GGGI Technical Report No. 21

Accelerating Implementation of GGGI Members' Nationally Determined Contributions: A Review of GGGI Members' NDCs for E-Mobility

December 2021

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Seoul 04518, Republic of Korea

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December 2021

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ACKNOWLEDGEMENTS

The authors would like to thank the country staff at GGGI (Anantaa Pandey, Chan Ho Park, Christophe Assicot, Daniel Munoz-Smith, Dereje Senshaw, Gemedo Dalle Tussie, Jose Luis Amaya Loustaunau, Juhern Kim, Karolien Casaer, Katerina Syngellakis, Maricor Muzones, Michelle DeFreese, Miguel Londono, Nishant Bhardwaj, Okechukwu Daniel Ogbonnaya, Stella Seung-Yeon Lee, Sut Samedy, Vikram Basyal) for their input to the country activities in Cambodia, India, Lao PDR, Myanmar, Nepal, Philippines, Sri Lanka, Ethiopia, Jordan, Rwanda, Ecuador, Mexico, and Fiji.

Furthermore, we would like to thank colleagues from the GGGI Publication Committee (Frank Rijsberman, Kyung Nam Shin, Bradley Abbott, Ingvild Solvang, Lasse Ringius, Marcel Silvius, Marian Mraz, Nathalie Andre, and Nera Mariz Puyo) for their valuable review.

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ABBREVIATIONS

AC	Air Conditioning
ADB	Asian Development Bank
AFD	Agence Française de Développement / French Development Agency
AMT	Metropolitan Transit Agency
ANT	National Transit Agency
ATMS	Advanced Traffic Management System
BANOBRAS	National Bank for Public Works and Services
BAU	Business as Usual
BC	Black Carbon
BEB	Battery Electric Bus
BIS	Bus Information System
BIT	Bus Information Terminal
BMS	Bus Management System
BRT	Bus Rapid Transit
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CBD	Central Business District
CCC	Climate Change Commissions
CCTV	Closed-Circuit Television
CDIA	Cities Development Initiative for Asia
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
DILG	Department of Interior and Local Government
DoT	Department of Transport
DoTr	Department of Transportation
DUPT	Department of Urban Public Transport
EBRD	European Bank for Reconstruction and Development
ECLAC	Economic Commission for Latin America and the Caribbean
EIRR	Economic Internal Rate of Return
EPMMOP	Metropolitan Public Company of Mobility and Public Works
EPMMQ	Municipal Public Company of Quito Metro
EPMTPQ	Municipal Public Company of Passenger Transport of Quito
EU	European Union
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
FBoS	Fiji Bureau of Statistics
FDB	Fiji Development Bank
FIRR	Financial Internal Rate of Return
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GGGI	Global Green Growth Institute

GHG	Greenhouse Gas
GIZ	Gesellschaft für Internationale Zusammenarbeit
GoE	Government of Ethiopia
GoI	Government of India
H/W	Hardware
ICCT	International Council on Clean Transportation
ICE	Internal Combustion Engine
ICLEI	Local Governments for Sustainability
IEA	International Energy Agency
IFC	International Finance Corporation
IMPU	Metropolitan Institute of Urban Planning
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
ITS	Intelligent Transportation System
KOICA	Korea International Cooperation Agency
LANDBANK	Land Bank of the Philippines
LCA	Life-Cycle Assessment
LCB	Low Carbon Bus
LCEB	Low Carbon Emission Bus
LCV	Light Commercial Vehicle
LDC	Least Developed Country
LEDS	Low Emission Development Strategy
LGU	Local Government Unit
LNG	Liquified Natural Gas
LRT	Light Rail Transit
LT-LEDS	Long-Emission Low-Emission Development Strategy
MAC	Marginal Abatement Cost
MDB	Multilateral Development Bank
MDMQ	Metropolitan District of Quito
MININFRA	Ministry of Infrastructure
MoE	Ministry of Environment
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MoF	Ministry of Finance
MoFE	Ministry of Forest and Environment
MoNREC	Ministry of Natural Resources and Environmental Conservation
MoPIT	Ministry of Physical Infrastructure and Transport
MP	Masterplan
MPWT	Ministry of Public Works and Transport
N/W	Network
NAMA	Nationally Appropriate Mitigation Actions
NC	Networking & Conceptualization
NCDD-S	National Committee for Sub-National Democratic Development Secretariat
NDC	Nationally Determined Contribution
NMT	Non-motorized Transport
NPV	Net Present Value
O&M	Operations and Maintenance
ODA	Official Development Assistance
OECD	Organisation for Economic Co-Operation and Development
OECS	Organisation of Eastern Caribbean States
OPEX	Operational Expenditure

PA	Policy / Regulatory Advice
PDTRA	Petra Development and Tourism Region Authority
PM	Particulate Matter
PP&E	Property, Plant and Equipment
PPF	Project Preparation Facility
PVR	Peak Vehicle Requirement
RE	Renewable Energy
RTDA	Rwanda Transportation Development Agency
RURA	Rwanda Utilities Regulatory Authority
S/W	Software
SLTB	Sri Lanka Transport Board
SoC	State of Charge
TA	Technical Assistance
TCO	Total Cost of Ownership
TDF	Town Development Fund
ToC	Theory of Change
TTW	Tank-to-Wheel
UNAM	National Autonomous University of Mexico
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework on Climate Change Convention
UNIDO	United Nations Industrial Development Organization
VDS	Vehicle Detection System
VMS	Variable Message Sign
WRI	World Resources Institute
WTT	Well-to-Tank
WTW	Well-to-Wheel
ZEV	Zero-Emissions Vehicle

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EXECUTIVE SUMMARY

Global surface temperature will continue to rise until 2050 under all emissions scenarios considered.[1] Global warming of 1.5 °C and 2°C will be exceeded in the 21st century without deep reductions in carbon dioxide (CO_2) and other greenhouse gas (GHG) emissions in the following decades.[2.] The changes in climate system became more drastic and are directly caused by the global warming. The transport sector is one the largest contributors of GHG emissions due to a growing population and a rapid rate of economic development in recent times resulting in increased reliance on automobiles and other forms of GHG emitting transport.[3] This increase has been accompanied by greater GHG emissions, with the transport sector being accountable for around 24% of direct CO_2 emissions from fuel combustion in 2020, and around 14% of global GHG emissions on average over the last decade.[4]

In 2015, the global community, having understood the further impending risks of climate change if ignored, came together to execute the Paris Agreement. This international treaty addresses climate change by clearly outlining the framework for collective progress moving forward.[5] The Paris Agreement encourages countries to set mitigation ambitions and formulate long-term low GHG emission development strategies which are reflected in each member state's Nationally Determined Contributions (NDCs).[6] Out of the 194 submitted NDCs[7], 140 identify transport as an area requiring prompt action due to its large contribution of GHG emissions[8] with various NDCs providing electric mobility (e-mobility) pledges.

Electromobility is seen as one of the potential solutions to mitigating the GHG emissions of the transport sector. The EV market continues to grow, with reliance on electric vehicles having increased.[9] In 2020, more than 10 million EVs were on the road globally; this figure increased by 43% from 2019, with 3 million new EVs being sold worldwide.[10] According to the report of Bloomberg, it is expected that the sales of EVs will increase to 41 million by 2040, representing 35% of new light-duty vehicle sales. Governments are showing increased support for the use of EVs, with this being one of the common strategies seen in NDCs. In order to give effect to these strategies, governments will be required to cooperate with the EV industry with the goal of increasing the use of electric transport.

This report analyses the NDCs submitted by 44 GGGI members with a particular focus on the strategies set out for mitigating contributions from the transport sector. It presents an in-depth analysis of the targets and measures of transport in the NDCs according to the fact that almost 80% of members included transport sector in their NDCs while 25% submitted specific transport sector mitigation targets. The report also covers GGGI's dedicated support to its members on introducing electric mobility, either through direct support or via institutional partnerships with other international organizations.

The majority of members included their national mitigation targets in various forms except for Guyana, Antigua and Barbuda, Qatar, and Vanuatu. Members without mitigation targets rather framed their NDCs around climate adaptation action plans. Among those who have indicated their mitigation targets for post-2020, 52.3% use BAU targets while 38.6% have absolute targets with various base years. 65.9% of GGGI members included unconditional mitigation targets; 12 members (Australia, Costa Rica, Cote d'Ivoire, Denmark, Hungary, Republic of Korea, Mexico, Norway, Saint Vincent and the Grenadines, Papua

1 IPCC, *Sixth Assessment Report*
2 IPCC, *Sixth Assessment Report*
3 Philander, *Encyclopedia of Global Warming & Climate Change*, 1354.
4 UNEP, *Emissions Gap Report 2020*, 7.
5 Klein et al., *The Paris Agreement on Climate Change Analysis and Commentary*, V.
6 UNFCCC, *The Paris Agreement*.
7 UNFCCC, "NDC Registry".
8 GIZ et al., *Transport in Nationally Determined Contributions (NDCs)*.
9 Skrúcaný et al., "Impact of the Electric Mobility Implementation on the Greenhouse Gases Production in Central European Countries".
10 IEA, *Global EV Outlook 2021.*

New Guinea, UAE, UK) only shared unconditional mitigation targets in their NDCs. Cambodia, Fiji, Dominica, Grenada, Saint Kitts and Nevis, Tonga, Uganda, and Uzbekistan limited their mitigation targets to conditional contributions. Burkina Faso expressed its economy wide mitigation targets using both BAU and absolute targets, using absolute targets for unconditional contribution while BAU for conditional mitigation contribution.

Almost 80% of members mention the transport sector in their NDCs, while only 25% (Angola, Burkina Faso, Costa Rica, Indonesia, Kiribati, Lao PDR, Norway, and Sri Lanka) submitted specific transport sector mitigation targets. The scope of the transport sector in NDCs varies depending on each member's national context, most of the transport sector actions are focused on the road transport while 15.9% with 7 members (Angola, Colombia, Fiji, Papua New Guinea, Paraguay, Sri Lanka, Vanuatu), included maritime action plans as a part of their transport sectoral targets. Fewer members, 11.4% with 5 members (Angola, Colombia, Denmark, Hungary, Papua New Guinea) have included aviation as part of their NDCs and most of them briefly focus on the general approaches to the sector as part of their transport sector climate actions.

The transport sector depends on oil more than any other end-use sector: oil products represent 92% of transport's total final energy consumption.[11] Electrification of the transport sector is one of the key elements in decarbonizing it, however, only 38% of members included relevant targets in their NDCs. Some members, including the UK and Norway, have EV targets as part of a separate comprehensive and elaborated transport sector policy and action plans; however, they did not include specific EV targets in their NDCs. All members with EV targets except for Colombia and Costa Rica included renewable energy targets as part of their NDCs to decarbonize both direct and indirect emissions in the transport sector, the upstream emissions related to electricity generation.

Table 1 Summary of Transport Target and Actions in Members' NDCs

Contents	No.	Member Countries
Sectoral Target	37	Angola*, Australia**, Burkina Faso*, Cambodia*, Colombia, Costa Rica, Cote d'Ivoire, Denmark**, Ecuador, Ethiopia*, Fiji, Hungary, Indonesia, Jordan, Kiribati*, Republic of Korea***, Kyrgyz Rep., Lao PDR*, Mexico***, Mongolia, Norway***, Antigua and Barbuda, Dominica, Grenada, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Papua New Guinea, Paraguay, Rwanda*, Sri Lanka, Thailand, Tonga, UAE, Uganda*, Uzbekistan, Vanuatu*, Vietnam.
Mitigation Target	11	Angola*, Burkina Faso*, Colombia, Costa Rica, Fiji, Indonesia, Kiribati*, Lao PDR*, Norway***, Dominica, Sri Lanka.
Road Transport Actions	31	Angola*, Australia**, Burkina Faso*, Cambodia*, Colombia, Costa Rica, Cote d'Ivoire, Denmark**, Ecuador, Ethiopia*, Fiji, Hungary, Indonesia, Jordan, Kiribati*, Republic of Korea***, Kyrgyz Rep., Lao PDR*, Mexico***, Mongolia, Saint Kitts and Nevis, Papua New Guinea, Paraguay, Qatar, Rwanda*, Sri Lanka, Thailand, UAE, Uzbekistan, Vanuatu*, Vietnam.
Maritime Actions	7	Angola*, Cambodia*, Fiji, Papua New Guinea, Paraguay, Sri Lanka, Vanuatu*.
Aviation Actions	5	Angola*, Cambodia*, Denmark**, Hungary, Papua New Guinea.
EV Target	16	Australia**, Cambodia*, Colombia, Costa Rica, Ethiopia*, Jordan, Republic of Korea***, Lao PDR*, Mexico***, Antigua and Barbuda, Papua New Guinea, Paraguay, Rwanda*, Sri Lanka, Thailand, UAE.
RE Target	37	Angola*, Australia**, Burkina Faso*, Cambodia*, Costa Rica, Cote d'Ivoire, Denmark**, Ethiopia*, Fiji, Guyana, Hungary, Indonesia, Jordan, Kiribati*, Republic of Korea***, Kyrgyz Rep., Lao PDR*, Mongolia, Antigua and Barbuda, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Papua New Guinea, Paraguay, Peru, Qatar, Rwanda*, Sri Lanka, Thailand, Tonga, UAE, Uganda*, Uzbekistan, Vanuatu*, Vietnam.
* LDC Group	** Annex I Group	*** OECD Group

As a facilitating partner for members' transition into electricity-based mobility, GGGI has been actively supporting its members implement e-mobility projects and programs, providing needs assessment & stakeholder engagement, technical assistance, resource mobilization, and knowledge sharing. GGGI has project-oriented structures to engage into, promote and scale up innovative solutions that can support the transition of developing member countries towards low carbon and/or

[11] ITF 2021

non-motorized transport infrastructure. In particular, GGGI has been supporting its members shift to the electricfication of mobility from fossile-fueled transprotation, emphasizing green, healthy and inclusive urban environments. To increase public and private sector capital flows toward the creation of the e-mobility enabling environment in member countries, GGGI has designed its own e-mobility approaches such as linking e-mobility solutions to transport infrastructure projects, applying an e-mobility component to relevnat projects, and establishing innovative financial mechanisms for the private sector, and has intervened in a seismic market shift to electrification of transportation in 15 member countries.

Table 2 GGGI E-Mobility Activities in Members

Regions	Countries	Key Technologies	E-Mobility Approach			Targets in NDCs	
			A type*	B type**	C type***	Transport	EV
ASIA	CAMBODIA	E-scooters, e-buses, ITS, etc.	🔴	🟢	🟢	🟢	🔴
	INDIA	Charging infrastructure	🟢	🔴	🟢	🟢	🟢
	LAO PDR	E-scooters, e-buses, BRT, etc.	🟢	🔴	🟢	🟢	🟢
	MYANMAR	E-buses, ITS, etc.	🟢	🔴	🔴	🟢	🔴
	NEPAL	E-scooters, e-buses, ITS, etc.	🟢	🟢	🔴	🟢	🟢
	PHILIPPINES	E-jeepneys, e-buses, ITS, BRT, etc.	🟢	🔴	🟢	🔴	🔴
	SRI LANKA	E-buses, ITS, etc.	🟢	🔴	🔴	🟢	🟢
AFRICA/ MIDDLE EAST	ETHIOPIA	E-buses, BRT, etc.	🟢	🔴	🔴	🟢	🟢
	JORDAN	E-buses, BRT, ITS, etc.	🟢	🟢	🔴	🟢	🟢
	RWANDA	Charging equiptment, e-buses, ITS, etc.	🟢	🔴	🔴	🟢	🟢
LATIN AMERICA	ECUADOR	E-buses, ITS, etc.	🟢	🔴	🔴	🟢	🔴
	MEXICO	E-buses	🟢	🔴	🔴	🟢	🟢
PACIFIC	FIJI	E-buses, charging equipment, etc.	🟢	🔴	🔴	🟢	🔴

🟢 Applicable to the country 🔴 Not applicable to the country

*A type: Linking e-mobility solutions to transport infrastructure, **B type: Applying an e-mobility component to relevant projects, ***C type: Facilitating the private sector's participation

Based on the activities across the different member countries, it has been identified there is the need for the combination of measures including policy, finance, business model, and capacity building in support of national strategy for promoting and managing an e-mobility transition in a manner that enhances overall welfare by nurturing an integrated, safe, clean and affordable multi-modal transport system. In line with that, this report recommends following measures for the electrification of transportation in GGGI Member countries:

- **(Policy)** It is recommended to establish a combination of fiscal (tax breaks and direct subsidy) and non-fiscal incentives to facilitate the adoption of e-mobility in the early stage. Most of tax exemptions for e-mobility are currently offered in many countries to consumers and the industry at the early stage of the adoption of e-mobility. Direct subsidy to vehicles and electricity tariffs is the most visible type of incentive for the EV purchase credit. Non-fiscal incentives such as special lane access and exemption from driving restrictions and road charges should be properly designed and applied to influence purchase decisions of customers.
- **(Business Model)** It is important to understand the sustainable business models so that relevant stakeholders are able to find a systematic way to unlock long-term value while fostering the shared responsibilities among vehicle manufacturers, charging service providers, and users.
- **(Finance)** It is difficult in developing countries to mobilize financial resources for several reasons including huge upfront costs and failure to match the risk and reward appetite of investors. These financial obstacles can be overcome with helping design innovative financial mechanisms that reduce and possibly mitigate risks and overcome other barriers.
- **(Capability)** Sharing of knowledge lessons and experience through capacity building, institutional relationships and partnerships and knowledge networks will drive learning, understanding, reduce knowledge gaps and ultimately facilitate action on sustainable transport development. It is also recommended to enhance the institutional capacity of responsible stakeholders for properly dealing with the quality of e-mobility services.

CHAPTER 1: INTRODUCTION

1.1. BACKGROUND

Global surface temperature will continue to rise until 2050 under all emissions scenarios considered.[12] Global warming of 1.5 °C and 2°C will be exceeded in the 21st century without deep reductions in carbon dioxide (CO_2) and other greenhouse gas (GHG) emissions in the following decades.[13.] The changes in climate system became more drastic and are directly caused by the global warming. It includes increasing frequency and intensity of hot extremes, marine heatwaves, and heavy precipitation, agricultural and ecological droughts, proportion of intense tropical cyclones, also reductions in the Arctic Sea ice, snow cover and permafrost.[14] The changes in climate has not only been a serious hazard to the nature but also has been described as the greatest threat to the global human health in the 21st century.[15] The adverse effects of climate change have already been observed in different aspects of society and the natural environment. [16]

The transport sector is one the largest contributors of GHG emissions due to a growing population and a rapid rate of economic development in recent times resulting in increased reliance on automobiles and other forms of GHG emitting transport.[17] This increase has been accompanied by greater GHG emissions, with the transport sector being accountable for around 24% of direct CO_2 emissions from fuel combustion in 2020, and around 14% of global GHG emissions on average over the last decade.[18] The International Energy Agency (IEA) expects for GHG emission in the transport sector to increase by 50% by 2060 without prompt and determined mitigation actions. Accordingly, great efforts are required to limit the amount of GHGs emitted by the transport sector. Cooperation from governments is needed to encourage domestic efforts to move away from traditional forms of transport and for the development of technologies and strategies for decarbonizing transport. The transport sector has and continues to undergo a substantial technological change, as the world is moving towards electromobility and zero-emission transport.[19]

In 2015, the global community, having understood the further impending risks of climate change if ignored, came together to execute the Paris Agreement. This international treaty addresses climate change by clearly outlining the framework for collective progress moving forward.[20] The Paris Agreement encourages countries to set mitigation ambitions and formulate long-term low GHG emission development strategies which are reflected in each member state's Nationally Determined Contributions (NDCs).[21] The NDCs include each member's general targets of reducing GHG emissions, with countries also providing strategies based on each separate contributing sector. Several countries have recognized the transport sector as one of the most significant GHG emitters and opted to separately address this area with specific mitigation and adaptation targets.

The overall NDCs are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. Out of the 194 submitted

12 IPCC, *Sixth Assessment Report*
13 IPCC, *Sixth Assessment Report*
14 IPCC, *Sixth Assessment Report*
15 WHO, "WHO calls for urgent action to protect health from climate change – Sign the call".
16 Philander, *Encyclopedia of Global Warming & Climate Change*, 271.
17 Philander, *Encyclopedia of Global Warming & Climate Change*, 1354.
18 UNEP, *Emissions Gap Report 2020*, 7.
19 Global e-Mobility Forum, "Driving Change Together".
20 Klein et al., *The Paris Agreement on Climate Change Analysis and Commentary*, V.
21 UNFCCC, *The Paris Agreement*.

NDCs[22], 140 identify transport as an area requiring prompt action due to its large contribution of GHG emissions[23] with various NDCs providing electric mobility (e-mobility) pledges.

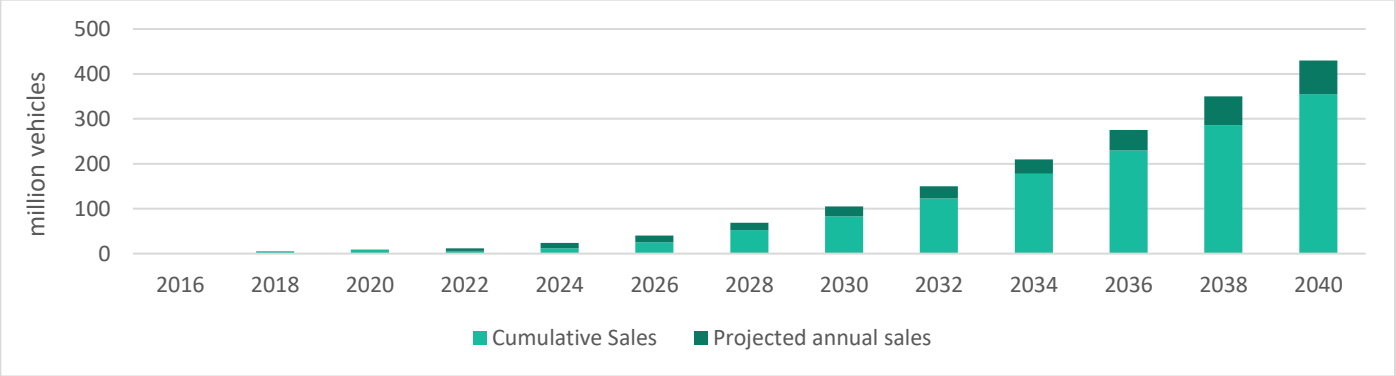
1.2. GLOBAL E-MOBILITY TRENDS

Electromobility is seen as one of the potential solutions to mitigating the GHG emissions of the transport sector, which is one of the leading and most challenging GHG polluters.[24] The EV market continues to grow, with reliance on electric vehicles having increased.[25] In 2020, more than 10 million EVs were on the road globally; this figure increased by 43% from 2019, with 3 million new EVs being sold worldwide.[26] As shown below in figure 1, it is expected that the sales of EVs will increase to 41 million by 2040, representing 35% of new light-duty vehicle sales.[27]

EV manufacturers have stepped up their efforts to supply various models of EVs and have also illustrated strong commitments to phase out combustion engines in their fleets. This shift is illustrated by large manufacturers such as Daimler AG, which has already invested €2.2 billion in PP&E related to EV-tech development in the first half of 2021 and has goals of fully electrifying its fleet by 2039.[28] Other leading automakers are following suit, with Hyundai indicating its goal to phase out of combustion engine vehicles and achieve carbon neutrality by 2045;[29] General Motors by 2040;[30] Honda by 2050;[31] BMW by 2050;[32] and Volvo by 2040.[33] Overall, 18 out of 20 major manufacturers have committed to increase the sale of EVs.[34]

Governments are showing increased support for the use of EVs, with this being one of the common strategies seen in NDCs. In order to give effect to these strategies, governments will be required to cooperate with the EV industry with the goal of increasing the use of electric transport. Such commitments include projects for improvement of public transportation by implementing Bus Rapid Transit (BRT) systems and incentives for consumers to change to EVs.

The electrification of transport has become a megatrend in mobility and is one of the various strategies that aim to reduce the sector's environmental impact. Electrification of vehicles has emerged as a viable technology and has become critical for achieving transport decarbonization.



Source: Bloomberg New Energy Finance

Figure 1 Projected/cumulative sales of EVs

22 UNFCCC, "NDC Registry".
23 GIZ et al., *Transport in Nationally Determined Contributions (NDCs)*.
24 Omahne et al., "Social Aspects of Electric Vehicles Research – Trends and Relations to Sustainable Development Goals", 1.
25 Skrúcaný et al., "Impact of the Electric Mobility Implementation on the Greenhouse Gases Production in Central European Countries".
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27 Randall, "Here's How Electric Cars Will Cause the Next Oil Crisis".
28 Daimler Group, *Q2 2021 Interim Report*, 9.
29 Hyundai, "*The Great Shift: Hyundai and the road to carbon neutrality*".
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31 Honda, *Sustainability Report 2021*, 4.
32 BMW, *BMW Group Report 2020*, 76.
33 Volvo, *Annual and Sustainability Report 2020*, 169.
34 IEA, *Global EV Outlook 2021.*

1.3 PURPOSE & SCOPE

Considering transport is a major emitter of GHGs, it is a key area which requires concentrated efforts to limit GHG emissions through decarbonization of the transport sector. In order for members to realistically achieve not only their NDC targets, but also realizing effective results for decarbonization of the transport sector, quality analysis of projects and their implementation is required with key technical help and policy modelling support.

This report analyses the NDCs submitted by each member with the particular focus on the strategies set out for mitigating contributions from the transport sector. With this insight into each countries' goals, expectations, and ambitions, GGGI is in the position to provide support members to reach their goals and provide strategic assistance to raise ambitions and setting stronger targets for decarbonization of the transport sector.

The overall objective of this report is to inform the Members on the opportunity of achieving their NDCs and greening the domestic transport sector through facilitating the adoption of electric mobility. The intent is to provide a clear understanding of the full range of the role of transport in the NDC achievement and implementation that have been undertaken in rapidly motorizing member countries.

The report presents the significance of transport transition as climate action with details on how the members are improving their climate pledges with enhanced NDCs through sustainable transport and electric mobility. It presents an in-depth analysis of the targets and measures of transport in the NDCs according to the fact that almost 80% of members included transport sector in their NDCs while 25% submitted specific transport sector mitigation targets. The report also covers GGGI's dedicated support to its members on introducing electric mobility, either through direct support or via institutional partnerships with other international organizations.

This report will be used to support its members develop and implement NDCs that reflect the cost-effective electromobility potential of each member. The report includes an executive summary and five chapters. The executive summary consolidates the key findings of the individual chapters. Description of the five chapters of the report is provided below:

- Chapter 1, Introduction, providing the background of the study, purpose of the report, the objective and scope of the study and the organization of the report.
- Chapter 2, the transport sector in members NDCs, introducing overview of members NDCs including transport targets and EVs deployment targets.
- Chapter 3, GGGI members' NDC profiles, presenting 45 Members' NDC summaries including general contributions, transport sector mitigation target, renewable energy target and total national GHG emissions.
- Chapter 4, GGGI e-Mobility profile, introducing GGGI's e-Mobility strategy, development process and theory of change with the cases of Ethiopia and Cambodia.
- Chapter 5, Conclusion and recommendations, summarizing assessment activities and encouraging members to consider the adoption of electric mobility as one of their long-term decarbonization strategies.

2.1 OVERVIEW OF MEMBERS' NDCs

The Paris Agreement requests each country to communicate their post-2020 climate actions through NDCs every five years starting from 2020. Following the request, all of 39 GGGI members[35] have responded, almost 70% of member countries have submitted or updated their first NDC between 2020 and 2021, while others communicated their first NDC between 2016 to 2019, right after the COP21. Each country may have its own respective timeframe for post-2020 climate action plans, most GGGI members have indicated their NDC timeframe to be 2021–2030. Whereas, Angola, Ecuador, Guyana, Saint Lucia and Saint Vincent and the Grenadines have set a 2025 timeframe. Some members included longer timeframes, with Kyrgyz Republic communicating a 2050-timeframe, while Dominica and Paraguay included pre-2020, 2016-2030 and 2014-2030, timeframe in their first NDC.

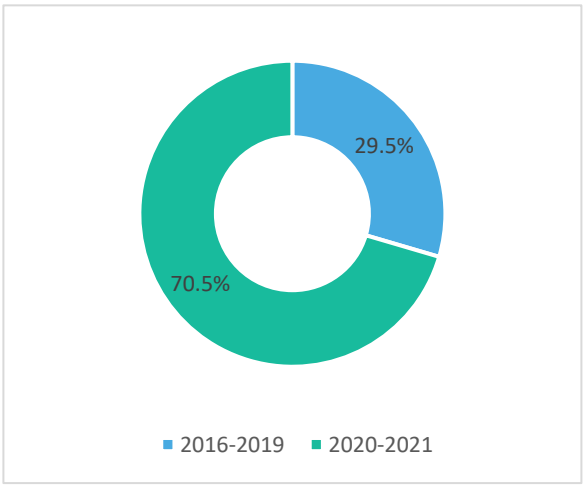


Figure 2 NDC submission by period

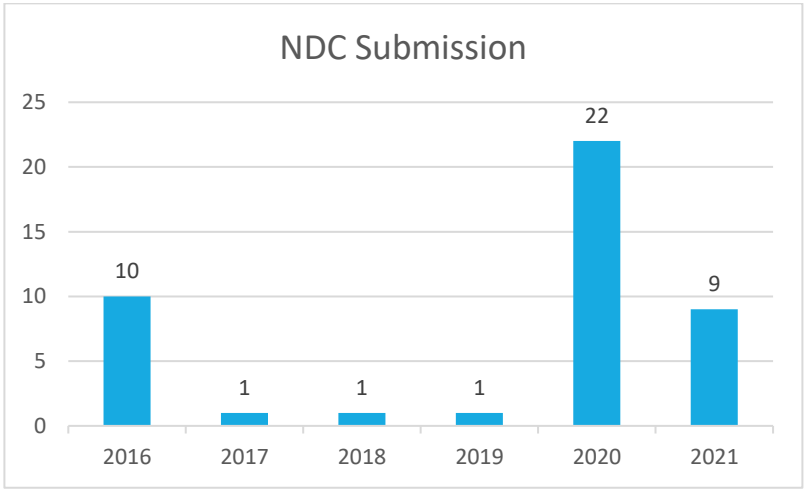


Figure 3 NDC submission by period in detail

The majority of members included their national mitigation targets in various forms except for Guyana, Antigua and Barbuda, Qatar, and Vanuatu. Members without mitigation targets rather framed their NDCs around climate adaptation action plans. Among those who have indicated their mitigation targets for post-2020, 52.3% use BAU targets while 38.6% have absolute targets with various base years. 65.9% of GGGI members included unconditional mitigation targets; 12 members (Australia, Costa Rica, Cote d'Ivoire, Denmark, Hungary, Republic of Korea, Mexico, Norway, Saint Vincent and the Grenadines, Papua New Guinea, UAE, UK) only shared unconditional mitigation targets in their NDCs. Cambodia, Fiji, Dominica, Grenada, Saint Kitts and Nevis, Tonga, Uganda, and Uzbekistan limited their mitigation targets to conditional contributions. Burkina Faso

35 This report analyzes NDCs of 44 countries. As of September 2021, there are 39 members to GGGI, with one of its members being the OECS that consists of 11 countries but having only 6 of them submitted their NDCs. Also, Nicaragua and Pakistan have recently joined GGGI and were not included for this report.

expressed its economy wide mitigation targets using both BAU and absolute targets, using absolute targets for unconditional contribution while BAU for conditional mitigation contribution.

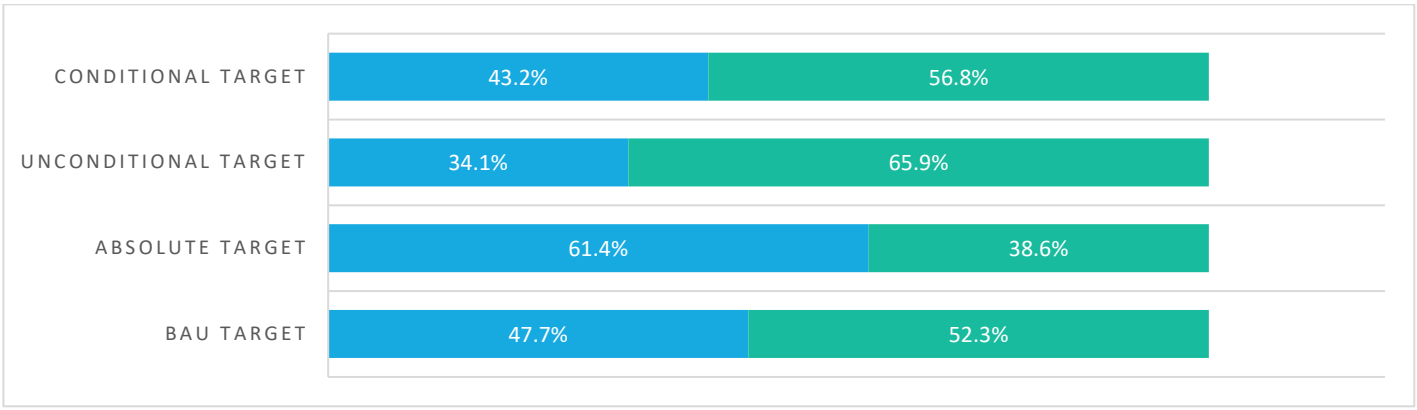


Figure 4 Members' GHG mitigation targets in NDCs

2.2 MEMBERS' TRANSPORT SECTOR TARGETS

Almost 80% of members mention the transport sector in their NDCs, while only 25% (Angola, Burkina Faso, Costa Rica, Indonesia, Kiribati, Lao PDR, Norway, and Sri Lanka) submitted specific transport sector mitigation targets. The scope of the transport sector in NDCs varies depending on each member's national context, most of the transport sector actions are focused on the road transport while 15.9% with 7 members (Angola, Colombia, Fiji, Papua New Guinea, Paraguay, Sri Lanka, Vanuatu), included maritime action plans as part of their transport sectoral targets. Angola, Colombia, and Sri Lanka see the maritime transport as a complementary measure to provide accessibility using abundant coast lines and rivers for trade and tourism. Paraguay also has a similar approach towards the maritime transport, although Paraguay is putting more emphasis on the transboundary and climate adaptation measures in this sector. PNG has indicated adaptation plans for the maritime transport while Fiji committed to reduce emissions in the sector, at the same time Vanuatu promised to impose new energy efficiency measures in the maritime sector. Fewer members, 11.4% with 5 members (Angola, Colombia, Denmark, Hungary, Papua New Guinea) have included aviation as part of their NDCs and most of them briefly focus on the general approaches to the sector as part of their transport sector climate actions.

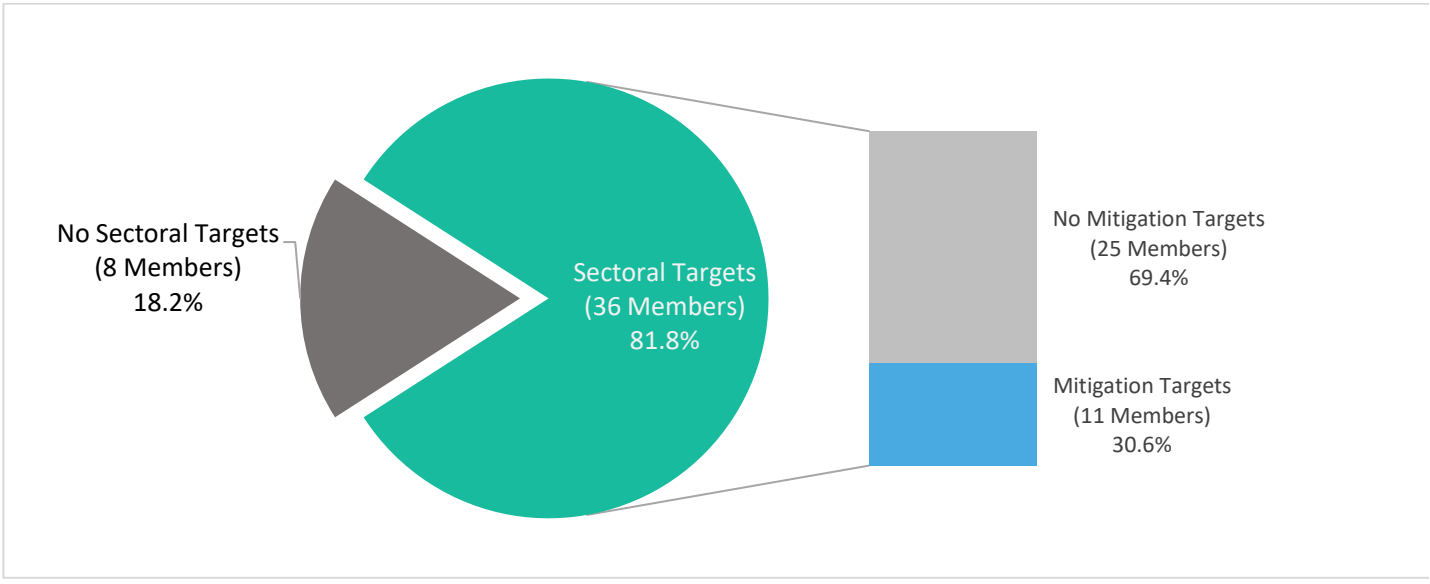


Figure 5 Transport sectoral mitigation target in Members' NDCs

The global GHG emissions in the transport sector have shown steady growth over the last 30 years, with a 1.9% compound annual growth rate since 2000. This trend is expected to continue even with the COVID-19 pandemic. The annual growth rate of the transport sector emission has dropped to 0.5% over the last two years due to the pandemic; however, the growing trend has not changed with the rising travel and freight demand, and it is only expected to rebound with the economic recovery.[36] Despite the challenges in the sector, almost 80% of members communicated climate actions for transport as part of their NDCs. Among those, only a quarter of members included a separated transport sector-specific mitigation targets along with other climate action plans.

Providing improved accessibility and connectivity is key for decarbonization of the transport sector. The trend in global mobility has moved its focus to connectivity, providing demand-based effective services, which has been reflected in members' NDCs in various actions and policy measures along with the general decarbonization of the sector. The decarbonization effort while improving general connectivity in the transport sector therefore has been focused on road transportation. Details of each NDC varies; however, the sectoral transport target can be summarized in the following eight categories: transport modernization, public transport, BRT, system improvement, NMT, 2-wheelers, railroad system, and use of biofuels.

The sectoral NDC cannot be summarized with a single trend; however, the most common climate action mentioned in NDCs is to improve public transport, which can provide accessibility and connectivity to workplaces and schools in everyday life, especially for the vulnerable groups including women and children, and at the same time, relieving urban traffic congestion and local pollution including PM2.5 and black carbon. 34.1% of members included public transport as one of their transport sector action plans. 29.5% of members emphasized modernization of the current transport fleet. Among those members, Cambodia, Cote d'Ivoire, Mongolia, Saint Kitts and Nevis, Papua New Guinea, Paraguay, Sri Lanka, and the UAE also plan to impose new energy efficiency targets. At the same time, 36.4% of members plan to improve or newly impose energy efficiency targets in the transport sector. Papua New Guinea, Rwanda, and Sri Lanka included BRT plans along with their public transport improvements in their NDC, while Jordan also included BRT but without any specific plans. Also, 20.5% of members included transport system improvement to maximize the efficiency of the general transport sector; however, detailed design or specifications were not part of their NDCs.

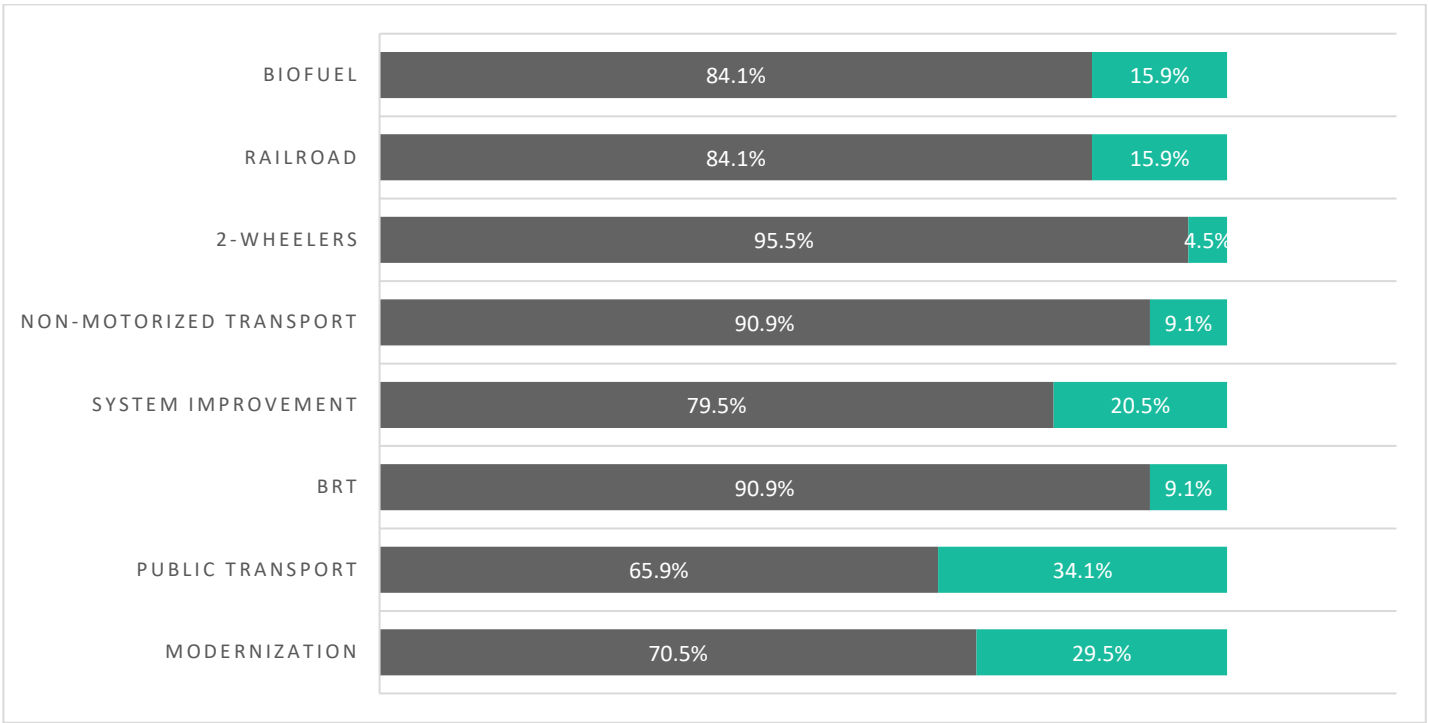


Figure 6 Sustainable transport policies in Members' NDCs

[36] ITF, *ITF Transport Outlook*.

Railroad transport is shown in 15.9% of members' NDCs to cover both cargo and passenger transport. Two-wheelers are an important mode of transport in Asia, however, none of GGGI members in this region included relevant targets in their NDCs while Costa Rica and Vanuatu have. Non-motorized transportation is also an important trend in the sector, while only 9.1% of members, with Colombia, Costa Rica, Lao PDR, and Sri Lanka, have included it as part of their decarbonization plan.

2.3 MEMBERS' EV DEPLOYMENT TARGETS

The transport sector depends on oil more than any other end-use sector: oil products represent 92% of transport's total final energy consumption.[37] Electrification of the transport sector is one of the key elements in decarbonizing it, however, only 38% of members included relevant targets in their NDCs. Some members, including the UK and Norway, have EV targets as part of a separate comprehensive and elaborated transport sector policy and action plans; however, they did not include specific EV targets in their NDCs. All members with EV targets except for Colombia and Costa Rica included renewable energy targets as part of their NDCs to decarbonize both direct and indirect emissions in the transport sector, the upstream emissions related to electricity generation.

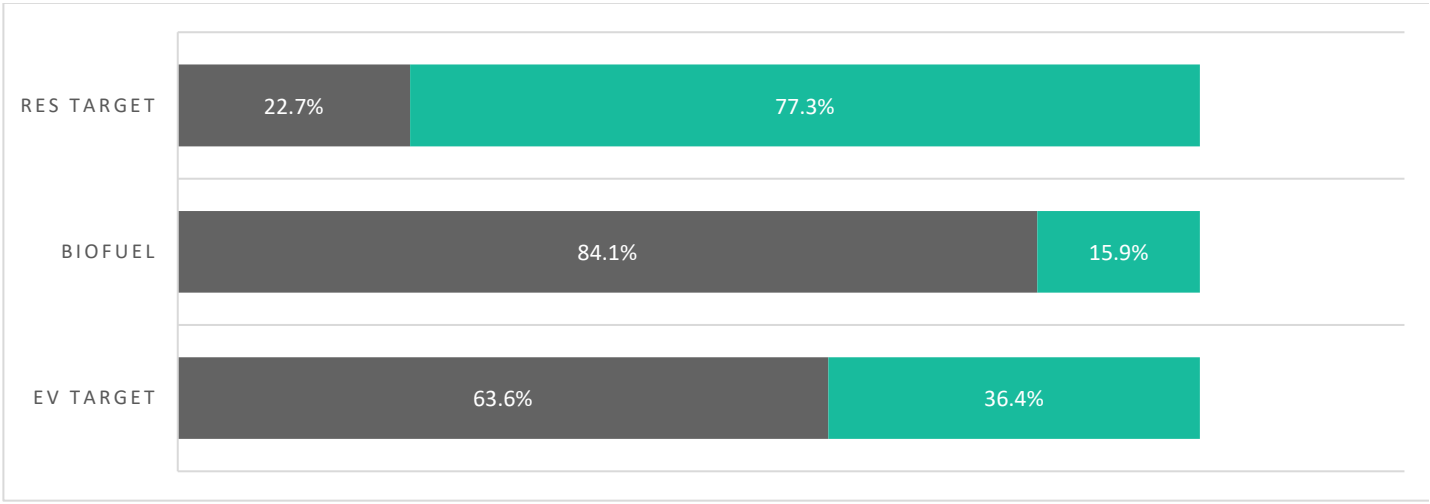


Figure 7 EV and RES targets in Members' NDCs

Australia included EV targets as part of its *Future Fuel Package* which provides a broad transition within the transport sector, including support for businesses to integrate new transport technology, providing public charging stations in blackspots, and a fund to remove the barriers of new technology adaptation in general. Colombia also included an elaborated electric mobility adaptation action plan and policy development with an expected GHG emission reduction. Costa Rica plans to utilize EVs in the public transport system, focusing on electric trains powered by renewable energy in the metropolitan area to reach zero GHG emissions for public transportation. Rwanda expects to utilize EVs as a mitigation measure in the sector, with plans to adapt EV fleets including electric buses, passenger vehicles, and motorcycles. Ethiopia and Jordan mention the incorporation of EVs as part of their transport sector plans while the Republic of Korea and Lao PDR include specific nationwide EV deployment targets as part of their NDC. The UAE also includes a separate EV adaption target within the *Dubai Green Mobility Strategy* along with the expansion of charging infrastructure development. Mexico does not have a specific EV deployment target; however, it has plans for implementing its *National Electric Mobility Strategy*. Other members mention EVs as one of the low carbon options in the transport sector with a gradual transition from the current fleet without specific policies or action plans.

[37] ITF 2021

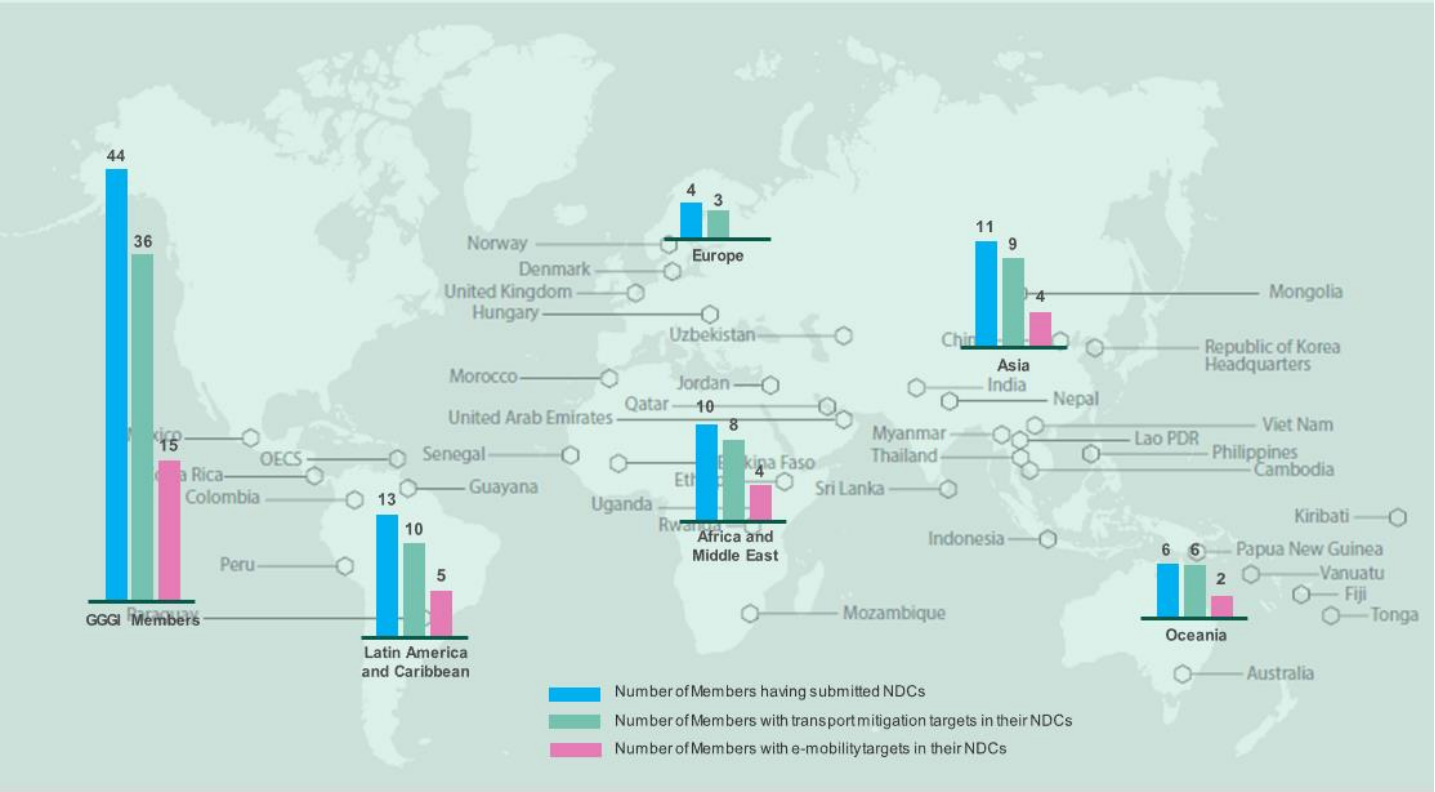


Figure 8 Transport components in Members' NDCs

Table 3 Summary of transport sectoral target and policies in Members' NDCs

	Transport												Fuel Transition			Energy	
	Sectoral Target	Mitigation Target	Road							Maritime	Aviation	EV Target	Energy Efficiency	Emission Standard	Biofuel	RES Target	Renewable Energy
			Modernization	Public	BRT	System	NMT	2-wheelers	Train								
Angola*	●	●	●	●					●	●	●					●	
Australia**	●			●								●				●	
Burkina Faso*	●	●		●											●	●	
Cambodia*	●		●			●			●			●	●			●	
Colombia	●	●	●	●		●	●			●	●	●					
Costa Rica	●	●	●	●		●	●	●				●					●
Cote d'Ivoire	●		●										●			●	
Denmark**	●										●		●	●		●	
Ecuador	●																
Ethiopia*	●			●		●						●				●	
Fiji	●	●								●						●	
Guyana																●	
Hungary	●			●							●		●	●		●	
Indonesia	●	●													●	●	
Jordan	●				●	●			●			●	●			●	
Kiribati*	●	●													●	●	
Republic of Korea***	●								●			●				●	
Kyrgyz Rep.																	
Lao PDR*	●	●					●		●			●			●	●	
Mexico***	●					●						●	●				
Mongolia	●		●										●			●	
Norway***	●	●															
Antigua and Barbuda	●											●	●			●	
Dominica	●	●														●	
Grenada	●												●			●	
Saint Kitts and Nevis	●		●										●			●	
Saint Lucia																●	
Saint Vincent and the Grenadines	●															●	
Papua New Guinea	●		●	●	●					●	●	●	●	●		●	
Paraguay	●		●	●						●		●	●		●	●	●
Peru																●	
Philippines																	
Qatar				●												●	
Rwanda*	●		●	●	●							●		●		●	
Senegal*																	
Sri Lanka	●	●	●	●	●	●	●			●		●	●			●	
Thailand	●					●			●			●				●	
Tonga	●															●	
UAE	●		●	●					●			●	●	●		●	
Uganda*	●												●			●	
UK**																	
Uzbekistan	●		●			●											●
Vanuatu*	●			●				●		●				●	●	●	
Vietnam	●			●									●		●	●	●

* LDC Group ** Annex I *** OECD

CHAPTER 3: GGGI MEMBERS' NDC SUMMARY

In the previous chapter, a general collective overview of GGGI members' NDCs was considered to illustrate the current trends in achieving decarbonization in the transport sector. For Chapter 3, a breakdown of each individual member's commitments is provided with detail information in relation to three categories within their NDCs: General GHG Contributions; Transportation Sector; and reliance on Renewable Energy. This information is also measured against the characteristics of each country such as GDP, population size and urbanization rate which are relevant when understanding the size of the transport sector and each country's commitment to reduce GHG emissions.

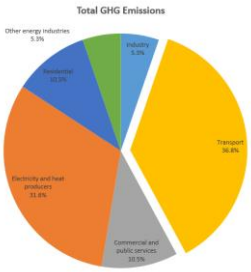
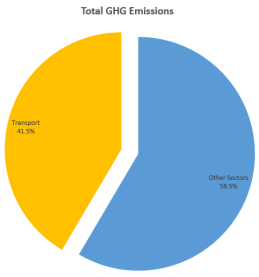
Further insight into what measures the member countries will take towards the use of renewable energy is highly relevant given the relationship between decarbonizing the transport sector and the transition to the use of EVs. It is important to understand the source of the energy used to power EVs and ensure that decarbonization of the transport sector has a positive impact on the reduction of overall GHG emissions. Impact of the growth in population size and urbanization rate are important to consider as they have an undeniable effect on the increasing levels of GHG emissions from the transport sector, especially as they become rapidly motorized. Identification of the conditionality or unconditionality of mitigation targets is insightful to understand the commitment levels of each member. Moreover, distinguishing transport sector's emissions from the total national GHG emissions is imperative to comprehend the impact and weight this sector has compared to the others.

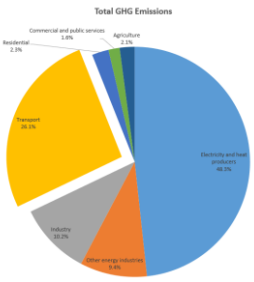
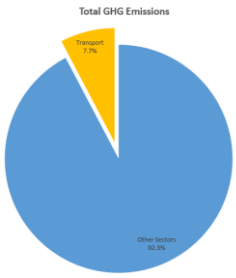
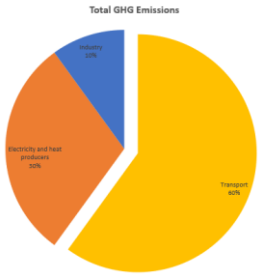
Through the breakdown of the different national conditions and areas that contribute to the overall GHG emissions, GGGI can identify plans which best suit the needs of each member. The strategies to upscale overall electromobility engagement to accelerate the achievement of goals from the Paris Agreement include finding factors that limit target ambitions, providing high quality technical assistance, developing policy recommendations, among others.

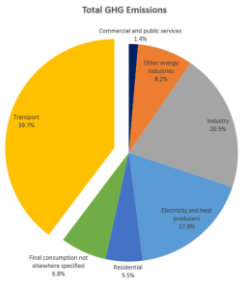
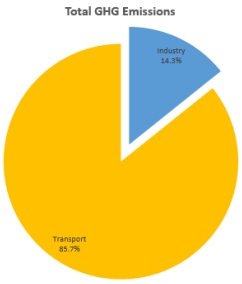
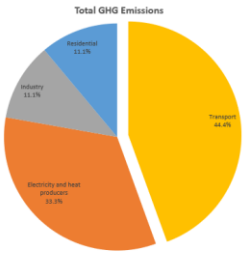
Analysis of the below information for a wider understanding of the country's condition and mobility needs, places GGGI in the position to provide support when identifying innovative next-steps to be taken for its members to reach their goals and provide further guidance on improving strategies for reducing GHG emission and the decarbonization of the transport sector including GGGI's e-mobility activities outlined in Chapter 4.

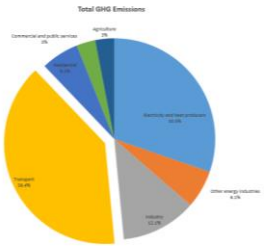
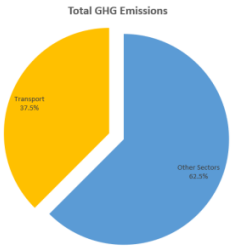
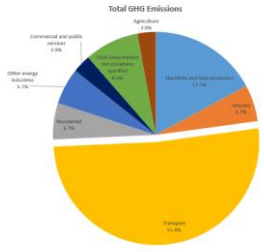
Further information related to the transport sector such as size of vehicle fleet, fuel consumption, government subsidies and policies, data regarding national electricity mix as well as a summary of NDCs related to transport and energy sector with more specific mitigation and/or adaptation targets can be found in the appendix.

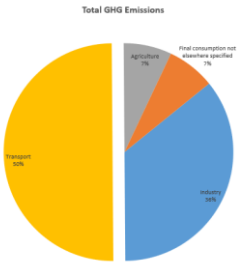
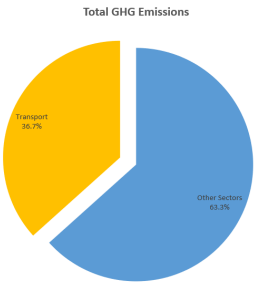
Table 4 GGGI Member's NDC Summary

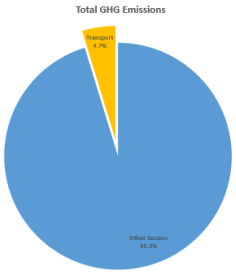
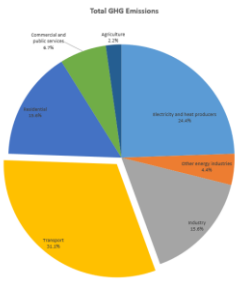
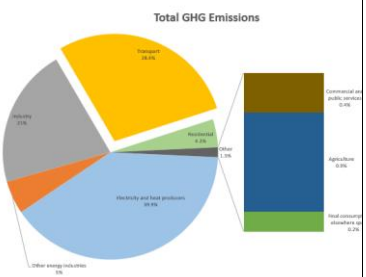
MEMBER	NATIONAL GHG EMISSIONS	NDC
ANGOLA (May 2020)  **GDP** (BILLIONS, 2020) USD 62.31 **GDP PER CAPITA** (2020) USD 1,895.77 **POPULATION** (2020) 32,866,268 **POPULATION GROWTH RATE** (2020) 3.22% **URBANIZATION RATE** (2020) 66.83%	 (IEA) **TOTAL EMISSIONS** (2018) 411.02 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 98.76 $MtCO_2e$ (26%)	*General Contributions* ***Unconditional reduction of GHG emissions by 14% compared to BAU projections by 2025*** ***Conditional reduction of additional 10%, with a total of 24% reduction of GHG emissions compared to BAU projections by 2025*** *Transportation Sector* **Conditional** target to introduce 4,000 natural gas buses and raise awareness of the use of public transportation *Renewable Energy* **Unconditional** commitment to achieve production of 1,604 MW from biomass plants, hydro power stations, solar plants, and wind farms **Conditional** commitment to achieve production of 3,108 MW from renewable energy sources
ANTIGUA AND BARBUDA (September 2021)   **GDP** (BILLIONS, 2020) USD 1.42 **GDP PER CAPITA** (2020) USD 14,450 **POPULATION** (2020) 97,928 **POPULATION GROWTH RATE** (2020) 0.83% **URBANIZATION RATE** (2020) 24.43%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.53 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.22 $MtCO_2e$ (41.5%)	*General Contributions* ***Target to be net-zero by 2040*** *Transportation Sector* **Conditional targets** to establish efficiency standards for the importation of all vehicles; change fiscal policies regarding fossil fuels in the transport sector to support the transition to 100% renewable energy generation; ban importation of new internal combustion engine vehicles *Low Carbon Transport and EV* **Conditional** target for 100% of new vehicle sales to be EVs by 2030 and 2035 for government vehicles *Renewable Energy* **Conditional** targets of generating renewable energy from local resources; using RE for all government operations; eliminating fuel surcharge tax on electricity bills by 2030

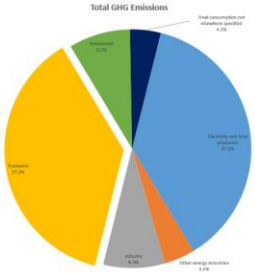
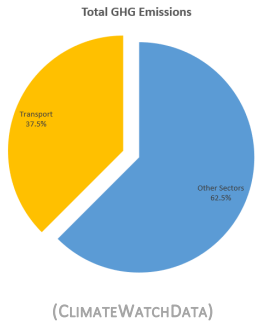
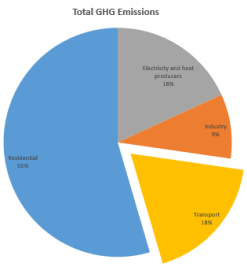
MEMBER	NATIONAL GHG EMISSIONS	NDC
AUSTRALIA (December 2020)  GDP (BILLIONS, 2020) USD 1,330.90 GDP PER CAPITA (2020) USD 51,812.15 POPULATION (2020) 25,687,041 POPULATION GROWTH RATE (2020) 1.26% URBANIZATION RATE (2020) 86.24%	 (IEA) TOTAL EMISSIONS (2018) 383 $MtCO_2e$ TRANSPORT SECTOR EMISSIONS (2018) 100 $MtCO_2e$ (26.1%)	*General Contributions* ***Reduction of GHG emissions by 26 – 28% below 2005 levels by 2030*** *Transportation Sector* A new ***Technology Co-Investment Fund*** to support businesses in different sectors, including transport, to adopt technologies that increase productivity and reduce emissions *Low Carbon Transport and EV* ***Future Fuels Package*** will enable businesses to start integrating new vehicle technologies into their fleets, and address blackspots in public charging and refueling infrastructure *Renewable Energy* 33,000GWh per year until 2030
BURKINA FASO (November 2016)  GDP (BILLIONS, 2020) USD 17.37 GDP PER CAPITA (2020) USD 830.93 POPULATION (2020) 20,903,278 POPULATION GROWTH RATE (2020) 2.82% URBANIZATION RATE (2020) 30.61%	 (CLIMATEWATCHDATA) TOTAL EMISSIONS (2018) 28.37 $MtCO_2e$ TRANSPORT SECTOR EMISSIONS (2018) 2.19 $MtCO_2e$ (7.7%)	*General Contributions* ***Unconditional reduction of GHG Emissions by 6.6% below 2007 levels by 2030*** ***Conditional reduction of additional 5%, with a total of 11.6% below 2007 levels by 2030*** *Transportation Sector* **Conditional** reduction of 42% compared to BAU in trade sector by 2030 **Unconditional** target to reduce 0.42% below 2007 levels, 30% reduction in fuel consumption in 2025; replace 10% of super grade petrol and 5% of diesel consumption with hydrocarbons *Renewable Energy* Commitment to promote renewable energy by eliminating fossil fuel subsidies, and subsidizing investments in renewable energy; implement adaptation measures to diversify energy sources (solar, wind, biogas)
CAMBODIA (December 2020)  GDP (BILLIONS, 2020) USD 25.29 GDP PER CAPITA (2020) USD 1,512.73 POPULATION (2020) 16,718,971 POPULATION GROWTH RATE (2020) 1.4% URBANIZATION RATE (2020) 24.23%	 (IEA) TOTAL EMISSIONS (2018) 10 $MtCO_2e$ TRANSPORT SECTOR EMISSIONS (2018) 6 $MtCO_2e$ (60%)	*General Contributions* ***Conditional reduction of GHG emissions by 27% below 2010 levels by 2030*** *Transportation Sector* **Conditional mitigation projects** – By 2030, operate 30 vehicle inspection centers, promote integrated public transport systems and shift long distance freight movement from trucks to train *Low Carbon Transport and EV* – Develop e-mobility program *Renewable Energy* **Mitigation project** – By 2030, 25% of the energy mix to be from renewable sources (solar, wind, hydro, biomass)

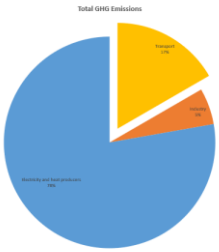
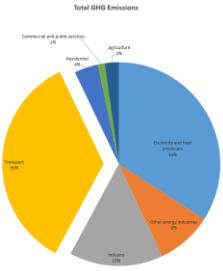
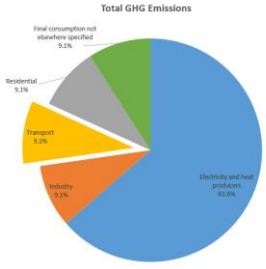
MEMBER	NATIONAL GHG EMISSIONS	NDC
COLOMBIA (December 2020)  **GDP** (BILLIONS, 2020) USD 271.35 **GDP PER CAPITA** (2020) USD 5,332.77 **POPULATION** (2020) 50,882,884 **POPULATION GROWTH RATE** (2020) 1.07% **URBANIZATION RATE** (2020) 81.43%	 (IEA) **TOTAL EMISSIONS** (2018) 73 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 29 $MtCO_2e$ (39.7%)	*General Contributions* ***Commitment to emit a maximum of 169.44 million tCO_2eq in 2030 and reduce black carbon emissions by 40% compared to 2014 levels*** *Transportation Sector* **Unconditional** target to modernize freight vehicles; shift road cargo transport to fluvial; reactivate the railway by 2030 **Conditional** target to increase the modal share of bicycle by 5.5% by 2030 *Low Carbon Transport and EV* **Unconditional** target to develop regulations to accelerate the transition to electric mobility to reach registration of 600,000 EVs by 2030 *Renewable Energy* **Conditional** target to diversify the energy mix and promote self-generation of energy through alternative sources (reduction of 11.2 $MtCO_2e$)
COSTA RICA (December 2020)  **GDP** (BILLIONS, 2020) USD 61.52 **GDP PER CAPITA** (2020) USD 12,076.81 **POPULATION** (2020) 5,094,114 **POPULATION GROWTH RATE** (2020) 0.92% **URBANIZATION RATE** (2020) 80.77%	 (IEA) **TOTAL EMISSIONS** (2018) 7 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 6 $MtCO_2e$ (85.7%)	*General Contributions* ***Unconditional target of maximum absolute net emissions of 9.11 $MtCO_2e$ in 2030 including LULUCF*** *Transportation Sector* Technology substitution in transport sector to reduce black carbon emissions by 20% compared to 2018 emissions *Low Carbon Transport and EV* By 2030, 8% of light vehicles to be electric; by 2022, operate the Limonense Electric Freight Train; the Electric Passenger Train in the Greater Metropolitan Area to be operated with renewable energy; by 2025 shift towards a zero-emission motorcycle fleet *Renewable Energy* Contributions to achieve 100% renewable electricity generation by 2030 and promote use of green hydrogen
COTE D'IVOIRE (October 2016)  **GDP** (BILLIONS, 2020) USD 61.35 **GDP PER CAPITA** (2020) USD 2,325.72 **POPULATION** (2020) 26,378,275 **POPULATION GROWTH RATE** (2020) 2.54% **URBANIZATION RATE** (2020) 51.71%	 (IEA) **TOTAL EMISSIONS** (2018) 9 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 4 $MtCO_2e$ (44.4%)	*General Contributions* ***Reduction of GHG emissions by 28% compared to BAU projections by 2030*** *Transportation Sector* **Conditional measures** to improve mobility and develop low carbon transport options, including private and public transport and support municipalities in the development of urban transport projects *Low Carbon Transport and EV* **Conditional measures** to facilitate and incentivize the purchase of low-emission vehicles *Renewable Energy* **Conditional measures** to increase the share of renewable energy in the electricity mix to 42% by 2030,

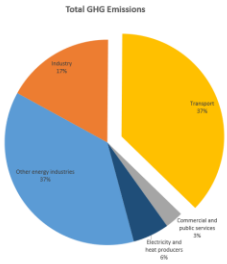
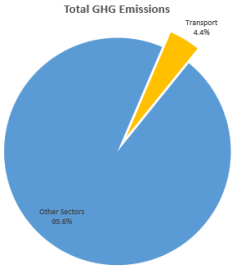
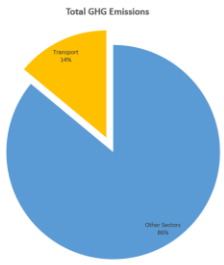
MEMBER	NATIONAL GHG EMISSIONS	NDC
DENMARK (December 2020)  **GDP** (BILLIONS, 2020) USD 355.18 **GDP PER CAPITA** (2020) USD 60,908.84 **POPULATION** (2020) 5,831,404 **POPULATION GROWTH RATE** (2020) 0.29% **URBANIZATION RATE** (2020) 88.12%	 (IEA) **TOTAL EMISSIONS** (2018) 33 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 13 $MtCO_2e$ (39.4%)	*General Contributions* ***Reduction of GHG emissions by at least 55% below 1990 levels by 2030*** *Transportation Sector* – Reduce CO_2 emissions from passenger cars by 37.5% and 31% from vans below 2021 levels *Low Carbon Transport and EV* Promote clean and energy-efficient road transport vehicles – Minimum procurement targets for the share of clean light-duty vehicles (37.4% by 2030) – Minimum procurement targets for the share of clean heavy-duty vehicles in the total number of heavy-duty vehicles by 2030 (Trucks 15% & Buses 65%) *Renewable Energy* – Directive (EU) 2018/2001 → Promotion of the use of energy from renewable sources
DOMINICA (September 2016)  **GDP** (BILLIONS, 2020) USD 0.47 **GDP PER CAPITA** (2020) USD 6,526.79 **POPULATION** (2020) 71,991 **POPULATION GROWTH RATE** (2020) 0.25% **URBANIZATION RATE** (2020) 71.09%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.16 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.06 $MtCO_2e$ (37.5%)	*General Contributions* ***Conditional reduction of GHG emissions by 44.7% below 2014 levels by 2030*** *Transportation Sector* Conditional reduction by 16.9% below 2014 levels by 2030 *Low Carbon Transport and EV* Mitigation actions include introducing policies to replace vehicles by hybrid vehicles *Renewable Energy* **Conditional** target to reduce 50.59 Gg
ECUADOR (March 2019)  **GDP** (BILLIONS, 2020) USD 98.81 **GDP PER CAPITA** (2020) USD 5,600.39 **POPULATION** (2020) 17,643,060 **POPULATION GROWTH RATE** (2020) 1.54% **URBANIZATION RATE** (2020) 64.17%	 (IEA) **TOTAL EMISSIONS** (2018) 35 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 18 $MtCO_2e$ (51.4%)	*General Contributions* ***Unconditional reduction of GHG emissions by 9% below 2010 levels by 2025*** ***Conditional reduction of additional 11.9%, with a total of 20.9% by 2025*** *Transportation Sector* **Unconditional** contribution to operate the Quito Metro (22km) and Cuenca Tram (12km) **Conditional** contribution to reduce GHG emissions in cargo transportation and passenger transport *Renewable Energy* **Unconditional** mitigation to improve generation of wind, solar and biogas energy from landfills **Conditional** mitigation to promote the use and development of renewable energy, guaranteeing full accessibility

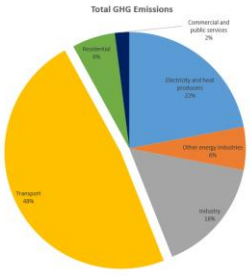
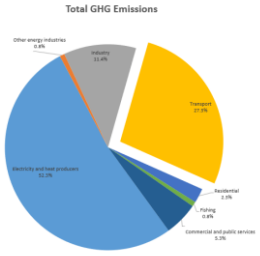
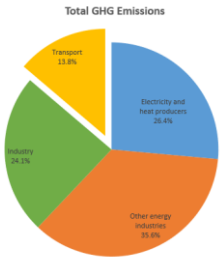
MEMBER	NATIONAL GHG EMISSIONS	NDC
ETHIOPIA (July 2021)  **GDP** (BILLIONS, 2020) USD 107.65 **GDP PER CAPITA** (2020) USD 936.34 **POPULATION** (2020) 114,963,583 **POPULATION GROWTH RATE** (2020) 2.54% **URBANIZATION RATE** (2020) 21.70%	 (IEA) **TOTAL EMISSIONS** (2018) 14 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 7 $MtCO_2e$ (50%)	*General Contributions* ***Unconditional reduction of GHG emissions by 14% compared to BAU projections by 2030*** ***Conditional reduction of additional 54.8%, with a total reduction of 68.8% compared to BAU projections by 2030*** *Transportation Sector* Implementation of policies to increase the share of public transport, including railways *Low Carbon Transport and EV* Implementation of policies to shift transport energy demand from petroleum to electricity *Renewable Energy* Increase number of households using renewable off-grid energy sources for lighting
FIJI (December 2020)  **GDP** (BILLIONS, 2020) USD 4.38 **GDP PER CAPITA** (2020) USD 4,881.53 **POPULATION** (2020) 896,444 **POPULATION GROWTH RATE** (2020) 0.73% **URBANIZATION RATE** (2020) 57.25%	(CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) -0.65 $MtCO_2e$	*General Contributions* ***Unconditional reduction of CO_2 emissions by 10% compared to BAU projections by 2030*** ***Conditional reduction of CO_2 emissions by 20% compared to BAU projections by 2030*** *Transportation Sector* Reduce domestic shipping emissions by 40% by 2030 *Renewable Energy* Reach close to 100% in renewable energy power generation (grid-connected) by 2030
GRENADA (December 2020)  **GDP** (BILLIONS, 2020) USD 1.09 **GDP PER CAPITA** (2020) USD 9,680.18 **POPULATION** (2020) 112,519 **POPULATION GROWTH RATE** (2020) 0.46% **URBANIZATION RATE** (2020) 36.54%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.3 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.11 $MtCO_2e$ (36.7%)	*General Contributions* ***Conditional reduction of GHG emissions by 40% below 2010 levels by 2030*** *Transportation Sector* INDC (2016) Conditional reduction of emissions in transport sector by 20% by 2025 *Renewable Energy* Conditional contribution to develop a geothermal program by 2030

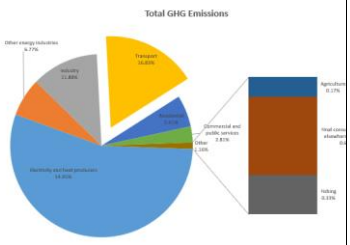
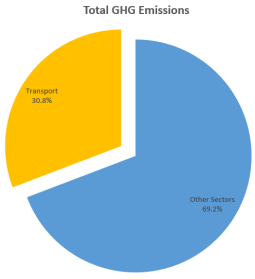
MEMBER	NATIONAL GHG EMISSIONS	NDC
GUYANA (May 2016)  **GDP** (BILLIONS, 2020) USD 5.47 **GDP PER CAPITA** (2020) USD 6,955.94 **POPULATION** (2020) 786,559 **POPULATION GROWTH RATE** (2020) 0.48% **URBANIZATION RATE** (2020) 26.79%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 16.51 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.78 $MtCO_2e$ (4.7%)	*Renewable Energy* **Unconditional** contributions – Construct a 26 MW wind farm – Encourage the use of bio-digesters to produce biogas and provide efficient cooking means at the household level **Conditional** contributions – Develop a 100% renewable power supply by 2025
HUNGARY (December 2020)  **GDP** (BILLIONS, 2020) USD 155.01 **GDP PER CAPITA** (2020) USD 15,899.15 **POPULATION** (2020) 9,749,763 **POPULATION GROWTH RATE** (2020) -0.22% **URBANIZATION RATE** (2020) 71.94%	 (IEA) **TOTAL EMISSIONS** (2018) 45 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 14 $MtCO_2e$ (31.1%)	*General Contributions* ***Reduction of GHG emissions by at least 55% below 1990 levels by 2030*** *Transportation Sector* – Reduce CO_2 emissions per kilometer from passenger cars by 37.5% and from new vans by 31% below 2021 levels *Low Carbon Transport and EV* Promote clean and energy-efficient road transport vehicles – Minimum procurement targets for the share of clean light-duty vehicles (23.1% by 2030) – Minimum procurement targets for the share of clean heavy-duty vehicles in the total number of heavy-duty vehicles by 2030 (Trucks 9% & Buses 53%) *Renewable Energy* Directive (EU) 2018/2001 → Promotion of the use of energy from renewable sources
INDONESIA (July 2021)  **GDP** (BILLIONS, 2020) USD 1,058.42 **GDP PER CAPITA** (2020) USD 3,869.59 **POPULATION** (2020) 273,523,621 **POPULATION GROWTH RATE** (2020) 1.07% **URBANIZATION RATE** (2020) 56.64%	 (IEA) **TOTAL EMISSIONS** (2018) 542 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 154 $MtCO_2e$ (28.4%)	*General Contributions* ***Unconditional reduction of GHG emissions by 29% compared to BAU levels by 2030*** ***Conditional reduction of GHG emissions by 41% by compared to BAU levels by 2030*** *Transportation Sector* Implementation of biofuel (mainly palm oil) in transport sector (reduce 90% unconditionally and 100% conditionally) *Renewable Energy* – By 2050, 31% of the energy mix to be from renewable energy o Renewable power plants to be developed include geothermal, hydropower, solar PV, wind turbine, biomass, and biofuel

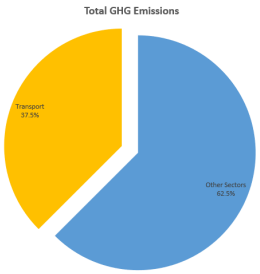
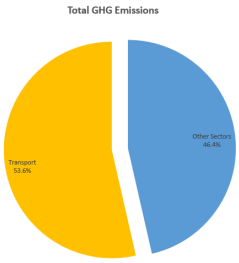
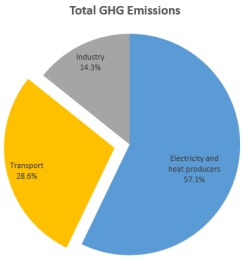
MEMBER	NATIONAL GHG EMISSIONS	NDC
JORDAN (October 2021)  **GDP** (BILLIONS, 2020) USD 43.70 **GDP PER CAPITA** (2020) USD 4,282.77 **POPULATION** (2020) 10,203,140 **POPULATION GROWTH RATE** (2020) 1% **URBANIZATION RATE** (2020) 91.42%	 (IEA) **TOTAL EMISSIONS** (2018) 24 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 9 $MtCO_2e$ (37.5%)	*General Contributions* ***Unconditional reduction of GHG emissions by 1.5% compared to BAU levels by 2030*** ***Conditional reduction of additional 12.5%, with a total reduction of 14% compared to BAU levels by 2030*** *Transportation Sector* – Mitigation measures include increasing share of total commuters using public transport by implementing national BRT system and developing railway system *Low Carbon Transport and EV* – Mitigation measures include installing charging stations and introducing electric bus fleet and 10,000 ZEVs *Renewable Energy* – Encourage investment for the development of renewable energy projects and increase share of renewable energy to 35% and natural gas to 39% in total energy mix by 2030
KIRIBATI (September 2016)  **GDP** (BILLIONS, 2020) USD 0.20 **GDP PER CAPITA** (2020) USD 1,670.82 **POPULATION** (2020) 119,446 **POPULATION GROWTH RATE** (2020) 1.55% **URBANIZATION RATE** (2020) 55.59%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.08 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.3 $MtCO_2e$ (37.5%)	*General Contributions* ***Unconditional reduction of GHG emissions by 13.7% by 2025 and 12.8% by 2030 compared to BAU projection*** ***Conditional reduction of additional 49%, with a total of 61.8% by 2030 compared to BAU projection*** *Transportation Sector* **Conditional** target to use coconut oil as biodiesel for transport by 2030 *Renewable Energy* **Unconditional** target to install PV panels in South Tarawa and off-grid solar electrification in Outer Island and rural areas by 2030 **Conditional** target to increase use of renewable energies and biodiesel by 2030
KYRGYZ REPUBLIC (October 2021)  **GDP** (BILLIONS, 2020) USD 7.74 **GDP PER CAPITA** (2020) USD 1,173.61 **POPULATION** (2020) 6,591,600 **POPULATION GROWTH RATE** (2020) 2.08% **URBANIZATION RATE** (2020) 36.86%	 (IEA) **TOTAL EMISSIONS** (2018) 11 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 2 $MtCO_2e$ (18.2%)	*General Contributions* ***Unconditional reduction of GHG emissions by 15.97% below BAU by 2030*** ***Conditional reduction of GHG emissions by 43.62% below BAU by 2030*** *Transportation Sector* Targets include improvement of traffic management; development of cycling infrastructure; replacement of diesel/gasoline powered buses with gas powered buses; expansion of trolleybus fleet with a total potential reduction of 770.49 Gg CO_2eq by 2030 *Low Carbon Transport and EV* Target to replace ICE light vehicles for electric vehicles, with a potential reduction of 432.18 Gg CO_2eq by 2030 *Renewable Energy* Targets include development, construction, and expansion of hydro, solar, biogas, geothermal power plants with a total potential reduction of 1,546.13 Gg CO_2eq by 2030

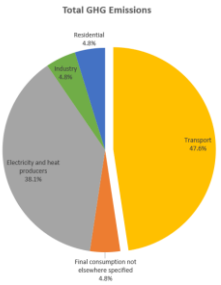
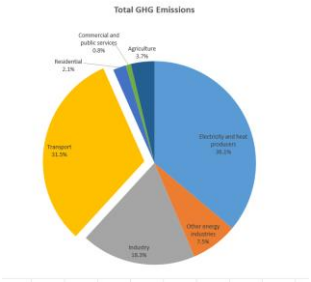
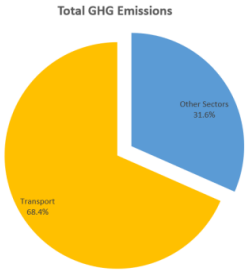
MEMBER	NATIONAL GHG EMISSIONS	NDC
LAO PDR (May 2021)  **GDP** (BILLIONS, 2020) USD 19.14 **GDP PER CAPITA** (2020) USD 2,630.20 **POPULATION** (2020) 7,275,556 **POPULATION GROWTH RATE** (2020) 1.47% **URBANIZATION RATE** (2020) 36.29%	 (IEA) **TOTAL EMISSIONS** (2018) 18 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 98.76 $MtCO_2e$ (16.7%)	*General Contributions* ***Reduction of GHG emissions by 60% below 2000 levels by 2030*** *Transportation Sector* **Unconditional** targe to introduce BRT system in Vientiane Capital and operate the Lao-China Railway **Conditional** target to increase share of biofuels in transport *Low Carbon Transport and EV* **Conditional** target to increase the share of electric vehicles for two-wheelers and passengers' vehicles to 30% in the national vehicle mix by 2030 *Renewable Energy* **Unconditional** target to install hydro power plants **Conditional** targets to install solar and wind power plants
MEXICO (December 2020)  **GDP** (BILLIONS, 2020) USD 1,076.16 **GDP PER CAPITA** (2020) USD 8,346.70 **POPULATION** (2020) 128,932,753 **POPULATION GROWTH RATE** (2020) 1.06% **URBANIZATION RATE** (2020) 80.73%	 (IEA) **TOTAL EMISSIONS** (2018) 499 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 157 $MtCO_2e$ (35%)	*General Contributions* ***Unconditional reduction of GHG emissions by 22% and 51% of black carbon compared to BAU projections by 2030*** ***Conditional reduction of GHG emissions by 36% and 70% of black carbon compared to BAU projections by 2030*** *Transportation Sector* **Mitigating** measures include strengthening of regulations applicable to motor vehicles; encouragement of alternative transportation systems; promotion of clean transportation programs; urban planning for efficient public transportation *Low Carbon Transport and EV* Commitment to develop and implement the *National Electric Mobility Strategy*
MONGOLIA (October 2020)  **GDP** (BILLIONS, 2020) USD 13.14 **GDP PER CAPITA** (2020) USD 4,007.31 **POPULATION** (2020) 3,278,292 **POPULATION GROWTH RATE** (2020) 1.63% **URBANIZATION RATE** (2020) 68.66%	 (IEA) **TOTAL EMISSIONS** (2018) 22 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 2 $MtCO_2e$ (9.1%)	*General Contributions* ***Unconditional reduction of GHG emissions by 22.7% below 2010 levels by 2030*** ***Conditional reduction of additional 27.2%, with a total of 44.9% below 2010 levels*** *Transportation Sector* GHG emission reduction of 1,048.8 $GgCO_2eq$ by 2030 *Renewable Energy* GHG emission reduction of 8,340.5 $GgCO_2eq$ by 2030

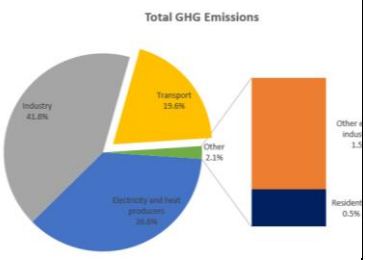
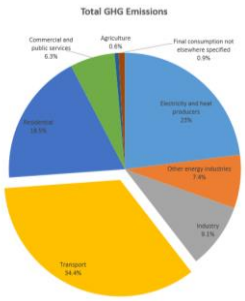
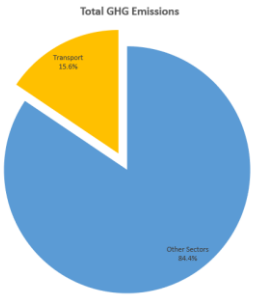
MEMBER	NATIONAL GHG EMISSIONS	NDC
NORWAY (February 2020)  **GDP** (BILLIONS, 2020) USD 362.01 **GDP PER CAPITA** (2020) USD 67,294.48 **POPULATION** (2020) 5,379,475 **POPULATION GROWTH RATE** (2020) 0.59% **URBANIZATION RATE** (2020) 82.97%	 (IEA) **TOTAL EMISSIONS** (2018) 35 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 13 $MtCO_2e$ (37.1%)	*General Contributions* ***Reduction of GHG emissions by 50 – 55% below 1990 levels by 2030*** *Transportation Sector* ***4th Biennial Report –*** *Reduce emissions by 50% below 2005 levels by 2030* *Low Carbon Transport and EV* ***4th Biennial Report*** – Incentivize use of EVs with reduction from payments and exemptions from taxes related to vehicles *Renewable Energy* ***4th Biennial Report*** – develop new energy production based on renewable energies
PAPUA NEW GUINEA (December 2020)  **GDP** (BILLIONS, 2020) USD 23.59 **GDP PER CAPITA** (2020) USD 2,636.80 **POPULATION** (2020) 8,947,027 **POPULATION GROWTH RATE** (2020) 1.93% **URBANIZATION RATE** (2020) 13.35%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 48.46 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 2.13 $MtCO_2e$ (4.4%)	*General Contributions* ***Commitment to reduce emissions to 50% by 2030, and achieve complete carbon neutrality by 2050*** *Transportation Sector* **Conditional** targets include improving fuel-efficient transport, substitution of fossil fuels by biofuels, monitor vehicle fleet-weighted fuel and CO_2 efficiency *Low Carbon Transport and EV* **Conditional** target to develop e-mobility program and implement green transport by 2030 *Renewable Energy* **Conditional** target to increase the share of renewable energy in the total energy mix to 78% by 2030
PARAGUAY (July 2021)  **GDP** (BILLIONS, 2020) USD 35.30 **GDP PER CAPITA** (2020) USD 4,949.75 **POPULATION** (2020) 7,132,530 **POPULATION GROWTH RATE** (2020) 1.24% **URBANIZATION RATE** (2020) 62.18%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 54.4 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 7.62 $MtCO_2e$ (14%)	*General Contributions* ***Unconditional reduction of GHG emissions by 10% compared to BAU projections by 2030*** ***Conditional reduction of additional 10%, with a total of 20% compared to BAU projections by 2030*** *Transportation Sector* Enhance transport infrastructure to facilitate mobility; replace fossil fuels for biofuel; improve public transport *Low Carbon Transport and EV* **Mitigation** actions include replacement of conventional vehicles by electric and hybrid vehicles, promotion of green hydrogen for public and private passenger transport *Renewable Energy* **Mitigation** actions include improving energy efficiency measures and promoting renewable energy projects

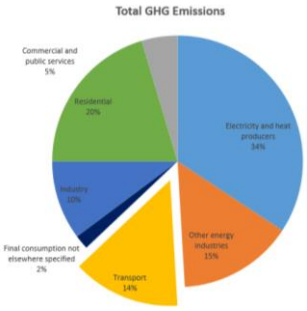
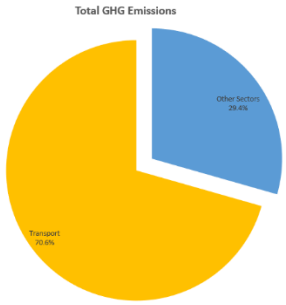
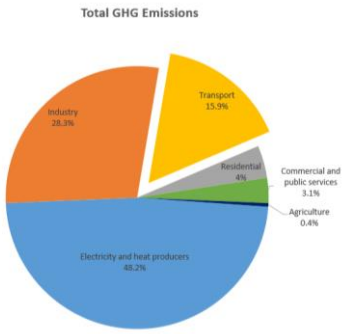
MEMBER	NATIONAL GHG EMISSIONS	NDC
PERU (December 2020)  **GDP** (BILLIONS, 2020) USD 202.01 **GDP PER CAPITA** (2020) USD 6,126.87 **POPULATION** (2020) 32,971,846 **POPULATION GROWTH RATE** (2020) 1.41% **URBANIZATION RATE** (2020) 78.30%	 (IEA) **TOTAL EMISSIONS** (2018) 50 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 24 $MtCO_2e$ (48%)	*General Contributions* ***Unconditional contribution to limit GHG emissions to a maximum level of 208.8 $MtCO_2eq$*** ***Conditional contributions to limit GHG emissions to a maximum level of 179 $MtCO_2eq$***
PHILIPPINES (April 2021)  **GDP** (BILLIONS, 2020) USD 361.49 **GDP PER CAPITA** (2020) USD 3,298.83 **POPULATION** (2020) 109,581,085 **POPULATION GROWTH RATE** (2020) 1.35% **URBANIZATION RATE** (2020) 47.41%	 (IEA) **TOTAL EMISSIONS** (2018) 132 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 36 $MtCO_2e$ (27.3%)	*General Contributions* ***Unconditional reduction of GHG emissions by 2.71% below BAU projections by 2030*** ***Conditional reduction of additional 72.29%, with a total of 75% below BAU projections by 2030***
QATAR (August 2021)  **GDP** (BILLIONS, 2020) USD 146.37 **GDP PER CAPITA** (2020) USD 50,805.46 **POPULATION** (2020) 2,881,060 **POPULATION GROWTH RATE** (2020) 1.72% **URBANIZATION RATE** (2020) 99.24%	 (IEA) **TOTAL EMISSIONS** (2018) 87 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 12 $MtCO_2e$ (13.8%)	*General Contributions* ***Reduction of GHG emissions by 25% compared to BAU projections by 2030*** *Transportation Sector* Reduce GHG emissions by improving public transportation and promote the use of Doha Metro and Lusail Tram *Low Carbon Transport and EV* Plans to electrify public transportation; invest in charging infrastructure; promote transition to EVs

MEMBER	NATIONAL GHG EMISSIONS	NDC
REPUBLIC OF KOREA (December 2020)  **GDP** (BILLIONS, 2020) USD 1,630.53 **GDP PER CAPITA** (2020) USD 31,489.12 **POPULATION** (2020) 51,780,579 **POPULATION GROWTH RATE** (2020) 0.14% **URBANIZATION RATE** (2020) 81.41%	 (IEA) **TOTAL EMISSIONS** (2018) 606 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 102 $MtCO_2e$ (16.8%)	*General Contributions* ***Reduction of GHG emissions by 24.4% below 2017 levels by 2030 and achieve carbon neutrality by 2050*** *Transportation Sector Mitigation* ***2nd Basic Plan for Climate Change Response*** aims to shift freight transport from road to rail and shipping; expand fleet of low-carbon ships fueled by LNG *Low Carbon Transport and EV* Both ***Korean Green New Deal*** and ***2nd Basic Plan for Climate Change Response*** have goals to expand the use of electric and hybrid vehicles *Renewable Energy* ***Korean Green New Deal*** promotes use of renewable energy, and ***2nd Basic Plan for Climate Change Response*** aims to increase the share of renewable energy up to 20% by 2030 and 30 – 35% by 2040
RWANDA (May 2020)  **GDP** (BILLIONS, 2020) USD 10.33 **GDP PER CAPITA** (2020) USD 797.86 **POPULATION** (2020) 12,952,209 **POPULATION GROWTH RATE** (2020) 2.54% **URBANIZATION RATE** (2020) 17.43%	(CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 2.73 $MtCO_2e$	*General Contributions* ***Unconditional reduction of GHG emissions by 16% compared to BAU projections by 2030*** ***Conditional reduction of additional 22%, with a total reduction of 38% compared to BAU projections by 2030*** *Transportation Sector* **Unconditional** mitigation to increase vehicle emission performance **Conditional** mitigation to improve public transport infrastructure with BRT, bus and NMT lane projects *Low Carbon Transport and EV* **Conditional** mitigation to implement e-mobility program *Renewable Energy* **Unconditional** mitigation to generate power through hydropower and install solar street lighting **Conditional** mitigation to install solar mini-grids, off-grid and rooftop electrification and solar water heaters
SAINT KITTS AND NEVIS (April 2016)  **GDP** (BILLIONS, 2020) USD 0.93 **GDP PER CAPITA** (2020) USD 17,435.93 **POPULATION** (2020) 53,192 **POPULATION GROWTH RATE** (2020) 0.68% **URBANIZATION RATE** (2020) 30.84%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.26 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.8 $MtCO_2e$ (30.8%)	*General Contributions* ***Conditional reduction of GHG emissions by 35% below BAU scenario by 2030*** *Transportation Sector* **Conditionally** reduce at least 5% of national fuel consumption by promoting public transportation; enhancing public infrastructure; replacing inefficient vehicles *Renewable Energy* Increase the use of renewable energy sources by 50%

MEMBER	NATIONAL GHG EMISSIONS	NDC
SAINT LUCIA (January 2021)  **GDP** (BILLIONS, 2020) USD 1.70 **GDP PER CAPITA** (2020) USD 9,276.12 **POPULATION** (2020) 183,629 **POPULATION GROWTH RATE** (2020) 0.46% **URBANIZATION RATE** (2020) 18.84%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.24 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.9 $MtCO_2e$ (37.5%)	*General Contributions* ***Reduction of GHG emissions by 7.2% below 2010 levels by 2030*** *Renewable Energy* **Conditional** contribution to introduce renewable energy technologies in the water sector
SAINT VINCENT AND THE GRENADINES (June 2016)  **GDP** (BILLIONS, 2020) USD 0.81 **GDP PER CAPITA** (2020) USD 7,297.91 **POPULATION** (2020) 110,947 **POPULATION GROWTH RATE** (2020) 0.32% **URBANIZATION RATE** (2020) 53.03%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.28 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.15 $MtCO_2e$ (53.6%)	*General Contributions* ***Unconditional reduction of GHG emissions by 22% compared to BAU projections by 2025*** *Transportation Sector* **Conditional** contribution to improve public transportation *Low Carbon Transport and EV* **Conditional** contribution to introduction of new policies to reduce tax paid on low emissions vehicles, with a goal to decrease 10% of emissions *Renewable Energy* **Conditional** contributions to generate 50% of electricity consumption from geothermal plants; renovate existing hydro power plants; install PV panels in both private and public sectors
SENEGAL (December 2020)  **GDP** (BILLIONS, 2020) USD 24.91 **GDP PER CAPITA** (2020) USD 1,487.76 **POPULATION** (2020) 16,743,930 **POPULATION GROWTH RATE** (2020) 2.71% **URBANIZATION RATE** (2020) 48.12%	 (IEA) **TOTAL EMISSIONS** (2018) 7 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 2 $MtCO_2e$ (28.6%)	*General Contributions* ***Unconditional reduction of GHG emissions by 7% compared to BAU projections by 2030*** ***Conditional reduction of GHG emission by 29% compared to BAU projections by 2030*** *Transportation Sector* Develop sustainable modes of public transport by installing BRT and regional express train systems *Low Carbon Transport and EV* Incentivize the use of hybrid vehicles *Renewable Energy* **Unconditional** commitment to achieve production of 699 MW from renewable energy sources by 2030 **Conditional** commitment to achieve production of 300 MW from renewable energy sources by 2030

MEMBER	NATIONAL GHG EMISSIONS	NDC
SRI LANKA (September 2021)  **GDP** (BILLIONS, 2020) USD 80.71 **GDP PER CAPITA** (2020) USD 3,682.04 **POPULATION** (2020) 21,919,000 **POPULATION GROWTH RATE** (2020) 0.53% **URBANIZATION RATE** (2020) 18.71%	 (IEA) **TOTAL EMISSIONS** (2018) 21 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 10 $MtCO_2e$ (47.6%)	*General Contributions* ***Unconditional reduction of GHG emissions by 4% compared to BAU by 2030*** ***Conditional reduction of additional 10.5%, with a total of 14.5% compared to BAU scenario by 2030*** *Transportation Sector* Reduction of GHG emissions by 4% compared to BAU by improving road infrastructure; reducing emissions from marine transport; and promoting public transport by introducing light rail and upgrading suburban railway *Low Carbon Transport and EV* Promote electric mobility and hybrid vehicles by increasing tax concession for EVs and install charging stations *Renewable Energy* Commitment to achieve 70% of renewable energy in electricity generation by 2030
THAILAND (October 2020)  **GDP** (BILLIONS, 2020) USD 501.79 **GDP PER CAPITA** (2020) USD 7,189.04 **POPULATION** (2020) 69,799,978 **POPULATION GROWTH RATE** (2020) 0.25% **URBANIZATION RATE** (2020) 51.43%	 (IEA) **TOTAL EMISSIONS** (2018) 241 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 76 $MtCO_2e$ (31.5%)	*General Contributions* ***Unconditional reduction of GHG emissions by 20% below BAU projections by 2030*** ***Conditional reduction of GHG emissions by 25% below BAU projections by 2030*** *Transportation Sector* Promote use of public transport and enhance bus system in Bangkok; facilitate modal shift from road to rail for both passenger and freight transport; implement vehicle tax scheme based on emissions levels *Low Carbon Transport and EV* **Conditional** mitigation to improve electrification of transport, providing technical support for battery charging technologies
TONGA (December 2020)  **GDP** (BILLIONS, 2020) USD 0.51 **GDP PER CAPITA** (2020) USD 4,903.01 **POPULATION** (2020) 105,697 **POPULATION GROWTH RATE** (2020) 1.14% **URBANIZATION RATE** (2020) 23.10%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.19 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.13 $MtCO_2e$ (68.4%)	*General Contributions* ***Conditional reduction of GHG emissions by 13% below 2006 levels by 2030*** *Transportation Sector* **Unconditional** contribution to introduce mandatory vehicle standards and incentives through tax, fees, import tariffs *Renewable Energy* **Conditional** mitigation to a transition to reach 70% of renewable electricity in the total energy mix by 2030

MEMBER	NATIONAL GHG EMISSIONS	NDC
UNITED ARAB EMIRATES (December 2020)  **GDP** (BILLIONS, 2020) USD 421.14 **GDP PER CAPITA** (2020) USD 43,103.34 **POPULATION** (2020) 9,890,400 **POPULATION GROWTH RATE** (2020) 1.22% **URBANIZATION RATE** (2020) 87.05%	 (IEA) **TOTAL EMISSIONS** (2018) 194 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 38 $MtCO_2e$ (19.6%)	*General Contributions* ***Unconditional reduction of GHG emissions by 23.5% relative to BAU by 2030*** *Transportation Sector* Develop clean transport infrastructure; replace gasoline and diesel to CNG; build Etihad Rail; expand Dubai metro *Low Carbon Transport and EV* ***Dubai Green Mobility Strategy*** – By 2030, 2% of Dubai's road fleet and 30% of Dubai's government vehicles to be electric – Increase the number of charging stations *Renewable Energy* Promote investment in green hydrogen and nuclear power plant; implement regulatory measures to reduce energy consumption by 40% by 2050; increase share of RE
UNITED KINGDOM (December 2020)  **GDP** (BILLIONS, 2020) USD 2,707.74 **GDP PER CAPITA** (2020) USD 40,284.64 **POPULATION** (2020) 67,215,293 **POPULATION GROWTH RATE** (2020) 0.57% **URBANIZATION RATE** (2020) 83.90%	 (IEA) **TOTAL EMISSIONS** (2018) 352 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 121 $MtCO_2e$ (34.4%)	*General Contributions* ***Reduction of economy wide GHG emissions by 68% below 1990 levels by 2030*** *Transportation Sector* ***Decarbonising Transport: A Better, Greener Britain*** – Promote cycling and walking; decarbonize railways; accelerate maritime and aviation decarbonization; maximize benefits of low carbon fuels *Low Carbon Transport and EV* ***Decarbonising Transport: A Better, Greener Britain*** – Promote zero emission buses, coaches, fleet of cars, vans, motorcycles, scooters, also the freight and logistics sector where hydrogen will have an important role *Renewable Energy* ***Welsh National Marine Plan*** – Generate 70% of electricity from RE by 2030
UGANDA (September 2016)  **GDP** (BILLIONS, 2020) USD 37.37 **GDP PER CAPITA** (2020) USD 817.04 **POPULATION** (2020) 45,741,000 **POPULATION GROWTH RATE** (2020) 3.27% **URBANIZATION RATE** (2020) 24.95%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 21.95 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 3.42 $MtCO_2e$ (15.6%)	*General Contributions* ***Reduction of GHG emissions by 22% compared to BAU by 2030*** ***NDC submitted in 2016 projected 2030 emissions would be 77.3MtCO2e, under this update they are projected to almost double*** *Transportation Sector* **Conditional** mitigation targets to update transport regulations; implement regulations to promote cleaner fuels; develop fuel efficiency vehicle technologies with potential reduction of 24-34% compared to BAU projections by 2030 *Renewable Energy* **Conditional** mitigation targets to achieve 3,200MW of renewable electricity generation by 2030; promote use of solar energy systems

MEMBER	NATIONAL GHG EMISSIONS	NDC
UZBEKISTAN (November 2018)  **GDP** (BILLIONS, 2020) USD 57.71 **GDP PER CAPITA** (2020) USD 1,685.76 **POPULATION** (2020) 34,232,050 **POPULATION GROWTH RATE** (2020) 1.92% **URBANIZATION RATE** (2020) 50.42%	 (IEA) **TOTAL EMISSIONS** (2018) 108 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 15 $MtCO_2e$ (13.9%)	*General Contributions* ***Conditional reduction of GHG emissions per unit of GDP by 10% below 2010 levels by 2030*** *Transportation Sector* – Extension of transport and logistics communication systems, ensuring efficient energy resources use, including optimization of transportation routes, improvement of road motor road quality, etc. – Expansion of measures on motor vehicles change over to run on alternative fuel *Renewable Energy* – Solar energy share to reach 6% of the total energy balance by 2030
VANUATU (March 2021)  **GDP** (BILLIONS, 2020) USD 0.85 **GDP PER CAPITA** (2020) USD 2,782.98 **POPULATION** (2020) 307,150 **POPULATION GROWTH RATE** (2020) 2.39% **URBANIZATION RATE** (2020) 25.53%	 (CLIMATEWATCHDATA) **TOTAL EMISSIONS** (2018) 0.17 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 0.12 $MtCO_2e$ (70.6%)	*General Contributions* ***Conditional reduction of GHG emissions by 30% in the energy sector and 100% in the electricity sub-sector compared to BAU scenario by 2030*** *Transportation Sector* By 2030, 20% of diesel to be biodiesel; improve energy efficiency in land and marine transport; and develop *Milage and Emission Standards for Vehicles* *Low Carbon Transport and EV* By 2030, 10% of public buses to be e-buses; 10% of government vehicles to be EVs; introduce 1,000 e-bikes and e-rikshaws *Renewable Energy* By 2030, reach close to 100% in renewable energy in the electricity generation sector through expanding RE capacity and replacing fossil fuels with coconut oil-based electricity
VIETNAM (September 2020)  **GDP** (BILLIONS, 2020) USD 271.16 **GDP PER CAPITA** (2020) USD 2,785.72 **POPULATION** (2020) 97,338,583 **POPULATION GROWTH RATE** (2020) 0.90% **URBANIZATION RATE** (2020) 2.83%	 (IEA) **TOTAL EMISSIONS** (2018) 226 $MtCO_2e$ **TRANSPORT SECTOR EMISSIONS** (2018) 36 $MtCO_2e$ (15.9%)	*General Contributions* ***Unconditional reduction of GHG emissions by 9% compared to BAU projections by 2030*** ***Conditional reduction of GHG emissions by 27% compared to BAU projections by 2030*** *Transportation Sector* – Improve energy efficiency of vehicles – Change freight transportation models – Restructure the transportation market – Shift from private to public means of transport – Shift from conventional fuels to biofuel, natural gas and electricity *Renewable Energy* Develop efficient use of renewable energy sources and increase their proportion in energy production and consumption

CHAPTER 4: GGGI E-MOBILITY PROFILE

4.1. GGGI's E-MOBILITY APPROACH

Sustainable transport has been a focus area for GGGI since its inception. Sustainable transport and e-Mobility align with GGGI's objectives of 1) scaling up existing electric mobility initiatives, including delivering policy advice to projects and programs in countries; conducting sector assessments, assessing technology options where relevant; identifying and conceptualizing sustainable project models; and leading the content side of knowledge sharing programs, 2) expanding its scope towards NMT (forms of travel that do not rely on an engine or motor for movement, such as walking and bicycling), and 3) stepping up the results into impacts that will be measured primarily through the Strategic Outcomes defined in GGGI's 2030 Strategy. GGGI plans to support member countries in the transition of their transport sector to sustainable modes, including low-carbon mobility and non-motorized transportation.

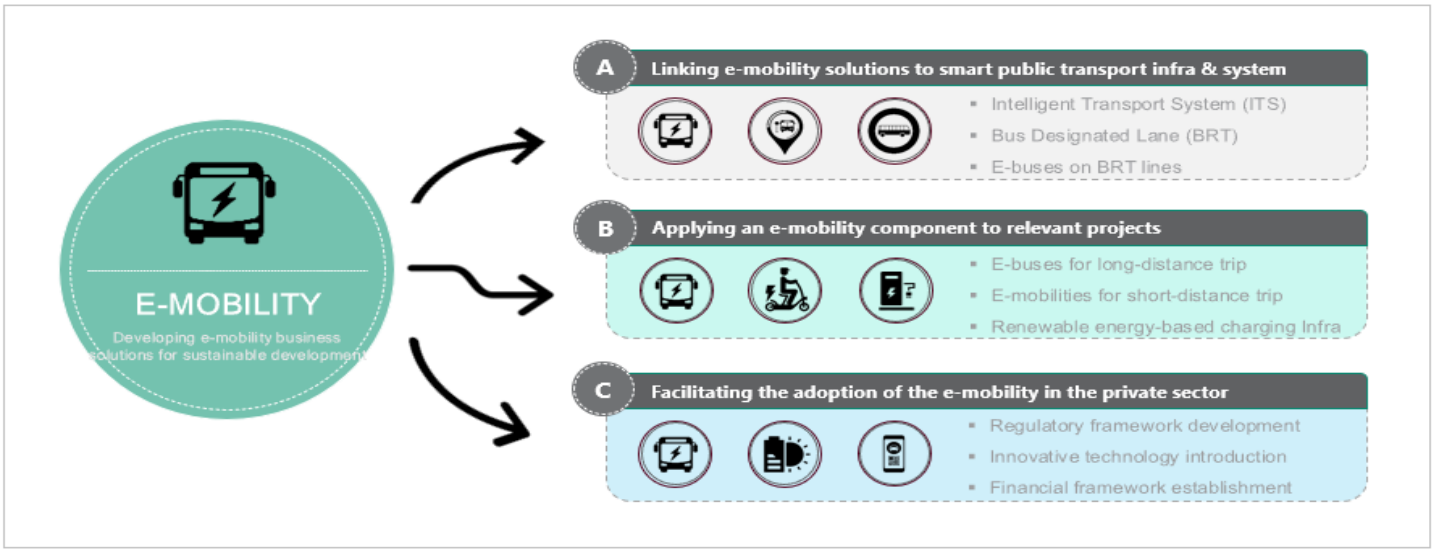


Figure 9 GGGI E-Mobility Strategy

GGGI occupies a niche space in the market providing a combination of policy and investment services through GGGI in-country teams embedded in governments. Compared to most larger-scale intergovernmental organizations, GGGI has had project-oriented structure to engage into, promote and scale up innovative solutions that can support the transition of developing member countries towards a low carbon and/or non-motorized transport infrastructure. In particular, GGGI has been supporting its members shift to the electricficaiton of mobility from fossile-fueled transprotation, emphasizing green, healthy and inclusive urban environments. To create GGGI's name value through making investment-ready e-mobility transport projects, it has established e-mobility strategies including i) linking e-mobility solutions to transport infra projects, ii) applying an e-mobility component to relevant projects such as eco-tourism projects, and iii) initiating e-mobility for facilitating the participationg of the private sector.

4.2. GGGI E-MOBILITY DEVELOPMENT PROCESS

The electrification of transportation — cars, buses, motorbikes, and outboard engines — has begun to displace the internal combustion engine. Many countries have established targets to ban the sales of conventional cars as early as 2030. To support its members transform into a low-carbon economic development in the transport sector, GGGI can help generate new innovative e-mobility markets that support the economic and financial case of green growth. Optimizing e-mobility use and identifying economic opportunities that can simultaneously increase the adoption of electric vehicles, GGGI conceptualizes e-mobility projects through holistic supporting programs including capacity building, regulatory framework, and technical assistance. GGGI also support its members have enhanced access to green and climate finance, which is the main bottleneck in demonstrating the economic case and financial viability of inclusive electrification models and bankable e-mobility projects and programs that can help transition a country from brown growth to green growth in the transport sector.

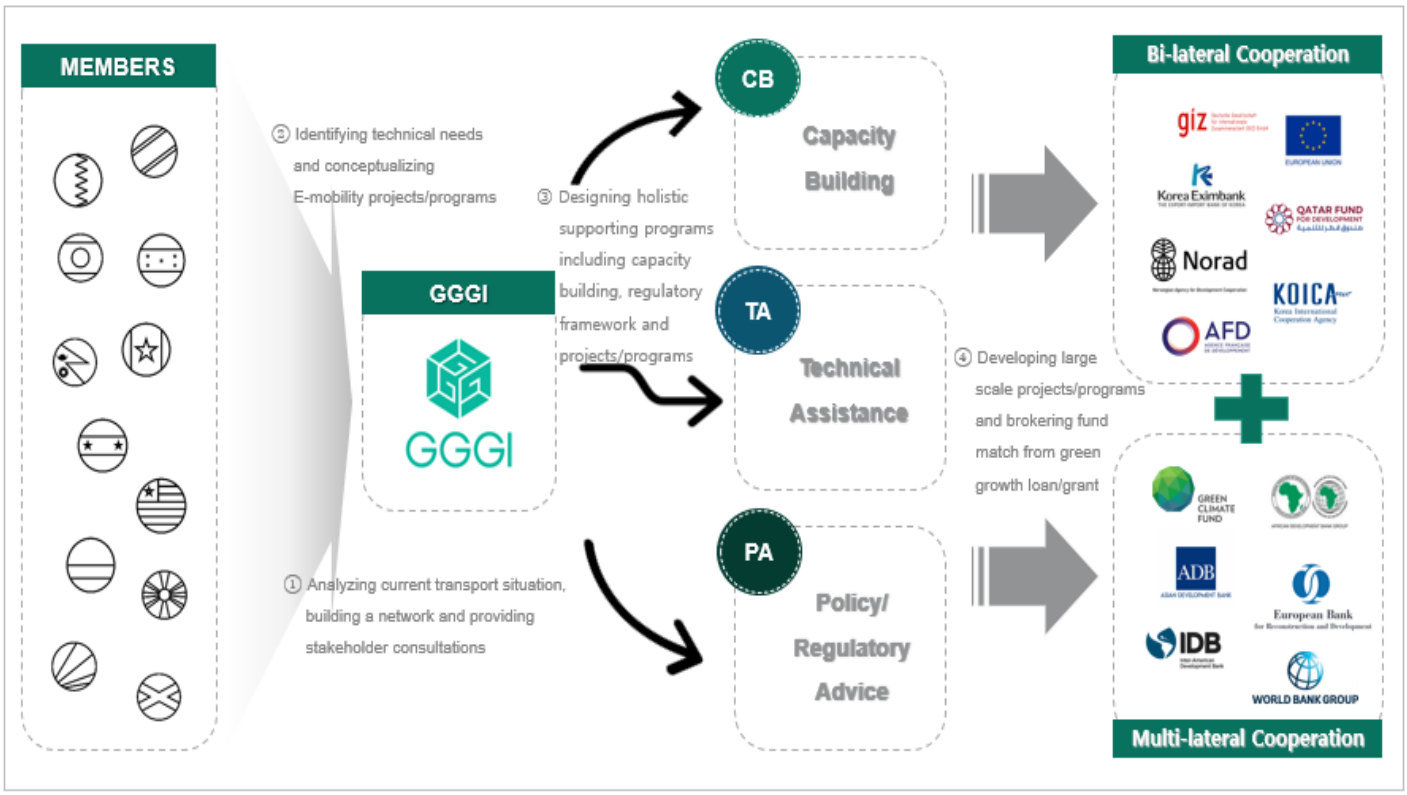


Figure 10 GGGI E-Mobility Development Process

In order to ultimately increase public and private sector capital flows toward the development of green investment projects that enhance members' green growth transformation in the transport sector, GGGI has given priority to i) mainstreaming e-mobility strategies into national, sub-national, regional, local, and sectoral policies and development plans; ii) linking e-mobility solutions to approved transport infra & system investments, mobilizing financial resources; and iii) strengthening and supporting relevant stakeholder capability through a global program. To create tangible success stories, GGGI has tried to focus on following activities including i) needs assessment & stakeholder engagement; ii) technical assistance; iii) resource mobilization; and iv) knowledge sharing.

Table 5 GGGI's E-Mobility Development Activities

Contents	Activities	Deliverables
Networking & Conceptualization	- Analyzing transport conditions and related policies to identify country needs and demands. - Providing consultations to related stakeholder to mainstream sustainable transport into development policies &plans. - Conceptualizing projects based on technical assessment and consultations.	- Project idea notes - Capacity building - Stakeholder engagement
Technical Assistance	- Designing national, regional, local, and sectoral regulatory framework. - Conducting a (pre) feasibility study on e-mobility and related technologies. - Producing project concept notes for mobilizing financial resources.	- Regulatory framework - F/S reports - Project concept notes
Resource Mobilization	- Coordinating and mobilizing financial resources for conducting technical assistance (TA) activities, designing Masterplan (MP), providing pilot programs, and implementing proposed projects/programs.	- TA applications - Funding proposals
Enabling Environment	- Designing and producing best practice models and lessons-learned programs. - Organizing technical forums/seminars/workshops for relevant stakeholders.	- Knowledge sharing seminar/forum - Knowledge sharing materials

4.3. GGGI E-MOBILITY THEORY OF CHANGE

To deliver the right activities for the desired outcomes, GGGI has been developing a theory of change (ToC) for facilitating the adoption of electric mobility for a sustainable development. By partnering with in-house and external experts or the organizations who have contributed to mainstreaming green growth in transport development, GGGI has been leveraging that knowledge and expertise, as well as the unique culture GGGI has built globally, and laying down the foundation of increasing the use of the public transport system, and supporting public and private investments in the electric mobility sector, as well as mainstreaming climate change considerations in members' transport policies and development plans.

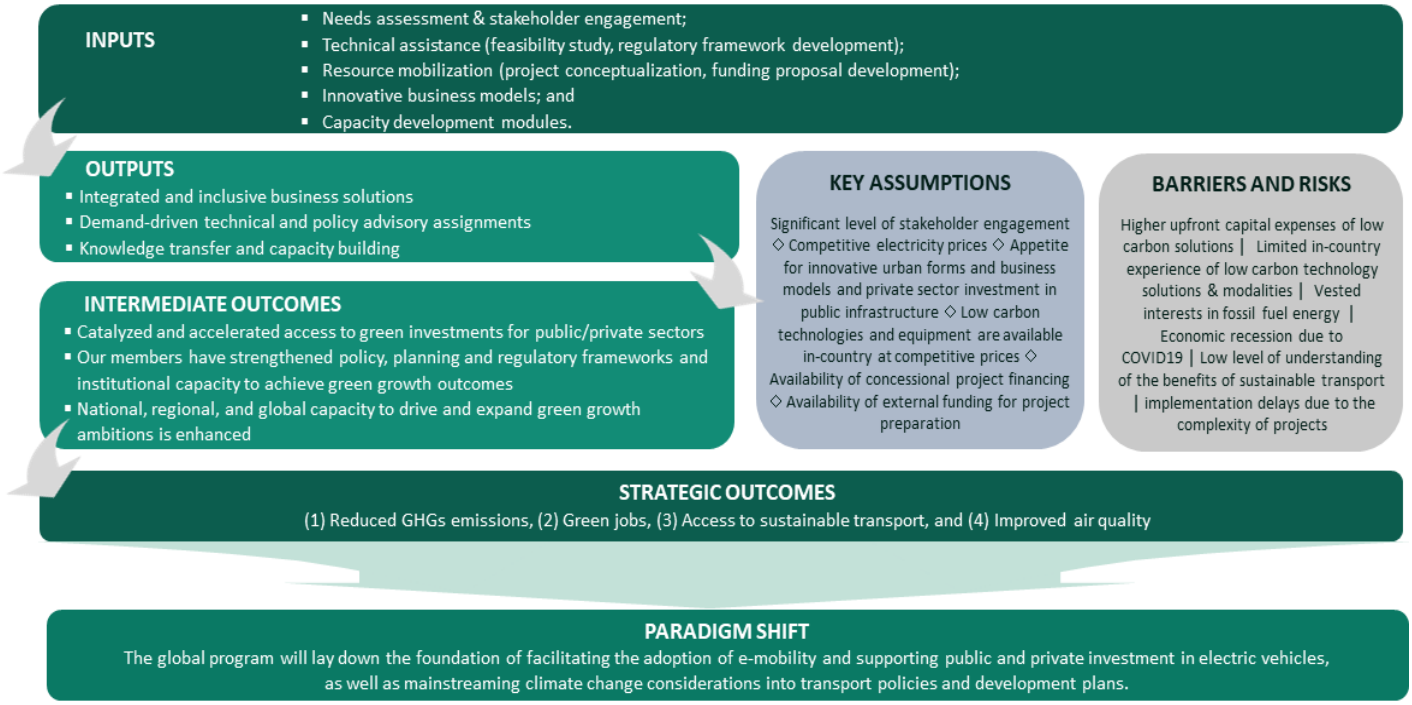


Figure 11 GGGI E-Mobility Development Process

CHAPTER 5: GGGI E-MOBILITY ACTIVITIES

Based on the existing pipeline of sustainable transport projects and country programmatic priorities in GGGI's 5-year Roadmap (2021-2025) which assumes 40 members by 2025, GGGI expects to engage all members in the electrification of mobility over the 5-year period. According to the fact that electrification of transport sector is one of the key elements in decarbonizing transport sector, 38% of its members have established relevant targets in their NDCs and some members including the UK, and Norway have EV targets as a part of a separate comprehensive and elaborated transport sector policy and action plans. To date, GGGI has actively supported e-mobility implementation in 15 countries, with 7 countries in Asia (Cambodia, India, Lao PDR, Myanmar, Nepal, Philippines, and Sri Lanka), 3 countries in Africa/Middle East (Ethiopia, Jordan, Rwanda), 2 countries in Latin America (Ecuador and Mexico), and 3 countries in Pacific (Fiji, Kiribati, and Tonga).

GGGI serves the role of an enabler and facilitator of members' transition to electrification of transportation, providing technical support in the development of e-mobility projects/programs, mobilization of green investments, implementation of e-mobility projects/programs, and development of local capacities and knowledge sharing. To realistically achieve tangible outcomes within the constraints of the operating environment and capabilities of the implementing agencies, GGGI requires the active participation of key stakeholders for promoting country ownership, incorporating key quality assessment criteria into each stage of the project cycle. Through this process, GGGI has been supporting the mobilization of financial resources and creating enabling environments for public and private sector investment in e-mobility initiatives.

Table 6 GGGI E-Mobility Activities in Members

Continent	Countries	Activities
Asia	**Cambodia** - Electric buses for UNESCO World Heritage city of Siem Reap & Financial Mechanism for E-Scooters	▪ (Partnership) Built partnership with following stakeholders: - (Government) Ministry of Public Works and Transport, Authority for the Protection of the Site and Management of the Region of Angkor, Ministry of Tourism, Municipal and Provincial authorities (Siem Reap), etc. - (Partners) The National Committee for Sub-National Democratic Development Secretariat (NCDD-S), Agence Française de Développement (AFD), Cities Development Initiative for Asia (CDIA), the World Bank, and Korea International Cooperation Agency (KOICA), Green Climate Fund (GCF), etc. ▪ (Activities) Produced and developing following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Developed the regulatory framework development for e-scooters through GCF readiness program. - Conducted technical assessment of e-buses and ITS depolyment in Siem Reap and produced a pre-feasiblity study report. - Developed investment proposals for CDIA and KOICA. - Secured and mobilized financial resources from GCF and KOICA for technical assistant activities.

		- Mobilizing financial resources for introducing electric public buses and e-scooters in collaboration with Agence Française de Développement (AFD) and the World Bank. ▪ (Approach) - Supporting to link e-buses to ITS systems for improving public transport services in Siem Reap. - Supporting to facilitate the adoption of e-sooters in the private sector through establishing financial mechanism.
	India – Mainstreaming e-mobility enabled infrastructure development	▪ (Partnership) Built partnership with following stakeholders: - (Government) New and Renewable Energy Dept. (Govt of AP), Government of Andhra Pradesh, Department of Heavy Industries (GOI), Ministry of New and Renewable Energy. - (Partners) The World Bank, the Asian Development Bank (ADB), The Export-Import Bank of Korea. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Conducing technical and financial analysis on setting up e-mobility infrastructure for building a sustainable transportation system. - Secured and mobilized financial resources from Danish Programmatic Funding for technical assistant activities. - Mobilizing financial resources for developing 1,000,000 EV charging facilities across the state of Andhra Pradesh in collaboration with New and Renewable Energy Dept. and Government of Andhra Pradesh. ▪ (Approach) - Supporting to facilitate the adoption of e-mobility in the private sector through expanding EV charging infrastructure.
	Lao PDR – Low carbon buses for the Bus Rapid Transit system in Vientiane	▪ (Partnership) Built partnership with following stakeholders: - (Government) Ministry of Public Works and Transport (MPWT), Department of Transport (DoT), etc. - (Partners) ADB, AFD, KOICA, GCF, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Conducted technical assessment of introducing low-carbon buses including e-buses on BRT routes in Vientiane and produced a pre-feasiblity study report. - Developed policy and technical standards for electric vehicles in Lao PDR. - Mobilized and secured funding from the UK embassy for facilitating the adoption of e-mobility in Lao PDR. - Developing the Non-Motorized Transport (NMT) project with Department of Transport. - Mobilizing financial resources for distributing E-Mobility in collaboration with AFD, GCF, KOICA, etc. ▪ (Approach)

		- Supporting to link e-buses to BRT for improving public transport services in Vientiane. - Supporting to facilitate the adoption of e-vehilce and e-sooters in the private sector.
	Myanmar – Accelerating the transition to sustainable public transport for low-carbon city development	▪ (Partnership) Built partnership with following stakeholders: - (Government) The Ministry of Natural Resources and Environmental Conservation (MoNREC), etc. - (Partners) GCF, KOICA, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Conducted technical assessment of e-buses and ITS deployment in Naypyitaw and produced a pre-feasiblity study report. - Secured and mobilized financial resources from GCF and KOICA for technical assistant activities. ▪ (Approach) - Supporting to link e-buses to ITS systems for improving public transport services in Naypyitaw.
	Nepal - Electric Mobility Program, Phase II including Smart E-Mobility Project	▪ (Partnership) Built partnership with following stakeholders: - (Government) the Ministry of Physical Infrastructure and Transport (MoPIT), the Ministry of Forest and Environment (MoFE) and the Ministry of Energy, Water Resources and Irrigation (MoEWRI), the Ministry of Finance (MoF), the Metropolitan Government of Pokhara, and the Provincial government of Bagamati, etc. - (Partners) Town Development Fund (TDF), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), KOICA, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Conducted investment projects for electric mobility to provide investors with investment-ready opportunities. - Conducted technical assessment of deploying electric buses in the Kathmandu valley and produced a pre-feasiblity study report. - Developed National Action Plan for Electric Mobility Accelerating Implementation of Nepal's Nationally Determined Contribution (2018). - Conducted technical and investment analytics for Sajha Yatayat's first electric bus fleet and developed e-mobility proposal for UNESCO World Heritage site across kathmandu Valley. - Conducted technical assessment of e-buses and ITS depolyment in Pokhara Metropolitan city and produced a pre-feasiblity study report. - Developed the Bagamati Province Electric Mobility Strategy, which can guide how to facilitate the adoption of e-mobility in local governemnts around the country. - Developing guidelines for EVs and charging station operation/maintenance and conducting electric bus operational modality for Bagamati province. - Secured and mobilized financial resources from NAMA, Bilateral ODA agencies and the private sector for technical assistant activities and pilot projects inlcuding the USD 26 million investment mobilization in 2019.

		- Mobilizing financial resources for introducing electric public buses and ITS in collaboration with TDB, GCF, GIZ, KOICA, etc. ▪ (Approach) - Supporting to link e-buses to ITS systems for improving public transport services in Bagamati province. - Supporting development of the Smart Eco-Tourism Project in Pokhara based on the e-mobility concept. - Supporting to facilitate the adoption of e-buses in private bus operators.
	Philippines – Sustainable Urban Transport Project	▪ (Partnership) Built partnership with following stakeholders: - (Government) Climate Change Commissions (CCC), Department of Transportation (DoTr), Department of Interior and Local Government (DILG), Several identified Local Government Units (LGUs), etc. - (Partners) Land Bank of the Philippines (LANDBANK), GCF, ADB, KOICA, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Demonstrated 100 electric tricycles in the municipalities of San Vicente and Brooke's Point in Palawan Province. - Conducting technical assessment of e-buses deployment in the province of Bataan. - Developing the GCF project for facilitating the adoption of e-mobility in collaboration with LANDBANK (DAE). - Mobilizing financial resources for introducing electric public buses and e-jeepneys in collaboration with ADB and LANDBANK. ▪ (Approach) - Supporting to link e-buses to BRT for improving public transport services. - Supporting to facilitate the adoption of e-jeepneys in private operators through establishing financial mechanism.
	Sri Lanka - Accelerating the transition to sustainable public transport	▪ (Partnership) Built partnership with following stakeholders: - (Government) Ministry of Transport, Ministry of Environment (NDA), Sri Lanka Transport Board (SLTB), Several identified Local Government, etc. - (Partners) the World Bank, GCF, ADB, KOICA, The Export-Import Bank of Korea, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Conducting technical assessment of e-buses and ITS deployment in Colombo Metropolitan areas. - Mobilizing finacial resources for the ITS pilot project in collaboration with bi-lateral ODA agency. - Developing the GCF concept note and project preparation facility (PPF) application for implementing the Smart E-mobility project with Sri Lanka NDA. - Mobilizing financial resources for enhancing transport services in collaboration with the World Bank.

		▪ (Approach) - Supporting to link e-buses to ITS for improving public transport services.
Africa & **Middle East**	**Ethiopia** – Accelerating the transition to e-buses on BRT lines in Addis Ababa	▪ (Partnership) Built partnership with following stakeholders: - (Government) Ministry of Finance, Ministry of Transport, Addis Ababa Road and Transport Bureau, etc. - (Partners) AFD, The Export-Import Bank of Korea, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Secured and mobilized financial resources from AFD for technical assistant activities. - Conducted technical assessment of introducing e-buses on BRT B2 line and produced a pre-feasiblity study report. - Mobilizing financial resources for introducing e-buses in collaboration with AFD. ▪ (Approach) - Supporting to link e-buses to BRT for improving public transport services.
	Rwanda – Supporting the transition to E-mobility in Rwanda	▪ (Partnership) Built partnership with following stakeholders: - (Government) Ministry of Infrastructure (MININFRA), Ministry of Environment (MoE), Rwanda Environmental Management Authority (REMA), Rwanda Utilities Regulatory Authority (RURA), Rwanda Transportation Development Agency (RTDA), etc. - (Partners) the Wrold Bank, AFD, KOICA, The Export-Import Bank of Korea, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Conducted technical assessment of charging infrastructure for Kigali e-buses and produced a pre-feasibility study report. - Conducting technical assessment of introducing e-buses on major bus routes and ITS in Kigali city. - Plan to develop transport projects with relevant resources organizations including GCF, AFD, The Export-Import Bank of Korea, etc. ▪ (Approach) - Supporting to link e-buses to ITS for improving public transport services.
	Jordan – Integrated adoption of electric mobility	▪ (Partnership) Built partnership with following stakeholders: - (Government) Ministry of Environment, Ministry of Transport, Ministry of Tourism and Antiquities, Ministry of Energy and Mineral Resources, Ministry of Finance, Ministry of Environment, Climate Change Department and Green Economy Unit, Petra Development and Tourism Region Authority (PDTRA), etc. - (Partners) the World Bank, AFD, UNIDO, GCF, IFC, EBRD, GEF, Tourism Transport Companies represented by the Jordan Tourism Transport Association, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar.

		- Conducted technical assessment of introducing e-buses on BRT routes in Amman and produced a pre-feasibility study report and a GCF concept note. - Conducted technical assessment of introducing e-buses for toursim buses in Petra and produced a pre-feasibility study report. - Mobilizing financial resources from GEF-7 for technical assistant and capacity building activities. - Mobilizing financial resources for introducing electric mobility for tourism in collaboration with GCF, EBRD, IFC, UNIDO, etc. ▪ (Approach) - Supporting to link e-buses to BRT for improving public transport services in Amman. - Supporting to conceptualize e-mobility projects for Petra.
Latin America	**Mexico** – Renovating Mexico City e-bus fleet renovation	▪ (Partnership) Built partnership with following stakeholders: - (Government) Governemnt of Mexico City, etc. - (Partners) Metrobus, C40, ICCT, the National Bank for Public Works and Services (BANOBRAS), World Resources Institute Mexico (WRI Mexico), the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), the Faculty of Architecture of the National Autonomous University of Mexico (UNAM), Local Governments for Sustainability (ICLEI), etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation to relevant stakeholders. - Plan to conduct technical assessment of deploying e-buses in Mexico City's Metrobus Line 3. - Mobilizing financial resources for introducing electric buses in Mexico City in collaboration with BANOBRAS, GCF, etc. ▪ (Approach) - Supporting to introduce e-buses on major bus routes for improving public transport services in Mexico City.
	Ecuador - Shifting to electrification of the transport sector through a reliable/efficient clean energy network	▪ (Partnership) Built partnership with following stakeholders: - (Government) Municipality of the Metropolitan District of Quito (MDMQ), Ministry of Environment of Quito, etc. - (Partners) the Wrold Bank, The Export-Import Bank of Korea, National Transit Agency (ANT), Metropolitan Institute of Urban Planning (IMPU), Metropolitan Public Company of Mobility and Public Works (EPMMOP), Municipal Public Company of Quito Metro (EPMMQ), Municipal Public Company of Passenger Transport of Quito (EPMTPQ), Public bicycle system in Quito (BiciQuito), Metropolitan Transit Agency (AMT), etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation to relevant stakeholders. - Plan to conduct technical assessment of introducing e-buses and ITS on major bus routes in Quito. - Mobilizing financial resources for introducing electric buses in Quito in collaboration with the World Bank, The Export-Import Bank of Korea, etc. ▪ (Approach)

		- Supporting to introduce e-buses on major bus routes for improving public transport services in Quito.
Pacific	**Fiji –** Transpforming Fiji buses to electric	▪ (Partnership) Built partnership with following stakeholders: - (Government) Permanent Secretary, Ministry of Economy, Ministry of Commerce, Trade, Tourism and Transport: Department of Transport, Fiji Bureau of Statistics (FBoS), Fiji Revenue and Customs Services, Land Transport Authority, Fiji Roads Authority, etc. - (Partners) Fiji Development Bank (FDB), GCF, etc. ▪ (Activities) Conducted and delivered following outputs: - Provided several consultation and capacity building to relevant stakeholders in the forms of workshop and seminar. - Produced a policy brief which is highlighting the main features and options for the development of a new vehicle standard, upgrading the vehicle standard to match to ensure compatibility with the new/updated fuel standards (Euro V). - Supported to develop the Long-Term Low-Emission Development Strategy (LT-LEDS), which identifys electric vehicles as a key strategy to reduce emissions. - Developed the GCF concept note for transforming Fiji buses to electrification in collaboration with Ministry of Economy (NDA) and Fiji Development Bank (DAE). - Plan to conduct technical assessment of introducing e-buses on major bus routes in Fiji. - Mobilizing financial resources for introducing electric buses in Fiji in collaboration with GCF, Fiji Development Bank, etc. ▪ (Approach) - Supporting to introduce e-buses on major bus routes for improving public transport services in Fiji.

GGGI has mainly supported its members apply e-mobility solutions to a high-quality bus-based transit system such as bus rapid transit (BRT) and intelligent transportation systems (ITS). For instance, GGGI has assessed the financial and environmental opportunity of shifting the baseline choice of vehicles from diesel Euro IV emissions standard to electric buses for Agence Française de Développement (AFD) to consider the introduction of electric buses on their BRT B2 line in the city of Addis Ababa. Specifically, feasibility studies on the introduction of electric buses were completed in Cambodia, Ethiopia, Jordan, Lao PDR, Myanmar and Nepal. Policy recommendations and/or project preparatory studies that support e-mobility, public and sustainable transport have been developed in cooperation with governments such as for example recommendations on technical standards for electric vehicles in Lao PDR, or Low Emission Development Strategy (LEDS) for land transport in Fiji. Throug this activities, GGGI has supptored the transformatin of Members toward low-carbon and resilient transportation to maximize their green growth outcomes and NDC implementation.

To successfully increase the attention of electric mobility in members' NDCs, it is necessary to connect NDC targets more closely with long-term decarbonization targets and policies. Ambitious targets for electrified transportation will send a strong signal both to industry and citizens. Many countries establish national electric car deployment targets, in particular Europe. In recent years these targets increasingly have been accompanied by more practical instruments including roadmap and guidelines to achieve 100% EV sales or stock. To contribute to developing more detailed e-mobility implementation plans and bringing clarity to the scope of the actions, GGGI supports its member governments to establish the roadmap and guidelines for e-mobility and electric vehicle supply equipment (EVSE). An overview of the detailed components of the roadmap and guidelines in decarbonizing transport for member countries is provided in the below table 5 (policy instruments and components for electrification of transportation).

Table 7 Policy instruments and components for electrification of transportation

Recommendations	Action list	
 EV targets in NDC	• Ambitious transport targets	• CO_2 reduction targets in the transport sector
		• EV deployment targets
	• Financial mobilization targets	• Financing plans for EVs
 EV Roadmap or Strategy	• Regulations	• Motor vehicle emission standards
		• GHG reduction legislations
	• Vehicle electrification	• Light-duty EV deployment plan
		• Medium and Heavy-duty EV deployment plan
	• Charging infrastructure expansion	• Residential charging infrastructure
		• Workplace charging infrastructure
		• Fleet charging infrastructure
	• Electric utilities and the grid	• Electricity rates
		• Grid infrastructure upgrades
		• Electricity production
	• Incentive schemes	• Financial incentive measures
		• Non-financial incentive measures
	• Funding mechanisms	• National financial programs
		• International funding resources
	• Education, marketing, and outreach	• Campaign and programs for dealers, manufactures and buyers
	• Innovation	• EV technology R&D programs
		• Standardize interoperability between EVs and EVSE
		• Smart charging strategy to fit the power mix (renewable energy)
 EV Policy	• Tax measures	• Registration tax/fee
		• Ownership tax/fee
		• Income/corporate Tax
	• Direct subsidy measures	• Direct subsidy for EVs
		• Direct subsidy for EVSE
		• Enhanced access to financing scheme
	• Non-financial measures	• Ease of access to EV charging for consumers
		• Parking incentives
		• Toll free waivers
		• Fleet promotion
		• Awareness
 EV guidelines	• EV guidelines	• Technology selection and specifications
		• Personnel training and development
		• Operation and Maintenance
		• Data monitoring and evaluation
		• Safety (codes and standards)
	• EVSE guidelines	• Site identification and design
		• Electricity rates (energy, demand, and time-of use charges)
		• Technology selection and specifications
		• Personnel training and development
		• Operation and Maintenance
		• Data monitoring and evaluation
		• Safety (codes and standards)

Nepal E-Mobility Case

The Electric Mobility Program (EMP)

The Government of Nepal has initiated a range of policy and regulatory action to proactively engage with the imperative challenges in transport sector. The Nationally Determined Contributions (NDCs) prepared and submitted by the government of Nepal to the United Nations Framework Convention on Climate Change (UNFCCC) includes important targets for electric mobility improvement as a critical driver to achieve general reduction in GHG emissions such as increasing the sales of electric vehicles to 25% of all private passenger vehicles sales by 2025; increasing sales of e-vehicles to cover 90% of all private passenger vehicle sales by 2030; and by 2030, developing 200 km of the electric rail network to support public commuting and mass transportation of goods. The government has also adopted a robust policy framework to support sustainable public transport and electric mobility. A summary of this policy landscape is presented below.

- National Sustainable Transport Strategy (NSTS) (2015). The strategy emphasizes that escalating hydropower generation in the country will provide numerous opportunities to integrate electric vehicles (EVs), both for passenger and freight transport, into the transport system (UNCRD, 2015).
- Environment Friendly Transport Policy (2014). It sets specific targets related to clean transport including increasing the share of "environment friendly vehicles" to a minimum of 20% of the total vehicle fleet by 2020 and encourage manufacturing of environment friendly vehicles, which include electric vehicles.
- National Transport Policy (2001). It is an overarching policy document which is aimed at providing clean transport services (powered by gas, electricity and solar) in order to manage air and noise pollution levels in Nepal, particularly from public transport, in addition to building sustainable transport infrastructure.

In this line, GGGI has been working under the guidance of the Ministry of Forests and Environment, and in partnership with the Ministry of Physical Infrastructure and Transport, to deliver the Electric Mobility Program (EMP). Phase 1 of this program spanned 2017-18 and involved the production of a 'National Action Plan for Electric Mobility', a pre-feasibility study for deploying electric buses, and the development of a set of investment projects for electric mobility. Phase II of this program spanned 2019-20 and involved the production of a 'Bagamati Province Electric Mobility Strategy 2020-2028', 'Going green: technical and investment analytics for Sajha Yatayat's first electric bus fleet', 'Celebrating Nepal's heritage with electric mobility' and a summary note on 'India-Nepal electric mobility knowledge exchange'. Phase III of this program has been allowed to span 2021-22.

GGGI has been supporting the government implement a range of ambitious targets for sustainable and clean transportation since 2017. In particular, GGGI has achieved following outputs in close partnership with the government:

- Nationally Determined Contribution Action Plan for Electric Mobility in 2018 - In this output, GGGI aimed to develop actions to accelerate implementation of targets specific to electric vehicles, outlined in Nepal's Nationally Determined Contribution (NDC). These actions will pertain specially to improving governance, mitigating greenhouse gas emissions, improving monitoring, reporting as well as verification and increasing visibility to financing tools to increase the share of electric vehicles in the transport sector.

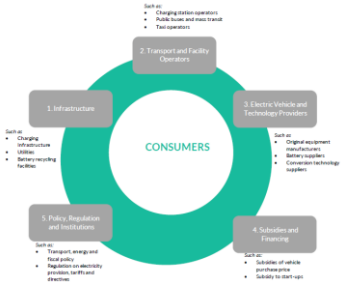
PM KP Sharma Oli launched the 'National Action Plan for Electric Mobility.'

National Action Plan for Electric Mobility

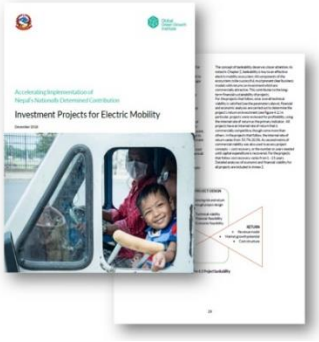
While many of the policy origins of the NDC have progressed, as policy efforts in their own right, systematic NDC-focused progress has yet to fully emerge. As such, this action plan has been formulated by the GGGI to facilitate action for the achievement of transport provisions laid out under the NDC. In this action plan, GGGI recommended the following priority actions for electric mobility:

- To overcome the barriers, three strategic actions should be prioritized at the national level including setting up a national taskforce for electric mobility, designing and implementing a national program for electric mobility and establishing a national financing vehicle for electric mobility.
- A Unit for Electric Mobility as a unit within an existing government entity or a quasi-independent government entity will act as a centralized regulatory and promotional entity providing oversight to financial and program initiatives.
- A National Program for Electric Mobility comprising a suite of regulatory, institutional, financing and legislative measures will facilitate public and private acquisition of electric vehicles, invest in infrastructure, push for operational progress and refine legislation.
- A National Financing Vehicle will manage and disburse financial support to promote infrastructure, innovation and entrepreneurship for electric mobility.
- A range of contributing initiatives to support greater electric mobility in Nepal should be implemented. These range across a) policy and governance; b) infrastructure and markets; c) financing and resources; and d) data and monitoring and are designed to act as targeted, specific interventions.

- Pipeline of Bankable Projects in 2018 – The fundamental goal of this pipeline was to provide concrete investment project opportunities to support implementation of the National Action Plan for Electric Mobility. This current Investment Plan builds off the project ideas initially conceived within the scope of the National Action Plan. This output was designed to introduce bankable project ideas concerning electric vehicles in the transport sector. The project design will be optimized according to availability of investment opportunities.



Components of an ecosystem for e-mobility



Investment Projects for Electric Mobility

These investment projects seek to provide investors with investment-ready opportunities in the clean energy and clean technology space. Most projects offer the possibility of solid financial performance, as well as environmental and social benefits:

- Deploying Midsize Electric Bus Fleet in Kathmandu Valley - Midsize electric buses are entirely battery powered and can access both larger highways and smaller feeder roads to service an estimated 600,000 monthly passengers in the areas.
- Deploying an Electric Trolley Bus System in Kathmandu Valley - New generation electric trolley buses draw power from overhead lines or catenaries, but also have the ability to go 'off-line' for short stretches of route.
- Upscaling Electric Vehicle Battery Leasing for Three-Wheelers - 714 electric three-wheelers, called safa tempo, operate in Kathmandu and date to the early 1990s, including outdated lead acid batteries.
- Upscaling and Monetizing Public Access Charging Stations - Deployment of 10 stations charging stations by the public power utility in partnership with a major retail outlet is a way to enable widespread adoption of private electric vehicles.
- Establishing and Valorizing Battery Recycling - Over 24,000 tons of spent lead-acid batteries are discarded every year due to no domestic battery recycling facilities in the country, all spent batteries are taken to India.
- Converting Fossil Fuel Taxis to Electric Taxis - An estimated 10,000 taxis provide transport services across Kathmandu. Taxi operators see hybrid-electric taxis as an attractive alternative, due to its significant savings in operations and maintenance.
- Establishing an SME Financing Facility for Electric Mobility - A central fund to provide debt and equity financing to electric mobility start-ups, provide subsidy to private consumers who buy electric vehicles, and develop electric mobility infrastructure would generate multiple benefits.

- Electric Bus Pilot Initiative in 2018 – GGGI was partnering with Sajha Yatayat, Kathmandu's largest public bus operator, to seek opportunities to deploy electric buses in Sajha Yatayat's fleet. This pre-feasibility study reports on the results of an extensive analysis undertaken by GGGI, in consultation with Sajha Yatayat, the Department of Roads and Transport Management, the Kathmandu Municipal Corporation, and the Asian Development Bank.

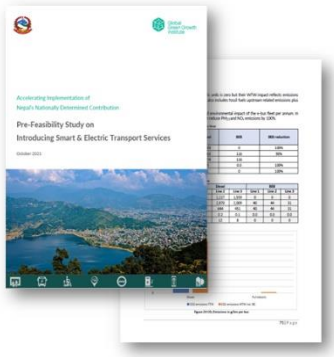
Pre-Feasibility Study on Deploying Electric Buses in the Kathmandu Valley

To seek operational feasibility, a total cost of ownership analysis was undertaken comparing the e-bus options with the current diesel bus operating on the Lagankhel-Budanilkantha route.

- The analysis found that the diesel bus was the most expensive over the lifetime of the vehicle, due to higher operational and maintenance cost, and significant social and environmental costs.
- Among the electric buses, the Ashok Leyland Circuit bus was the costliest option – indeed costlier than the current diesel model. Both BYD buses are cheaper than diesel buses. The BYD K9 bus is 24% cheaper than diesel and the BYD K7 is 39% cheaper.

Cost component (NPR)	Bus models			
	Diesel (Viking)	Electric (K7)**	Electric (K9)**	Electric (Circuit)**
Acquisition cost***	3,198,345	23,104,100	30,618,500	42,738,500
Lifetime fuel cost	13,087,901	2,861,036	2,861,036	2,861,036
Lifetime maint. cost	6,576,587	3,288,293	3,288,293	3,288,293
Economic cost	10,393,303	-	-	-
Social cost	11,723,683	-	-	-
Environmental cost	3,338,927	-	-	-
Total (NPR)	**48,318,746**	**29,253,429**	**36,767,829**	**48,887,829**
Total (USD)*	**470,027**	**284,566**	**357,664**	**475,563**
% cheaper than diesel	-	39%	24%	-1%

- Pre-Feasibility Study on Introducing Smart & Electric Transport Services in 2021 - GGGI conducted a pre-feasibility study to assess the financial and environmental opportunity of shifting the baseline choice of vehicles from diesel Euro IV emissions standard to electric buses (E-buses) in Pokhara Metropolitan City.



Pre-Feasibility Study on Introducing Smart & Electric Transport Services

Based on the proposal of the use of 12m electric buses (250 kWh high-capacity battery) on the three routes, GGGI produced following results for identifying cost-effective solutions to enhance the connectivity to this tourist destination and other urban destinations:

- Economic NPV of incremental economic benefits from emissions reduction is calculated as USD 114,574 per bus, and EIRR is 26%, which is higher than WACC 10% (the hurdle rate).
- The GHG impact TTW (direct) of electric units is zero as well as reducing PM2.5 and NOx emissions by 100%.

Financial and Economic Calculations	Diesel	BEB
CAPEX bus (inc. 1 time battery replacement)	12,480,000	9,804,927
CAPEX bus infrastructure	0	936,000
Incremental total CAPEX		-1,739,073
OPEX savings year p.a		2,049,760
Economic savings p.a		319,194
Financial NPV		5,872,252
FIRR		21%
EIRR		26%
MAC per tCO_2 non-discounted (WTW)		-50
MAC per tCO_2 discounted (WTW)		-189

Dr. Lasse Ringius
Country Representative – Nepal and GIS Global Practice Lead, GGGI

Since 2017, GGGI has been promoting the establishment of an electric mobility ecosystem in Nepal for climate action and green growth through building government policy, planning and capacity at all levels and supporting transport operators to procure and deploy electric vehicles. By promoting the introduction of electric mobility, GGGI will be supportive of the achievement of NDC in Nepal.

Ethiopia E-Mobility Case

Pre-Feasibility Study on Introducing Low-Carbon Buses on BRT B2 Line in Addis Ababa

To address increased congestion, greenhouse gas emissions, incidence of road accidents, and deteriorating local air quality in the capital city of Addis Ababa, the Government of Ethiopia (GoE) has decided to implement a bus rapid transit (BRT) B2 line that delivers fast, comfortable, and cost-effective services at metro-level capacities. The project's initial route will develop a 17.4 km long bus lane including 12 km of dedicated corridor. The line will have a capacity of 5,400 passengers per hour in each direction and to reach more than 400,000 residents. Also, vehicles will be expected to meet a minimum diesel Euro IV emissions standard. The BRT project has already closed financing through securing an €85 million sovereign concessional loan from Agence Française de Développement (AFD), which covers infrastructure, including the required interchanges and traffic management systems, as well as shelters. There are another 14 planned BRT corridors in Addis Ababa and therefore, scale-up opportunities.

The project of this B2 line of the BRT network (17.4 km) is developing along a North/South axis crossing Addis-Ababa, breaking down in five main sequences defined according to their specificities and types of work on the section.

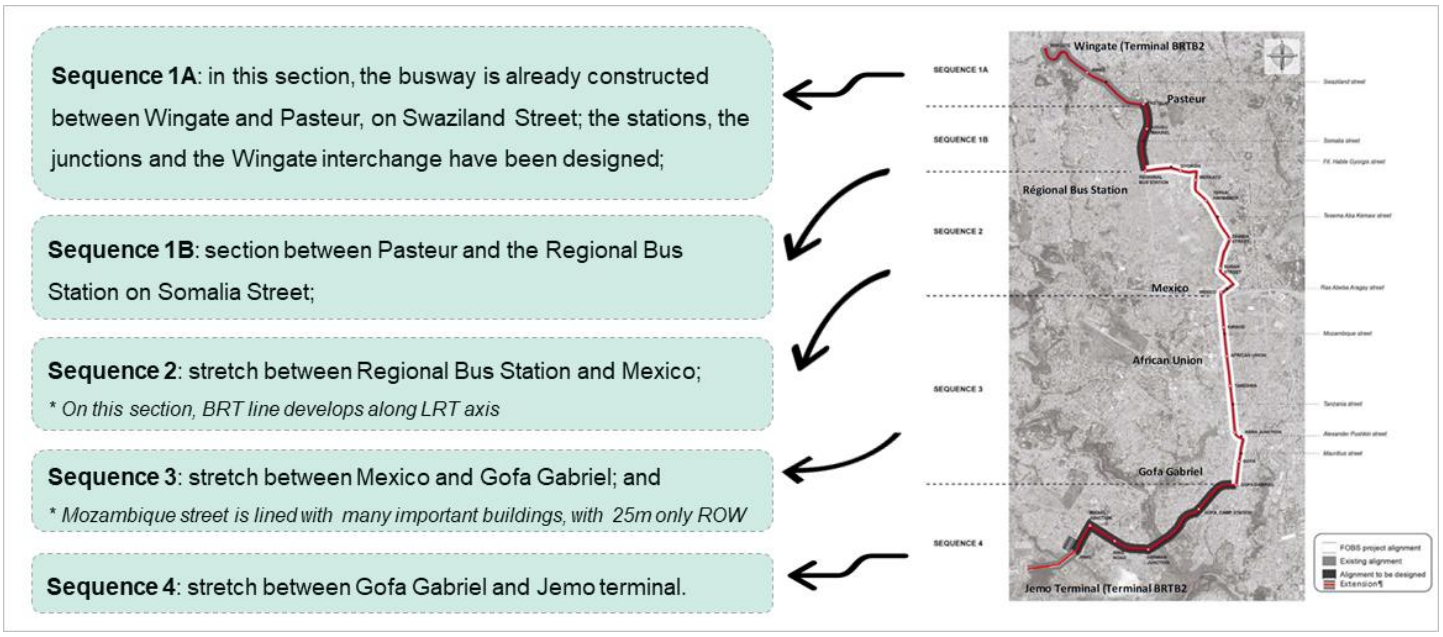
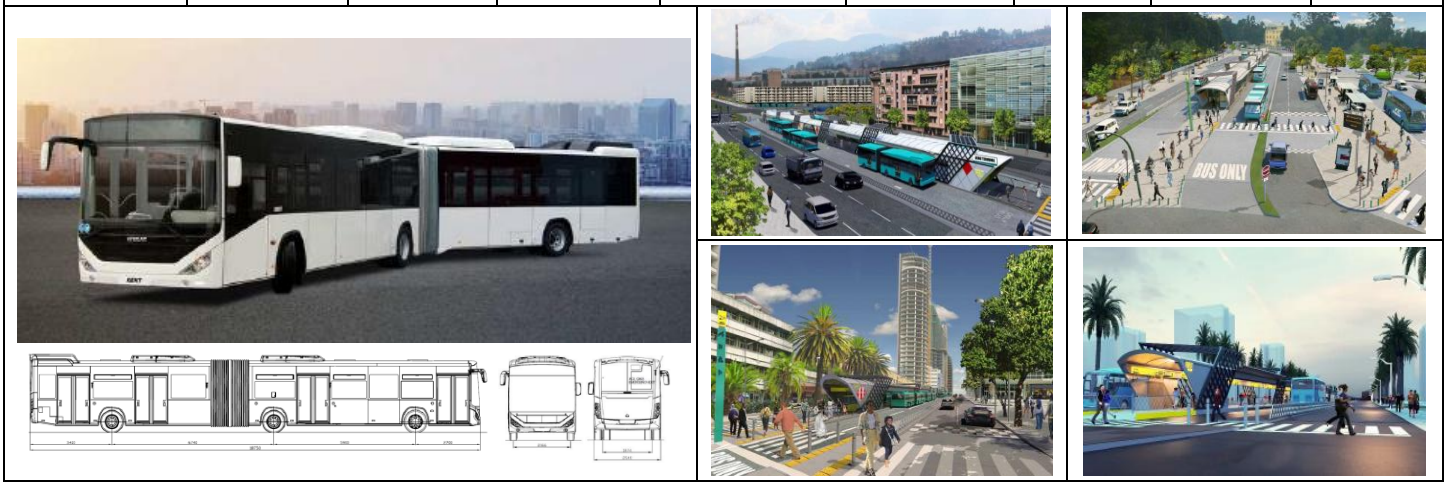


Figure 13 BRT B2 Line Typical Cross-Sections

It is important that the services are properly integrated, with regular headways on both individual services and on the combined services on each section of the busway, and with compatibility of vehicle types. Based on a possible operation scenario in AFD's Operation Plan Note for the BRT B2 line, GGGI and AFD agreed that GGGI would undertake a pre-feasibility study to assess the financial and environmental opportunities of shifting the baseline choice of vehicles from diesel Euro IV emissions standard to electric buses.

Table 8 BRT B2 Line E-Bus Operation Plan

Bus Capacity (pax)	Round Trip (mins)	Buses Per Hour	Headway (min)	Operating Speed (km/h)	Route Length (km)	PVR (no.)	15% Spare (no.)	Total (no.)
130	122	36.9	1.6	19	17.4	76	12	88



Source: AFD detailed design – Final Report

The full electric bus will reduce up to 51% of WTW CO_2 emissions compared to that of diesel and has no PM2.5 and NOx emissions. TTW emission of a full electric bus is none, there is only upstream emission from the electricity production. Both hybrid bus options also show a reduction in emissions. TTW emissions plug-in hybrid shows more reduction 41% compared to 23% of hybrid-diesel; however, WTT emissions hybrid diesel shows 67% of reduction while plug-in hybrid only reduces 11%. The full comparison in emissions for the three possible low-carbon options can be seen in the chart below.

Table 9 Environmental Impacts of E-Buses

Emissions per annum in tons	CO_2 emissions TTW	CO_2 emissions WTW incl. BC	CO_2 emissions WTT incl. BC	PM2.5 emissions	NOx emissions
Diesel 18M	12540.81	20380.94	7840.13	7.34	92.27
BEB 18M	0.00	9970.29	9970.29	0.00	0.00
Hybrid 18M	9656.42	12214.95	2558.52	5.65	71.05
Plug-in 18M	7439.64	14430.37	6990.73	4.36	54.74

- Tank-to-Wheel (TTW): the subrange of fuel supply from production of the energy source to fuel supply.
- Well-to-Wheel (WTW): the assessment of the environmental impact of a given product or service throughout its lifespan.
- Well-to-Tank (WTT): an average of all the GHG emissions released into the atmosphere from the production, processing and delivery of a fuel.
- Particulate matter (PM) 2.5: fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.
- Nitrogen oxide (NOx): a chemical compound of oxygen and nitrogen that is formed by reacting with each other during combustion of fuel such as oil, diesel, gas, and organic matter.

GGGI has conducted an initial economic and environmental assessment of the propose Project over a 16-year time horizon that considered: (i) fuel savings and (ii) carbon savings. This analysis included the additional costs of battery renewal in approximately 8 years. Results suggest that the project would yield an Economic Net Present Value of (ENPV) US$ -25.9 million at a 10% discount rate with an Economic Rate of Return (ERR) of -1%. It is expected to reduce 14,615 tonCO_2/year in option 1 or 13,052 tonCO_2/year through introducing e-buses on suggested routes.

Table 10 Financial/Economic Impacts of E-Buses

Financial and Economic Calculations	Bus Operation Plan			
	Diesel	BEB	Hybrid	Plug-in
CAPEX bus (inc. 1 time battery replacement)	37,520,000	70,697,990	69,516,432	80,604,615
CAPEX bus infrastructure	0	3,999,000	0	3,064,000
Incremental total CAPEX	0	37,176,990	31,996,432	46,148,615
OPEX savings year p.a.	0	4,980,131	1,343,046	1,955,076
Economic savings p.a.	0	782,098	518,305	418,743
FNPV	0	-25,922,790	-5,402,943	-11,028,903
FIRR	0	-3%	-2%	-3%
EIRR	0	-1%	4%	0%
MAC per tCO_2 non-discounted (WTW)	0	156	55	124
MAC per tCO_2 discounted (WTW)	0	51	34	98

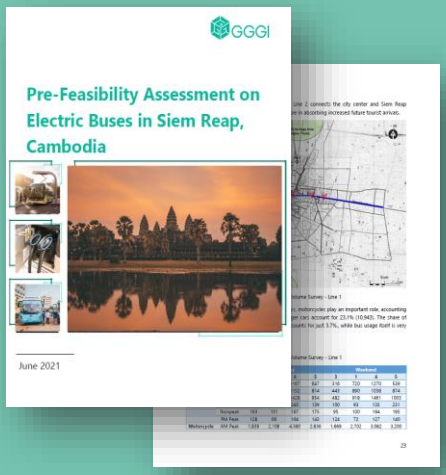
- Capital expenditure (CAPEX): funds to acquire, upgrade, and maintain physical assets such as property, plants, buildings, technology, or equipment.
- Operating expenses (OPEX): the day-to-day expenses to keep the business operational.
- Net present value (NPV): the difference between the present value of cash inflows and the present value of cash outflows over a period of time.
- Financial internal rate of return (FIRR): an indicator to measure the financial return on investment of an income generation project.
- Economic internal rate of return (EIRR): an indicator for project benefits and returns from the perspective of the national economy.

Introducing e-buses can solve critical urban issues such as traffic congestion, GHG emissions, and air pollution caused by the increased use of fossil fuel-based private vehicles in the city. As it would be the first case to introduce the e-bus solution in the country, it is critical to assess the enabling environment and potential challenges such as financial resources, governance & regulation, energy infrastructure and alignment with public transport service. The key bottleneck of introducing electric mobilities identified in developing countries is how to secure financial resources and financial viability of green and inclusive business models.

The most common method for financing e-buses is self-financing combined with government grants, as it is the case for conventional public bus procurement. In Europe and the US, for example, grants from regional, national, and federal levels are provided to cover part of e-bus purchase costs, while funding from the bus operator and the local/state government fills the financing gap. This would not be a feasible option for many developing countries including Ethiopia, particularly in consideration of the large upfront cost of e-buses. To alleviate this issue, alternative financing models are being developed including a leasing scheme to reduce substantial upfront cost for purchasing buses; public sector investment in the form of equity, subsidy, or in-kind contribution to attract co-financing from MDBs, donors, and private partners, climate finances including GCF and NAMA, MDB engagement which has reported that the eight largest MDBs offered $4.7 billion for climate change mitigation in the transport sector in 2016, and private sector participation that can be considered for the e-bus operations as a concessionaire.

Dr. Gemedo Dalle Tusssie
Country Representative – Ethiopia, GGGI

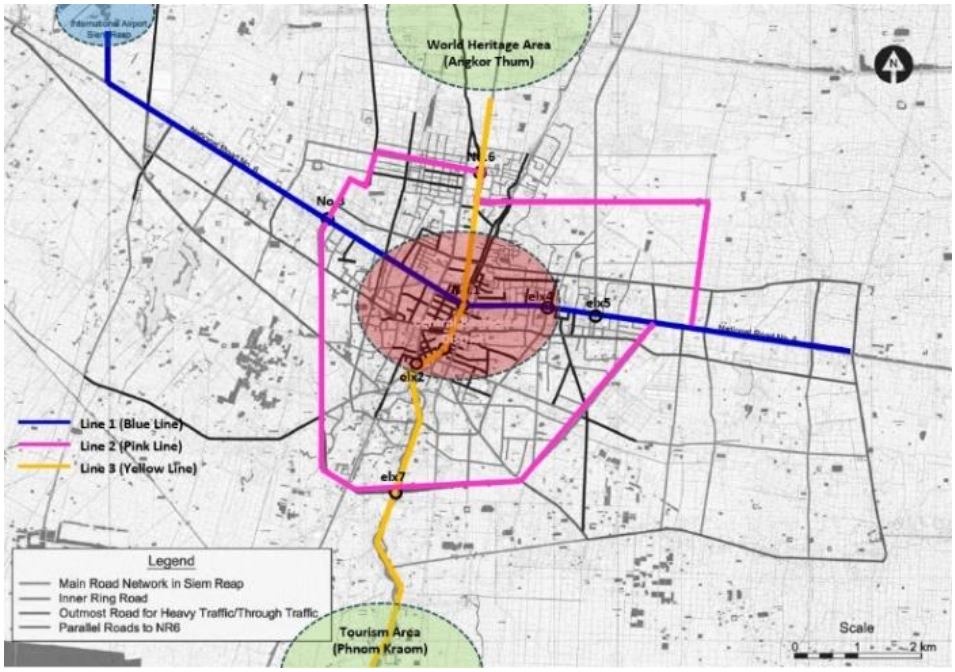
The Ministry of Transport and Logistics of Ethiopia has demonstrated its commitment to create a climate resilient transport infrastructure and services with clear targets including: (i) making future of transport infrastructure projects more resilient to climate change; (ii) de-carbonizing the Country's fleet by introducing 4,850 electric buses and 148,000 small vehicles. In this regard, I am proud of GGGI to support this effort through the assessment of the introduction of electric buses on BRT B2 line in the City of Addis Ababa.

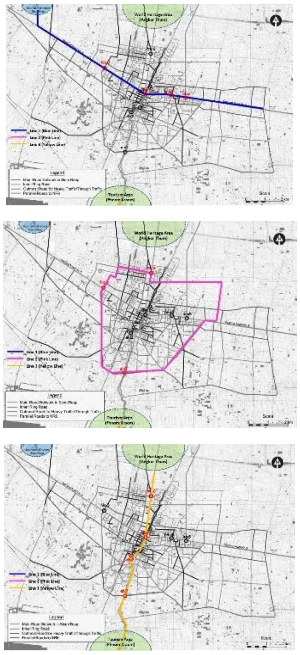


Cambodia E-Mobility Case

Pre-Feasibility Assessment on Electric Buses in Siem Reap

Siem Reap City is the second largest city in Cambodia and the most popular tourist destination in the country where the World Heritage Site of Angkor is located. Increased tourism (pre-COVID19) have been generating negative environmental impacts including high levels of GHG emissions and traffic congestion, which calls for introducing a set of mitigation measures including sustainable transport systems such as electric public buses and for considering smart transport systems. Requested by the Department of Urban Public Transport (DUPT), this study assesses technical, environmental, and financial feasibility of introducing three new bus lines as a pilot project using low carbon vehicles. Three bus lines are suggested by the DUPT as shown in the below figure.





- *Line 1 (blue) is the National Road No. 6 connecting Siem Reap airport to the city center area, playing an important role in meeting tourists' demands.*
- *Line 2 (pink) is a ring road around the adjacent area of city center, Central Business District (CBD) fringe and APSARA cultural/tourism zone.*
- *Line 3 (yellow) will be used as a service road linking CBD and world heritage areas including Angkor Thum and Phnom Kraom, creating urban structure as a service town of key tourist destinations.*

Figure 14 Map of 3 Bus Routes in Siem Reap

To address traffic and environmental issues and to enhance transport services in Siem Reap, GGGI reviews a set of e-bus technology options and recommends 12-meter battery electric buses (BEB) with the plug charging system as optimal for the

proposed three lines in Siem Reap, considering the local conditions, e.g. low traffic demand with less than 200km daily distance driven, and economic aspects (lower infrastructure cost). Siem Reap bus operation services are planned based on the information provided by DUPT as below:

Table 11 E-Bus Operation Plan

Parameter	Unit	Route 1	Route 2	Route 3	Total
Route length	km	13.66	20.32	15.05	49.03
Headway bus	minutes	10	14	10	
Average speed	km/h	19	19	19	
Stand time per side	minutes	6	6	6	
Cycle time	minutes	98	140	107	
Reserve buses	percentage	10%	10%	10%	
Fleet required at peak time	buses	10	10	10	30
Fleet including reserve units	buses	11	11	11	33
Passenger capacity 12m bus	passengers	80	80	80	
Annual distance driven per buses	km	90,000	90,000	90,000	
				Power: 240 kW Bus length: 12 m Bus capacity: 80 people Charging: 70 mins (250 kWh) Driving range: 300 – 350 km Battery Capacity: 256 kWh Battery: Lithium polymer	

Source: HYUNDAI and CIRCONTROL

The following table shows the expected environmental impact of the electric fleet (BEB) per annum and over the lifetime of the buses in comparison to the diesel baseline. Overall CO_2 emissions including black carbon are reduced by 43%, and PM2.5 and NOx emissions reduced by 100%. In addition, the introduction of electric buses will decrease reliance on imported fossil fuels and build Siem Reap's image as an e-mobility leader in the region.

Table 12 Environmental Impacts of E-Buses

Emissions per annum	Diesel		BEB		BEB reduction		
	Per line	3 lines	Per line	3 lines	%	annum	lifespan
CO_2 emissions TTW direct	1,225	3,674	-	-	100%	3,674	58,785
CO_2 emissions WTT incl. BC	356	1,069	901	2,703			
CO_2 emissions WTW incl. BC	1,581	4,743	901	2,703	43%	2,040	32,645
PM2.5 emissions	0.1	0.3	-	-	100%	0.3	5
NOx emissions	7	21	-	-	100%	21	331

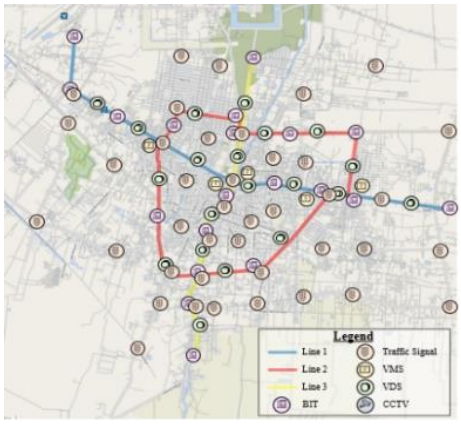
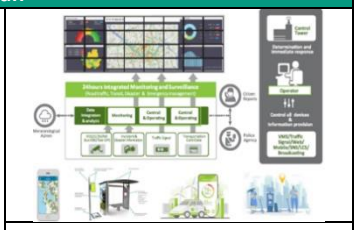
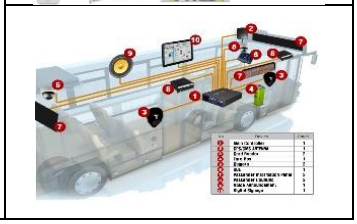
The financial assessment is conducted to compare incremental costs and savings of e-buses with those of diesel vehicles, while economic assessment is carried out from the perspective of the entire economy and evaluate projects overall economic benefits, e.g., emissions reduction, to the society. The below table shows that although the BEB option would require additional capital expenditures compared to diesel vehicles, operating a fleet of e-buses is financially and economically more attractive over the lifespan, presenting the positive financial net present value (appx. USD 2 million in total cost savings) and economic net present value (appx. USD 3.3 million net economic benefits).

Table 13 Financial/Economic Impacts of E-Buses

Item	Diesel	BEB
CAPEX bus (inc. 1 time battery replacement)	6,427	11,333
CAPEX bus infrastructure	0	594
Incremental total CAPEX		5,501
OPEX savings year p.a.		1,011
Economic savings p.a.		96
FNPV		1,991
ENPV		3,298
FIRR		17%
EIRR		20%
MAC per tCO_2 non-discounted/discounted (WTW)		-65/-321 USD

GGGI recommends introducing the Intelligent Transportation System (ITS) which will be applied in the area of EV charging facilities. The proposed traffic control center hosting the intelligent traffic management system is able to monitor the performance of the e-buses as well as their charging status. A traffic signal system and an Advanced Traffic Management System (ATMS) will be useful to improve the provision of traffic information and alleviation of traffic congestion. Traffic congestion in Siem Reap could be alleviated by providing a bypass route through ATMS and interlocking traffic signals. By providing bus information to citizens through a Bus Information System (BIS), users' satisfaction could be improved, and demand for public transport services could be increased. In consideration of the current transport conditions and the effectiveness of full electric mobility, GGGI provide ITS deployment plan as follows:

Table 14 Smart System Deployment Plan for E-Buses

System	Component	No.	Unit	Deployment Plan
Center	H/W	1	Set	  
	S/W	1	Set	
	N/W	1	Set	
	Interior	1	Set	
BIS/ BMS	BIT	20	ea.	
	OBE	33	ea.	
ATMS	Traffic Signal	40	ea.	
	VMS	5	ea.	
	VDS	20	ea.	
	CCTV	5	ea.	

Source: Seoul TOPIS

Ms. Karolien Casaer-Diez
Country Representative – Cambodia, GGGI

GGGI has been supporting the Government of Cambodia to promote sustainable transport through the deployment of smart management systems and low-carbon transport mobility, recognizing that the transport sector is expected to have the largest increase and share of GHG emissions by 2050 in the country. I believe that GGGI's intervention in Siem Reap could be a catalyst for the decarbonization of the transport sector.

CHAPTER 6: CONCLUSIONS & RECOMMENDATIONS

6.1. CONCLUSIONS

NDCs are national climate plans that highlight a country's climate targets, plans, and actions. To implement solutions in response to climate change, 194 countries have submitted their first NDCs, and 11 parties have submitted their second NDCs being updated with long-term emission reduction strategies. Although the electrification of transportation is one of the megatrends in the market and climate change sector, it is true that a diverse set of countries is currently unable to integrate a more comprehensive picture of e-mobility distribution measures into their NDCs and transport development plans.

This report outlines 44 NDCs covering 44[38] GGGI members and partners, of which almost 70% of member countries have submitted or updated their first NDC between 2020 and 2021 while others communicated their first NDC between 2016 to 2019, right after the COP21. 36 members and partners explicitly mention the transport sector as part of their mitigation and/or adaptation strategies in their NDCs, of which 30% (11 members and partners) include specific transport mitigation targets. The majority of transport actions are expressed in terms of road transport while 7 members (Angola, Colombia, Fiji, Papua New Guinea, Paraguay, Sri Lanka, Vanuatu) include maritime action plans as part of their transport sectoral targets. Angola, Colombia, and Sri Lank see maritime transport as a complementary measure to solve accessibility utilizing abundant costal lines and rivers for trade and tourism.

Electrification of the transport sector is one of the key elements in decarbonizing the transport sector; however, only 36% of members and partners included relevant targets in their NDCs. Some members including UK, and Norway, have EV targets as a part of a separate comprehensive and elaborated transport sector policy and action plans, however, do not included a specific EV target in their NDCs. In order to encourage the members to consider the adoption of electric mobility as one of their long-term decarbonization strategies, GGGI plans to keep supporting the assessment of the case for shining a light on how transport electrification can play an important role in GHG emissions reductions in the transport sector. All members with EV targets except for Colombia and Costa Rica included renewable energy targets as a part of their NDCs to also decarbonize both direct and indirect emissions in transport sector, the upstream emission related to electricity generation.

As a facilitating partner for members' transition into electricity-based mobility, GGGI has been actively supporting its members implement e-mobility projects and programs, providing needs assessment & stakeholder engagement, technical assistance, resource mobilization, and knowledge sharing. To increase public and private sector capital flows toward the creation of the e-mobility enabling environment in member countries, GGGI has designed its own e-mobility approaches such as linking e-mobility solutions to transport infra projects, applying an e-mobility component to relevnat projects, and establishing innovative financial mechanisms for the private sector, and has intervened in a seismic market shift to electrification of transportation in 15 member countries.

[38] There are 39 members to GGGI, with one of its members being the OECS which consists of 11 countries. However, only 6 of the OECS members have submitted their NDC, therefore, this report analyzes a total of 44 NDCs.

6.2. RECOMMENDATIONS

Based on the activities across the different member countries, it has been identified there is the continued need for the combination of measures including policy and regulatory framework, finance, business model, and capacity building in support of national strategy for promoting and managing an e-mobility transition in a sustainable manner that enhances overall welfare by nurturing an integrated, safe, clean, and affordable multi-modal transport system. In line with that, this report recommends following measures for the electrification of transportation in GGGI member and partner countries:

- **(Policy and Regulatory Framework)** It is recommended to establish a combination of fiscal (tax breaks and direct subsidy) and non-fiscal incentives to facilitate the adoption of e-mobility in the early stage. Most of tax exemptions for e-mobility are currently offered in many countries to consumers and the industry at the early stage of the adoption of e-mobility. Direct subsidy to vehicles and electricity tariffs is the most visible type of incentive for the EV purchase credit. These fiscal incentives reduce upfront costs of the e-mobility acquisition and help scale up the production and services in a nascent e-mobility industry. Non-fiscal incentives such as special lane access and exemption from driving restrictions and road charges should be properly designed and applied to influence purchase decisions of customers. From the perspective of the project development, more emphasis should be given to the preparation of transport sector master plan at the early stage that will facilitate planning and developing affordable and efficient multi-dimensional transport system which GGGI has multiple embedded working experience and successful project stories in the past.
- **(Business Model)** It is important to understand the sustainable business models so that relevant stakeholders are able to find a systematic way to unlock long-term value while fostering the shared responsibilities among vehicle manufacturers, charging service providers, and users. For instance, a financial leasing company who purchases and owns the vehicles and leases them to bus operators is going to make the operators confident of the fleet renewal to e-buses. At the end of the leased e-buses, the manufacturers will collect the waste batteries for recycling and disposal and the bus body for scrappage and metal recycling. The bankable and sustainable development of business model will be a key entry point to ensure more potential stakeholders' participation in GGGI-led low carbon transport projects.
- **(Finance)** It is difficult in developing countries to mobilize financial resources for several reasons including huge upfront costs and failure to match the risk and reward appetite of investors. These financial obstacles can be overcome with helping design innovative financial mechanisms that reduce and possibly mitigate risks and overcome other barriers. For instance, green bonds are one of the most innovative options for member countries to tap into given its acceptability in the international markets, availability of local standards and variety of purposes it may serve. GGGI's best practice model of low carbon transport projects have invited many potential financing partners in the public sector including multilateral development Banks and bilateral development partners. GGGI is also planning to enhance the public private partnership through participation of interested private sector stakeholders.
- **(Capacity Building)** GGGI's member and partner countries are interested in developing their capacities to manage their own transformation of the mobility systems in a sustainable manner. Sharing of knowledge lessons and experience through capacity building, institutional relationships and partnerships and knowledge networks will drive learning, understanding, reduce knowledge gaps and ultimately facilitate action on sustainable transport development. It is also recommended to enhance the institutional capacity of responsible stakeholders for properly dealing with the quality of e-mobility services during the course of project administration.

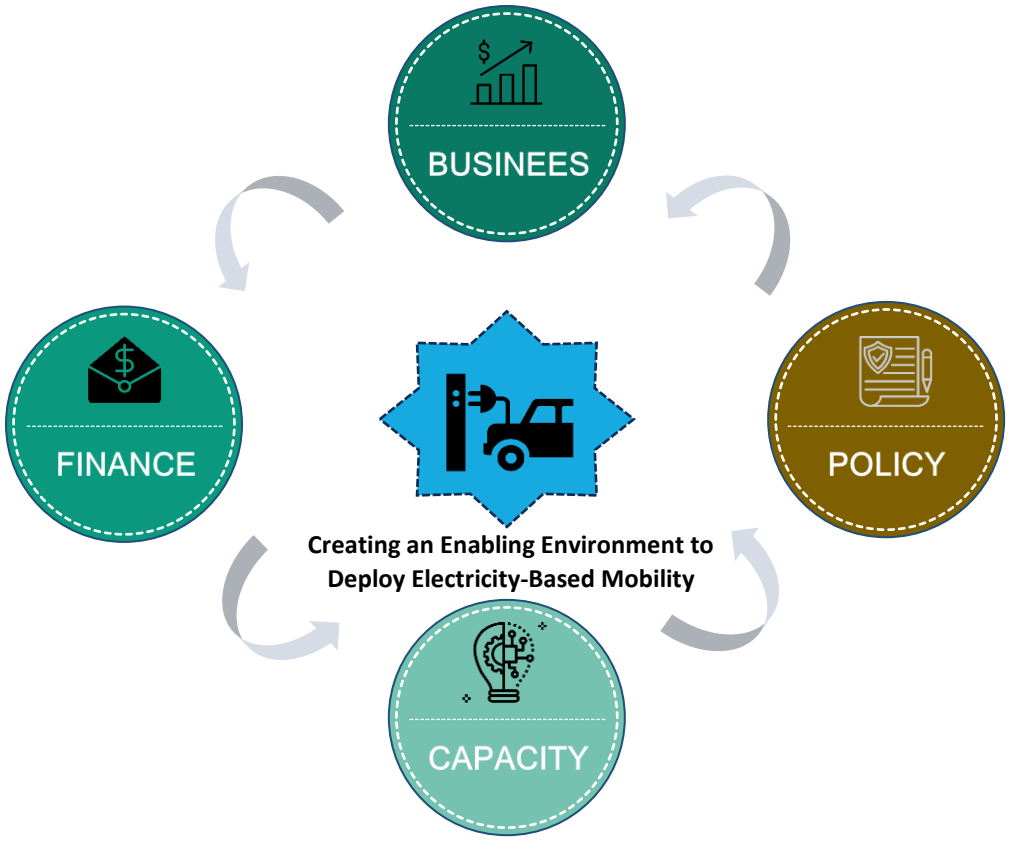


Figure 15 Recommended Measures for Promoting and Managing an E-Mobility Transition

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APPENDIX – OVERVIEW OF TRANSPORTATION UNDER MEMBERS' NDCs

Angola

Nationally Determined Contribution (May 2021)

Unconditional reduction of GHG emissions by 14% compared to BAU projections by 2025

Conditional reduction of additional 10%, with a total of 24% reduction of GHG emissions compared to BAU projections by 2025

Transportation Sector

Conditional target to introduce 4,000 natural gas buses, with a reduction potential of 13.18 CO_2e (kt/ano) by 2030

Raise awareness of the use of public transportation

Renewable Energy

Unconditional measures with forecasted reductions

- 100 MW mini hydro (194.2 $ktCO_2e$)
- 100 MW small-scale solar panels (PV) (2.76 $ktCO_2e$)
- 100 MW wind farms (154.71 $ktCO_2e$)
- 104 MW large-scale solar power plants (PV) (159.58 $ktCO_2e$)
- 500 MW biomass plants (2,102ktCO2e)
- 700 MW hydroelectric power stations (3,247,67 $ktCO_2e$)

Conditional measures with forecasted reductions

- 2 MW small-scale solar panels in the industry (5.52$ktCO_2e$)
- 15 MW small-scale solar panels (20.88 $ktCO_2e$)
- 100 MW wind farms (154.71 $ktCO_2e$)
- 104MW large-scale solar power plants (PV) (159.5858$ktCO_2e$)
- 150MW mini hydro (291.3 $ktCO_2e$)
- 187MW small-scale solar panels (258$ktCO_2e$)
- 500MW biomass plants (2,102$ktCO_2e$)
- 2,000 solar lamps on the streets (1.55 $ktCO_2e$)
- 2,050MW hydroelectric power stations (9,511.05 $ktCO_2e$)

General Information

GDP (billions, 2020)
USD 62.31

GDP per capita (2020)
USD 1,895.77

Total population (2020)
32,866,268

Population growth rate (2020)
3.22%

Urbanization rate (2020)
66.83%

Urban growth rate (2020)
4.19%

Transport Sector

Total registered vehicles
2,080,000

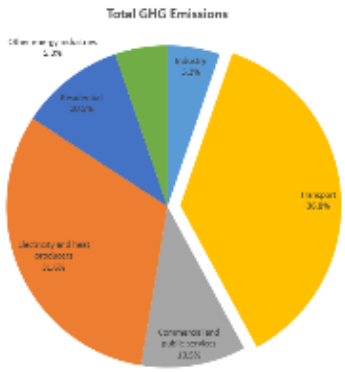
Annual Growth rate (2018-2019)
13.9%

Annual Fuel Consumption
Gasoline 327 megaliters

Road Condition
Total 76,000 km (18% paved)

Electric Vehicles and LCT
Total EV 1300+

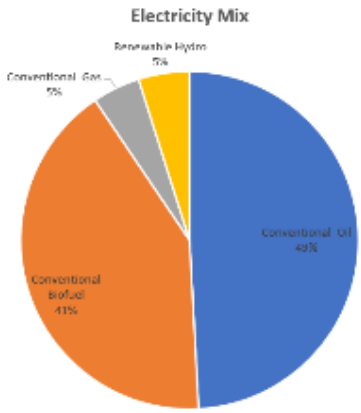
GHG Emissions (IEA)



Total emissions (2018)
19 $MtCO_2e$

Transport sector emissions (2018)
7 $MtCO_2e$ (36.8%)

Energy Sector



Electricity Mix (2019)
Oil 7,559 Ktoe
Biofuel 6,369 Ktoe
Hydro 751 Ktoe
Gas 702 Ktoe

RES Target
8,491 MW by 2030

Antigua and Barbuda

Nationally Determined Contribution (September 2021)

Target to be net-zero by 2040

Transportation Sector

Conditional targets

- By 2020, establish efficiency standards for the importation of all vehicles
- By 2025, change fiscal policies regarding fossil fuels in the transport sector to support the transition to 100% renewable energy generation
- By 2030, ban importation of new internal combustion engine vehicles (start year 2025)

Low Carbon Transport and EV

Conditional targets

- By 2030, 100% of all new vehicle sales to be electric vehicles
- By 2035, 100% of government vehicles to be electric

Renewable Energy

Conditional targets by 2030

- 86% of renewable energy generation from local resources
- 100 MW of renewable energy generation capacity available to the grid
- 50 MW of renewable energy generation owned by farmers who can sell electricity to off-takers
- 100 MW of renewable energy generation capacity owned by social investment entities
- 20 MW of wind-powered energy generation
- 100% renewable energy generation for all government operations
- 100% of fixtures and appliances in government buildings will be energy efficient
- Elimination of the fuel surcharge tax on electricity bills

General Information

GDP (billions, 2020)

USD 1.42

GDP per capita (2020)

USD 14,450

Total population (2020)

97,928

Population growth rate (2020)

0.83%

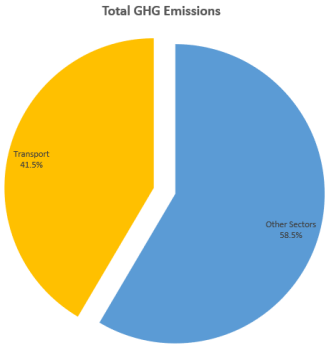
Urbanization rate (2020)

24.43%

Urban growth rate (2020)

0.54%

GHG Emissions (ClimateWatchData)



Total emissions (2018)

0.53 $MtCO_2e$

Transport sector emissions (2018)

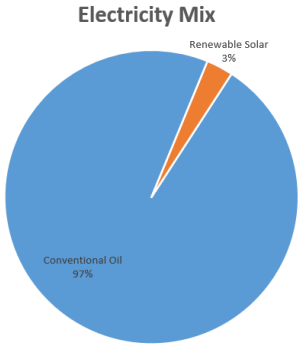
0.22 $MtCO_2e$ (41.5%)

Transport Sector

Total registered vehicles (2016)

36,030

Energy Sector



Electricity Mix (OurWorldinData, 2019)

Oil 28.37 Ktoe (0.33 TWh)

Solar 0.86 Ktoe (0.01 TWh)

RES Target

By 2030, achieve matrix with 50 MW of electricity from renewable sources, both on and off grid and in the public and private sectors

By 2030, meet 100% of electricity demand from essential services through off-grid renewable sources

Australia

Nationally Determined Contribution (December 2020)

Reduction of GHG emissions by 26 – 28% below 2005 levels by 2030

Transportation Sector

A new ***Technology Co-Investment Fund*** to support businesses in different sectors, including transport, to adopt technologies that increase productivity and reduce emissions

Low Carbon Transport and EV

Future Fuels Package will enable businesses to start integrating new vehicle technologies into their fleets, and address blackspots in public charging and refueling infrastructure

Renewable Energy

33,000GWh per year until 2030

Green Transportation Plans & Policies

Technology Co-Investment Fund

The **Future Fuels Fund** is a $71.9 million initiative announced in the 2020-21 federal budget to remove barriers to the uptake of new vehicle technologies. Round 1 aims to support the growing number of Australian motorists with EVs with a charging network across regional and capital cities, while subsequent rounds will focus on increasing EV charging capacity in regional areas, reducing barriers to transition. The Future Fuels Fund is a $71.9 million initiative announced in the 2020-21 federal budget to remove barriers to the uptake of new vehicle technologies. Round 1 aims to support the growing number of Australian motorists with EVs with a charging network across regional and capital cities, while subsequent rounds will focus on increasing EV charging capacity in regional areas, reducing barriers to transitioning business fleets and increasing the use of hydrogen and biofuels in the transport sector.

General Information

GDP (billions, 2020)
USD 1,330.90

GDP per capita (2020)
USD 51,812.15

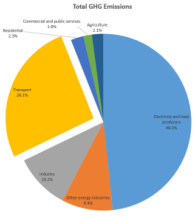
Total population (2020)
25,687,041

Population growth rate (2020)
1.26%

Urbanization rate (2020)
86.24%

Urban growth rate (2020)
1.39%

GHG Emissions (IEA)



Total emissions (2018)
383 $MtCO_2e$

Transport sector emissions (2018)
100 $MtCO_2e$ (26.1%)

Transport Sector

Total registered vehicles
29,358,458

- *Gasoline 23,457,407*
- *Diesel 5,901,051*

Annual Growth rate (2019-2020)
1.5%

Annual Fuel Consumption
Gasoline 16,179 megaliters
Diesel 16,212 megaliters

Road Condition
Total 817,000 km (43% paved)

Electric Vehicles and LCT
Total EV 20,000 (0.01%)

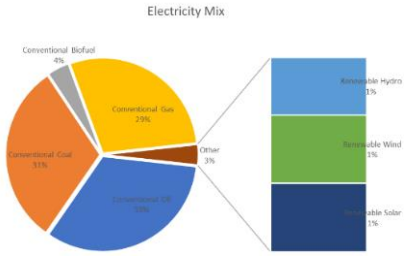
- 4-wheel 16,000
- 2-wheel 4,000

Charging Facilities
More than 2,500

EV Policies
Plans to convert 50 buses to electric in 2021
Free registration fee for 2 years in Capital Territory
Removal on ownership fee in Capital Territory

Direct Subsidies
Low-emission vehicles eligible for a plug-in grant

Energy Sector



Electricity Mix (2019)
Oil 43,687 Ktoe
Coal 40,909 Ktoe
Gas 38,331 Ktoe
Biofuel 4,941 Ktoe
Hydro1,350 Ktoe
Wind 1606 Ktoe
Solar 1606 Ktoe

RES Target
33,000GWh per year until 2030

Burkina Faso

Nationally Determined Contribution (November 2016)

Unconditional reduction of GHG Emissions by 6.6% below 2007 levels by 2030

Conditional reduction of additional 5%, with a total of 11.6% below 2007 levels by 2030

Transportation Sector

Unconditional contributions to reduce 0.42% compared to BAU in trade sector by 2030

Conditional reduction of 42% below 2007 levels by 2030

- 30% reduction in fuel consumption in 2025
- Replace 10% of super grade petrol consumption in 2030
- Replace 5% of diesel consumption with hydrocarbons by 2030

Renewable Energy

- Commitment to promote renewable energy by eliminating fossil fuel subsidies and, subsidizing investments in renewable energy
- Implementation of adaptation measures to diversify energy sources (solar, wind, biogas)

General Information

GDP (billions, 2020)
USD 17.37

GDP per capita (2020)
USD 830.93

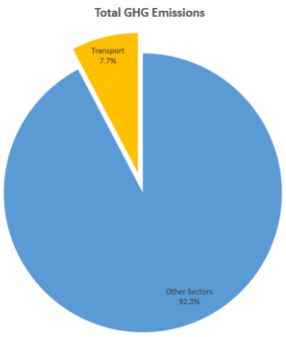
Total population (2020)
20,903,278

Population growth rate (2020)
2.82%

Urbanization rate (2020)
30.61%

Urban growth rate (2020)
4.89%

GHG Emissions (ClimateWatchData)



Total emissions (2018)
28.37 $MtCO_2e$

Transport sector emissions (2018)
2.19 $MtCO_2e$ (7.7%)

Transport Sector

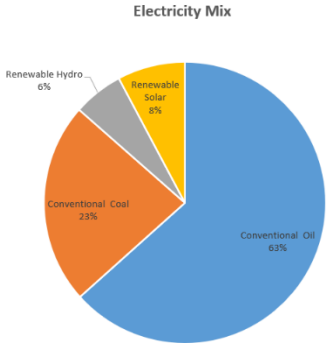
Total registered vehicles (2017)
2,705,000

Annual Growth rate (2019-2020)
2.42%

Annual Fuel Consumption (2016)
Gasoline 3.65 megaliters

Road Condition (2001)
Total 15,202 km (20% paved)

Energy Sector



Electricity Mix (2019)
Oil 35.08 Ktoe
Coal 12.8 Ktoe
Solar 4.3 Ktoe
Hydro 3.18 Ktoe

RES Target
Remove fossil fuel subsidies
Diversify Invest in the production of sustainable energy
Diversify energy sources

Cambodia

Nationally Determined Contribution (December 2020)

Conditional reduction of GHG emissions by 27% below 2010 levels by 2030

Transportation Sector

Conditional mitigation projects

- Operate 30 vehicle inspection centers by 2030
- Promote integrated public transport systems by 2030
- Shift long distance freight movement from trucks to train

Low Carbon Transport and EV

Develop E-mobility program

Renewable Energy

Mitigation project

- By 2030, 25% of the energy mix to be from renewable sources (solar, wind, hydro, biomass)

General Information

GDP (billions, 2020)

USD 25.29

GDP per capita (2020)

USD 1,512.73

Total population (2020)

16,718,971

Population growth rate (2020)

1.4%

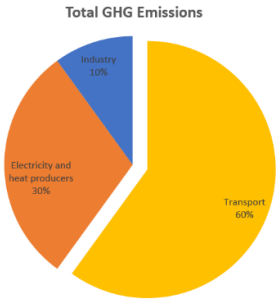
Urbanization rate (2020)

24.23%

Urban growth rate (2020)

3.18%

GHG Emissions (IEA)



Total emissions (2018)

10 $MtCO_2e$

Transport sector emissions (2018)

6 $MtCO_2e$ (60%)

Transport Sector

Total registered vehicles

4,520,000

- *Gasoline 3,444,240*
- *Diesel 1,075,760*

Annual Growth Rate (2018-2019)

15.6%

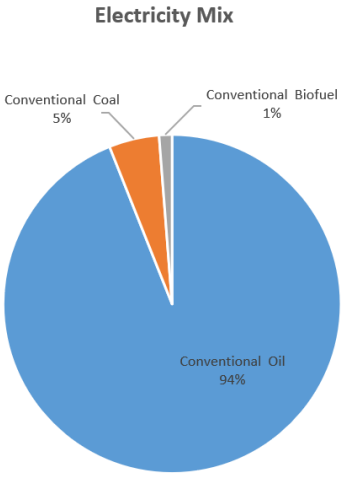
Annual Fuel Consumption

Gasoline 831 megaliters

Road Condition

Total 61,534 km (18% paved)

Energy Sector



Electricity Mix (2019)

Oil 78,126 Ktoe

Coal 3,998 Ktoe

Biofuel 1,025 Ktoe

RES Target

25 % of the renewable energy in the energy mix (solar, wind, hydro, biomass) by 2030

Colombia

Nationally Determined Contribution (December 2020)

Commitment to emit a maximum of 169.44 million tCO_2eq in 2030 and reduce black carbon emissions by 40% compared to 2014 levels

Transportation Sector

Unconditional targets by 2030

- Modernization of 57,000 freight vehicles
  - Potential reduction of 1,028,100 tCO_2eq
- Shifting road cargo transport to fluvial along Magdalena River, transporting 8 million tons of cargo per year
  - Potential reduction of 197,100 tCO_2eq
- Reactivate the railway La Dorada – Chiriguaná – Santa Maria and achieve to transport 4.2 million tons of cargo per year
  - Potential reduction of 112,100 tCO_2eq

Conditional target by 2030

- Increase the modal share of bicycle by 5.5%
  - Potential reduction of 126,100 tCO_2eq

Low Carbon Transport and EV

Unconditional target

- Develop regulations and incentives to accelerate the transition to electric mobility to reach registration of 600,000 EVs by 2030
  - Potential reduction of 4,041,987 tCO_2eq

Renewable Energy

Conditional target

- Diversify the energy mix and promote self-generation of energy through alternative sources
  - Potential reduction of 11.2 $MtCO_2e$

General Information

GDP (billions, 2020)
USD 271.35

GDP per capita (2020)
USD 5,332.77

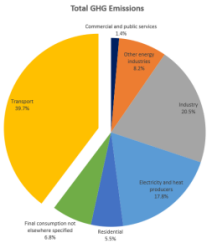
Total population (2020)
50,882,884

Population growth rate (2020)
1.07%

Urbanization rate (2020)
81.43%

Urban growth rate (2020)
1.47%

GHG Emissions (IEA)



Total emissions (2018)
73 $MtCO_2e$

Transport sector emissions (2018)
29 $MtCO_2e$ (39.7%)

Transport Sector

Total registered vehicles
15,606,000

Annual Growth rate (2018-2019)
13.8%

Annual Fuel Consumption
Gasoline 654 megaliters
Diesel 569 megaliters

Road Condition (2015)
Total 206,727 km

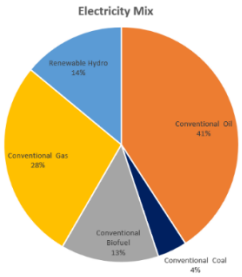
Electric Vehicles and LCT
Total EV 22,874

- Only 203 fully electric
- Bus 443

Charging Facilities
275

Direct Subsidies
Discount on the technical mechanical check-ups

Energy Sector



Electricity Mix (2019)
Oil 14,997 Ktoe
Gas 10,146 Ktoe
Hydro 5,153 Ktoe
Biofuel 4,952 Ktoe
Coal 1,493 Ktoe
Others 6 Ktoe

RES Target
Reduction of 11.2 $MtCO_2e$ by diversifying energy mix with RE

Costa Rica

Nationally Determined Contribution (December 2020)

Unconditional target of maximum absolute net emissions of 9.11 $MtCO_2e$ in 2030 including LULUCF

Transportation Sector

Costa Rica is committed to developing a mobility system based on active mobility and a safe, efficient public transport system, powered by renewable energy and accessible to all people, including those with disabilities; with a fleet of zero-emission light vehicles and efficient freight transport

- By 2030, technology substitution and energy efficiency measures in the passenger, cargo and industrial transport sectors will reduce black carbon emissions by 20% compared to 2018 emissions

Low Carbon Transport and EV

Costa Rica offers the following contributions

- Operation of the Limonense Electric Freight Train (TELCA) by 2022
- By 2025, the country will have adopted standards to migrate towards a zero-emission motorcycle fleet and the stabilization of the growth of the motorcycle fleet
- By 2030, at least 8% of light vehicles will be electric
- Operation of the Electric Passenger Train in the Greater Metropolitan Area, powered by renewable electric energy

Renewable Energy

Costa Rica offers the following contributions

- To achieve and maintain 100% renewable electricity generation by 2030
- To create a strategy for the development and promotion of green hydrogen

General Information

GDP (billions, 2020)
USD 61.52

GDP per capita (2020)
USD 12,076.81

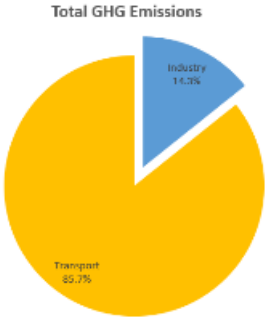
Total population (2020)
5,094,114

Population growth rate (2020)
0.92%

Urbanization rate (2020)
80.77%

Urban growth rate (2020)
1.78%

GHG Emissions (IEA)



Total emissions (2018)
7 $MtCO_2e$

Transport sector emissions (2018)
6 $MtCO_2e$ (85.7%)

Transport Sector

Total registered vehicles
1,794,658

Annual Growth rate (2019-2020)
2.08 %

Annual Fuel Consumption
Gasoline 1,295 megaliters
Diesel 1,232 megaliters

Road Condition
Total 35,330 km (24% paved)

Electric Vehicles and LCT
Total EV 3,106 (0.17%)

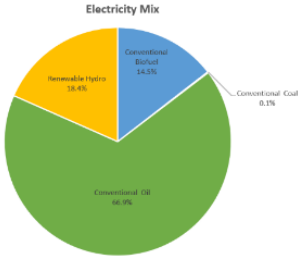
- 4-wheel 2,904
- 2-wheel 187
- Bus 15

Charging Facilities
120

EV Policies
Property tax exemption for 5 years

Direct Subsidies
Special line of credit for acquisition of EVs that incorporate programs for new buses
100% custom tax exemption

Energy Sector



Electricity Mix (2019)
Oil 2,608 Ktoe
Hydro 717 Ktoe
Biofuel 567 Ktoe
Coal 5 Ktoe

RES Target
100% renewable electricity generation by 2030

Cote d'Ivoire

Nationally Determined Contribution (October 2016)

Reduction of GHG emissions by 28% compared to BAU projections by 2030

Transportation Sector

Conditional measures

- Improve mobility and develop low carbon transport options, including private and public transport
- Support municipalities in the development of urban transport projects
- Incentivize the disposal of high polluting vehicles

Low Carbon Transport and EV

Conditional measures

- Facilitate and incentivize the purchase of low-emission vehicles

Renewable Energy

Conditional measures

- Increase the share of renewable energy in the electricity mix to 42% by 2030
- Develop energy production from renewable sources
  - Develop incentive framework
  - Facilitate investment in renewable energy projects

General Information

GDP (billions, 2020)
USD 61.35

GDP per capita (2020)
USD 2,325.72

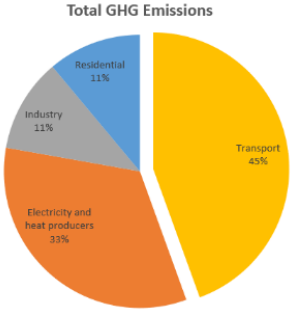
Total population (2020)
26,378,275

Population growth rate (2020)
2.54%

Urbanization rate (2020)
51.71%

Urban growth rate (2020)
3.45%

GHG Emissions (IEA)



Total emissions (2018)
9 $MtCO_2e$

Transport sector emissions (2018)
4 $MtCO_2e$ (44.4%)

Transport Sector

Total registered vehicles
600,000

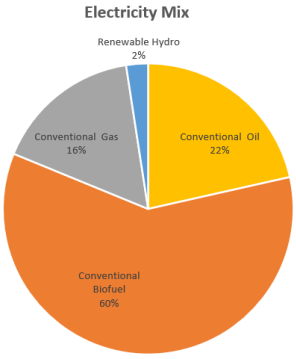
Annual Growth rate (2019-2020)
9%

Annual Fuel Consumption
Gasoline 717 megaliters

Road Condition
Total 86,400 km (12% paved)

EV Policies
Incentivize purchase of low-emission vehicles

Energy Sector



Electricity Mix (2019)
Biofuel 6,257 Ktoe
Oil 2,251 Ktoe
Gas 1,716 Ktoe
Hydro 255 Ktoe

RES Target
Increase share of RE in the electricity mix to 42% by 2030

Denmark

Nationally Determined Contribution (December 2020)

Reduction of GHG emissions by at least 55% below 1990 levels by 2030

Transportation Sector Mitigation

Regulation (EU) 2019/631

- By 2030, reduce CO_2 emissions per kilometer from passenger vehicles by 37.5% below 2021 levels
- By 2030, reduce CO_2 emissions per kilometer from new vans by 31% from 2021 levels

Low Carbon Transport and EV

Directive (EU) 2019/1161 → Promotion of clean and energy-efficient road transport vehicles

- Minimum procurement targets for the share of clean light-duty vehicles
  - 37.4% by 2030
- Minimum procurement targets for the share of clean heavy-duty vehicles in the total number of heavy-duty vehicles by 2030
  - Trucks 15%; buses 65%

Renewable Energy

Directive (EU) 2018/2001 → Promotion of the use of energy from renewable sources

Increase share of renewable energy in final energy consumption to at least 32% by 2030 (almost double from 2017 levels)

General Information

GDP (billions, 2020)
USD 355.18

GDP per capita (2020)
USD 60,908.84

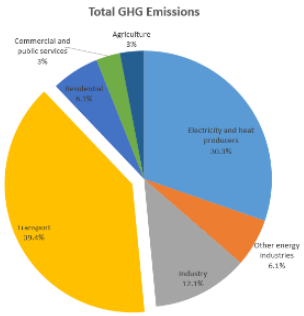
Total population (2020)
5,831,404

Population growth rate (2020)
0.29%

Urbanization rate (2020)
88.12%

Urban growth rate (2020)
0.43%

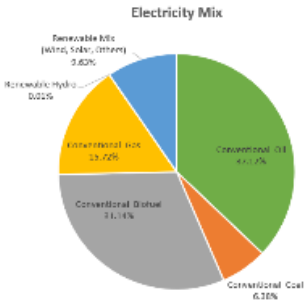
GHG Emissions (IEA)



Total emissions (2018)
33 $MtCO_2e$

Transport sector emissions (2018)
13 $MtCO_2e$ (39.4%)

Energy Sector



Electricity Mix (2019)
Oil 5,943 Ktoe
Biofuel 4,986 Ktoe
Gas 2,517 Ktoe
Renewable Mix 1,542 Ktoe
Coal 1,022 Ktoe
Hydro 1 Ktoe

RES Target
Increase share of RE in final energy consumption to 32%

Transport Sector

Total registered vehicles
3,081,749

- *Gasoline 2,061,690*
- *Diesel 924,525*

Annual Growth Rate (2019-2020)
1.6%

Annual Fuel Consumption
Gasoline 253.27megaliters

Road Condition (2017)
Total 74,849 km (100% paved)

Electric Vehicles and LCT
Total EV 18,490 (0.06%)

- Bus 116

Charging Facilities
758

EV Policies
Tax reductions based on fuel and electric power consumption.
PHEVs and BEVs are granted a further reduction up to DKK 40,000
PHEVs and BEVs have the lowest circulation tax

Dominica

Nationally Determined Contribution (September 2016)

Conditional reduction of GHG emissions by 44.7% below 2014 levels by 2030

Transportation Sector

Conditional reduction of GHG emissions by 16.9% below 2014 levels by 2030

Low Carbon Transport and EV

Potential emission reduction of 12Gg by

- Introducing policies that, when replacing government vehicles, they will be replaced by hybrids vehicles
- Incentivizing private sector to buy hybrid vehicles when replacing current vehicles

Renewable Energy

Proposed **conditional** mitigation measures with forecasted reduction

- New Geothermal Generation Plants (39.3Gg)
- Energy Efficiency (EE) Program (5.2 Gg)
- Solar Photovoltaic (PV) conversion program for Hotel Sector (0.24Gg)
- Solar Photovoltaic (PV) conversion program for Commercial, Institutional and Manufacturing Facilities (0.86Gg)
- Off-Grid Hybrid Micro-Hydro, Wind, Solar PV, DG Back-up for Ross University (1.71Gg)
- Off-Grid Hybrid Wind, Solar, Biodiesel Generator Back-up in Off-grid Mini-Grid Configuration for South-East and East Coast (three separate projects) (2.92Gg)
- Replace Streetlights in Portsmouth with Off-grid Light Emitting Diode (LED) Fixtures (0.36Gg)

General Information

GDP (billions, 2020)
USD 0.47

GDP per capita (2020)
USD 6,526.79

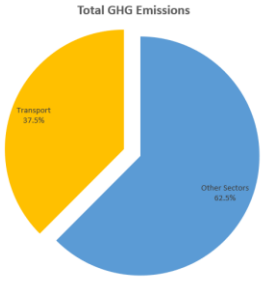
Total population (2020)
71,991

Population growth rate (2020)
0.25%

Urbanization rate (2020)
71.09%

Urban growth rate (2020)
0.68%

GHG Emissions (ClimateWatchData)



Total emissions (2018)
0.16 $MtCO_2e$

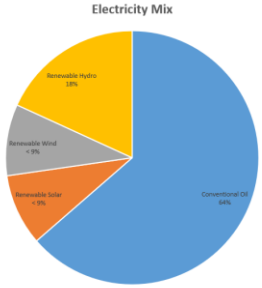
Transport sector emissions (2018)
0.06 $MtCO_2e$ (37.5%)

Transport Sector

Total registered vehicles (2016)
35,796

EV Policies
When replacing government vehicles, replace with hybrid vehicles
Incentivize private sector to purchase hybrid when replacing current vehicles

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Oil 6.02 Ktoe (0.07 TWh)
Hydro 1.72 Ktoe (0.02 TWh)
Solar <0.86 Ktoe (<0.01 TWh)
Wind <0.86 Ktoe (<0.01 TWh)

Ecuador

Nationally Determined Contribution (March 2019)

Unconditional reduction of GHG emissions by 9% below 2010 levels by 2025

Conditional reduction of additional 11.9%, with a total of 20.9% by 2025

Transportation Sector Mitigation

Unconditional contribution to enhance efficiency in public transportation by operating the Quito Metro (22km) and Cuenca Tram (12km)

Conditional contribution to reduce GHG emissions in cargo transportation and passenger transport in Quito, Guayaquil and Cuenca

Renewable Energy

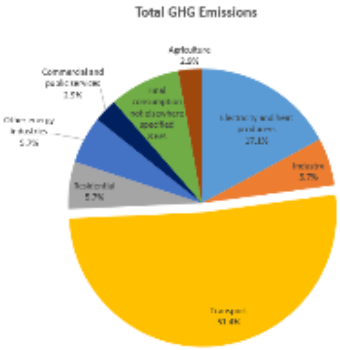
Unconditional mitigation actions to promote the use of renewable energy by enhancement of wind, solar and biogas energy from landfills

Conditional mitigation actions to promote the use and development of renewable energy, guaranteeing full accessibility

General Information

GDP (billions, 2020)
USD 98.81
GDP per capita (2020)
USD 5,600.39
Total population (2020)
17,643,060
Population growth rate (2020)
1.54%
Urbanization rate (2020)
64.17%
Urban growth rate (2020)
1.82%

GHG Emissions (IEA)



Total emissions (2018)
35 $MtCO_2e$
Transport sector emissions (2018)
18 $MtCO_2e$ (51.4%)

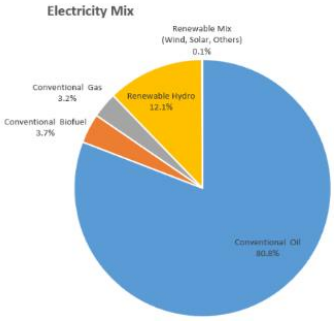
Transport Sector

Total registered vehicles
2,311,960
Annual growth rate (2018-2019)
-3.81%
Annual Fuel Consumption
Gasoline 4,912 megaliters
Road Condition (2015)
Total 43,216 km (19% paved)
Electric Vehicles and LCT
Total EV 485

- Bus 20

Charging Facilities
24
EV Policies
VAT tax exemption on EVs which purchase price do not exceed US$40,000
Direct Subsidies
Microcredits from a state-owned financial institution with interest rate of 9.8% for 2 – 5 years
The National Finance Corporation provides funding for electric public transport projects. The credit lines are up to US$20 million, with interest rates from 7.5% and a term of up to 15 years

Energy Sector



Electricity Mix (2019)
Oil 11,832 Ktoe
Hydro 1,778 Ktoe
Biofuel 543 Ktoe
Gas 470 Ktoe
Renewable Mix 13 Ktoe
RES Target
Use of water and geothermal resources for electricity generation by 2030

Ethiopia

Nationally Determined Contribution (July 2021)

Unconditional reduction of GHG emissions by 14% compared to BAU projections by 2030

Conditional reduction of additional 54.8%, with a total reduction of 68.8% compared to BAU projections by 2030

Transportation Sector
Implementation of policies to increase the share of public transport, including railways

Low Carbon Transport and EV
Implementation of policies to shift transport energy demand from petroleum to electricity

Renewable Energy
Increase number of households using renewable off-grid energy sources for lighting

General Information

GDP (billions, 2020)
USD 107.65

GDP per capita (2020)
USD 936.34

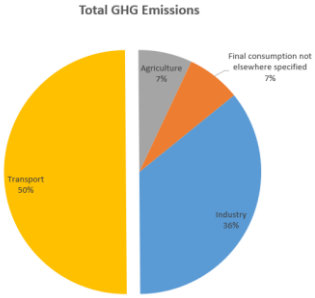
Total population (2020)
114,963,583

Population growth rate (2020)
2.54%

Urbanization rate (2020)
21.70%

Urban growth rate (2020)
4.73%

GHG Emissions (IEA)



Total emissions (2018)
14 $MtCO_2e$

Transport sector emissions (2018)
7 $MtCO_2e$ (50%)

Transport Sector

Total registered vehicles
1,200,110

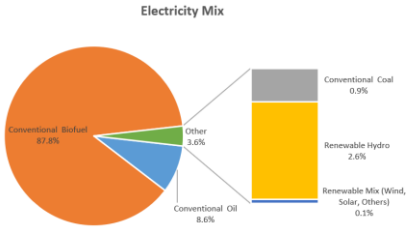
Annual Growth Rate (2019-2020)
17.3%

Annual Fuel Consumption
Gasoline 641 megaliters

Road Condition (2019)
Total 138,127 km (90% paved)

EV Policies
Increase share of electric vehicles
Shift transport energy demand from petroleum to electricity

Energy Sector



Electricity Mix (2019)
Biofuel 38,142 Ktoe
Oil 3,728 Ktoe
Hydro 1,119 Ktoe
Coal 383 Ktoe
Renewable Mix (wind, solar, others) 48 Ktoe

Fiji

Nationally Determined Contribution (December 2020)

Unconditional reduction of CO_2 emissions by 10% compared to BAU projections by 2030

Conditional reduction of CO_2 emissions by 20% compared to BAU projections by 2030

Transportation Sector

Reduce domestic shipping emissions by 40% by 2030

Renewable Energy

Reach close to 100% renewable energy power generation (grid-connected) by 2030

General Information

GDP (billions, 2020)

USD 4.38

GDP per capita (2020)

USD 4,881.53

Total population (2020)

896,444

Population growth rate (2020)

0.73%

Urbanization rate (2020)

57.25%

Urban growth rate (2020)

1.60%

GHG Emissions (ClimateWatchData)

Total emissions (2018)

-0.65 $MtCO_2e$

Transport Sector

Total registered vehicles

130,000

Annual Growth rate (2018-2019)

20.1%

Annual Fuel Consumption

Gasoline 153.78 megaliters

Road Condition

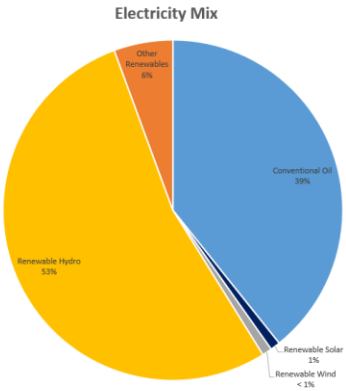
Total 11,000 km

EV Policies

55% capital deduction for purchasing EVs

7 years income tax exemption for businesses installing EC charging stations

Energy Sector



Electricity Mix (OurWorldinData, 2019)

Hydro 49.01 Ktoe (0.57 TWh)

Oil 36.11 Ktoe (0.42 TWh)

Other renewables 5.16 Ktoe (0.06 TWh)

Solar 0.86 Ktoe (0.01 TWh)

Wind <0.86 Ktoe (<0.01 TWh)

RES Target

100% renewable energy power generation by 2030

Grenada

Nationally Determined Contribution (December 2020)

Conditional reduction of GHG emissions by 40% below 2010 levels by 2030

Transportation Sector

INDC (2016)
Conditional reduction of emissions in transport sector by 20% by 2025

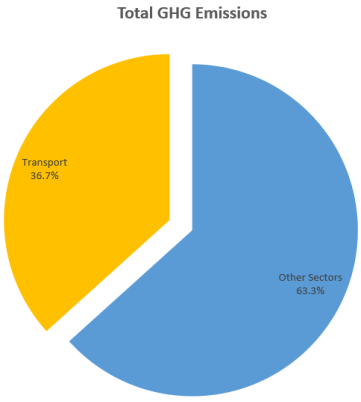
Renewable Energy

Conditional contribution to develop Geothermal Program by 2030

General Information

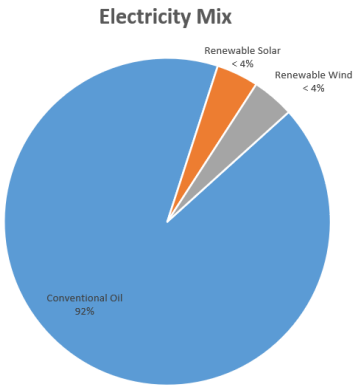
GDP (billions, 2020)
USD 1.09
GDP per capita (2020)
USD 9,680.18
Total population (2020)
112,519
Population growth rate (2020)
0.46%
Urbanization rate (2020)
36.54%
Urban growth rate (2020)
0.85%

GHG Emissions (ClimateWatchData)



Total emissions (2018)
0.3 $MtCO_2e$
Transport sector emissions (2018)
0.11 $MtCO_2e$ (36.7%)

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Oil 18.92 Ktoe (0.22 TWh)
Solar <0.86 Ktoe (<0.01 TWh)
Wind <0.86 Ktoe (<0.01 TWh)

Guyana

Nationally Determined Contribution (May 2016)

Renewable Energy

Unconditional contributions

- Construct a 26 MW wind farm
- Encourage the use of bio-digesters to produce biogas and provide efficient cooking means at the household level

Conditional contributions

- Develop a 100% renewable power supply by 2025

General Information

GDP (billions, 2020)
USD 5.47

GDP per capita (2020)
USD 6,955.94

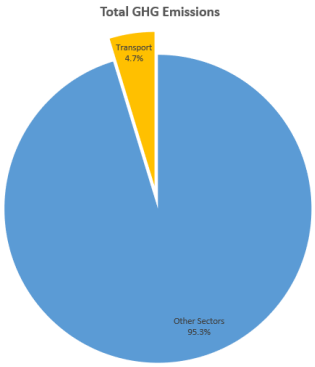
Total population (2020)
786,559

Population growth rate (2020)
0.48%

Urbanization rate (2020)
26.79%

Urban growth rate (2019)
0.85%

GHG Emissions (ClimateWatchData)



Total emissions (2018)
16.51 $MtCO_2e$

Transport sector emissions (2018)
0.78 $MtCO_2e$ (4.7%)

Transport Sector

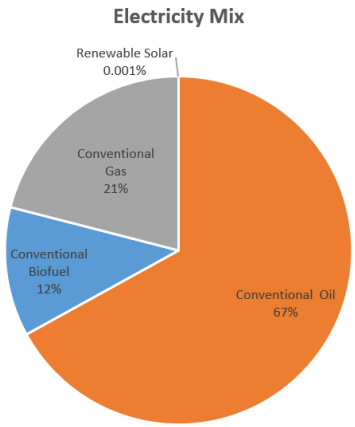
Total registered vehicles
195,438

Annual Growth Rate (2018-2019)
6%

Annual Fuel Consumption
Gasoline 211.25 megaliters

Road Condition (2019)
Total 3995 km (20% paved)

Energy Sector



Electricity Mix (2019)
Oil 101.6658 Ktoe
Gas 31.8654 Ktoe
Biofuel 18.2088 Ktoe
Solar 0.001 Ktoe

RES Target
100% renewable power supply by 2025

Hungary

Nationally Determined Contribution (December 2020)

Reduction of GHG emissions by at least 55% below 1990 levels by 2030

Transportation Sector

Regulation (EU) 2019/631, by 2030

- Reduce CO_2 emissions per kilometer from passenger cars by 37.5% below 2021 levels
- Reduce CO_2 emissions per kilometer from new vans by 31% from 2021 levels

Low Carbon Transport and EV

Directive (EU) 2019/1161 → Promotion of clean and energy-efficient road transport vehicles

- Minimum procurement targets for the share of clean light-duty vehicles
  - 23.1% by 2030
- Minimum procurement targets for the share of clean heavy-duty vehicles in the total number of heavy-duty vehicles by 2030
  - Trucks 9%; buses 53%

Renewable Energy

Directive (EU) 2018/2001 → Promotion of the use of energy from renewable sources

Increase share of renewable energy in final energy consumption to at least 32% by 2030 (almost double from 2017 levels)

General Information

GDP (billions, 2020)
USD 155.01

GDP per capita (2020)
USD 15,899.15

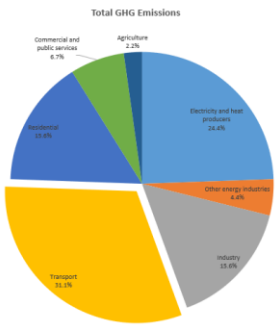
Total population (2020)
9,749,763

Population growth rate (2020)
-0.22%

Urbanization rate (2020)
71.94%

Urban growth rate (2020)
0.2%

GHG Emissions (IEA)



Total emissions (2018)
45 $MtCO_2e$

Transport sector emissions (2018)
14 $MtCO_2e$ (31.1%)

Transport Sector

Total registered vehicles
4,395,683

- *Gasoline 2,918,734*
- *Diesel 1,384,640*

Annual growth rate (2019-2020)
4.7%

Annual Fuel Consumption
Gasoline 1,832 megaliters

Road Condition (2014)
Total 203,601 km (37% paved)

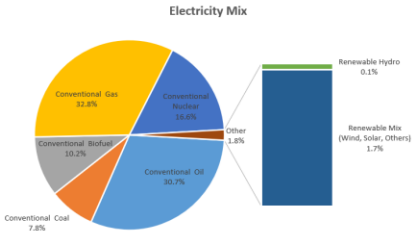
Electric Vehicles and LCT
Total EV 8,791 (0.2%)

- Bus 117

Charging Facilities
2,130

EV Policies
Low-emission vehicles are exempt from registration tax and property transfer tax

Energy Sector



Electricity Mix (2019)
Gas 8,419 Ktoe
Oil 7,879 Ktoe
Nuclear 4,258 Ktoe
Biofuel 2,624 Ktoe
Coal 2,002 Ktoe
Renewable Mix (Wind, Solar, Others) 434 Ktoe
Hydro 19 Ktoe

RES Target
Increase share of RE in final energy consumption to 32%

Indonesia

Nationally Determined Contribution (July 2021)

Unconditional reduction of GHG emissions by 29% compared to BAU levels by 2030

Conditional reduction of GHG emissions by 41% by compared to BAU levels by 2030

Transportation Sector

Implementation of biofuel (mainly palm oil) in transport sector

- **Unconditionally** reduce 90%
- **Conditionally** reduce 100%

Renewable Energy

- By 2050, 31% of the energy mix to be from renewable energy
  - Renewable power plants to be developed include geothermal, hydropower, solar PV, wind turbine, biomass, and biofuel

General Information

GDP (billions, 2020)
USD 1,058.42

GDP per capita (2020)
USD 3,869.59

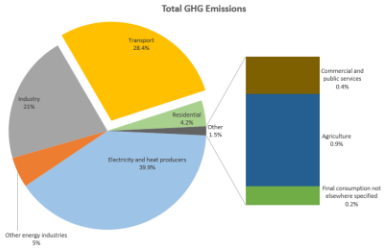
Total population (2020)
273,523,621

Population growth rate (2020)
1.07%

Urbanization rate (2020)
56.64%

Urban growth rate (2020)
2.23%

GHG Emissions (IEA)



Total emissions (2018)
542 $MtCO_2e$

Transport sector emissions (2018)
154 $MtCO_2e$ (28.4%)

Transport Sector

Total registered vehicles
15,437,640

Annual Growth rate (2018-2019)
5.1%

Annual Fuel Consumption
Gasoline 34,470 megaliters

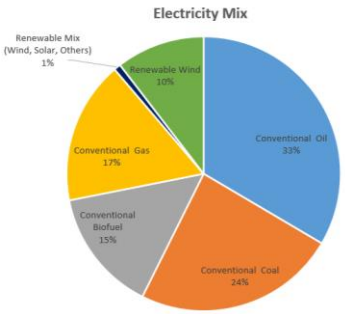
Road condition (2019)
Total 544,917 km (60% paved)

Electric Vehicles and LCT
Total EV 15,000 (0.001%)

Charging Facilities
57

EV Policies
Reduction or exemption from registration taxes depending on the local government

Energy Sector



Electricity Mix (2019)
Oil 77,307 Ktoe
Coal 55,234 Ktoe
Gas 38,935 Ktoe
Biofuel 33,540 Ktoe
Renewable Mix (Wind, Solar, Others) 24,132 Ktoe
Hydro 1,860 Ktoe

RES Target
31% of energy mix to be from renewables by 2030

Jordan

Nationally Determined Contribution (October 2021)

Unconditional reduction of GHG emissions by 1.5% compared to BAU levels by 2030

Conditional reduction of additional 12.5%, with a total reduction of 14% compared to BAU levels by 2030

Transportation Sector

- Increase the share of total commuters using public transport to 25% by 2025 by
  - Implementing projects to improve public transport
  - Implementing national BRT system
- Develop railway system to ease the transportation of passengers and freight
- Implement policies related to fleet characteristics to increase efficiency and reduce emissions
- Introduce BRTs and ITS

Low Carbon Transport and EV

- Introduce 10,000 ZEVs
- Install 3,000 charging stations powered by RE
- Introduce electric bus fleet

Renewable Energy

- Encourage investment for the development of renewable energy projects
- Encourage the use of solar energy for water heating
- Increase the use of solar cooling in commercial and industrial facilities
- ***National Vision Strategy***
  - Increase the share of renewable energy to 35% and natural gas to 39% in the total energy mix
- Introduction of concentrated solar power of 400 MW

General Information

GDP (billions, 2020)
USD 43.70

GDP per capita (2020)
USD 4,282.77

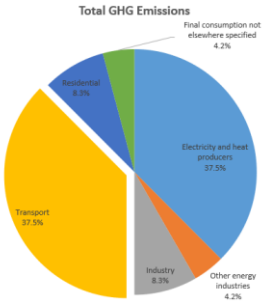
Total population (2020)
10,203,140

Population growth rate (2020)
1%

Urbanization rate (2020)
91.42%

Urban growth rate (2020)
1.23%

GHG Emissions (IEA)



Total emissions (2018)
24 $MtCO_2e$

Transport sector emissions (2018)
9 $MtCO_2e$ (37.5%)

Transport Sector

Total registered vehicles
1,635,222

Annual Growth Rate (2018-2019)
3.27%

Annual Fuel Consumption
Gasoline 1,911 megaliters

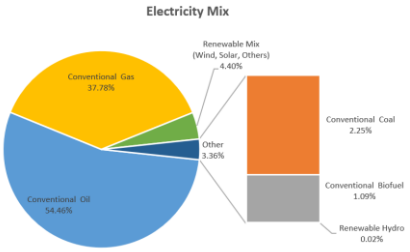
Road Condition (2015)
Total 7,999 km (100% paved)

Electric Vehicles and LCT
Total EV 18,000 (0.01%)

Charging Facilities
12

EV Policies
Registration tax reduction for electric vehicles

Energy Sector



Electricity Mix (2019)
Oil 4,955 Ktoe
Gas 3,438 Ktoe
Renewable Mix 400 Ktoe
Coal 205 Ktoe
Biofuel 99 Ktoe
Hydro 2 Ktoe

RES Target
Increase the share of RE to 11% in the total energy mix

Kiribati

Nationally Determined Contribution (September 2016)

Unconditional reduction of GHG emissions by 13.7% by 2025 and 12.8% by 2030 compared to BAU projection

Conditional reduction of additional 49%, with a total of 61.8% by 2030 compared to BAU projection

Transportation Sector

Conditional target by 2030

- Use of coconut oil as biodiesel for transport, with a potential reduction of 12,550 tCO_2e

Renewable Energy

Unconditional targets by 2030

- Installation of 1.3 MW PV on-grid in South Tarawa, with a potential reduction of 1910 tCO_2e
- Off-grid solar electrification in Outer Island and rural areas, with a potential reduction of 1100 tCO_2e

Conditional targets by 2030

- Maximum use of RE and EE, potential reduction of 13,030 tCO_2e
- Use coconut oil as biodiesel for electricity generation, potential reduction of 12,840 tCO_2e

General Information

GDP (billions, 2020)
USD 0.20

GDP per capita (2020)
USD 1,670.82

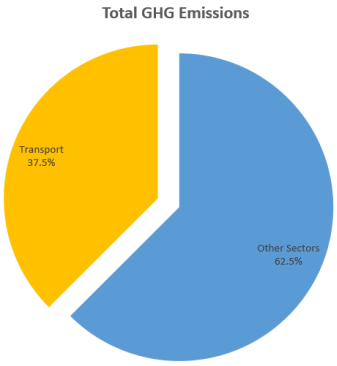
Total population (2020)
119,446

Population growth rate (2020)
1.55%

Urbanization rate (2020)
55.59%

Urban growth rate (2020)
2.93%

GHG Emissions (ClimateWatchData)



Total emissions (2018)
0.08 $MtCO_2e$

Transport sector emissions (2018)
0.3 $MtCO_2e$ (37.5%)

Transport Sector

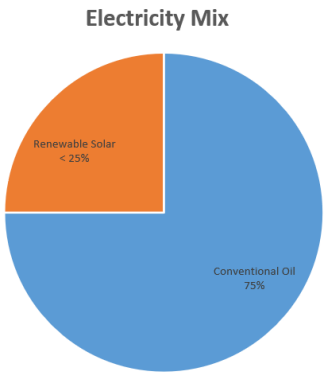
Total registered vehicles
9175

Annual Growth rate (2018-2019)
29%

Annual Fuel Consumption
Gasoline 6.96 megaliters

Road Condition (2013)
Total 808 km (16% paved)

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Oil 2.58 Ktoe (0.03 TWh)
Solar <0.86 Ktoe (<0.01 TWh)

Kyrgyz Republic

Nationally Determined Contribution (October 2021)

Unconditional reduction of GHG emissions by 15.97% below BAU by 2030

Conditional reduction of GHG emissions by 43.62% below BAU by 2030

Transportation Sector

Targets by 2030

- Improvement of Traffic Management and Cycling Infrastructure Development
  - Potential reduction of 747.96 Gg CO_2eq
- Replacement of buses with buses with diesel/gasoline fuel engines by buses with gas powered engines in Bishkek and Osh city
  - Potential reduction of 21.65 Gg CO_2eq
- Expansion of the trolleybus fleet by replacing buses with internal combustion engines in Bishkek
  - Potential reduction of 0.88 Gg CO_2eq

Low Carbon Transport and EV

Target by 2030

- Replacement of light vehicles with internal combustion engines for electric vehicles
  - Potential reduction of 432.18 Gg CO_2eq

Renewable Energy

Targets by 2030

- Expand the use of biogas plants
  - Potential reduction of 1,311.98 Gg CO_2eq
- Electricity generation at existing private small hydropower plants
  - Potential reduction of 2.74 Gg CO_2eq
- Expansion of the application of solar heat collectors
  - Potential reduction of 78.4 Gg CO_2eq
- Construction of new hydropower plants
  - Potential reduction of 64.61 Gg CO_2eq
- Construction and launch of small hydropower plants
  - Potential reduction of 49.8 Gg CO_2eq
- Development of geothermal energy (heat pumps)
  - Potential reduction of 38.6 Gg CO_2eq

General Information

GDP (billions, 2020)
USD 7.74

GDP per capita (2020)
USD 1,173.61

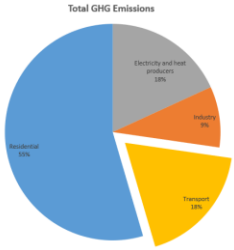
Total population (2020)
6,591,600

Population growth rate (2020)
2.08%

Urbanization rate (2020)
36.86%

Urban growth rate (2020)
2.80%

GHG Emissions (IEA)



Total emissions (2018)
11 $MtCO_2e$

Transport sector emissions (2018)
2 $MtCO_2e$ (18.2%)

Transport Sector

Total registered vehicles
1,330,000

Annual growth rate (2018-2019)
6.4%

Annual Fuel Consumption
Gasoline 938 megaliters

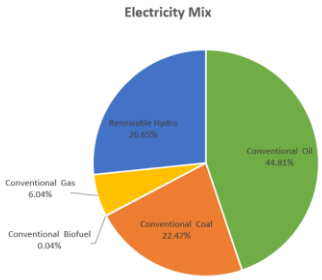
Road Condition
Total 34,000 km (66% paved)

Electric Vehicles and LCT
Total EV 24 (0.01%) (2019)

- 4-wheel 24

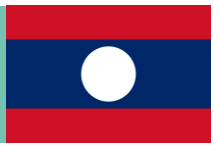
EV Policies
Amendments to Certain Legislative Acts on Clean Air and Improving Tax Administration provides tax benefits for electric vehicles

Energy Sector



Electricity Mix (2019)
Oil 2,070 Ktoe
Hydro 1,231 Ktoe
Coal 1,038 Ktoe
Gas 279 Ktoe
Biofuel 2 Ktoe

Lao PDR



Nationally Determined Contribution (May 2021)

Reduction of GHG emissions by 60% below 2000 levels by 2030

Transportation Sector

Unconditional mitigation targets

- Average yearly reduction of 25 $ktCO_2e$ by introducing BRT system in Vientiane Capital and associated NMT component
- Average yearly reduction of 300 $ktCO_2e$ by operating Lao-China Railway

Conditional mitigation targets

- Average yearly reduction of 29$ktCO_2e$ by increasing share of biofuels to 10% of transport fuels

Low Carbon Transport and EV

Conditional mitigation targets

- Increase the share of electric vehicles for 2-wheelers and passenger vehicles to 30% in the national vehicle mix by 2030

Renewable Energy

Unconditional mitigation targets

- Install 13GW total hydropower capacity (domestic and export use) in the country

Conditional mitigation targets

- Solar and wind: 1GW total installed capacity
- Biomass: 300 MW total installed capacity in the country

General Information

GDP (billions, 2020)
USD 19.14

GDP per capita (2020)
USD 2,630.20

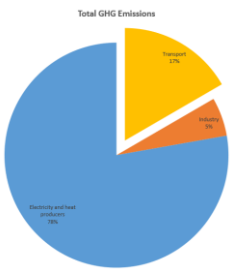
Total population (2020)
7,275,556

Population growth rate (2020)
1.47%

Urbanization rate (2020)
36.29%

Urban growth rate (2020)
3.26%

GHG Emissions (IEA)



Total emissions (2018)
18 $MtCO_2e$

Transport sector emissions (2018)
98.76 $MtCO_2e$ (16.7%)

Transport Sector

Total registered vehicles (2016)
1,715,094

- *Gasoline 1,369,085*
- *Diesel 346,009*

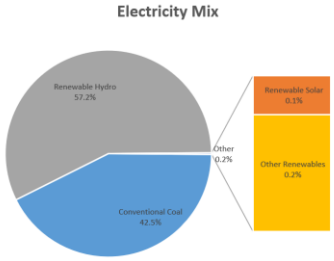
Annual Growth rate (2015-2016)
13%

Annual Fuel Consumption
Gasoline 417.5 megaliters
Diesel 624.5 megaliters

Road Condition
Total 58,255 km (21% paved)

EV Policies
30% of national vehicle mix to be electric by 2030
E-motorcycles have a 20% reduction in excise taxes compared to conventional motorcycles
Clean energy vehicles have reduced tax rate of 5-10% compared to ICE vehicles

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Hydro 1,662.08 Ktoe (19.33 TWh)
Coal 1,234.74 Ktoe (14.36 TWh)
Other renewables 5.16 Ktoe (0.06 TWh)
Solar 1.72 Ktoe (0.02 TWh)

RES Target
Install hydro, solar and wind power plants by 2030

Mexico

Nationally Determined Contribution (December 2020)

Unconditional reduction of GHG emissions by 22% and 51% of black carbon compared to BAU projections by 2030

Conditional reduction of GHG emissions by 36% and 70% of black carbon compared to BAU projections by 2030

Transportation Sector

The implementation of the following policies and measures will support the reduction of emissions

- Strengthening of regulations applicable to motor vehicles
- Encouragement of alternative transportation systems
- Promotion of clean transportation programs
- Urban planning oriented towards efficient public transportation systems

Low Carbon Transport and EV

Commitment to develop and implement the ***National Electric Mobility Strategy***

General Information

GDP (billions, 2020)
USD 1,076.16

GDP per capita (2020)
USD 8,346.70

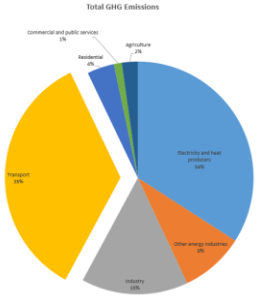
Total population (2020)
128,932,753

Population growth rate (2020)
1.06%

Urbanization rate (2020)
80.73%

Urban growth rate (2020)
1.41%

GHG Emissions (IEA)



Total emissions (2018)
449 $MtCO_2e$

Transport sector emissions (2018)
157 $MtCO_2e$ (35%)

Transport Sector

Total registered vehicles
35,000,000

Annual Growth Rate (2019-2020)
2.7%

Annual Fuel Consumption
Gasoline 34,700 megaliters
Diesel 23,154 megaliters

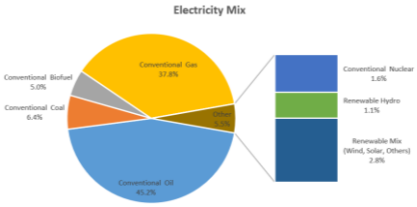
Road Condition (2017)
Total 398,148 km (44% paved)

Electric Vehicles and LCT
Total EV 20,000+ (5%)

Charging Facilities
1,000

EV Policies
Tax breaks on EV imports and purchases.
New federal car tax exemption.
Ownership tax exemption

Energy Sector



Electricity Mix (2019)
Oil 83,178 Ktoe
Gas 69,625 Ktoe
Coal 11,854 Ktoe
Biofuel 9,245 Ktoe
Renewable Mix (Wind, Solar, Others) 5,062 Ktoe
Nuclear 2,986 Ktoe
Hydro 2,071 Ktoe

Mongolia

Nationally Determined Contribution (October 2020)

Unconditional reduction of GHG emissions by 22.7% below 2010 levels by 2030

Conditional reduction of additional 27.2%, with a total of 44.9% below 2010 levels

Transportation Sector

GHG emission reduction of 1,048.8 $GgCO_2eq$ by 2030

- Switching to Euro-5 standard fuel
- Switching the coal export transportation to rail transport from auto transportation
- Switching the heating of passenger train to electric heating

Renewable Energy

GHG emissions reduction of 8,340.5 $GgCO_2eq$ by 2030 through

- Use of renewable energy sources
  - Hydro, wind, and solar power plants
- Improve efficiency of energy production

General Information

GDP (billions, 2020)
USD 13.14

GDP per capita (2020)
USD 4,007.31

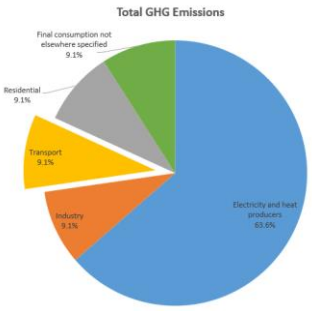
Total population (2020)
3,278,292

Population growth rate (2020)
1.63%

Urbanization rate (2020)
68.66%

Urban growth rate (2020)
1.80%

GHG Emissions (IEA)



Total emissions (2018)
22 $MtCO_2e$

Transport sector emissions (2018)
2 $MtCO_2e$ (9.1%)

Transport Sector

Total registered vehicles
795,754

Annual Growth Rate (2018-2019)
5.2%

Annual Fuel Consumption
Gasoline 568 megaliters

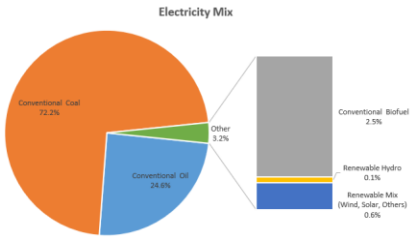
Road Condition (2017)
Total 113,200 km (9% paved)

Electric Vehicles and LCT
Total EV 300+ (0.0004%)

- Mostly 4-wheels
- Electric trolleybuses in use

EV Policies
EVs are exempted from road user charges

Energy Sector



Electricity Mix (2019)
Coal 4,049 Ktoe
Oil 1,378 Ktoe
Biofuel 143 Ktoe
Renewable Mix (Wind, Solar, Others) 32 Ktoe
Hydro 7 Ktoe

RES Target
Reduction of 8,340.5$GgCO_2eq$ by 2030

Norway

Nationally Determined Contribution (February 2020)

Reduction of GHG emissions by 50 – 55% below 1990 levels by 2030

Transportation Sector

4th Biennial Report

- Reduce emissions by 50% below 2005 levels by 2030

Measures already in place

- Norwegian CO_2 tax scheme for transport sector
- Vehicle tax depending on amount of emissions
- Promote public transport, cycling and walking
- Increase investment in railways
- Operate zero emission ferries
- Provide grants to projects that move freight from road to sea

Low Carbon Transport and EV

4th Biennial Report

Incentives already in place to encourage the use of electric vehicles

- Exemption from different type of taxes related to ownership and maintenance of the vehicle
- Reduction from payments related to the vehicle, including toll fares, parking fees, etc.

Renewable Energy

Development and adoption of low emissions technology, including policies for renewable energy are also important

4th Biennial Report

Measures and policies already in place

- Electricity Certificate Act to develop new energy production based on RE
- Bioenergy Scheme

General Information

GDP (billions, 2020)
USD 362.01

GDP per capita (2020)
USD 67,294.48

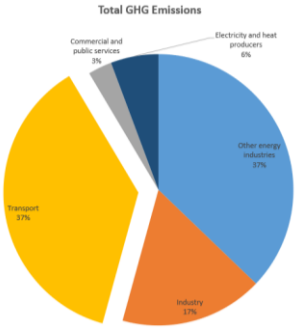
Total population (2020)
5,379,475

Population growth rate (2020)
0.59%

Urbanization rate (2020)
82.97%

Urban growth rate (2020)
1.02%

GHG Emissions (IEA)



Total emissions (2018)
35 $MtCO_2e$

Transport sector emissions (2018)
13 $MtCO_2e$ (37.1%)

Transport Sector

Total registered vehicles
5,685,785

- *Gasoline 2,103,740*
- *Diesel 2,569,975*

Annual Growth Rate (2019-2020)
1.9%

Annual Fuel Consumption
Gasoline 991 megaliters

Road Condition
Total 94,902 km (2018)
(80.7% paved) (2009)

Electric Vehicles and LCT
Total EV 607,387 (10.7%%)

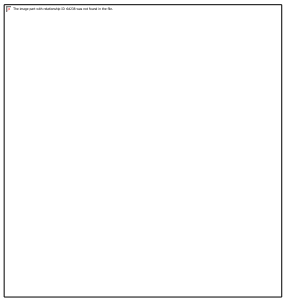
- Bus 206

Charging Facilities
16,000

EV Policies
Tax exemption and reduction of payments related to EVs

Direct Subsidies
BEVs have been exempted from VAT on purchase since 2001 (new and second-hand vehicles)
In 2015, the VAT exemption was extended to include leasing

Energy Sector



Electricity Mix (2019)
Hydro 10,741 Ktoe
Gas 4,959 Ktoe
Oil 4,685 Ktoe
Biofuel 2,090 Ktoe
Coal 801 Ktoe
Renewable Mix (Wind, Solar, Others) 477 Ktoe

Papua New Guinea

Nationally Determined Contribution (December 2020)

Commitment to reduce emissions to 50 percent by 2030, and achieve complete carbon neutrality by 2050

Transportation Sector

Conditional measures

- Introduce fuel-efficient transport equipment
- Encourage substitution of fossil fuels by biofuels
- Monitor vehicle fleet-weighted fuel and CO_2 efficiency
- Eliminate high emission vehicles
- Establish low carbon fuel standards

Low Carbon Transport and EV

Conditional measure to develop of *E-Mobility Policy* for the implementation of green transport by 2030

- Adaptation measures by 2030
  - Operate electrified BRT in urban centers
  - Improve roads
  - Build new bridges and culverts

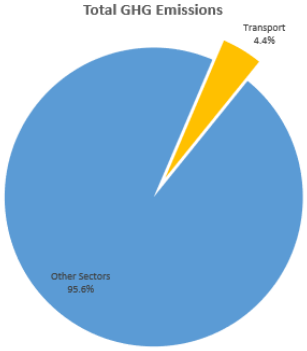
Renewable Energy

Conditional target to increase the share of renewable energy in the total energy mix to 78% by 2030

General Information

GDP (billions, 2019)
USD 23.59
GDP per capita (2020)
USD 2,636.80
Total population (2020)
8,947,027
Population growth rate (2020)
1.93%
Urbanization rate (2020)
13.35%
Urban growth rate (2020)
2.64%

GHG Emissions (ClimateWatchData)

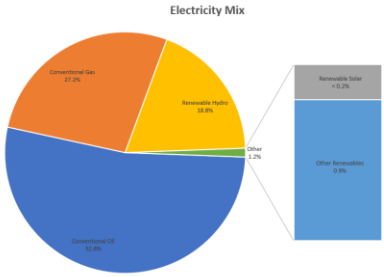


Total emissions (2018)
48.46 $MtCO_2e$
Transport sector emissions (2018)
2.13 $MtCO_2e$ (4.4%)

Transport Sector

Total registered vehicles (2016)
100,993
Annual Fuel Consumption
Gasoline 167 megaliters
Road Condition (2011)
Total 9,349 km (32% paved)

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Oil 193.47 Ktoe (2.25 TWh)
Gas 99.74 Ktoe (1.16 TWh)
Hydro 68.79 Ktoe (0.8 TWh)
Other renewables 3.44 Ktoe (0.04 TWh)
Solar < 0.86 Ktoe (<0.01 TWh)
RES Target
Increase share of RE to 78% by 2030

Paraguay

Nationally Determined Contribution (July 2021)

Unconditional reduction of GHG emissions by 10% compared to BAU projections by 2030

Conditional reduction of additional 10%, with a total of 20% compared to BAU projections by 2030

Transportation Sector

2 main objectives

- Develop the navigability of transboundary rivers in times of low water and drought
- Develop transport infrastructures to facilitate trade and mobilization of people

Mitigation actions

- Increase replacement of fossil fuels for biofuels promoting cleaner vehicle fleet, this measure implies transition to cleaner and more efficient technologies
- Improve efficiency for freight and public transport

Low Carbon Transport and EV

Mitigation actions

- Boost replacement of conventional vehicles by electric and hybrid vehicles
- Promote the use of green hydrogen in land vehicle fleet, including freight, public and private passenger transport

Renewable Energy

Mitigation actions

- Use of certified forest biomass
- Improve energy efficiency measures
- Promote renewable energy projects
  - Use of solar water heaters, biodigesters, solar panels
  - Research on hybrid systems (solar, wind, thermal) for an efficiency generation of electricity

General Information

GDP (billions, 2020)
USD 35.30

GDP per capita (2020)
USD 4,949.75

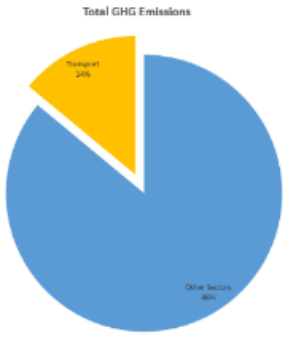
Total population (2020)
7,132,530

Population growth rate (2020)
1.24%

Urbanization rate (2020)
62.18%

Urban growth rate (2020)
1.73%

GHG Emissions (ClimateWatchData)



Total emissions (2018)
54.4 $MtCO_2e$

Transport sector emissions (2018)
7.62 $MtCO_2e$ (14%)

Transport Sector

Total registered vehicles
2,400,000

Annual Growth rate (2018-2019)
2.5%

Annual Fuel Consumption
Gasoline 1,494 megaliters

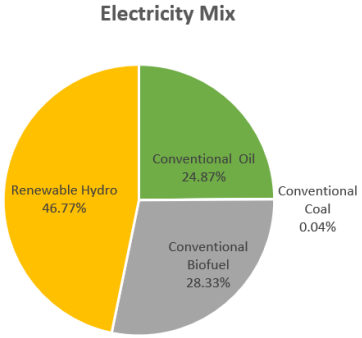
Road Condition (2017)
Total 74,676 km (8% paved)

Electric Vehicles and LCT
Total EV 250 (0.0001%)

- Bus 2

Charging Facilities
12

Energy Sector



Electricity Mix (2019)
Hydro 5,091 Ktoe
Biofuel 3,084 Ktoe
Oil 2,707 Ktoe
Coal 4 Ktoe

RES Target
Increase by 60% the consumption of renewable energies

Peru

Nationally Determined Contribution (December 2020)

Unconditional contribution to limit GHG emissions to a maximum level of 208.8 $MtCO_2eq$

Conditional contributions to limit GHG emissions to a maximum level of 179 $MtCO_2eq$

General Information

GDP (billions, 2020)
USD 202.01

GDP per capita (2020)
USD 6,126.87

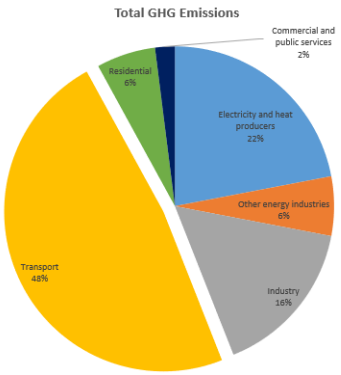
Total population (2020)
32,971,846

Population growth rate (2020)
1.41%

Urbanization rate (2020)
78.30%

Urban growth rate (2020)
1.66%

GHG Emissions (IEA)



Total emissions (2018)
50 $MtCO_2e$

Transport sector emissions (2018)
24 $MtCO_2e$ (48%)

Transport Sector

Total registered vehicles
2,900,000

Annual Growth Rate (2019-2020)
4.2%

Annual Fuel Consumption
Gasoline 2,545 megaliters

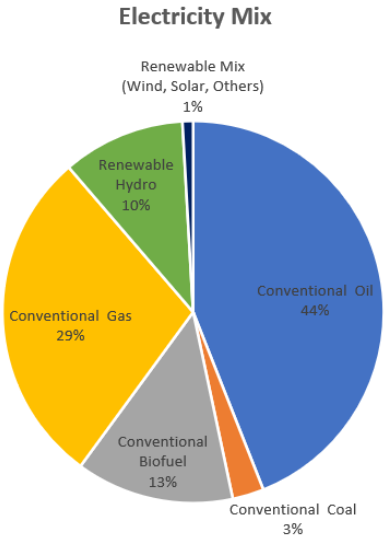
Road Condition (2012)
Total 140,672 km (13% paved)

Electric Vehicles and LCT
Total EV 551 (0.0002%)

- 4-wheel 551

EV Policies
Plans for electric buses operating in Lima, Arequipa, and Trujillo by 2030
Exemption of excise tax for electric and hybrid vehicles
Grants for purchasing electric and hybrid vehicles

Energy Sector



Electricity Mix (2019)
Oil 11,160 Ktoe
Gas 7,259 Ktoe
Biofuel 3,400 Ktoe
Hydro 2,642 Ktoe
Coal 676 Ktoe
Renewable Mix (Wind, Solar, Others) 228 Ktoe

RES Target

Philippines

Nationally Determined Contribution (April 2021)

Unconditional reduction of GHG emissions by 2.71% below BAU projections by 2030

Conditional reduction of additional 72.29%, with a total of 75% below BAU projections by 2030

General Information

GDP (billions, 2020)
USD 361.49

GDP per capita (2020)
USD 3,298.83

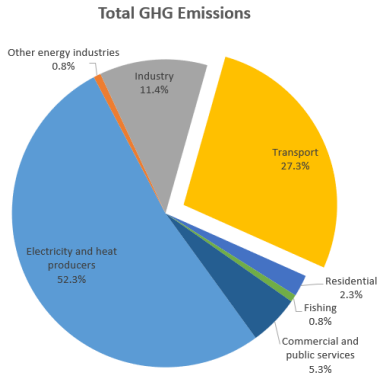
Total population (2020)
109,581,085

Population growth rate (2020)
1.35%

Urbanization rate (2020)
47.41%

Urban growth rate (2020)
1.89%

GHG Emissions (IEA)



Total emissions (2018)
132 $MtCO_2e$

Transport sector emissions (2018)
36 $MtCO_2e$ (27.3%)

Transport Sector

Total registered vehicles
11,000,000 +

Annual Fuel Consumption
Gasoline 5,838 megaliters
Diesel 10,840 megaliters

Road Condition (2019)
Total 33,018 km (97% paved)

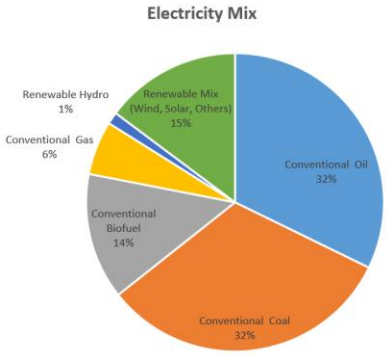
Electric Vehicles and LCT
Total EV 5,002

- 4-wheel 166
- 2-wheel 4,834
- Bus 2

Charging Facilities
4

EV Policies
Importation Tariff Exemption to cover both BEV and PHEV
BEV excise tax exemption
VAT reduction/exemption (50%) until 2025
Government allowed the import of EV components free of tariffs to encourage local manufacturing.
Corporate incentives to expand EV replacement of current fleets

Energy Sector



Electricity Mix (2019)
Oil 19,991 Ktoe
Coal 19,937 Ktoe
Renewable Mix (Wind, Solar, Others) 9,179 Ktoe
Biofuel 8,510 Ktoe
Gas 3,628 Ktoe
Hydro 807 Ktoe

Qatar

Nationally Determined Contribution (September 2021)

Reduction of GHG emissions by 25% compared to BAU projections by 2030

Transportation Sector

- Reduction of GHG emissions by improving public transportation sector
- Promote the use of Doha Metro and Lusail Tram

Low Carbon Transport and EV

- Electrification of public transportation
- Investment in installation of charging infrastructure across the country
- Promotion of transition from ICE vehicles to EVs
- Electrification in port operations (electric tractors)

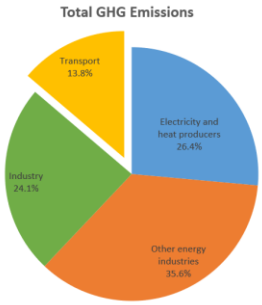
Renewable Energy

Great attention is being paid to the development of renewable energies. Recently, an 800 MW solar power plant has been recently introduced.

General Information

GDP (billions, 2020)
USD 146.37
GDP per capita (2020)
USD 50,805.46
Total population (2020)
2,881,060
Population growth rate (2020)
1.72%
Urbanization rate (2020)
99.24%
Urban growth rate (2020)
1.76%

GHG Emissions (IEA)

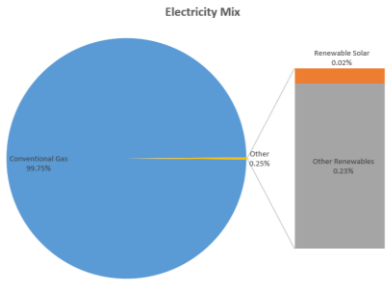


Total emissions (2018)
87 $MtCO_2e$
Transport sector emissions (2018)
12 $MtCO_2e$ (13.8%)

Transport Sector

Total registered vehicles
1,655,704
Annual Growth Rate (2018-2019)
4.3%
Annual Fuel Consumption
Gasoline 2,199 megaliters
Diesel 1276 megaliters
Road Condition (2016)
Total 7,039 km

Energy Sector



Electricity Mix (2019)
Gas 4,055.89 Ktoe
Other renewables 9.46 Ktoe
Solar <0.86 Ktoe
Electricity Mix (2019)
Gas 38,437 Ktoe

Republic of Korea

Nationally Determined Contribution (December 2020)

Reduction of GHG emissions by 24.4% below 2017 levels by 2030. Achieve carbon neutrality by 2050

Transportation Sector

The ***2nd Basic Plan for Climate Change Response*** *(2BPCC)* aims to

- Shift freight transport from road to rail and shipping
- Expand fleet of low-carbon ships fueled by LNG

Low Carbon Transport and EV

The ***Korean Green New Deal*** has projects to expand the use of electric and hydrogen vehicles.

The ***2nd Basic Plan for Climate Change Response*** (2BPCC) aims by 2030 to

- Deploy 3 million units of electric vehicles
- Deploy 850,000 hydrogen vehicles

Renewable Energy

The ***Korean Green New Deal*** includes projects that will promote the use of renewable energy

The ***2nd Basic Plan for Climate Change Response*** *(2BPCC)* aims to

- Increase the share of renewable energy up to 20% by 2030 and 30 – 35% by 2040

General Information

GDP (billions, 2020)
USD 1,630.53

GDP per capita (2020)
USD 31,489.12

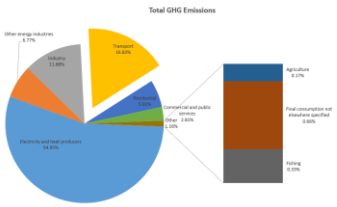
Total population (2020)
51,780,579

Population growth rate (2020)
0.14%

Urbanization rate (2020)
81.41%

Urban growth rate (2020)
0.12%

GHG Emissions (IEA)



Total emissions (2018)
606 $MtCO_2e$

Transport sector emissions (2018)
102 $MtCO_2e$ (16.8%)

Transport Sector

Total registered vehicles
24,370,000

- *Gasoline 13,842,160*
- *Diesel 8,919,420*

Annual Growth Rate (2019-2020)
2.91%

Annual Fuel Consumption
Gasoline 13,220 megaliters
Diesel 1,732megaliters

Road Condition (2016)
Total 100,428km (92%paved)

Electric Vehicles and LCT
Total EV 143,258 (0.59%)

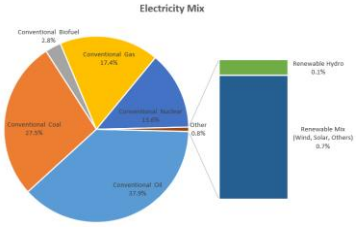
- 4-wheel 134,000
- Bus – More than 650

Charging Facilities
29,309

EV Policies
Expand the use of electric and hydrogen vehicles
Deploy 3 million electric vehicles

Direct Subsidies
Up to 8 million won (over €5,000) for BEVs, and up to 22 million won (over €16,000) for FCEVs

Energy Sector



Electricity Mix (2019)
Oil 106,115 Ktoe
Coal 77,083 Ktoe
Gas 48,730 Ktoe
Nuclear 38,018 Ktoe
Biofuel 7,821 Ktoe
Renewable Mix (Wind, Solar, Others) 1,865 Ktoe
Hydro 239 Ktoe

RES Target
Increase the share of renewable energy up to 20% by 2030

Rwanda

Nationally Determined Contribution (May 2020)

Unconditional reduction of GHG emissions by 16% compared to BAU projections by 2030

Conditional reduction of additional 22%, with a total reduction of 38% compared to BAU projections by 2030

Transportation Sector

Unconditional mitigation

- Vehicle emission standards – measures to increase vehicle emissions performance, including tax incentives and scrappage of older vehicles and inspection

Conditional mitigation

- Public transport infrastructure – BRT projects, bus lanes, non-motorized transport lanes

Low Carbon Transport and EV Target

Conditional mitigation

- E-mobility program – adoption of electric buses, passenger vehicles and motorcycles from 2020 onwards

Renewable Energy Target

Unconditional mitigation

- Grid-connected hydropower generation
- Solar street lighting

Conditional mitigation

- Solar mini-grids (68 MWp by 2030 in rural areas)
- Off-grid and rooftop electrification
- Solar water heater program

General Information

GDP (billions, 2020)
USD 10.33

GDP per capita (2020)
USD 797.86

Total population (2020)
12,952,209

Population growth rate (2020)
2.54%

Urbanization rate (2020)
17.43%

Urban growth rate (2020)
3.23%

GHG Emissions (ClimateWatchData)

Total emissions (2018)
2.73 $MtCO_2e$

Transport Sector

Total registered vehicles
221,000

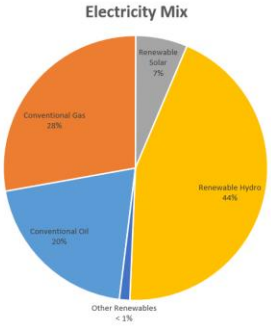
Annual growth rate (2018-2019)
12%

Annual Fuel Consumption
Gasoline 139 megaliters

Road Condition (2016)
Total 14,008 km (19% paved)

EV Policies
Adoption of electric buses, passenger vehicles and motorcycles from 2020 onwards

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Hydro 30.09 Ktoe (0.35 TWh)
Gas 18.92 Ktoe (0.22 TWh)
Oil 13.76 Ktoe (0.16 TWh)
Solar 4.3 Ktoe (0.05 TWh)
Other renewables < 0.86 Ktoe (<0.01 TWh)

RES Target
Promotion of renewable energies and energy efficiency, including the involvement of the private sector

Saint Kitts and Nevis

Nationally Determined Contribution (April 2016)

Conditional reduction of GHG emissions by 35% below BAU scenario by 2030

Transportation Sector

Conditional policies and measures to reduce at least 5% of national fuel consumption:

- Improve efficiency of transportation
  - Promote more efficient vehicles
  - Replace inefficient vehicles
  - Tax vehicles with high fuel consumption
  - Improve public transportation
- Enhance public infrastructure and planning
  - Repair roads and create new ones
  - Implement parking and transit regulation

Renewable Energy

Conditional mitigation to implement policies and measures to increase the use of renewable energy sources by 50%

General Information

GDP (billions, 2020)
USD 0.93

GDP per capita (2020)
USD 17,435.93

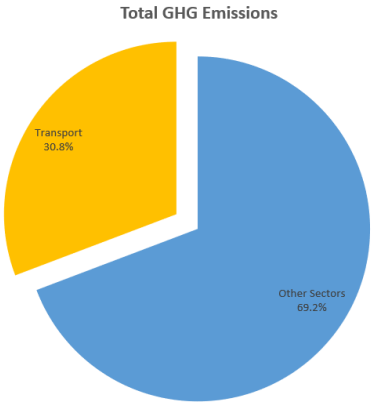
Total population (2020)
53,192

Population growth rate (2020)
0.68%

Urbanization rate (2020)
30.84%

Urban growth rate (2020)
0.82%

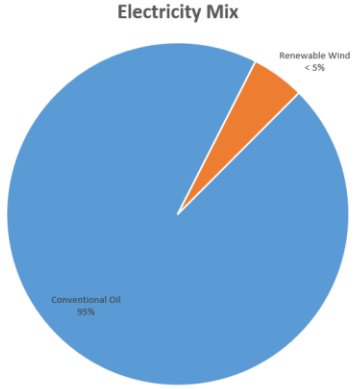
GHG Emissions (ClimateWatchData)



Total emissions (2018)
0.26 $MtCO_2e$

Transport sector emissions (2018)
0.08 $MtCO_2e$ (30.8%)

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Oil 16.34 Ktoe (0.19 TWh)
Wind <0.86 Ktoe (<0.01 TWh)

RES Target
Increase use of renewable energy sources by 50%

Saint Lucia

Nationally Determined Contribution (January 2021)

Reduction of GHG emissions by 7.2% below 2010 levels by 2030

Renewable Energy

From NDC

- **Conditional** contribution to introduce renewable energy technologies in the water sector

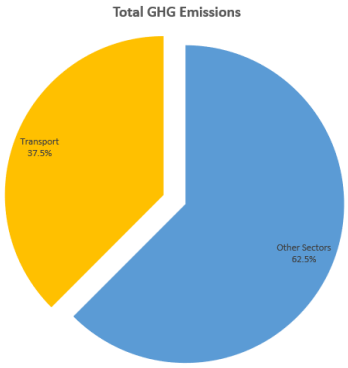
From NAMA

- Reduction of 20% in energy consumption by 2025
- Generation of renewable energies for school facilities

General Information

GDP (billions, 2020)
USD 1.70
GDP per capita (2020)
USD 9,276.12
Total population (2020)
183,629
Population growth rate (2020)
0.46%
Urbanization rate (2020)
18.84%
Urban growth rate (2020)
0.92%

GHG Emissions (ClimateWatchData)

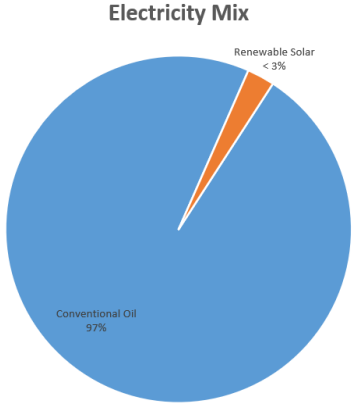


Total emissions (2018)
0.24 $MtCO_2e$
Transport sector emissions (2018)
0.09 $MtCO_2e$ (37.5%)

Transport Sector

Total registered vehicles (2016)
35,681
Annual Fuel Consumption
Gasoline 66.73megaliters
Road Condition (2011)
Total 1,210 km (70% paved)

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Oil 32.67 Ktoe (0.38 TWh)
Solar <0.86 Ktoe (<0.01 TWh)
RES Target
Generation of renewable energies for school facilities
20% reduction in final energy consumption by 2025

Saint Vincent and the Grenadines

Nationally Determined Contribution (June 2016)

Unconditional reduction of GHG emissions by 22% compared to BAU projections by 2025

Transportation Sector

- **Conditional** contribution to improve public transportation

Low Carbon Transport and EV

- **Conditional** contribution to introduction of new policies to reduce tax paid on low emissions vehicles, with a goal to decrease 10% of emissions

Renewable Energy

- **Conditional** contributions
  - Development of geothermal power plants to generate 50% of national annual electricity consumption
  - Renovation of existing hydro power plants to improve generation efficiency
  - Installation of small-scale photovoltaics in the private and public sectors

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General Information

GDP (billions, 2020)
USD 0.81

GDP per capita (2020)
USD 7,297.91

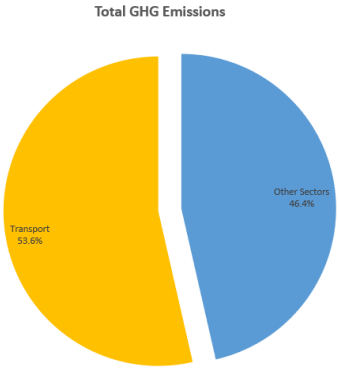
Total population (2020)
110,947

Population growth rate (2020)
0.32%

Urbanization rate (2020)
53.03%

Urban growth rate (2020)
1.11%

GHG Emissions (ClimateWatchData)



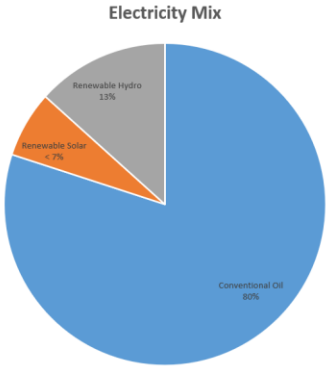
Total emissions (2018)
0.28 $MtCO_2e$

Transport sector emissions (2018)
0.15 $MtCO_2e$ (53.6%)

Transport Sector

EV Policies
Tax reduction on low emission vehicles

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Oil 10.32 Ktoe (0.12 TWh)
Hydro 1.72 Ktoe (0.02 TWh)
Solar <0.86 Ktoe (<0.01 TWh)

RES Target
Supply 50% of national electricity consumption through geothermal power plants
Install PV system in private and public sectors
Renovate hydro power plants

Senegal

Nationally Determined Contribution (December 2020)

Unconditional reduction of GHG emissions by 7% compared to BAU projections by 2030

Conditional reduction of GHG emission by 29% compared to BAU projections by 2030

Transportation Sector

Develop sustainable modes of public transport by installing BRT and regional express train systems

Low Carbon Transport and EV

Incentivize the use of hybrid vehicles

Renewable Energy

Unconditional commitment to achieve production of 699 MW from renewable energy sources by 2030

- 235 MW from solar
- 150 MW from wind
- 314 MW from hydro

Conditional commitment to achieve production of 300 MW from renewable energy sources by 2030

- 100 MW from solar
- 100 MW from wind
- 50 MW from biomass
- 50 MW from CSP

General Information

GDP (billions, 2020)

USD 24.91

GDP per capita (2020)

USD 1,487.76

Total population (2020)

16,743,930

Population growth rate (2020)

2.71%

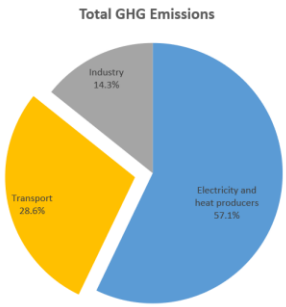
Urbanization rate (2020)

48.12%

Urban growth rate (2020)

3.69%

GHG Emissions (IEA)



Total emissions (2018)

7 $MtCO_2e$

Transport sector emissions (2018)

2 $MtCO_2e$ (28.6%)

Transport Sector

Total registered vehicles

660,000

Annual Growth Rate (2018-2019)

4.7%

Annual Fuel Consumption

Gasoline 302 megaliters

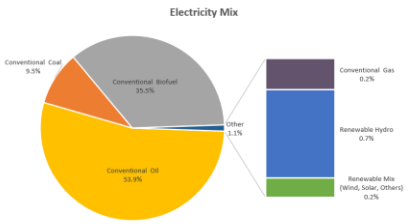
Road Condition (2017)

Total 16,665 km (37% paved)

EV Policies

Incentivize use of hybrid vehicles

Energy Sector



Electricity Mix (2019)

Oil 2,449 Ktoe

Biofuel 1,615 Ktoe

Coal 430 Ktoe

Hydro 31 Ktoe

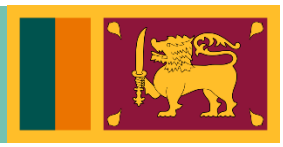
Gas 11 Ktoe

Renewable Mix 7 Ktoe

RES Target

Development of new production capacities to 1,000 MW by 2030

Sri Lanka



Nationally Determined Contribution (July 2021)

Unconditional reduction of GHG emissions by 4% compared to BAU by 2030

Conditional reduction of additional 10.5%, with a total of 14.5% compared to BAU scenario by 2030

Transportation Sector

Reduction of GHG emissions by 4% compared to BAU (1% **unconditionally** and 3% **conditionally**)

- Improve transport sector system
- Improve road infrastructure
- Introduce taxes and other instruments to promote public transport
- Promote non-motorized transport modes
- Shift freight to efficient modes
- Introduce light rail transport
- Upgrade suburban railway
- Introduce inland water transport modes
- Reduce emissions from marine transport

Low Carbon Transport and EV Target

Commitment to launch initiatives to promote electric mobility and hybrid vehicles

- Increase tax concessions for electric and hybrid vehicles
- Develop infrastructure such as charging stations, battery swapping & replacements

Renewable Energy Target

Commitment to achieve 70% of renewable energy in electricity generation by 2030

- Increase solar PV, wind, hydro, and sustainable biomass-based electricity generation

General Information

GDP (billions, 2020)
USD 80.71

GDP per capita (2020)
USD 3,682.04

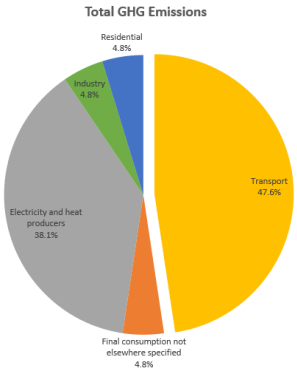
Total population (2020)
21,919,000

Population growth rate (2020)
0.53%

Urbanization rate (2020)
18.71%

Urban growth rate (2020)
1.22%

GHG Emissions (IEA)



Total emissions (2018)
21 $MtCO_2e$

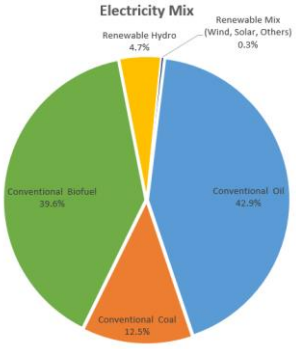
Transport sector emissions (2018)
10 $MtCO_2e$ (47.6%)

Transport Sector

Total registered vehicles (2018)
6,795,469

EV Policies
Increase tax concessions for electric and hybrid vehicles

Energy Sector



Electricity Mix (2018)
Oil 5,010 Ktoe
Biofuel 4,628 Ktoe
Coal 1,459 Ktoe
Hydro 550 Ktoe
Renewable Mix (Wind, Solar, Others) 38 Ktoe

RES Target
Increase share of RE to 70% in electricity generation by 2030

Thailand

Nationally Determined Contribution (October 2020)

Unconditional reduction of GHG emissions by 20% below BAU projections by 2030

Conditional reduction of GHG emissions by 25% below BAU projections by 2030

Transportation Sector

INDC

- Facilitate the shift from private to public transport
- Enhance bus system in Bangkok

Environmentally Sustainable Transport System Plan

- Promote modal shift from road to rail for passenger and freight transport
- Implement vehicle tax scheme based on CO_2 emission levels to promote low carbon vehicles

Low Carbon Transport and EV

Conditional mitigation to improve electrification of transport, providing technical support for battery charging technologies

Renewable Energy

Conditional mitigation to explore the potential of offshore renewable power generation systems

NAMA target to further develop renewable energy sources

General Information

GDP (billions, 2020)
USD 501.79

GDP per capita (2020)
USD 7,189.04

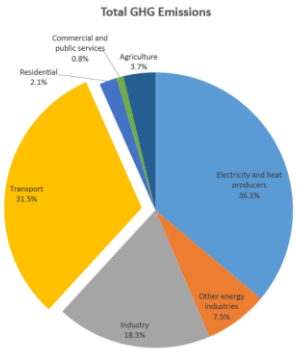
Total population (2020)
69,799,978

Population growth rate (2020)
0.25%

Urbanization rate (2020)
51.43%

Urban growth rate (2020)
1.70%

GHG Emissions (IEA)



Total emissions (2018)
241 $MtCO_2e$

Transport sector emissions (2018)
76 $MtCO_2e$ (31.5%)

Transport Sector

Total registered vehicles
40,712,050

- *Gasoline - Mostly uses*
- *Gasohol- mix of biofuel and gasoline blend*
- *Diesel 17,099,061*

Annual Growth Rate (2019-2020)
2.9%

Annual Fuel Consumption
Gasoline 11,333 megaliters

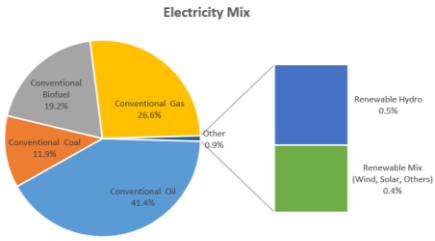
Road Condition (2019)
Total 701,847 km (58% paved)

Electric Vehicles and LCT
Total EV 192,000

Charging Facilities
527

EV Policies
Provide technical support for battery charging technologies

Energy Sector



Electricity Mix (2019)
Oil 55,359 Ktoe
Gas 35,512 Ktoe
Biofuel 25,702 Ktoe
Coal 15,833 Ktoe
Hydro 650 Ktoe
Renewable Mix (Wind, Solar, Others) 543 Ktoe

RES Target
Explore the potential of offshores renewable power generation systems

Tonga

Nationally Determined Contribution (December 2020)

Conditional reduction of GHG emissions by 13% below 2006 levels by 2030

Transportation Sector

Unconditional contribution to introduce mandatory vehicle standards and incentives through tax, fees, import tariffs

Renewable Energy

Conditional mitigation to a transition to reach 70% of renewable electricity in the total energy mix by 2030

General Information

GDP (billions, 2019)
USD 0.51

GDP per capita (2019)
USD 4,903.01

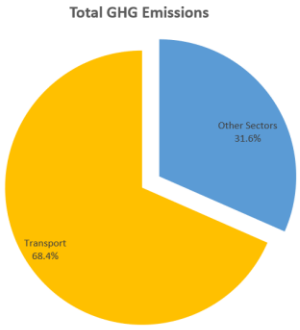
Total population (2020)
105,697

Population growth rate (2020)
1.14%

Urbanization rate (2020)
23.10%

Urban growth rate (2020)
1.11%

GHG Emissions (ClimateWatchData)



Total emissions (2018)
0.19 $MtCO_2e$

Transport sector emissions (2018)
0.13 $MtCO_2e$ (68.4%)

Transport Sector

Total registered vehicles (2012)
8,154

Annual Fuel Consumption
Gasoline 21.47 megaliters

Road Condition (2011)
Total 680 km (27% paved)

Energy Sector

RES Target
Increase the share of RE to 70% in the total energy mix by 2030

United Arab Emirates

Nationally Determined Contribution (December 2020)

Unconditional reduction of GHG emissions by 23.5% relative to BAU by 2030

Transportation Sector

- Develop clean transport infrastructure and services to support sustainable transport
- Replace conventional gasoline and diesel to CNG, with a focus on public transportation, commercial vehicles and government vehicles
- Build the 1,200km-long Etihad Rail network
- Expand the Dubai metro network

Low Carbon Transport and EV

- *Dubai Green Mobility Strategy*
  - Reach 2% of electric and hybrid cars in Dubai's road fleet by 2030
  - Reach 30% of electric and hybrid cars for Dubai government's vehicles by 2030
- Increase the number of charging stations

Renewable Energy

- Promote investment in green hydrogen power plants
- UAE's National Energy Strategy 2050
  - Increase share of clean energy (nuclear and renewables) to 50% of the installed power capacity mix
  - Reduce final energy demand by 40%
- Invest in nuclear energy with the development of the four-reactor Barakah nuclear power plant
- By 2030, reach 14 GW with solar and nuclear energy
- Promote the installation of rooftop solar photovoltaic systems in the Emirate of Dubai
- Develop a 250 MW pumped storage hydropower project in the Hatta mountains in Dubai
- Implement regulatory measures to reduce energy consumption by 40% by 2050

General Information

GDP (billions, 2019)
USD 421.14

GDP per capita (2019)
USD 43,103.34

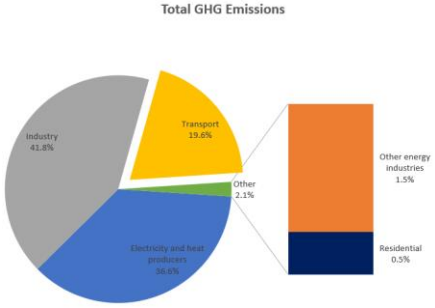
Total population (2020)
9,890,400

Population growth rate (2020)
1.22%

Urbanization rate (2020)
87.05%

Urban growth rate (2020)
1.52%

GHG Emissions (IEA)



Total emissions (2018)
194 $MtCO_2e$

Transport sector emissions (2018)
38 $MtCO_2e$ (19.6%)

Transport Sector

Total registered vehicles
1,830,000

Annual Fuel Consumption
Gasoline 11,917 megaliters

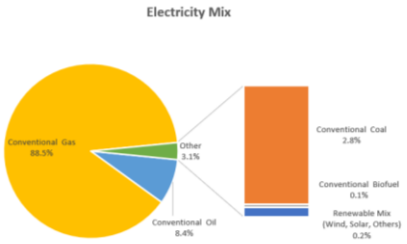
Road Condition
Total 27,000+ km (43% paved)

Electric Vehicles and LCT
Total EV 2,473 + hybrid 6,016

Charging Facilities
300

EV Policies
Increase the share of electric and hybrid vehicles
Free Salik tag and free vehicle registration

Energy Sector



Electricity Mix (2019)
Gas 59,820 Ktoe
Oil 5,663 Ktoe
Coal 1,920 Ktoe
Renewable Mix (Wind, Solar, Others) 153 Ktoe
Biofuel 44 Ktoe

RES Target
Increase the share of clean energy to 50% of the installed power capacity mix
Reduce final energy demand by 40%

United Kingdom

Nationally Determined Contribution (December 2020)

Reduction of economy wide GHG emissions by 68% below 1990 levels by 2030

Transportation Sector

Decarbonising Transport: A Better, Greener Britain

- Promote cycling and walking
- Decarbonize railways
- Accelerate maritime and aviation decarbonization
- Maximize benefits of low carbon fuels

Low Carbon Transport and EV

Decarbonising Transport: A Better, Greener Britain

- Zero emission buses and coaches
- Zero emission fleet of cars, vans, motorcycles, and scooters
- Zero emission freight and logistics sector
- Hydrogen's role in a decarbonized transport system

Renewable Energy

The first ***Welsh National Marine Plan*** was published by the Welsh Government in November 2019. This Plan delivers the strategic structure to enable renewable energy generation at sea

- Generate 70% of electricity from RE by 2030

General Information

GDP (billions, 2020)
USD 2,707.74

GDP per capita (2020)
USD 40,284.64

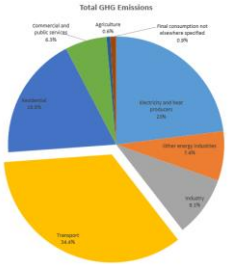
Total population (2020)
67,215,293

Population growth rate (2020)
0.57%

Urbanization rate (2020)
83.90%

Urban growth rate (2020)
0.87%

GHG Emissions (IEA)



Total emissions (2018)
352 $MtCO_2e$

Transport sector emissions (2018)
121 $MtCO_2e$ (34.4%)

Transport Sector

Total registered vehicles
40,386,429

- *Gasoline 23,706,834*
- *Diesel 15,750,707*

Annual growth rate (2019-2020)
1%

Annual Fuel Consumption
Gasoline 12,900 megaliters

Road Condition (2019)
Total 423,439 km (100% paved)

Electric Vehicles and LCT
Total EV 888,501 (2.2%)

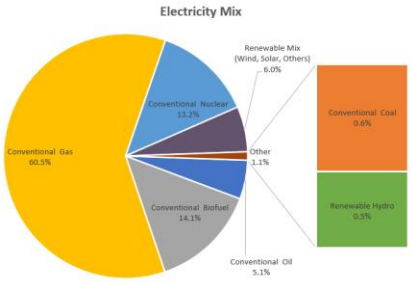
- Bus 412

Charging Facilities
35,000

EV Policies
Incentivize the transition to zero emission transport modes

Direct Subsidies
Grants for purchasing low-emission cars, motorcycles, mopeds, small and large vans.

Energy Sector



Electricity Mix (2019)
Gas 67,308 Ktoe
Biofuel 15,670 Ktoe
Nuclear 14,639 Ktoe
Renewable Mix (Wind, Solar, Others) 6,660 Ktoe
Oil 5,716 Ktoe
Coal 716 Ktoe
Hydro 512 Ktoe

RES Target
Generate 70% of electricity from RE sources by 2030

Uganda

Nationally Determined Contribution (October 2021)

Reduction of GHG emissions by 22% compared to BAU by 2030

NDC submitted in 2016 projected 2030 emissions would be 77.3MtCO_2e, under this update they are projected to almost double

Transportation Sector

Conditional mitigation targets

- Update transport regulations and implement measure for compliance with mitigation targets
- Implementation of policies and regulations to promote cleaner fuels, and fuel efficiency vehicle technology to comply with "Fuel Efficiency Initiative National Appropriate Mitigation Action" which has a reduction potential of 24 – 34% compared to BAU projections by 2030

Renewable Energy

Conditional mitigation targets

- Achieve a total of 3,200 MW of renewable electricity generation capacity by 2030
- Develop sustainable energy solutions for public buildings such as hospitals and schools in off-grid areas
- Promote the use of energy efficient cooking stoves or induction cookers
- Promote the use of solar energy systems
- Enforce building regulations for energy efficient construction and renovation

General Information

GDP (billions, 2020)
USD 37.37

GDP per capita (2020)
USD 817.04

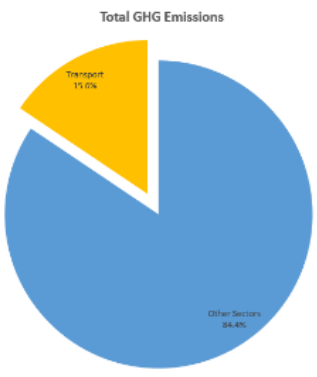
Total population (2020)
45,741,000

Population growth rate (2020)
3.27%

Urbanization rate (2020)
24.95%

Urban growth rate (2020)
5.67%

GHG Emissions (ClimateWatchData)



Total emissions (2018)
21.95 MtCO_2e

Transport sector emissions (2018)
3.42 MtCO_2e (15.6%)

Transport Sector

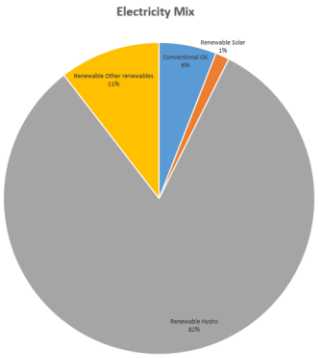
Total registered vehicles
2,302,021

Annual Growth rate (2018-2019)
11%

Annual Fuel Consumption
Gasoline 842megaliters

Road Condition (2017)
Total 20,544 km (21% paved)

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Hydro 343.94 Ktoe (4 TWh)
Other renewables 43.85 Ktoe (0.51 TWh)
Oil 24.94 Ktoe (0.29 TWh)
Solar 6.02 Ktoe (0.07 TWh)

RES Target
Achieve 3,200 MW of renewable electricity generation by 2030

Uzbekistan

Nationally Determined Contribution (November 2018)

Conditional reduction of GHG emissions per unit of GDP by 10% below 2010 levels by 2030

Transportation Sector

- Extension of transport and logistics communication systems, ensuring efficient energy resources use, including optimization of transportation routes, improvement of road motor road quality, etc.
- Expansion of measures on motor vehicles change over to run on alternative fuel

Renewable Energy

Production of solar energy has become pivotal in reaching their goals of substantially increasing Uzbekistan's reliance on renewable energy sources.

Solar water heaters for hot water supply have been used for more than 10 years. Moreover, a project to develop solar photovoltaic power plants of 100MW each has been initiated, with a goal to reach a solar energy share of 6% of the total energy balance by 2030.

General Information

GDP (billions, 2020)
USD 57.71

GDP per capita (2020)
USD 1,685.76

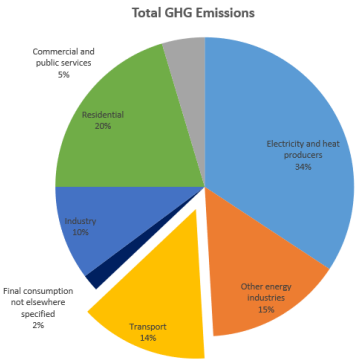
Total population (2020)
34,232,050

Population growth rate (2020)
1.92%

Urbanization rate (2020)
50.42%

Urban growth rate (2020)
1.89%

GHG Emissions (IEA)



Total emissions (2018)
108 $MtCO_2e$

Transport sector emissions (2018)
15 $MtCO_2e$ (13.9%)

Transport Sector

Total registered vehicles
2,787,140

Annual Growth Rate (2019-2020)
1.5%

Annual Fuel Consumption
Gasoline 1,450 megaliters

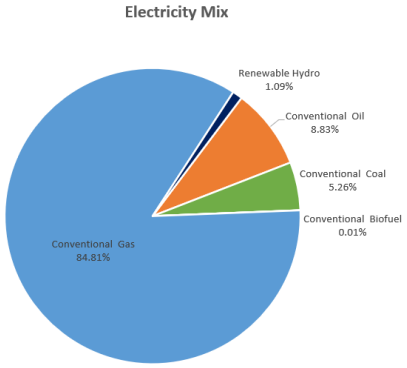
Road Condition (2020)
Total 185,000 km (95% paved)

Electric Vehicles and LCT
Total EV >1000 (Based on import numbers)

Charging Facilities
2

EV Policies
Imports of electric cars, buses, trucks and motorcycles is carried out at zero customs duty and zero excise tax.

Energy Sector



Electricity Mix (2019)
Gas 39,374 Ktoe
Oil 4,100 Ktoe
Coal 2,442 Ktoe
Hydro 507 Ktoe
Biofuel 4 Ktoe

Vanuatu

Nationally Determined Contribution (March 2021)

Conditional reduction of GHG emissions by 30% in the energy sector and 100% in the electricity sub-sector compared to BAU scenario by 2030

Transportation Sector

By 2030

- 10% improvement of energy efficiency in land and marine transport
- 20% biodiesel (biofuel) blending in Diesel
- Milage and Emission Standards for Vehicles

Low Carbon Transport and EV

By 2030

- Introduce electric vehicles (e-buses) for public transportation (10% of total public buses)
- Introduce electric cars (e-cars) in Vanuatu (10% of government fleet)
- Introduce 1,000 electric two wheelers (e-bikes) and three wheelers (e-rickshaw)

Renewable Energy

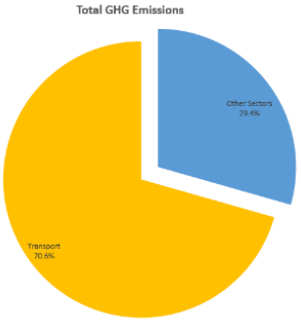
By 2030, reach close to 100% in renewable energy in the electricity generation sector through

- Renewable Energy Capacity Addition
- Replacement of fossil fuels with coconut oil-based electricity generation NDC

General Information

GDP (billions, 2020)
USD 0.85
GDP per capita (2020)
USD 2,782.98
Total population (2020)
307,150
Population growth rate (2020)
2.39%
Urbanization rate (2020)
25.53%
Urban growth rate (2020)
2.91%

GHG Emission (ClimateWatchData)

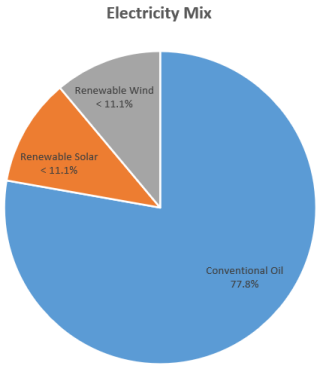


Total emissions (2018)
0.17 $MtCO_2e$
Transport sector emissions (2018)
0.12 $MtCO_2e$ (70.6%)

Transport Sector

Total registered vehicles
>11,500
Annual Growth rate (2018-2019)
0.24%
Annual Fuel Consumption
Gasoline 10.45 megaliters
Road Condition (2017)
Total 2,036 km (5% paved) (2014)
EV Policies
Introduce electric vehicles, including e-buses, passenger vehicles, e-bikes

Energy Sector



Electricity Mix (OurWorldinData, 2019)
Oil 6.02 Ktoe (0.07 TWh)
Solar <0.86 Ktoe (<0.01 TWh)
Wind <0.86 Ktoe (<0.01 TWh)
RES Target
Increase the share of RE in the electricity generation to 100% by 2030

Vietnam

Nationally Determined Contribution (September 2020)

Unconditional reduction of GHG emissions by 9% compared to BAU projections by 2030

Conditional reduction of GHG emissions by 27% compared to BAU projections by 2030

Transportation Sector

- Improve energy efficiency of vehicles
- Change freight transportation models
- Restructure the transportation market
- Shift from private to public means of transport
- Shift from conventional fuels to biofuel, natural gas, and electricity

Renewable Energy

- Develop efficient utilization of renewable energy sources and increase their proportion in energy production and consumption

General Information

GDP (billions, 2020)
USD 271.16

GDP per capita (2020)
USD 2,785.72

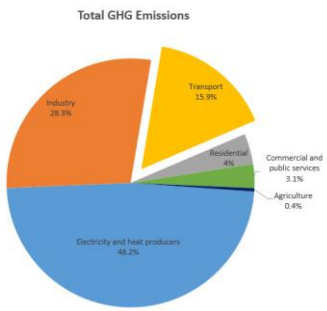
Total population (2020)
97,338,583

Population growth rate (2020)
0.90%

Urbanization rate (2020)
37.34%

Urban growth rate (2020)
2.83%

GHG Emissions (IEA)



Total emissions (2018)
226 $MtCO_2e$

Transport sector emissions (2018)
36 $MtCO_2e$ (15.9%)

Transport Sector

Total registered vehicles
62,900,000

Annual Growth Rate (2018-2019)
6.87%

Annual Fuel Consumption
Gasoline 8,626 megaliters

Road Condition (2019)
Total 594,898 km (80% paved)

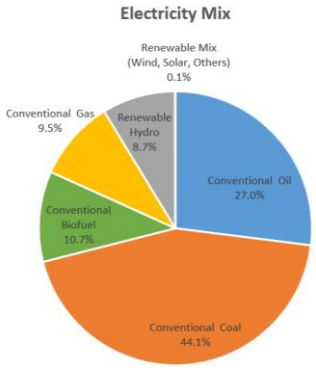
Electric Vehicles and LCT
Total EV 1,000,000+ (0.02%)

- 2-wheel 1,000,000

Charging Facilities
<200

EV Policies
10 – 20 % of Special Tax is due for EVs

Energy Sector



Electricity Mix (2019)
Coal 36,740 Ktoe
Oil 22,499 Ktoe
Biofuel 8,911 Ktoe
Gas 7,941 Ktoe
Hydro 7,233 Ktoe
Renewable Mix (Wind, Solar, Others) 45 Ktoe

RES Target
Increase share of renewable energy sources in both consumption and production

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