

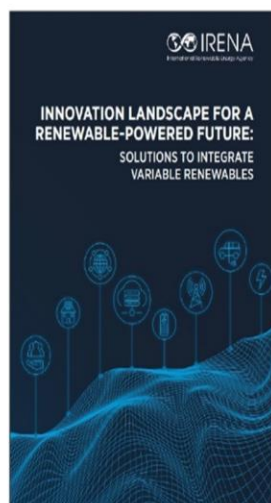
Guidelines for policy makers



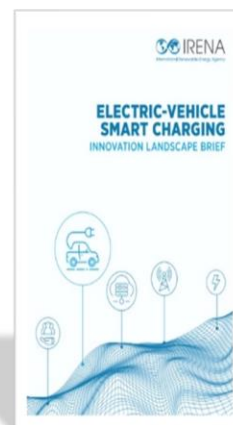
Further reading



IRENA (2019), Innovation Outlook smart charging for Electric Vehicles: [Link](#)



IRENA (2019), Innovation Landscape for a renewable-powered future: *Solutions to integrate variable renewables*: [Link](#)



IRENA (2019), Innovation Landscape Brief: Electric-Vehicle Smart Charging: [Link](#)

New webinar series



#IRENAinsights

Tuesday, 17 March 2020, 10:00–10:30 CET

**Innovations for 100% renewable power:
a systemic approach**

Registration:

<https://www.irena.org/renewables/Knowledge-Gateway/webinars/2020/Jan/IRENA-insights>

Save-the-date



IRENA INNOVATION WEEK 2020

**8-10 September 2020
Bonn, Germany**

<https://www.irena.org/events/2020/Sep/IRENA-Innovation-Week-2020>

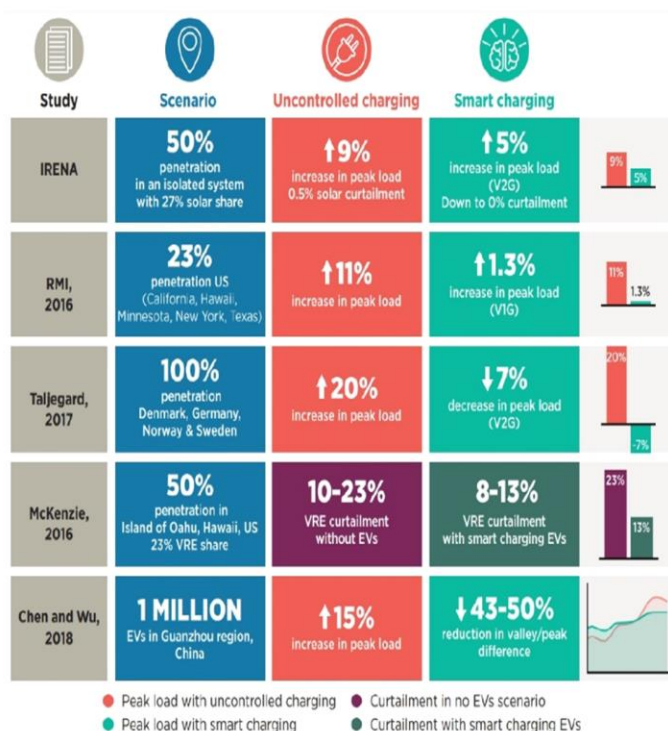
15



**Thank you for your
attention!**

Aanisie@irena.org
www.irena.org

Impact of smart charging and next steps



KEY ENABLING FACTORS

- Charging infrastructure development and deployment
- ICT control and communication protocols
- Define roles and responsibilities of stakeholders
- Design regulation for vehicle-grid integration
- Big data and artificial intelligence for smart charging

Policies driven by air-pollution and friendly-transport for citizens. GHG mitigation is becoming a more prominent issue

Government / City level targets

California aims to reach **5 million zero-emission vehicles by 2030**



UK set an ambition for at least **50% - and as many as 70%** - of new car sales to be **ultra-low emissions by 2030**, alongside up to 40% new vans.



China sets target of **25%** of new car sold by **2025** to be electrified



The city of **Amsterdam** aims to **ban** all petrol and diesel vehicles from town by **2030**



Examples of incentives for EV Chargers



In **Amsterdam**, there are 912 public charging stations.. EV owners can request **free installation** of public **charging point**. Total will install and operate up to 20,000 new public charging points in the Netherlands



UK government provides **grant schemes** to local-authorities, **private or residential customers** to cover part of the **cost** associated to the **installation of EV Smart Chargers**



India will spend **\$1.4 billion** to **subsidize sales of electric and hybrid vehicles** as part of efforts to curb pollution and reduce dependency on fossil fuels.



In the state of **California**, **~15 programs** implemented by utilities or municipalities **incentivise the installation of charging stations**.



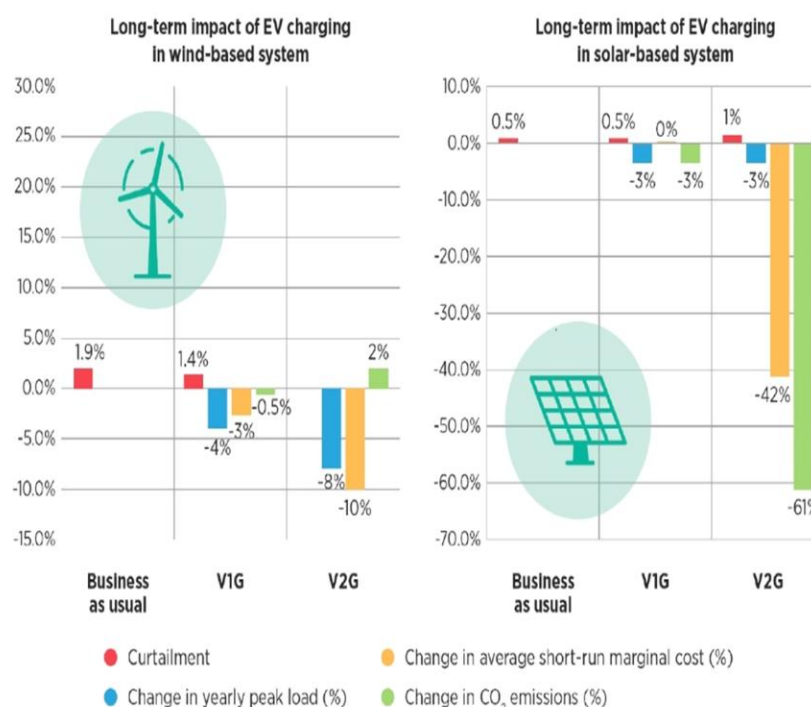
*Status in mid 2018

Source: IRENA (2019) Innovation Outlook: Smart charging for Electric Vehicles

Impact of smart charging on solar PV and wind integration



- Smart charging cuts peak load, reduces curtailment and allows higher shares of low-cost PV electricity.
- This can help to displace more expensive generation and lower electricity prices.
- Higher impact on PV than wind due to generation profiles



Source: IRENA (2019) Innovation Outlook: Smart charging for Electric Vehicles

Possible evolution of EV flexibility by 2030 and 2050



	Today	2030	2050
	Low penetration	High penetration	High penetration
	Small batteries (30-60kWh) → Low driving range (150-300km)	Large batteries (90-200kWh) → High driving range (600-1000km) (?)	Large batteries (90-200kWh) → High driving range (600-1000km)
	Standing still 90% of time	Still high parking time	Reduced parking time
	Home & office charging	Still mostly home & office charging	Hubs in city suburbs (mostly night)
	Smart charging in testing phase Only ToU more common	Smart charging implemented, market-dependent potential	Smart charging implemented, market-dependent potential

Legend:
● Positive for EV flexibility
● Negative for EV flexibility
● Less positive impact than in 2030

3. **“EVs Global Outlook and Policy Framework in Pakistan” by Mr. Gul Hassan Bhutto**
Head of Engineering and Operations, Omni Power, Pakistan

EVs Global Outlook and Policy Framework in Pakistan

Promotion of Electrical Vehicles in SAARC

Gul Hassan Bhutto

(Energy practitioner, speaker, analyst and technical writer)

17th March 2020

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?*'

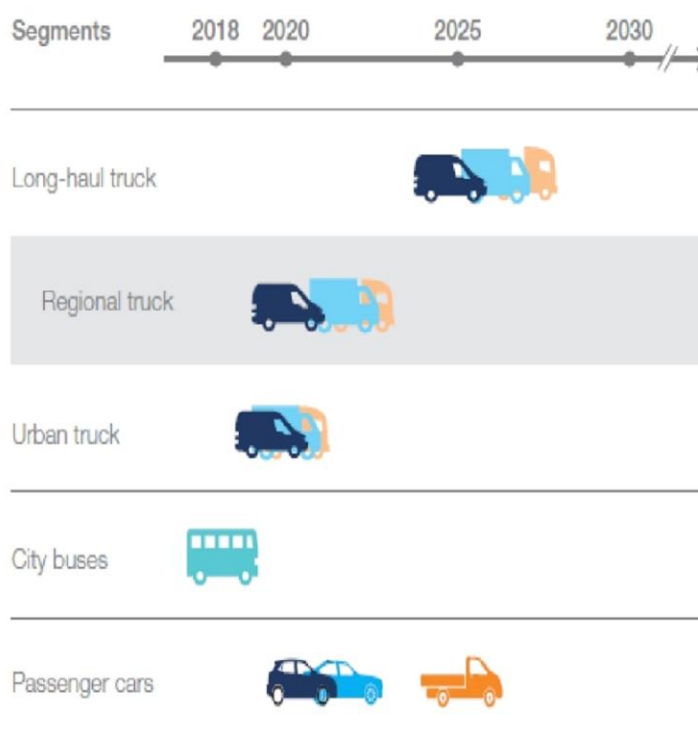
Modern EVs

- 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**

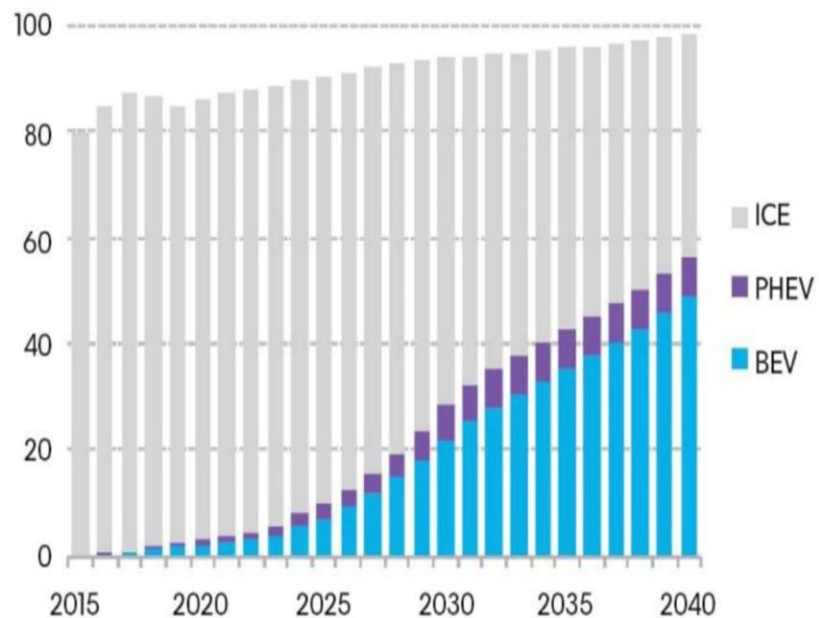
Timing of cost-parity of electric vehicles with fuel vehicles, based on TCO in the EU



Source: McKinsey Energy Insights

Global long-term passenger vehicle sales by drivetrain

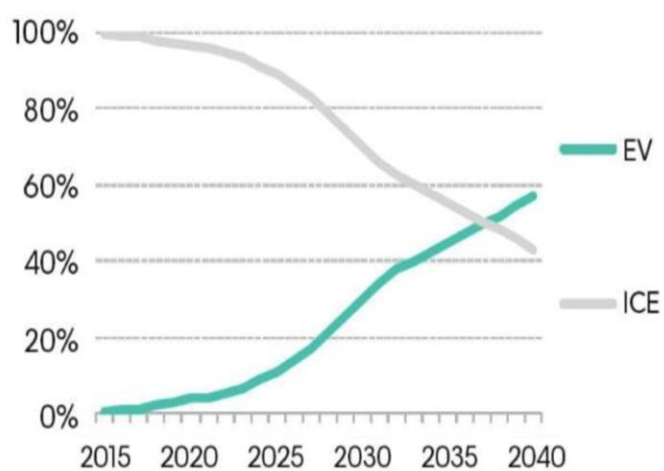
Million vehicles



Source: BloombergNEF

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

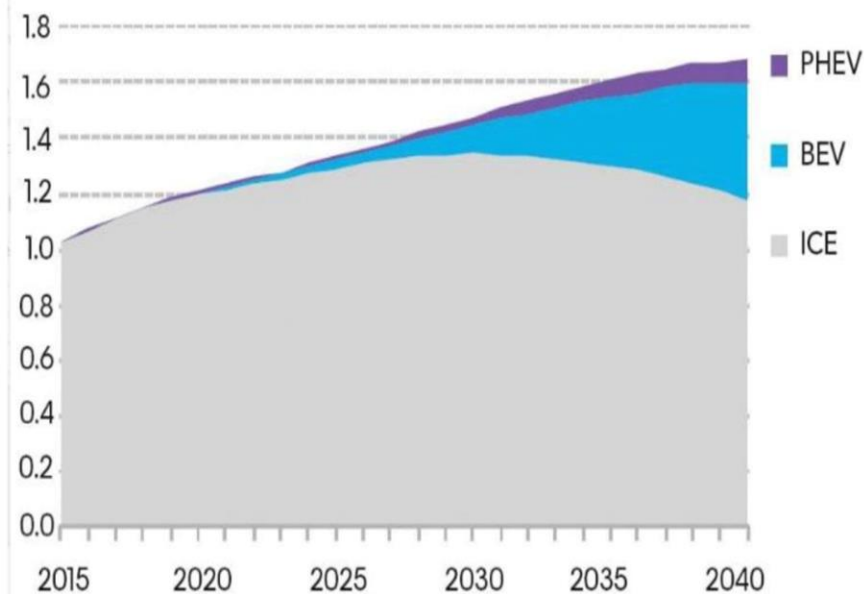
Share of annual sales



Source: BloombergNEF

Global long-term passenger vehicle fleet by drivetrain

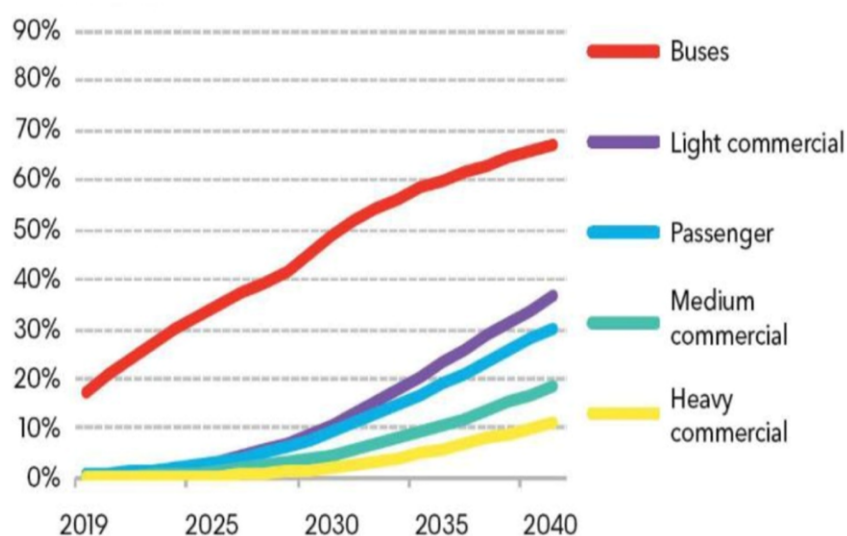
Billion vehicles



Source: BloombergNEF

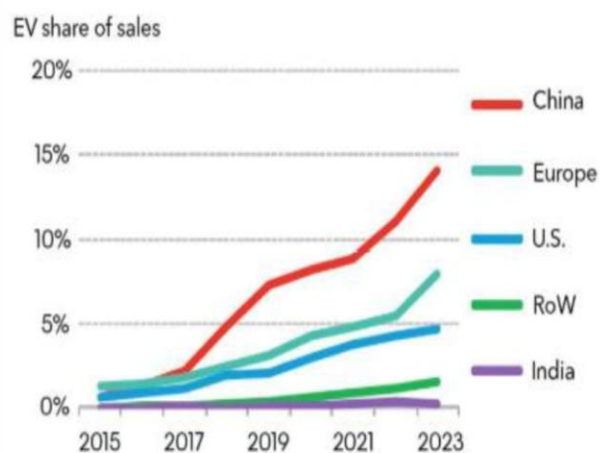
EV share of global vehicle fleet by segment

Share of fleet



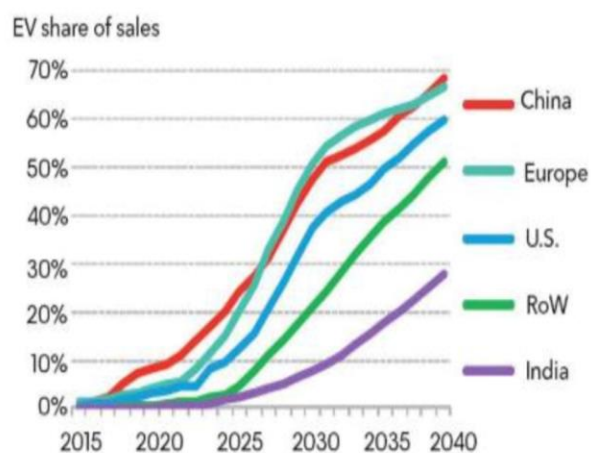
Source: BloombergNEF. Note: Commercial vehicle adoption figures include the main markets of China, Europe, and the U.S.

Global short-term passenger EV adoption by region



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

Global long-term passenger EV adoption by region



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	Till 2030	Till 2040
	100,000	30% of New Sales	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**

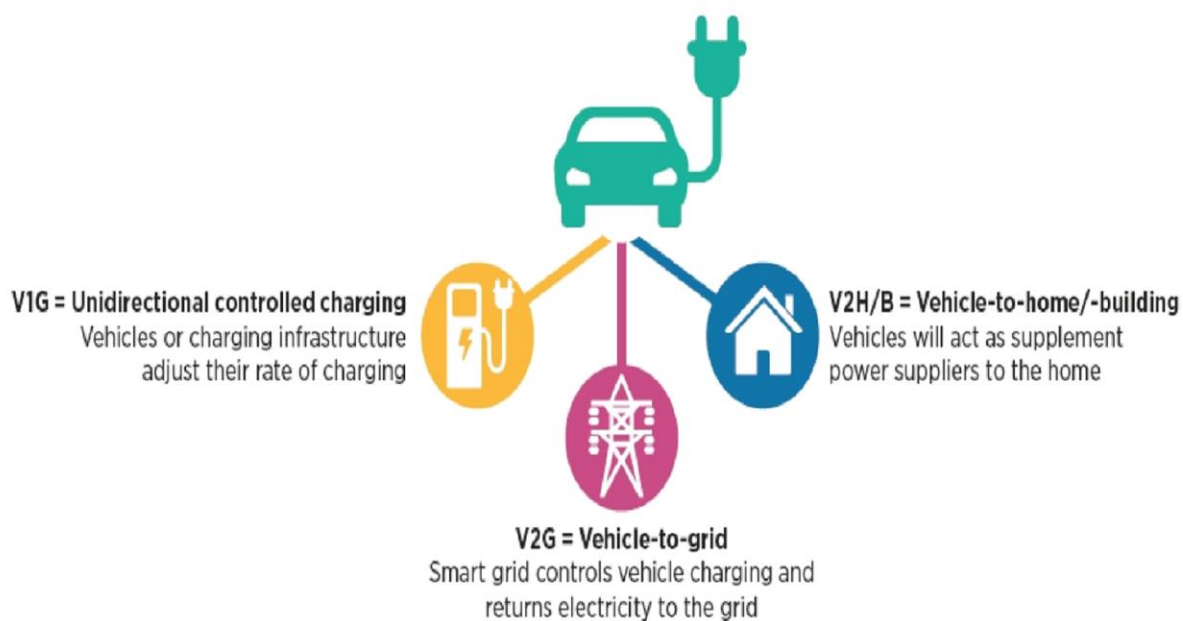
Grid boon or bane?

- 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



Source: IRENA

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)

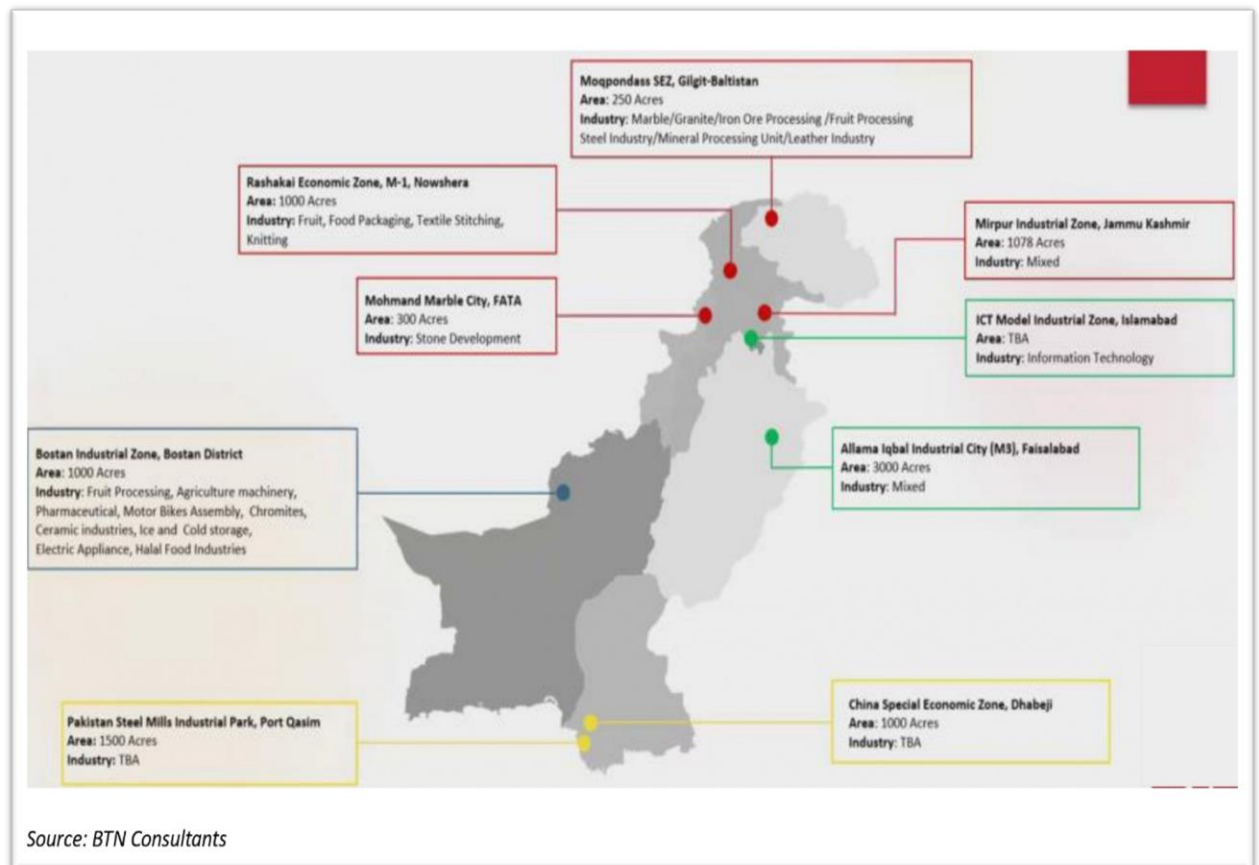
Other EV Challenges for Grid!

- 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 !

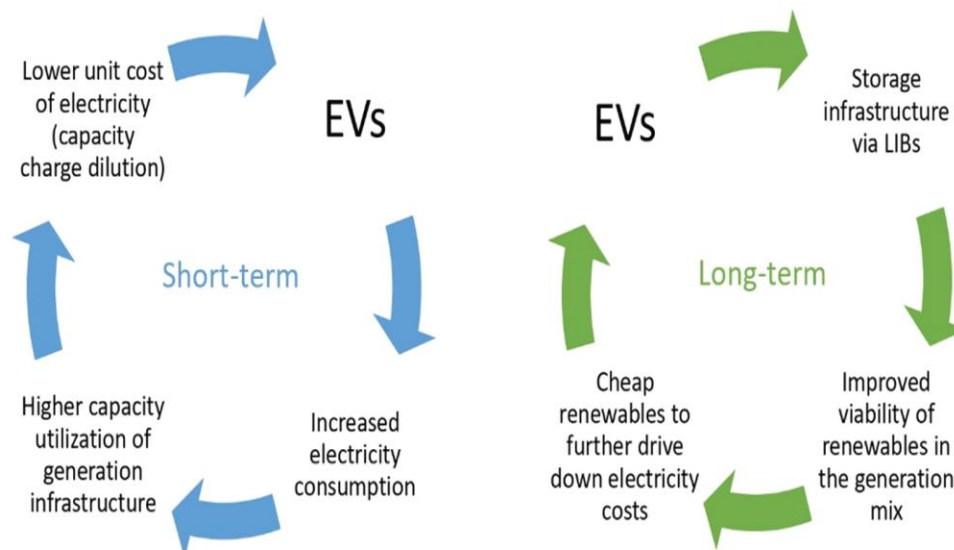
Leveraging CPEC



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

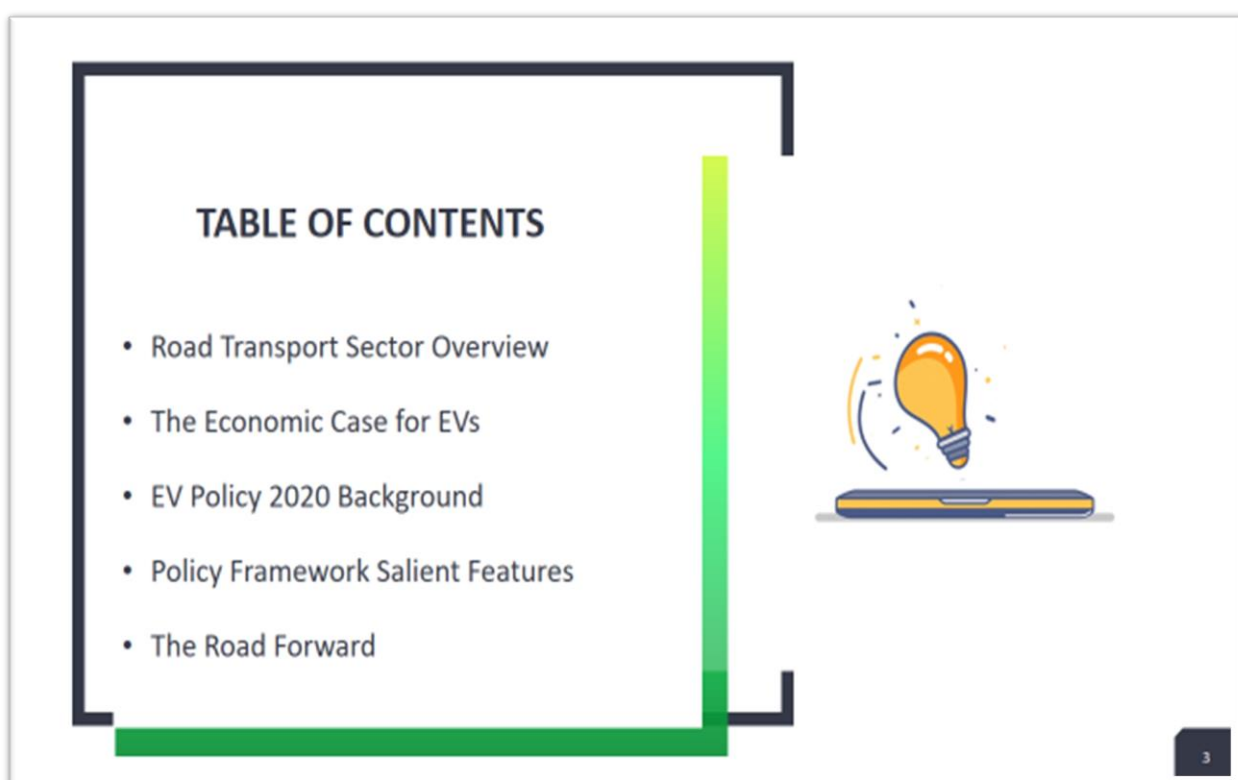
Gul Hassan Bhutto

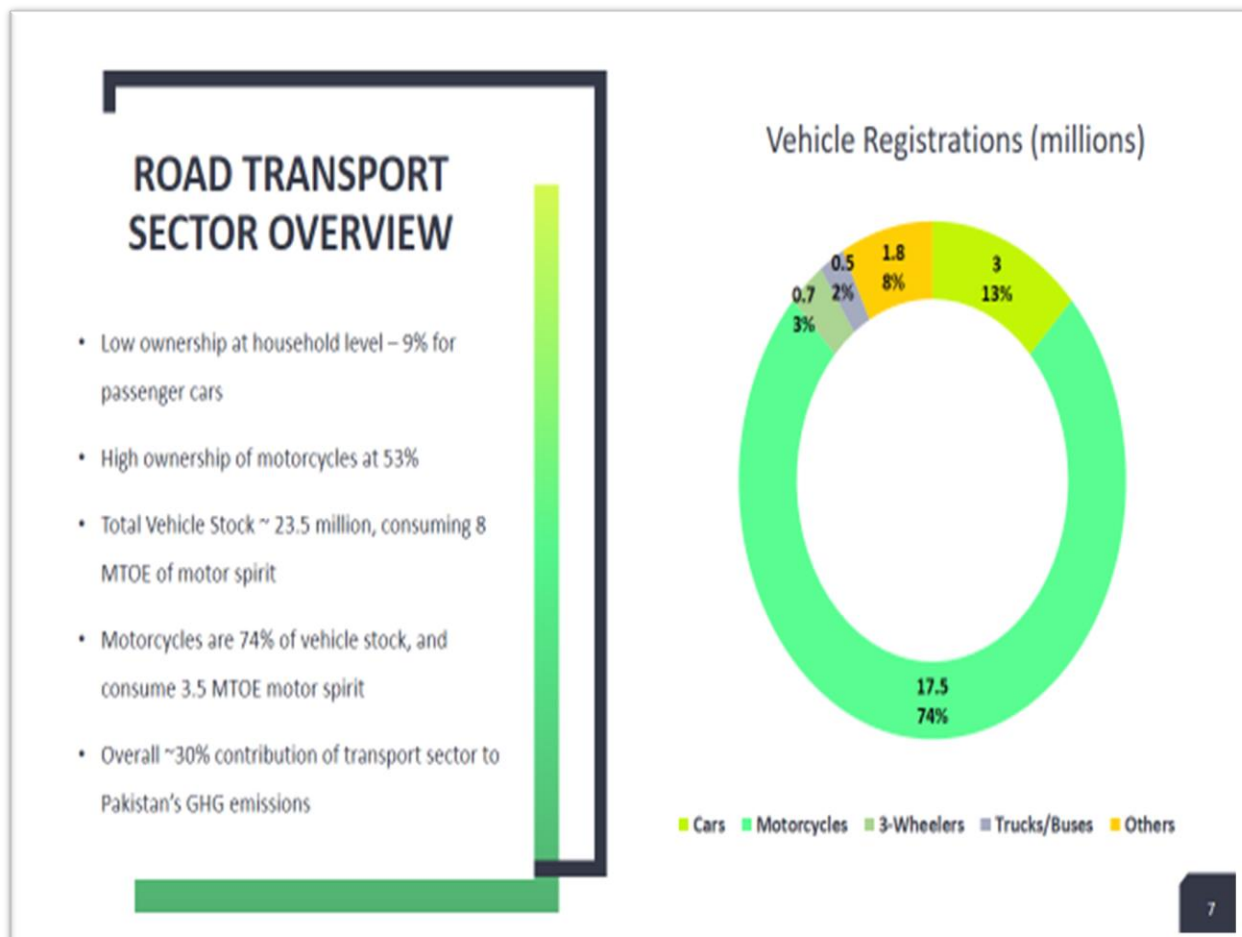
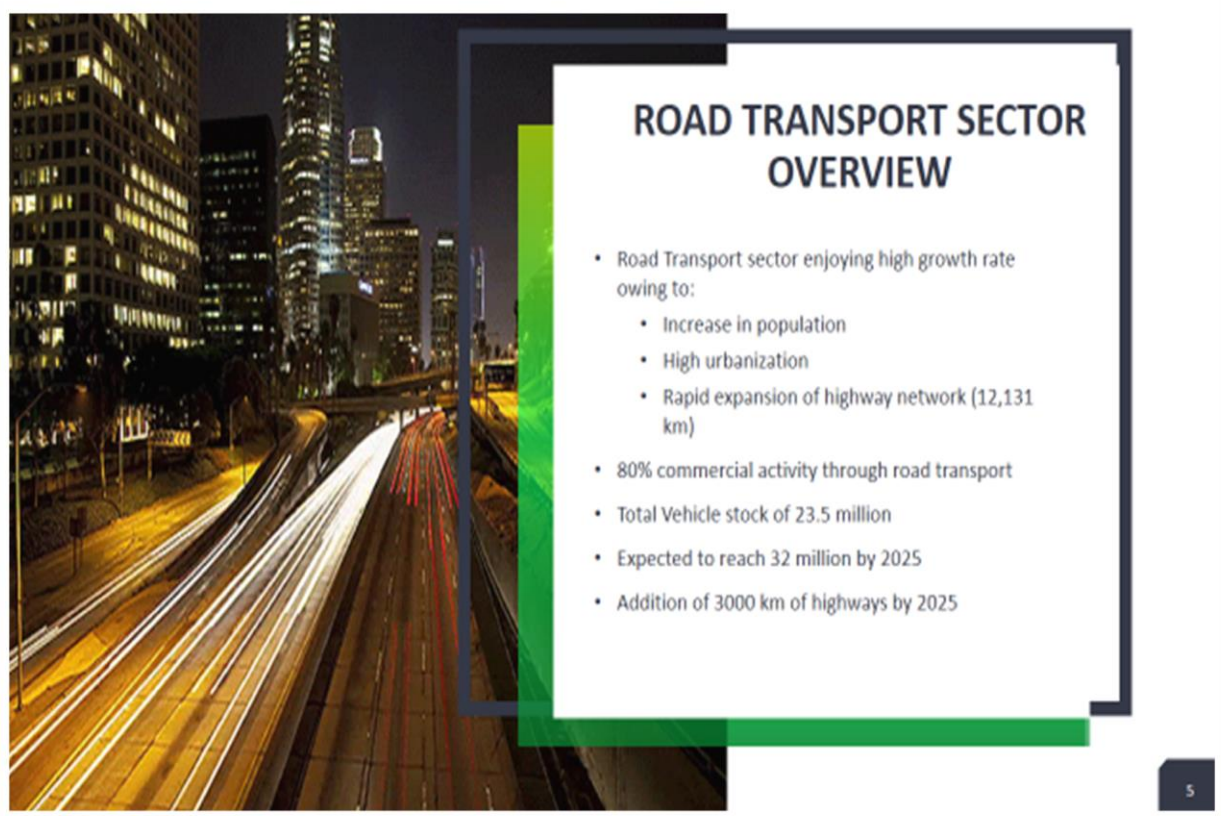
bhutto.gulhassan@gmail.com

+92 300 3214517

4. “EV Policy Framework in Pakistan” by Mr. Muhammad Umar Mukhtar

Research Fellow (Energy, Transport & Environment), SAARC Energy Centre, Islamabad.





THE ECONOMIC CASE FOR EVS



- High socioeconomic cost of the road transport sector
- Hefty import bill for oil import
- Strain on foreign exchange reserves
- Electric Vehicles will lessen the dependency on imported oil
- High cost of purchase but extremely cheap running cost and minimal maintenance, leading to savings over lifetime
- From purely economic point of view, EV passenger cars are not viable as of now, but 2W and 3W (motorcycles and rickshaws) are

9

THE ECONOMIC CASE FOR EVS

- A case of replacement of 30% motorcycles in Pakistan with e-bikes of high quality e.g. Okinawa I-Prize
- Total foreign exchange savings of \$580 million per year in terms of fuel import
- With 107,000 GWh annual power production, additional requirement is only 2%
- Linear Relationship between number of bikes converted to EV and Forex savings to the govt
- For just 100k bikes conversion to EV, fuel import savings to the govt will be \$11 million

Number of Bikes

5.25 million

Petrol cost to the Government

\$640 million

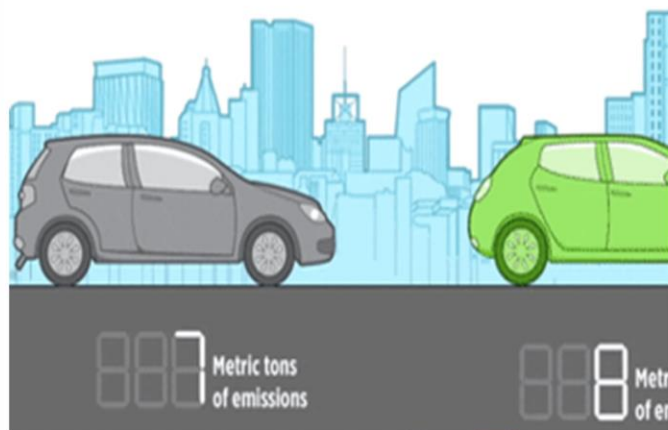
Additional Power Generation Needed
2112 GWh

Additional Generation Fuel Cost
\$60 million

Total Fuel Import Savings Per Year
\$580 million

11

EV POLICY 2020 BACKGROUND



- MoCC made a presentation to the PM in May 2019 for introduction of EVs
- By Nov 2019, a policy framework was presented by the MoCC covering 2W, 3W, 4W and heavy vehicles.
- However, MoIP, EDB and AIDC opposed covering 4W passenger vehicles under the policy till the time the current Auto Policy is active (2021)
- Govt formed an inter-ministerial committee in Apr'20 to finalize the policy framework before submission to ECC
- The ECC of the Cabinet approved the EV Policy in June 2020. It covers 2W, 3W and heavy vehicles only.

13

SALIENT FEATURES OF THE POLICY

Electric 2-3 Wheelers

- No GST at import stage and only 1% GST at sales stage for 5 years
- Import of EV specific parts at 1% duty
- Exemption from registration and annual token tax. 50% reduction in toll taxes
- Import of CBU vehicles allowed at 50% less duty if manufacturing facilities are established



Electric HCVs

- No GST at import stage and only 1% GST at sales stage for 5 years
- Exemption from registration and annual token tax. 50% reduction in toll taxes
- 1% custom duty on import of CBUs
- 1% customs duty on import of CKD

15

SALIENT FEATURES OF THE POLICY

Both 2-3 Wheelers and HCVs

- Duty & tax free import of plant and machinery
- 5 year income tax exemption to manufacturers for setting up EV equipment manufacturing facility
- Localization of parts to be reviewed 2 years after policy announcement
- Input materials for EV vendors exempted from duties
- 5 year income tax exemption for manufacturers of EV equipment and infrastructure development
- SBP funding facility to be made available
- Import of charging stations at zero duty, while import of chargers with CKD kits on 1% CD and GST



THE WAY FORWARD

- As the capital cost of 2-3 Wheelers is still high, so concessionary green financing facility of SBP through partner banks be made available to the consumers just like in the case of solar PV.
- Govt may invest in PPP mode to introduce EV charging infrastructure, especially cheaper Level 2 chargers within cities to alleviate range anxiety of consumers
- Stringent battery recycling and disposal laws to be formulated from now to avoid environmental degradation

